FCC PART 15, SUBPART C
ISEDC RSS-247, ISSUE 2, FEBRUARY 2017
LP0002-2020

TEST REPORT

For

Ruckus Wireless, Inc.

350 West Java Dr.
Sunnyvale, CA 94089, USA

FCC ID: S9GH350
IC: 5912A-H350

Report Type:	**Model:**
Original Report	Indoor Access Point

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ACCREDITED
CERTIFICATE #3297.02

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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" (Rev.2)

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2105132-06	Original Report	2021-06-25

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report was prepared on behalf of *Ruckus Wireless, Inc.*, and their product model: *H350, FCC ID: S9GH350, IC: 5192A-H350*, or the "EUT" as referred to in this report. The EUT is an Access Point with 2.4GHz/5GHz Wi-Fi, BLE and ZigBee capabilities. This device is an update from model H550 (Report Numbers: R2007201-01 Rev. B and R2007201-03 Rev. B) to H350. Please refer to the manufacturer declaration of similarity letter in Annex D of this report.

EUT SW versions: "116.0.0.0.16215502" (2.4 GHz Wi-Fi), "116.0.0.0.1506" (BLE)

EUT Receive date: 2021-05-13

Brand/Manufacturer: Ruckus Wireless, Inc.

1.2 Mechanical Description of EUT

The EUT measures approximately 21cm (L) x 10cm (W) x 1.2cm (H) and weighs approximately 0.45 kg. S/N: 502006000016 (2.4 GHz Wi-Fi), and 502006000035 (BLE) assigned by Client.

1.3 Objective

This report was prepared on behalf of *Ruckus Wireless, Inc.*, in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules, ISEDC RSS-247 Issue 2, February 2017 and LP0002-2020.

The objective was to determine compliance with FCC Part 15.247, ISEDC RSS-247 and LP0002-2020 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, Power Spectral Density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Radiated Spurious Emissions.

Due to the similarities between H350 and H550, test results for H550 (report numbers: R2007201-01 Rev. B and R2007201-03 Rev. B) were leveraged. H350 (EUT) was verified to show continuous compliance. Verification results were shown in this report.

1.4 Related Submittal(s)/Grant(s)

Equipment Class: NII, FCC ID: S9GH350, IC: 5912A-H350

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, FCC KDB 558074 D01 DTS Meas Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 and LP0002-2020.

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: (Innovation, Science and Economic development Canada - ISEDC) 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/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- 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 Media Development Authority - IMDA) 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;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- 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 v05r02.

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

2.2 EUT Exercise Software

The test software used was QSPR. The software is compliant with the standard requirements being tested against.

Modulation	Channel Frequency (MHz)	Tested Frequency (MHz)	Power Setting
802.11b	2412-2462	2412	18
		2437	20
		2462	19
8002.11g		2412	18
		2437	20
		2462	17
802.11n20		2412	18
		2437	20
		2462	17
8002.11n40	2422-2452	2422	16
		2437	20
		2452	16
802.11ax20	2412-2462	2412	17
		2437	20
		2462	17
802.11ax40	2422-2452	2422	16
		2437	20
		2452	16

Data Rates Tested:
802.11b mode: 1Mbps
802.11g mode: 6Mbps
802.11n HT20 mode: MCS0
802.11n HE20 mode: MCS0
802.11n HT40 mode: MCS0
802.11n HE40 mode: MCS0

Modulation	Channel Frequency (MHz)	Tested Frequency (MHz)	Power Setting
BLE (GFSK)	2402-2480	2402	200
		2440	200
		2480	200

2.3 Equipment Modifications

N/A

2.4 Local Support Equipment

Manufacturer/Brand	Description	Model	Serial Number
Dell	Laptop	Latitude E6410	3CKRAQ1

2.5 Remote Support Equipment

Manufacturer/Brand	Description	Model	Serial Number
Dell	Laptop	Latitude E5440	-

2.6 Power Supply/Adapter

Manufacturer/Brand	Description	Model
Ruckus Wireless, Inc.	PoE Injector	740-64214-001

2.7 Interface **Ports and Cabling**

Description	Length (m)	To	From
Ethernet Cable	2	EUT	PoE Injector
Ethernet Cable	2	Laptop	EUT

3 Summary of Test Results

Results reported relate only to the product tested.

FCC, ISEDC, and LP0002-2020 Rules	Description of Test	Results
FCC §15.203 ISEDC RSS-Gen §6.8 LP0002-2020 §3.2	Antenna Requirement	Compliant[1]
FCC §15.207 ISEDC RSS-Gen §8.8 LP0002-2020 §3.3	AC Line Conducted Emissions	Compliant[1]
FCC §2.1091, §15.247(i) ISEDC RSS-102 LP0002-2020 §6.20.2	RF Exposure	Compliant
FCC §2.1051, §15.247 (d) ISEDC RSS-247 §5.5 LP0002-2020 §4.10.1.5	Spurious Emissions at Antenna Port	Compliant[1]
FCC §2.1053, §15.205, §15.209, §15.247 (d) ISEDC RSS-247 §5.5 ISEDC RSS-Gen §8.9 and §8.10 LP0002-2020 §3.5, §3.6, §3.7, §3.9	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) ISEDC RSS-247 §5.2(a) LP0002-2020 §3.5, §3.6, §3.7	6 dB and 99% Emission Bandwidth	Compliant[1]
FCC §15.247(b)(3) ISEDC RSS-247 §5.4(d) LP0002-2020 §4.10.1.2	Maximum Peak Output Power	Compliant[1]
FCC §15.247(d) ISEDC RSS-247 §5.5 LP0002-2020 §4.10.1.5	100 kHz Bandwidth of Frequency Band Edge	Compliant[1]
FCC §15.247(e) ISEDC RSS-247 §5.2(b) LP0002-2020 §4.10.1.6(2)(B)	Power Spectral Density	Compliant[1]

Note[1]: compliance was based on test data from the similar model, which were reported in Report Numbers: R2007201-01 and R2007201-03 issued by BACL on 01/27/2021

4 FCC §2.1091, §15.247(i) & ISEDC RSS-102 – RF Exposure

4.1 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.

According to KDB 447 498 Section (7.2), "simultaneous transmission of MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum *test separation distance* required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency.

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

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

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF field.

According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

4.2 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

Note: According to MIMOFCC KDB 662911 D02 MIMO with Cross Polarized Antenna v01, Where an FCC rule specifies limits in radiated terms such as EIRP or ERP, the limits apply to the maximum emission that would be observed by a linearly polarized measurement antenna. Therefore, the highest output power from single antenna power was selected to calculate in this section.

4.3 MPE Results

Radio Standalone RF Exposure Configuration

2.4 GHz Wi-Fi: 802.11n40, Mid Channel 2437 MHz

Maximum output power at antenna input terminal (dBm):	21.18
Maximum output power at antenna input terminal (mW):	131.22
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	0
Maximum Antenna Gain (numeric):	1
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.026
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

5 GHz Wi-Fi: 802.11ac80, Mid Channel 5610 MHz

Maximum output power at antenna input terminal (dBm):	20.90
Maximum output power at antenna input terminal (mW):	123.03
Prediction distance (cm):	20
Prediction frequency (MHz):	5610
Maximum Antenna Gain, typical (dBi):	1
Maximum Antenna Gain (numeric):	1.26
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.031
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

BLE: High Channel 2480 MHz

Maximum output power at antenna input terminal (dBm):	18.626
Maximum output power at antenna input terminal (mW):	72.88
Prediction distance (cm):	20
Prediction frequency (MHz):	2480
Maximum Antenna Gain, typical (dBi):	0
Maximum Antenna Gain (numeric):	1
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0145
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

ZigBee: High Channel 2475 MHz

Maximum output power at antenna input terminal (dBm):	19.74
Maximum output power at antenna input terminal (mW):	94.19
Prediction distance (cm):	20
Prediction frequency (MHz):	2475
Maximum Antenna Gain, typical (dBi):	0
Maximum Antenna Gain (numeric):	1
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0187
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 at 20 cm distance.

Radio Co-location RF Exposure Configuration

Radio	Standalone MPE (mW/cm^2)	Standalone MPE Limit (mW/cm^2)	Ratio (%)	Total Ratio for Radio Co-location Configuration (%)	Radio Co-location Limit (%)
2.4 GHz Wi-Fi	0.026	1	2.6	9.02	100
5 GHz Wi-Fi	0.031	1	3.1		
BLE	0.0145	1	1.45		
ZigBee	0.0187	1	1.87		

4.4 RF exposure evaluation exemption for IC

2.4 GHz Wi-Fi: 802.11n40, Mid Channel 2437 MHz

Maximum EIRP power = 21.18 dBm + 0 dBi = 21.18 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 2.70 W = 34.31 dBm

5 GHz Wi-Fi: 802.11ac80, Mid Channel 5610 MHz

Maximum EIRP power = 20.90dBm + 1 dBi = 21.90 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 4.88 W = 36.88 dBm

BLE: High Channel 2480 MHz

Maximum EIRP power = 18.626 dBm + 0 dBi = 18.626 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 2.74 W = 34.4 dBm

Zigbee: Low Channel 2405 MHz

Maximum EIRP power = 19.74 dBm + 0 dBi = 19.74 dBm, which is less than $1.31\times10^{-2}f^{0.6834}$ = 2.68 W = 34.3 dBm

Therefore, the RF exposure Evaluation is not required.

Note:
The 2.4 GHz Wi-Fi output power was referenced from report number: R2007201-01 issued by BACL on 01-27-2021.
The 5 GHz Wi-Fi output power was referenced from report number: R2007201-02 issued by BACL on 02-09-2021.
The BLE output power was referenced from report number R2007201-03 issued by BACL on 01-27-2021.

5 FCC §15.209, §15.247(d), ISEDC RSS-247 §5.5, RSS-Gen §8.9, §8.10 & LP0002-2020 §3.5, §3.6, §3.7, & §3.9 - Spurious Radiated Emissions

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

As per ISEDC RSS-Gen 8.9,

> Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (µv/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for license-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

As per ISEDC RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

As Per LP0002-2018 §3.5: Additional regulations shall apply except for this standard. The fundamental frequency of any low-power radio-frequency devices shall be restricted in any of the operation bands listed below; spurious emissions shall be permitted in any of frequency band listed below and shall meet the field strength requirement of 3.6:

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)
0.090 ~ 0.110	322.00 ~ 335.40	3500.0 ~ 4400.0
0.490 ~ 0.510	399.90 ~ 410.00	4500.0 ~ 5250.0
2.172 ~ 2.198	485.00 ~ 510.00	5350.0 ~ 5460.0
3.013 ~ 3.033	608.00 ~ 614.00	7250.0 ~ 7750.0
4.115 ~ 4.198	703.00 ~ 748.00	8025.0 ~ 8500.0
5.670 ~ 5.690	758.00 ~ 803.00	9000.0 ~ 9200.0
6.200 ~ 6.300	825.00 ~ 915.00	9300.0 ~ 9500.0
8.230 ~ 8.400	930.00 ~ 1240.0	10600 ~ 12700
12.265 ~ 12.600	1300.0 ~ 1427.0	13250 ~ 13400
13.340 ~ 13.430	1435.0 ~ 1626.5	14470 ~ 14500
14.965 ~ 15.020	1660.0 ~ 1785.0	15350 ~ 16200

16.700 ~ 16.755	1805.0 ~ 1880.0	17700 ~ 21400
19.965 ~ 20.020	1885.0 ~ 1900.0	22010 ~ 23120
25.500 ~ 25.700	1905.0 ~ 1985.0	23600 ~ 24000
37.475 ~ 38.275	2010.0 ~ 2025.0	31200 ~ 31800
73.500 ~ 75.400	2110.0 ~ 2170.0	36430 ~ 36500
108.00 ~ 138.00	2200.0 ~ 2300.0	38600 +
149.90 ~ 150.05	2310.0 ~ 2390.0	
156.70 ~ 156.90	2483.5 ~ 2900.0	
162.01 ~ 167.17	3260.0 ~ 3267.0	
167.72 ~ 173.20	3332.0 ~ 3339.0	
240.00 ~ 285.00	3345.8 ~ 3358.0	)

As Per LP0002-2018 §3.6: Additional regulations shall applyexcept for this standard, the emissions from the low-power radio-frequency devices shall be less than or equal the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission.

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 ≤ f ≤ 0.490	2400/Freq.(kHz)	300
0.490 < f ≤ 1.705	24000/Freq.(kHz)	30
1.705 < f ≤ 30.0	30	30
30 ≤ f ≤ 88	100	3
88 < f ≤ 216	150	3
216 < f ≤ 960	200	3
960 < f	500	3

As Per LP0002-2018 §3.7: The field strength radio frequency 9-90 kHz, 110-490 kHz and 1000 MHz above stipulated in the above table shall be measured according to an average detector and comply with Section 6.15.2, while others shall be measured using a CISPR quasi-peak detector. Those not specified above shall comply with Section 6.5 and the frequency bands measurement of radiated emission shall accord with Section 6.14.

As Per LP0002-2018 §3.9: If the transmitter and receiver of the low-power radio-frequency device are sold in one set, the corresponding type approval review documents shall be submitted; otherwise the transmitter and receiver should be applied for approval together. The receiver radiated field strength must not exceed the emission specified in Section 3.6 and the receiver shall not receive, demodulate frequency listed in Section 3.5.

5.2 Test Setup

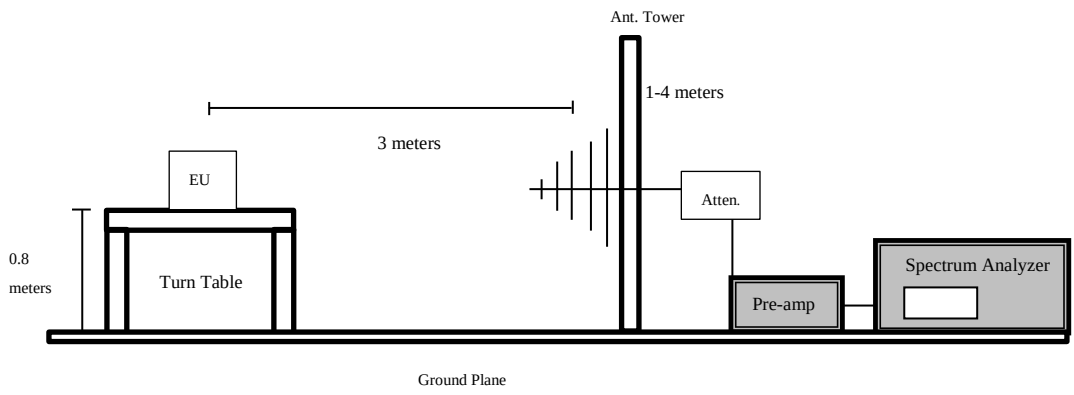
The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart C, ISEDC RSS-247 & LP0002-2020 limits.

The spacing between the peripherals was 10 centimeters.

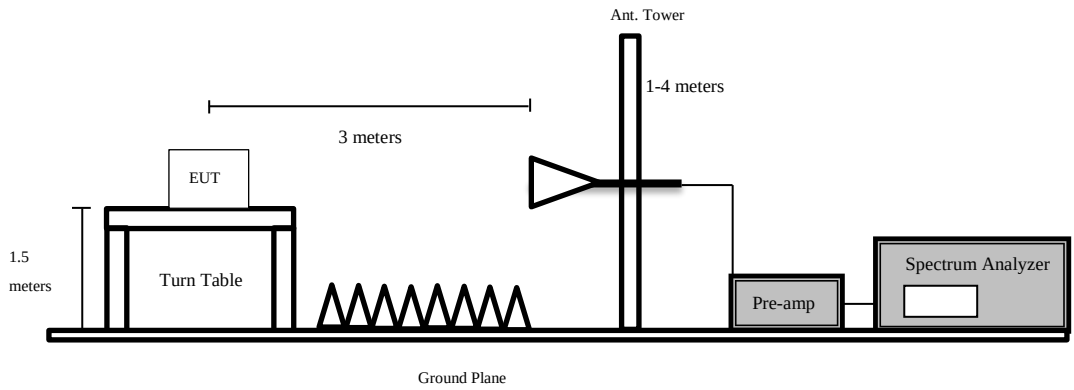
External I/O cables were draped along the edge of the test table and bundle when necessary.

5.3 Test Setup Block Diagram

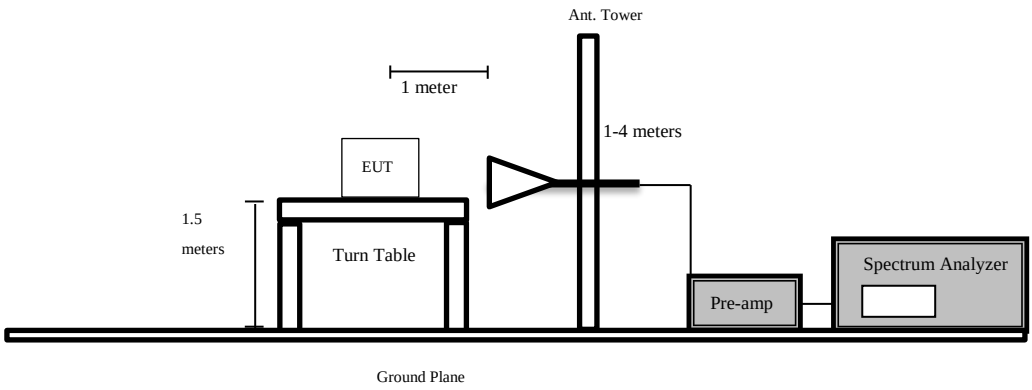
Test Setup for Below 1 GHz at 3 meters



Test Setup for Above 1 GHz at 3 meters



Test Setup for Above 1 GHz at 1 meter



5.4 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 or 1/T / Sweep = Auto

5.5 Corrected Amplitude and Margin Calculation

For emissions below 1 GHz,
The Corrected Amplitude (CA) is calculated by adding the Correction Factor to the S.A. Reading. The basic equation is as follows:

CA = S.A. Reading + Correction Factor

For example, a corrected amplitude of 40.3 dBuV/m = S.A. Reading (32.5 dBuV) + Correction Factor (7.8 dB/m)

The Correction Factor is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) together. This calculation is done in the measurement software, and reported in the test result section. The basic equation is as follows:

Correction Factor = AF + CL + Atten – Ga

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

For emission above 1 GHz,
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/m) + 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

5.6 Test Equipment List and Details

Manufacturer/ Brand	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2020-10-26	2 years
Rohde & Schwarz	Signal Analyzer	FSV40	1321.3008K39-101203-UW	2021-04-26	1 year
Agilent	Spectrum Analyzer	E4446A	US44300386	2021-02-12	1 year
Sunol Science Corp	System Controller	SC110V	122303-1	N/R	N/A
HP	Pre-Amplifier	8447D	2944A07030	2020-08-17	1 year
HP	Pre-Amplifier	8449B	3147A00400	2021-05-05	1 year
AH Systems	Pre-Amplifier	PAM 1840 VH	170	2020-11-19	1 year
Wisewave	Horn Antenna	ARH-4223-02	10555-02	2020-02-05	2 years
ETS Lindgren	Horn Antenna	3117	00218973	2019-02-13	2.5 years
Sunol Sciences	Biconilog Antenna	JB3	A020106-2	2019-11-20	2 years
-	RF cable	-	-	Each time[1]	N/A
-	Notch Filter	-	-	Each time[1]	N/A
Insulated Wire Corp.	157 Series 2.92 SM (x2) Armored 33 ft. Cable	KPS-1571AN-3960-KPS	DC 1917	2021-03-03	1 year
MDP Digital	Times Microwave LMR 400 UltraFex Coaxial Cable 35\'	LMR400UF	BACL1904161	2020-05-20	18 months
IW Microwave	157 Series Cable Armored with 2.92mm Male Plugs	KPS-1571AN-2400	DC 1922	2020-06-06	18 months
BACL	5m3 Sensitivity Box	1	2	2020-10-27	1 year

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 the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

5.7 Test Environmental Conditions

Temperature:	20-22 ºC
Relative Humidity:	42-50 %
ATM Pressure:	102.7 kPa

The testing was performed by Rita Yang from 2021-05-28 to 2021-06-15 in 5m chamber 3.

5.8 Summary of Test Results

According to the data hereinafter, the EUT complied with FCC Title 47, Part 15C, ISEDC RSS-247 and LP0002-2020 §4.10 standard's radiated emissions limits, and had the worst margin of:

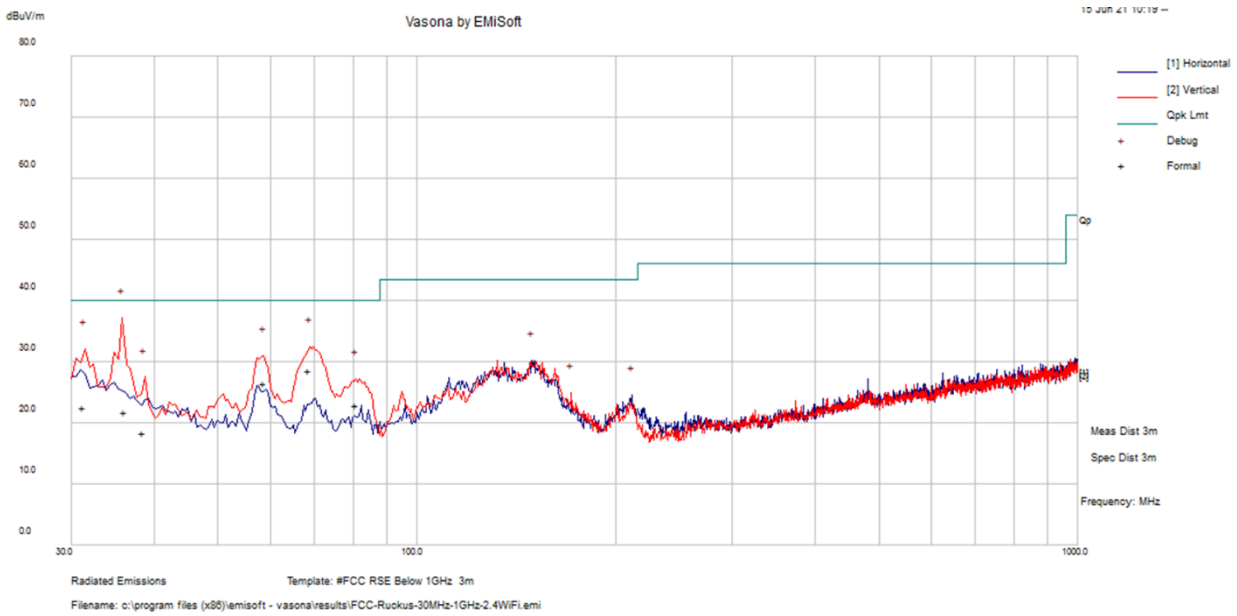
2.4 GHz Wi-Fi and BLE

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, channel**
-2.64	16576.35	Horizontal	2.4GHz Wi-Fi (n40 mode, 2480MHz)
-3.01	17137.75	Horizontal	BLE (2480MHz)

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

5.9 Radiated Emissions Test Results

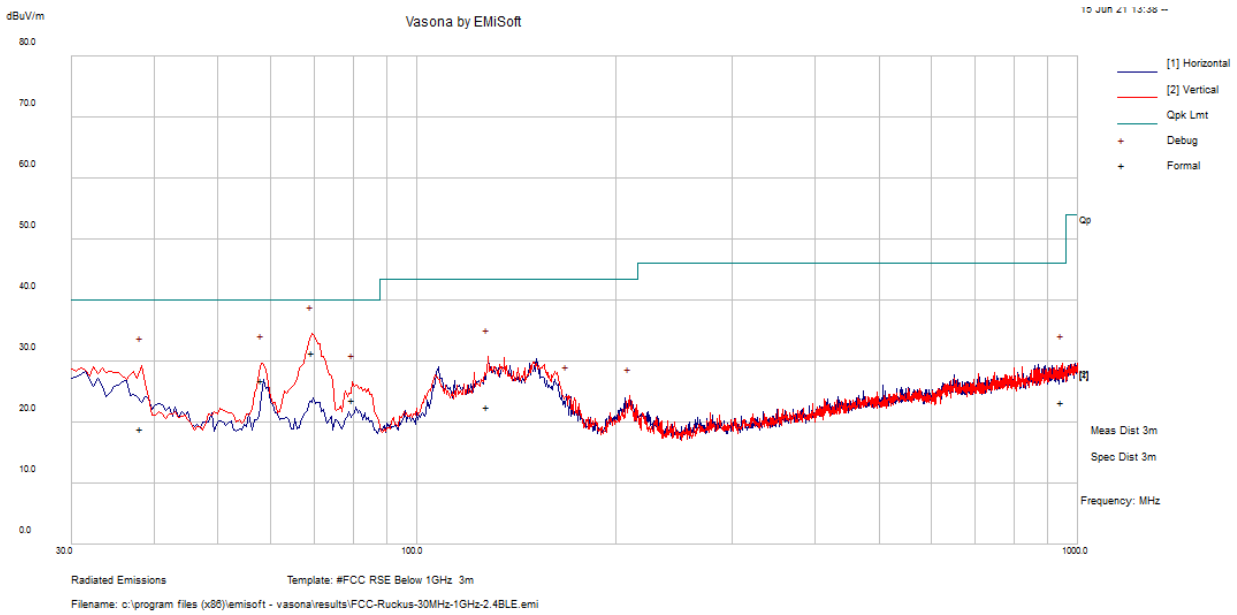
1) 30 MHz – 1 GHz Worst Case, 2.437 GHz Wi-Fi n40 mode Measured at 3 meters



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
36.08175	23.94	-2.17	21.76	202	V	271	40	-18.24	QP
68.6095	38.82	-10.35	28.47	156	V	83	40	-11.53	QP
31.252	21.07	1.53	22.59	225	H	287	40	-17.41	QP
58.61525	37.72	-11.2	26.51	269	V	306	40	-13.49	QP
38.5665	22.42	-4.11	18.32	198	V	52	40	-21.68	QP

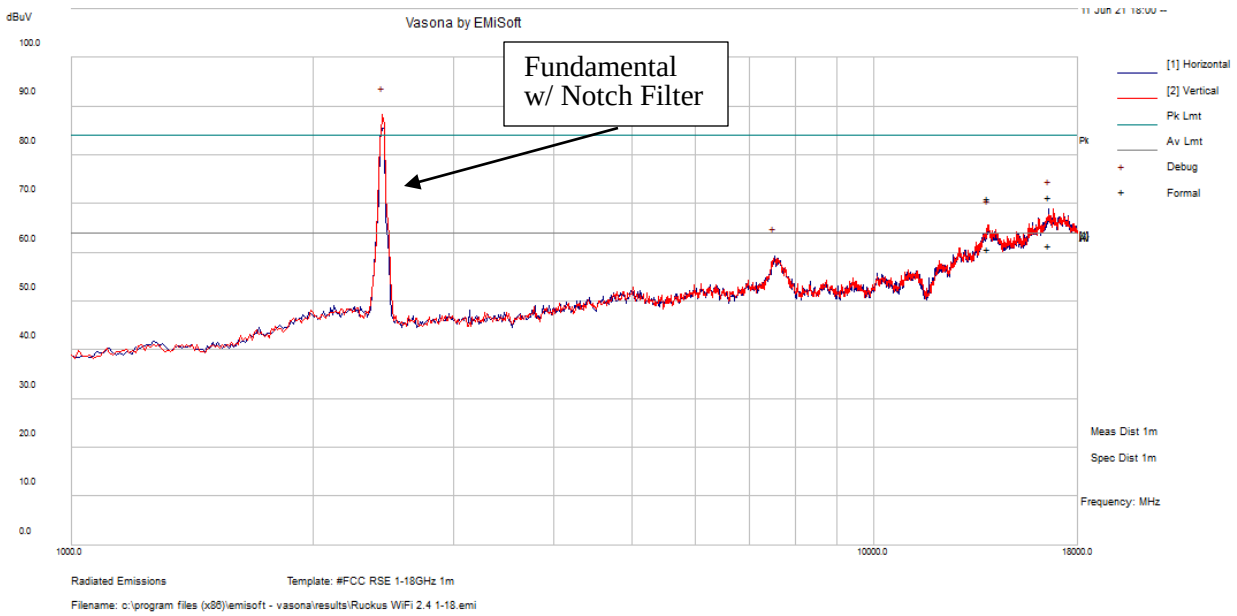
Note: Only 5 highest emissions were recorded due to other emissions being more than 20 dB below the limit.

2) 30 MHz – 1 GHz Worst Case, BLE 2.480GHz Measured at 3 meters



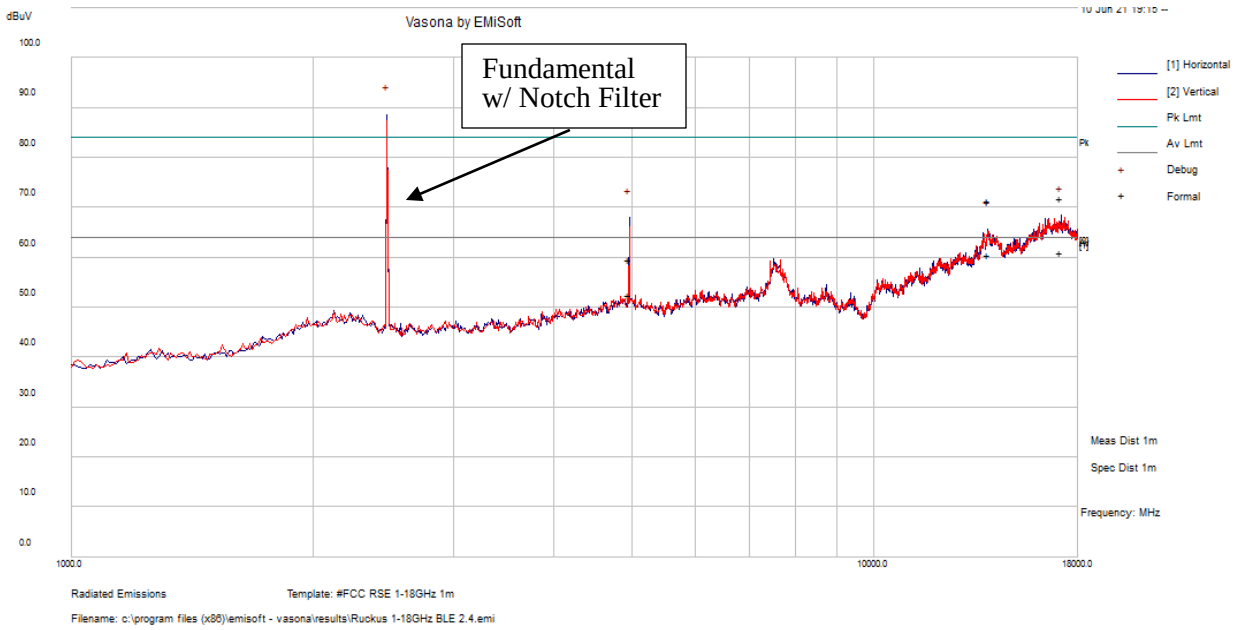
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
69.3705	41.76	-10.31	31.45	189	V	81	40	-8.55	QP
58.26425	38.15	-11.24	26.91	159	V	18	40	-13.09	QP
38.242	22.67	-3.81	18.86	137	V	136	40	-21.14	QP
127.6905	26.72	-4.19	22.53	272	H	303	43.5	-20.97	QP
79.99925	34.42	-10.86	23.56	185	V	40	40	-16.44	QP
946.1978	17.69	5.59	23.28	295	H	309	46	-22.72	QP

3) 1-18GHz 2.437GHz Wi-Fi n40 mode Measured at 1 meter



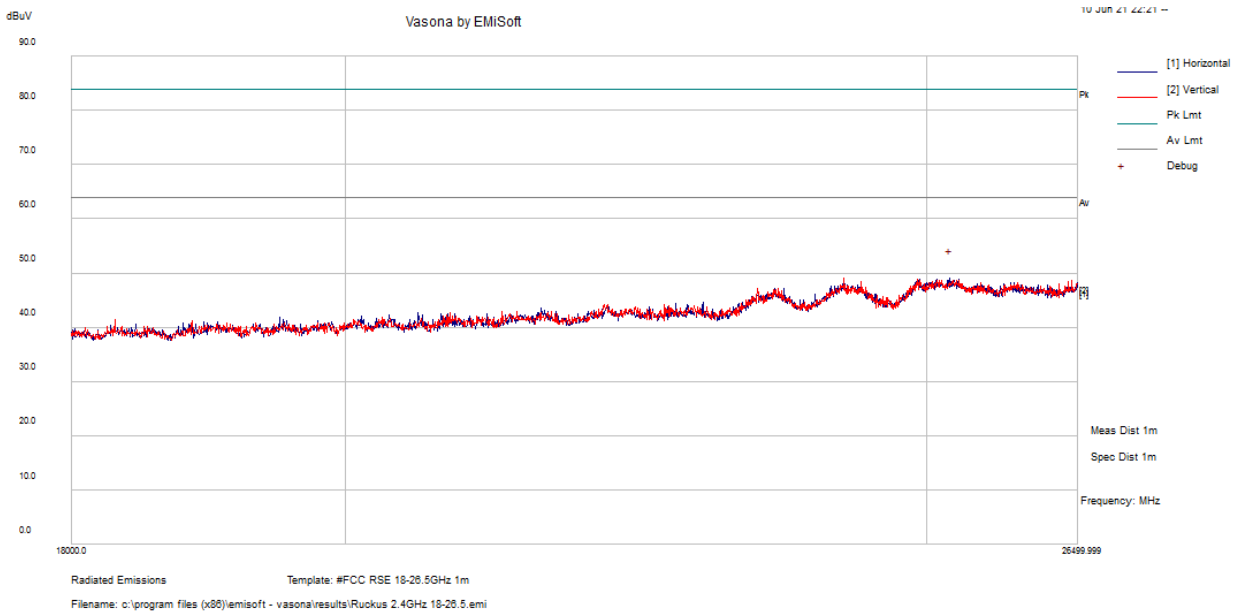
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
16576.35	40.37	30.93	71.29	265	H	97	84	-12.71	Peak
13914.12	41.67	29.45	71.12	296	V	85	84	-12.88	Peak
16576.35	30.44	30.93	61.36	265	H	97	64	-2.64	Ave
13914.12	31.38	29.45	60.83	296	V	85	64	-3.17	Ave

4) 1-18 GHz BLE 2.480GHz Measured at 1 meter

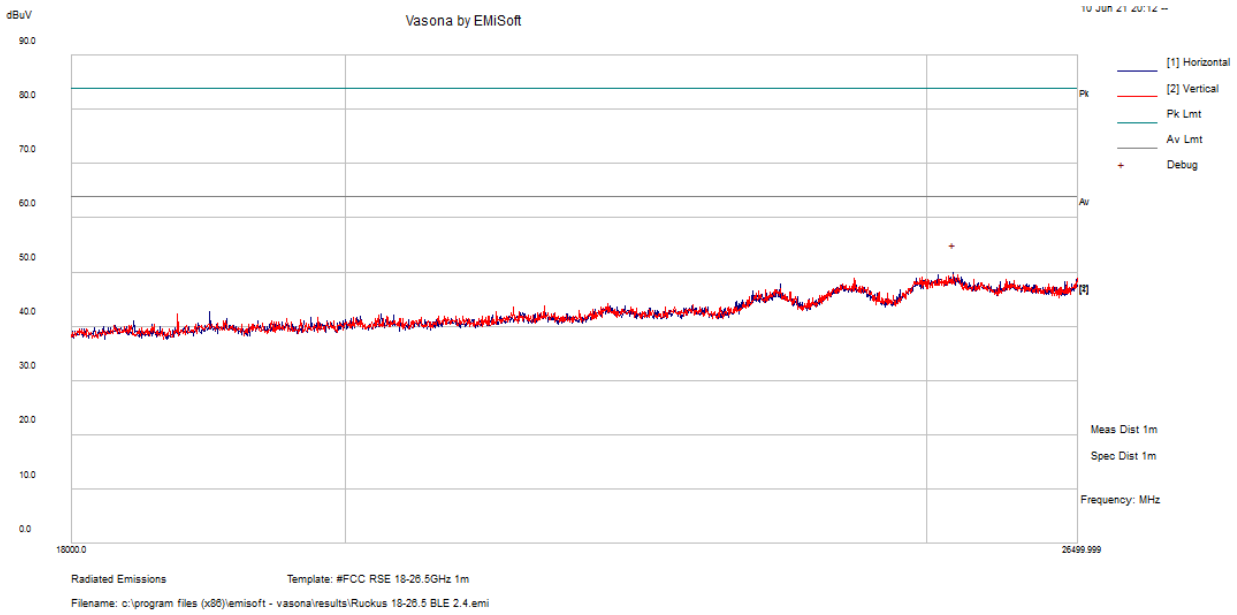


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
17137.75	42.11	29.74	71.84	246	H	27	84	-12.16	Peak
4961.128	48.42	11.04	59.46	274	H	333	84	-24.54	Peak
13911.08	41.81	29.53	71.34	106	H	340	84	-12.66	Peak
17137.75	31.26	29.74	60.99	246	H	27	64	-3.01	Ave
4961.128	41.38	11.04	52.42	274	H	333	64	-11.58	Ave
13911.08	31.02	29.53	60.54	106	H	340	64	-3.46	Ave

5) 18-26.5 GHz 2.437GHz Wi-Fi n40 Measured at 1 meter



6) 18-26.5 GHz BLE 2.480GHz Measured at 1 meter



5.10 Rx Radiated Emissions Test Results

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	LP0002-2020		Note
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Receiver											
1500	49.29	45	150	H	28	4.136	37.589	43.837	54	-10.163	Peak
1500	49.35	285	150	V	28	4.136	37.589	43.897	54	-10.103	Peak
528	31.2	0	150	H	27.5	1.98	30.194	30.486	46	-15.514	Peak
528	40.26	115	150	V	27.5	1.98	30.194	39.546	46	-6.454	Peak

Note: the peak measurements were recorded and compared with QP (below 1 GHz) and Average (above 1 GHz) limits.

6 Annex A (Normative) – EUT Test Setup Photographs

Please refer to the attachment.

7 Annex B (Normative) – EUT External Photographs

Please refer to the attachment.

8 Annex C (Normative) – EUT Internal Photographs

Please refer to the attachment.

9 Annex D (Informative) – Manufacturer Declaration of Similarity

COMMSCOPE®
RUCKUS WIRELESS™

Business Unit - Ruckus Wireless Inc.
350 W. Java Dr.
Sunnyvale CA 94089 USA
T: +1 650 265 4200
F: +1 408 738 2065
www.commscope.com

DECLARATION OF SIMILARITY

To: May 14, 2021

Bay Area Compliance Laboratories Corp.
1274 Anvilwood Ave. Sunnyvale, CA 94089
Phone: 408-732-9162, Fax: 408-732-9164
http://www.baclcorp.com

Dear Sir or Madam:

Ruckus Wireless Inc., hereby declare that product: *Indoor Access Points,* model(s): *H550 and H350* are electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics as model: *H550* tested by BACL, the results of which are featured in BACL project: *R2007201-xx*.

A description of the differences between the tested model and the new one are as follows:

Features / Specifications	H550	H350
Wi-Fi	11ax	11ax
2.4 & 5GHz Radio Config	2x2	2x2
Tx Power 5GHz (Target)	22 dBm	22 dBm
Tx Power 2.4GHz (Target)	19 dBm	19 dBm
Wi-Fi BW Supported (MHz)	20/40/80	20/40/80
Onboard BLE	Yes	Yes – 1 radio
Onboard Zigbee	Yes	BLE + Zigbee
USB Port	Yes	No
WAN Port Ethernet	1x (1GbE)	1x (1GbE)
PoE Input	Yes, 802.3bt	Yes, 802.3af
LAN Port Ethernet	4x (1GbE)	2x (1GbE)
PoE Output	1x (af)	No
DC power	Yes	Yes
Dimensions	90 x 29 x 180 mm	90 x 29 x 180 mm
BSS Coloring	Yes	Yes

Please contact me should there be need for any additional clarification or information.

Sincerely,

Responsible Party Signature

Signature: Ivaylo Tankov
Name: Ivaylo Tankov
Tittle: Principal Wireless Compliance Engineering
Email: certifications@commscope.com

10 Annex E (Normative) - 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 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets 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 April 2017*).

Presented this 10th day of March 2021.

Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2022

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

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---