



**FCC PART 15, SUBPART C
ISED C RSS-247, ISSUE 3, AUGUST 2023**



TEST REPORT

For

Zebra Technologies Corporation

3 Overlook Point
Lincolnshire, IL 60069, USA

**FCC ID: I28-WYSBHVDXP
IC: 3798B-WYSBHVDXP**

Report Type: Class II Permissive Change	Product Type: WLAN/BT Module
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* This test report may contain data and test methods that are not covered by BACL's scope of accreditation as of the test report date shown above. These items are marked within the test report text with an asterisk "*"

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2409304-247	Class II Permissive Change	2025-01-23

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report is prepared on behalf of *Zebra Technologies Corporation*, and their product model: WYSBHVDXP (FCC ID: I28-WYSBHVDXP, IC: 3798B-WYSBHVDXP) or the “EUT” as referred to in this report. The EUT is a WLAN/BT module and installed in host device model: ZT620. The module can also be installed in similar model: ZT610.

1.2 Mechanical Description of EUT

The EUT measures approximately 50.5 cm (H) x 39.5 cm (W) x 34.0 cm (D) and weighs approximately 26.0 kg.

The data gathered was from a production sample provided by Zebra Technologies Corporation with S/N: 76J244200073.

1.3 Objective

This report is prepared on behalf of *Zebra Technologies Corporation*, in accordance with Part 2, Subpart J, and Part 15, Subpart C of the Federal Communication Commission’s rules and ISEDC RSS-247 Issue 3, August 2023.

The purpose of this Class II Permissive Change is to enable colocation of the WiFi/BT module (FCC ID: I28-WYSBHVDXP, IC: 3798B-WYSBHVDXP) with RFID module (FCC ID: I28-RFIDM6EMTT, IC: 3798B-RFIDM6EMTT) when installed in the host.

The objective is to determine compliance with FCC Part 15.247 and ISEDC RSS-247 for Antenna Requirement, RF Exposure, and Radiated Spurious Emissions.

In order to determine compliance, the manufacturer or a contracted laboratory makes measurements and takes the necessary steps to ensure that the equipment complies with the appropriate technical standards.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the immunity should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing and/or I/O cable changes, etc.).

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.407, RSS-247, Equipment Class: NII with FCC ID: I28-WYSBHVDXP and IC: 3798B-WYSBHVDXP.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2020, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v05r02: 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 ° 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.

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-0428.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2017 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 - ISED) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
 - o BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
 - o NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
 - o EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
 - o Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
 - o 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:
 - o ENERGY STAR Recognized Test Laboratory – US EPA
 - o Telecommunications Certification Body (TCB) – US FCC;
 - o 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 C63.10-2020 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 exercising software used during testing was “Tool box 1.84.21488”, provided by Zebra Technologies Corporation. The software is compliant with the standard requirements being tested against.

Radio	Mode	Channel	Frequency (MHz)	Power Setting
2.4GHz Wi-Fi	802.11b	Middle	2437	17
Bluetooth Classic	DH1	Low	2402	Default
Bluetooth LE	2M PHY	Low	2402	Default
RFID	-	-	902.75	Default

Data rates used:
802.11b: 1 Mbps

2.3 Special Equipment

No special equipment was used during testing.

2.4 Equipment Modification

No modifications were made to the EUT during testing.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude 5401	6QN2533

2.6 Remote Support Equipment

None.

2.7 Power Supply and Line Filters

None.

2.8 Interface Ports and Cabling

Cable Description	Length (m)	From	To
Power Cable	1	EUT	AC Power Source
USB-A to USB-B	1	EUT	Laptop

3 Summary of Test Results

FCC & ISEDC Rules	Description of Test	Results
FCC §15.203 ISEDC RSS-Gen §6.8	Antenna Requirements	Compliant
FCC §2.1091, §15.247(i) ISEDC RSS-102	RF Exposure	Compliant
FCC §2.1053, §15.35(b), §15.205, §15.209, §15.247(d) ISEDC RSS-247 §5.5 ISEDC RSS-Gen §8.9, §8.10	Radiated Spurious Emissions	Compliant

BACL is responsible for all the information provided in this report, except when information is provided by the customer as identified in this report. Information provided by the customer, e.g., antenna gain, can affect the validity of results.

4 FCC §15.203 & ISEDC RSS-Gen §6.8 – 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.

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotopically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For license-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

4.2 Antenna Information

External/Internal/ Integral	Antenna Type	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
External	Dipole Antenna	2400-2483.5	3.0

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

5.1 Applicable Standards

According to FCC §15.247(i), Radio frequency devices operating under the provisions of this part are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 1.1310, 2.1091, and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of mobile or portable devices operating under this section must contain a statement confirming compliance with these requirements. Technical information showing the basis for this statement must be submitted to the Commission upon request.

According to FCC §2.1091(e)(1) and §1.1310(e)(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

According to ISEDC RSS-102 Issue 6 Section 6.6: SAR exemption limits for routine evaluations

Field reference level (FRL) 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 (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP 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 EIRP 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 EIRP 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 EIRP 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 EIRP 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 EIRP was derived.

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 Result

Radio	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
Bluetooth	3.00	12.00	15.00	31.62	0.00629060	1.0
2.4 GHz Wi-Fi	3.00	17.00	20.00	120.23	0.02391900	1.0
RFID	-36.00	28.11	-7.89	0.16	0.00003234	1.0

Sum of Ratios:

Bluetooth + RFID: $(0.00629060/1.0) + (0.00003234/1.0) = 0.00632294 < 1$

2.4 GHz Wi-Fi + RFID: $(0.02391900/1.0) + (0.00003234/1.0) = 0.02395134 < 1$

5.4 IC Exemption

Bluetooth

Maximum EIRP = 12.00dBm + 3.00dBi = 15.00dBm which is less than $1.31 \times 10^{-2} f^{0.6834} = 2.68W = 34.28dBm$.

2.4 GHz Wi-Fi

Maximum EIRP = 17.00dBm + 3.00dBi = 20.00dBm which is less than $1.31 \times 10^{-2} f^{0.6834} = 2.68W = 34.28dBm$.

RFID

Maximum EIRP = 28.11dBm + -36.00dBi = -7.89dBm which is less than $1.31 \times 10^{-2} f^{0.6834} = 1.37W = 31.37dBm$.

Therefore, the SAR evaluation is exempt.

6 FCC §15.35(b), §15.205, §15.209 & ISEDC RSS-Gen §8.9, §8.10 – Spurious Radiated Emissions

6.1 Applicable Standards

As per FCC §15.35(b): 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	960 – 1240	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5.35 – 5.46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 – 167.17	3332 – 3339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	33458 – 3358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

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 ISED RSS-Gen §8.9,

Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic Field Strength ($\mu\text{A/m}$)	Measurement Distance (m)
9 – 490 kHz ^{Note 1}	$6.37/F$ (F in kHz)	300
490 – 1705 kHz	$63.7/F$ (F in kHz)	30
1.705 – 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

As per ISED RSS-Gen §8.10(c),

Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

Table 7 – Restricted frequency bands^{Note 1}

MHz	MHz	GHz
0.090 – 0.110	149.9 – 150.05	9.0 – 9.2
0.495 – 0.505	156.52475 – 156.52525	9.3 – 9.5
2.1735 – 2.1905	156.7 – 156.9	10.6 – 12.7
3.020 – 3.026	162.0125 – 167.17	13.25 – 13.4
4.125 – 4.128	167.72 – 173.2	14.47 – 14.5
4.17725 – 4.17775	240 – 285	15.35 – 16.2
4.20725 – 4.20775	322 – 335.4	17.7 – 21.4
5.677 – 5.683	399.9 – 410	22.01 – 23.12
6.215 – 6.218	608 – 614	23.6 – 24.0
6.26775 – 6.26825	960 – 1427	31.2 – 31.8
6.31175 – 6.31225	1435 – 1626.5	36.43 – 36.5
8.291 – 8.294	1645.5 – 1646.5	Above 38.6
8.362 – 8.366	1660 – 1710	
8.37625 – 8.38675	1718.8 – 1722.2	
8.41425 – 8.41475	2200 – 2300	
12.29 – 12.293	2310 – 2390	
12.51975 – 12.52025	2483.5 – 2500	
12.57675 – 12.57725	2655 – 2900	
13.36 – 13.41	3260 – 3267	
16.42 – 16.423	3332 – 3339	
16.69475 – 16.69525	3345.8 – 3358	
16.80425 – 16.80475	3500 – 4400	
25.5 – 25.67	4500 – 5150	
37.5 – 38.25	5350 – 5460	
73 – 74.6	7250 – 7750	
74.8 – 75.2	8025 – 8500	
108 – 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

6.2 Test Setup

The radiated emissions tests were performed in the 5-meter chamber, using the setup in accordance with ANSI C63.10-2020. The specification used was the FCC §15.209/205 and ISEDC RSS-GEN limits.

The spacing between the peripherals was 10 centimeters.

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

6.3 Test Procedure

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 meters, and the EUT was placed on a turntable, which was 0.8 meters and 1.5 meters 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 150 kHz:

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

From 150 kHz to 30 MHz:

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

From 30 MHz to 1 GHz:

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

6.4 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:

$$CA = \text{S.A. Reading} + \text{Correction Factor}$$

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:

$$\text{Correction Factor} = AF + CL + \text{Atten} - Ga$$

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:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

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:

$$CA = Ai + AF + CL + \text{Atten} - Ga$$

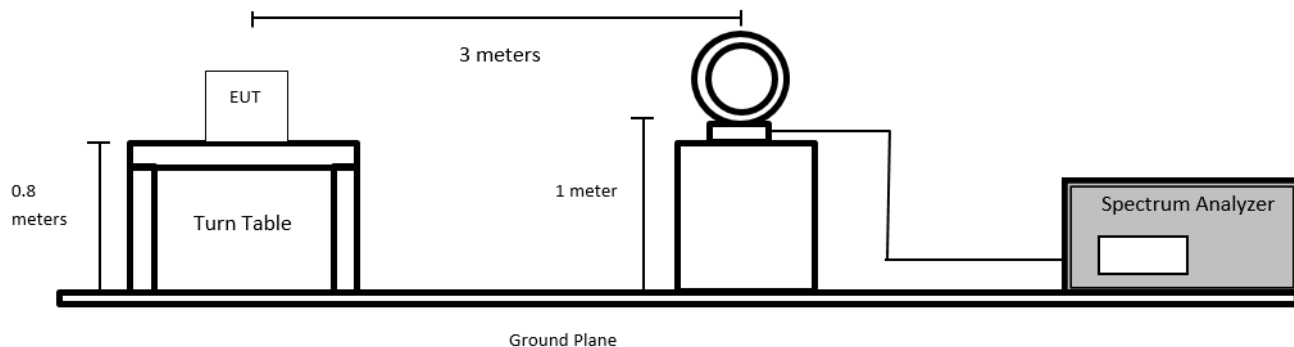
For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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:

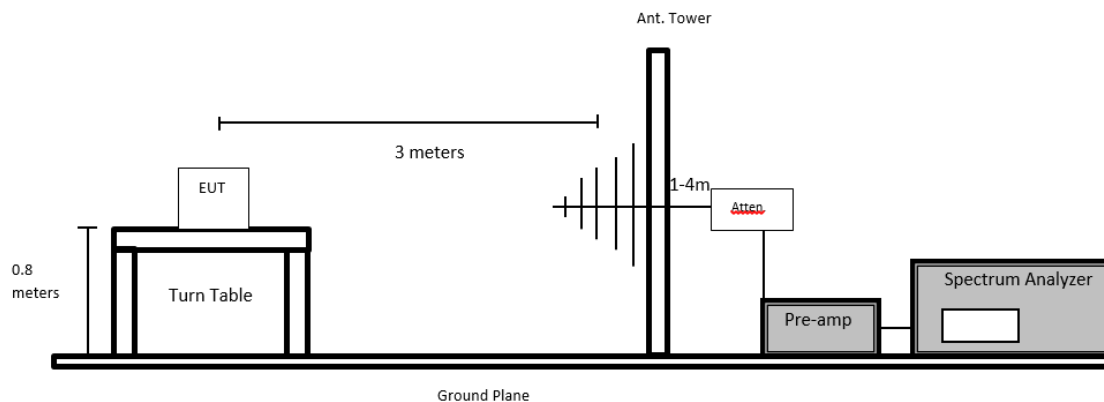
$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

6.5 Test Setup Diagrams

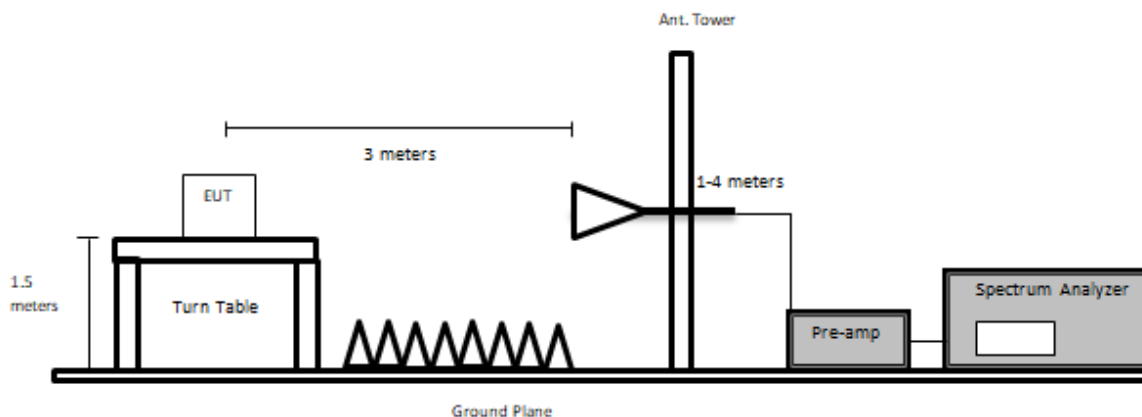
9 kHz to 30 MHz at 3 meters distance



30 MHz to 1 GHz at 3 meters distance



Above 1 GHz at 3 meters distance



6.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
1432	Keysight Technologies	MXE EMI Receiver, Multi-touch	N9038B	MY60180008	2025-01-03	1 year
327	Sunol Sciences	System Controller	SC110V	122303-1	N/A	N/A
1075	Sunol Sciences	Boresight Tower	TLT3	050119-7	N/A	N/A
1388	Sunol Sciences	Flush Mount Turntable	FM	112005-2	N/A	N/A
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2; 1504	2023-12-18	2 years
316	Sonoma Instruments	Preamplifier	317	260406	2024-08-30	1 year
1245	-	Attenuator	PE7390-6	01182018A	2023-12-18	2 years
1359	Pasternack	N 600in RF Cable	PE3496LF-600	-	2025-01-02	6 months
1248	Pasternack	RG214 COAX Cable	PE3062	-	2024-10-01	6 months
1249	Time Microwave	LMR-400 Cable Dc-3 GHz	AE13684	2k80612-5 6fts	2024-04-09	1 year
1246	Hewlet Packard	RF Limiter	11867A	01734	2024-04-09	1 year
1192	ETS Lindgren	Horn Antenna	3117	00218973	2024-10-23	2 years
1449	BACL	Preamplifier	BACL1313-A100M18G	4052472	2024-08-19	6 months
1394	Mini Circuit	CBL ASSY 2.92MM	FL086-12KM+	QN2318110-2318	2024-08-16	6 months
91	Wisewave	Horn Antenna	ARH-4223-02	10555-02	2024-03-14	2 years
1451	BACL	Preamplifier	BACL-1313-A1840	4052432	2024-08-16	6 months
1392	Mini Circuit	CBL ASSY 2.92MM	FL086-12KM+	QN2318110-2318	2024-10-16	6 months
1295	Carlisle Interconnected Technologies	10m Coaxial Cable	UFB142A-1-3937-200200	6463989091 2-001	2024-10-16	6 months
672	Micro-Tronics	2.4 - 2.6 GHz Notch Filter	BRM50701	160	2024-03-06	1 year
393	Com-Power	Antenna, Loop Active	AL-130	17043	2023-05-26	2 years

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".

6.7 Test Environmental Conditions

Temperature:	20 to 23 °C
Relative Humidity:	38 to 45 %
ATM Pressure:	101.8 kPa

The testing was performed by Arturo Reyes from 2025-01-16 to 2025-01-21 in 5m chamber 3.

6.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.209 and ISEDC RSS-GEN standards’ radiated emissions limits, and had the worst margin of:

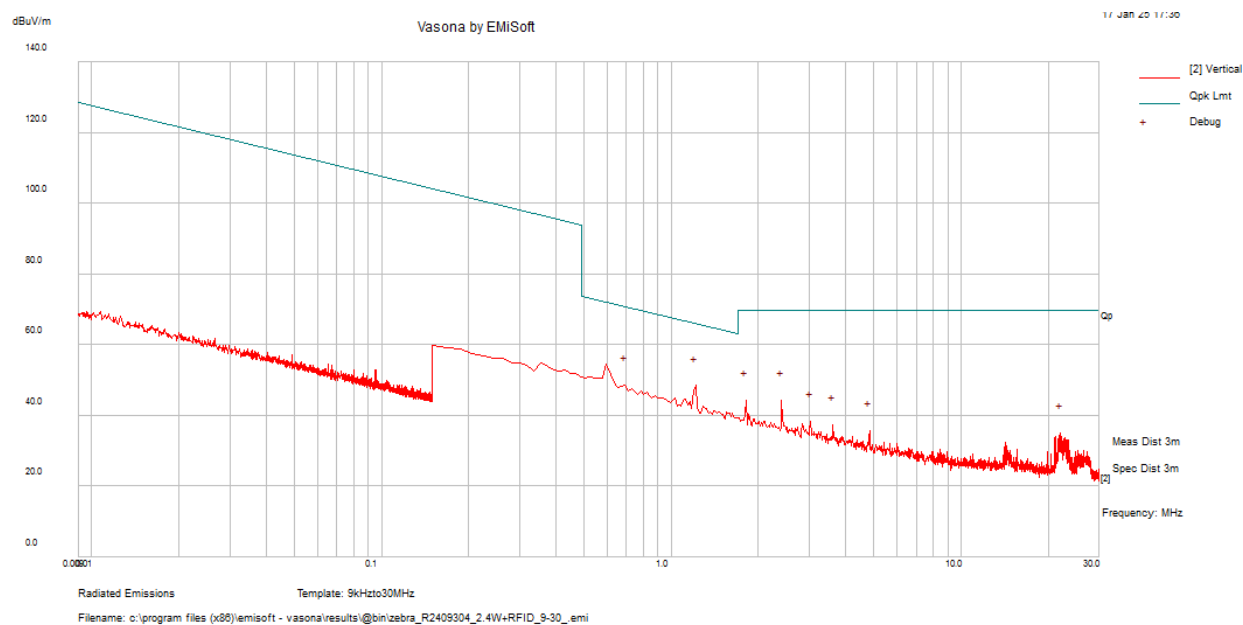
Worst Case – Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Configuration
-1.29	4803.75	Horizontal	Bluetooth LE + RFID

Please refer to the tables and plots in the next section for detailed test results.

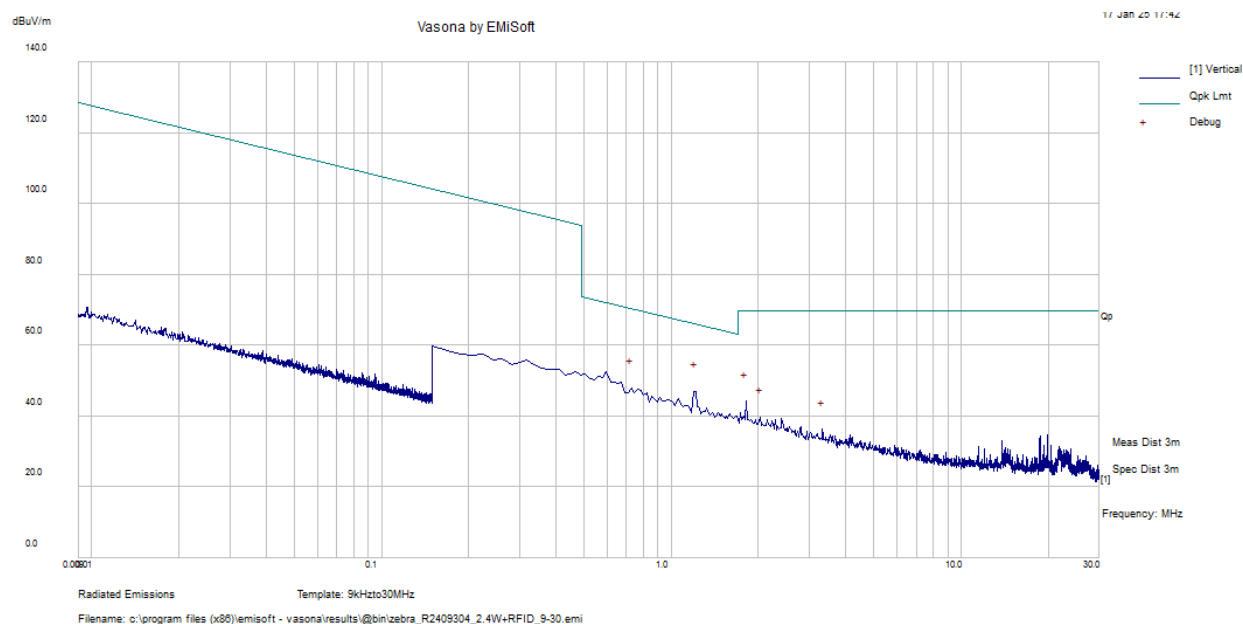
6.9 Radiated Emissions Test Results

1) 9kHz – 30 MHz, Measured at 3 meters

Co-location: 2.4 GHz Wi-Fi + RFID, Parallel

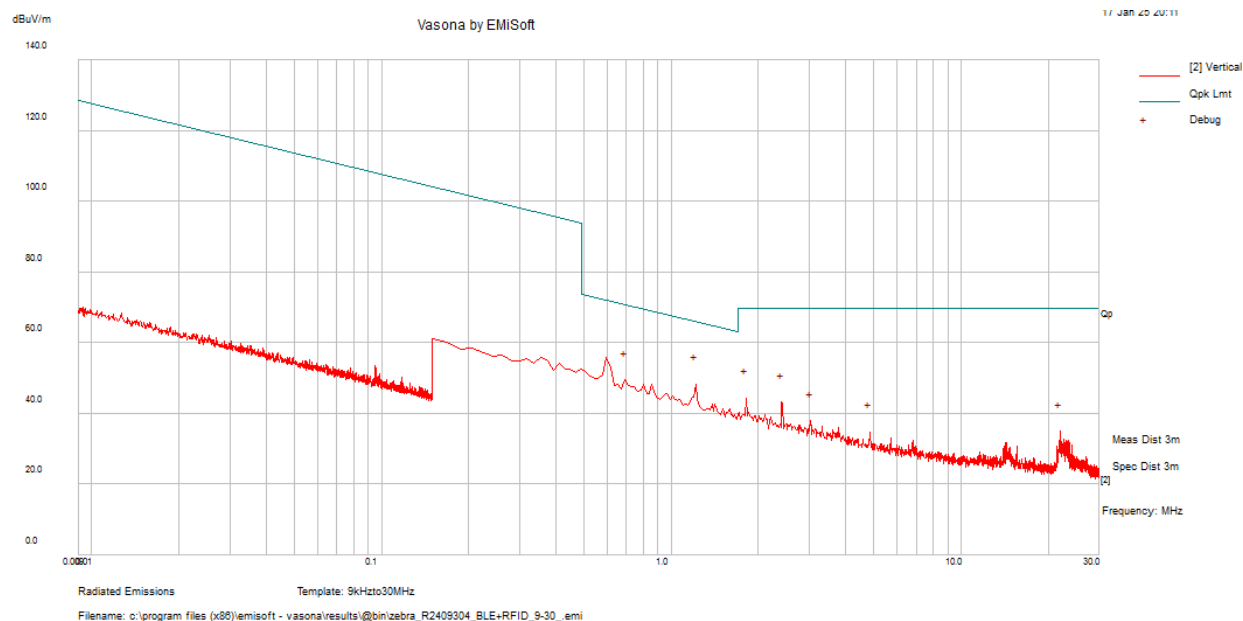
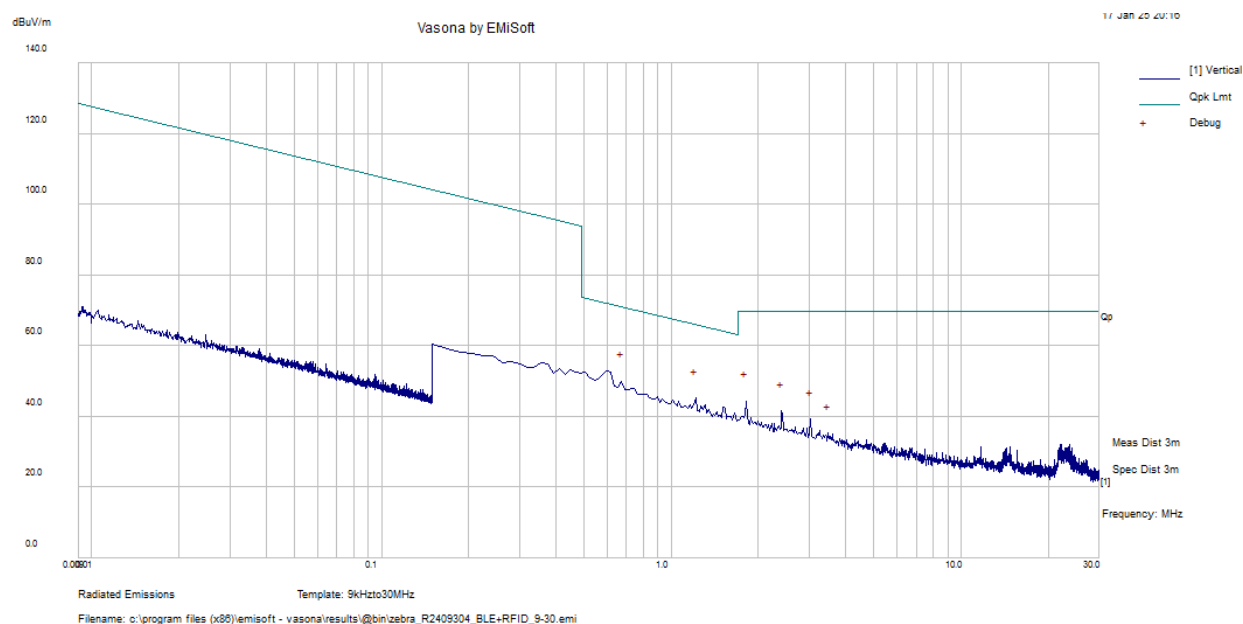


Co-location: 2.4 GHz Wi-Fi + RFID, Perpendicular



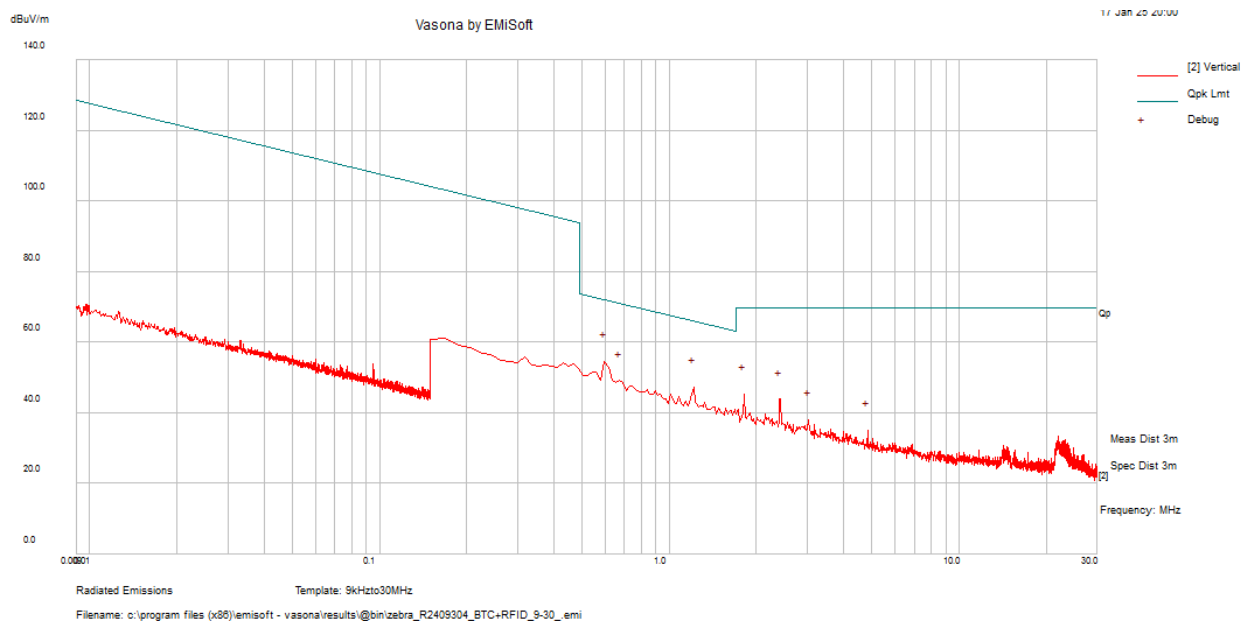
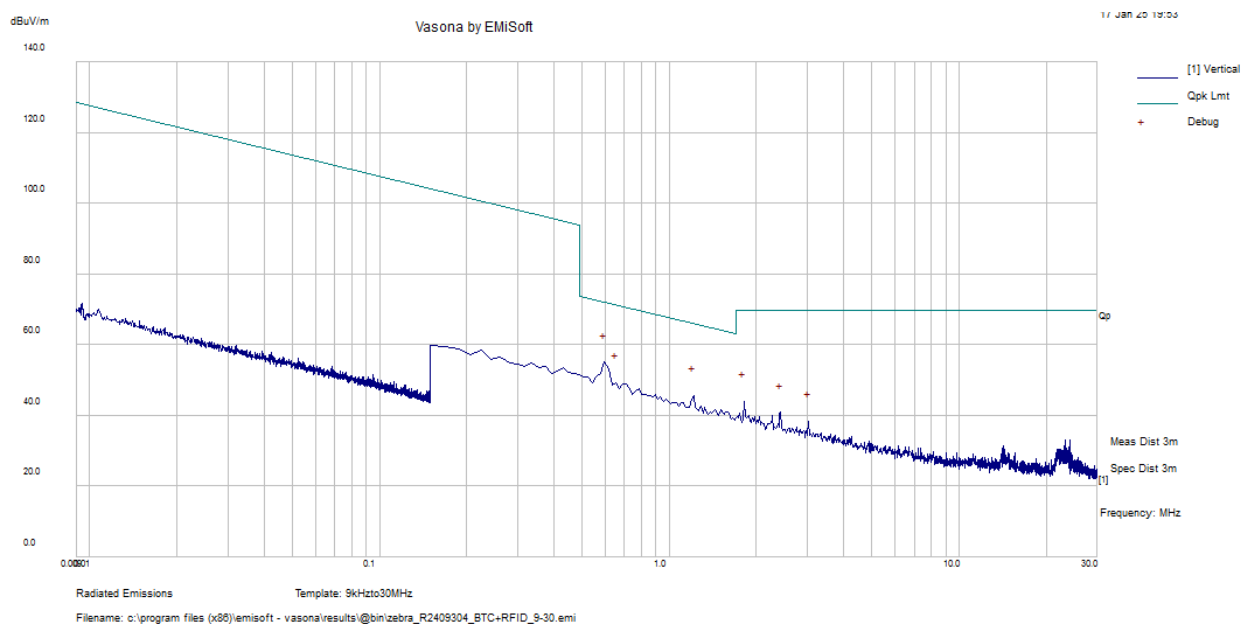
Note 1: The Peak measurement is used to show compliance, which is evaluated against the Quasi-Peak Limit.

Note 2: The plot above shows that there were no significant emissions above the noise floor at 9kHz-30MHz frequency range.

Co-location: Bluetooth LE + RFID, Parallel**Co-location: Bluetooth LE + RFID, Perpendicular**

Note 1: The Peak measurement is used to show compliance, which is evaluated against the Quasi-Peak Limit.

Note 2: The plot above shows that there were no significant emissions above the noise floor at 9kHz-30MHz frequency range.

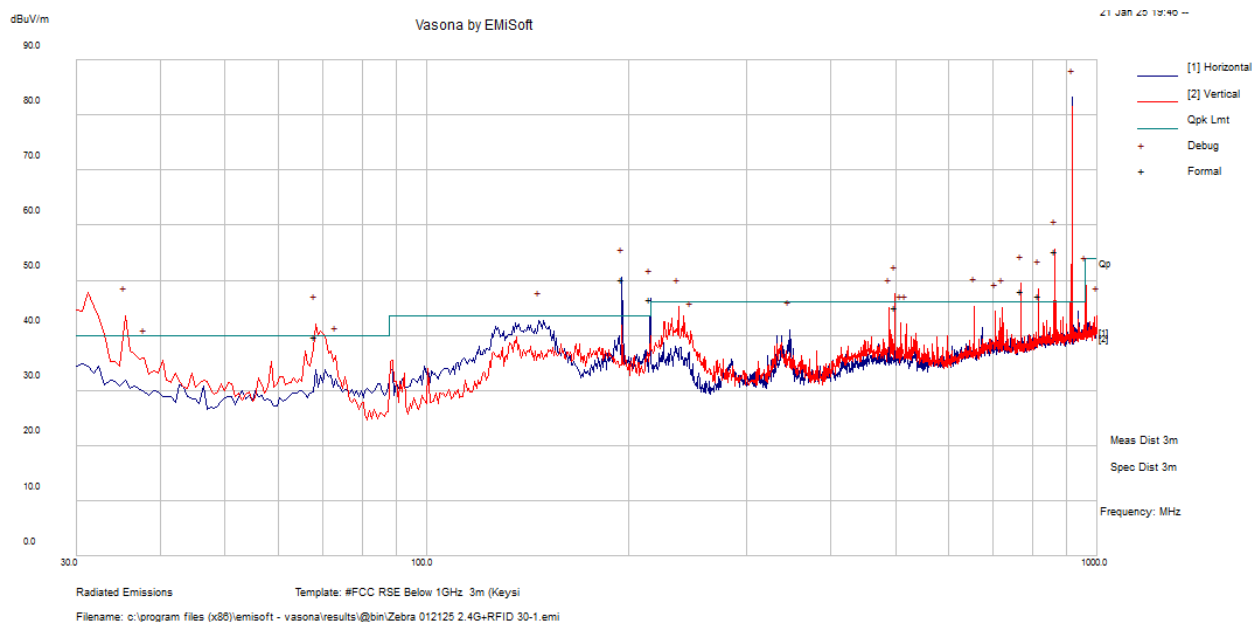
Co-location: Bluetooth Classic + RFID, Parallel**Co-location: Bluetooth Classic + RFID, Perpendicular**

Note 1: The Peak measurement is used to show compliance, which is evaluated against the Quasi-Peak Limit.

Note 2: The plot above shows that there were no significant emissions above the noise floor at 9kHz-30MHz frequency range.

2) 30 MHz – 1 GHz, Measured at 3 meters

Co-location: 2.4 GHz Wi-Fi + RFID

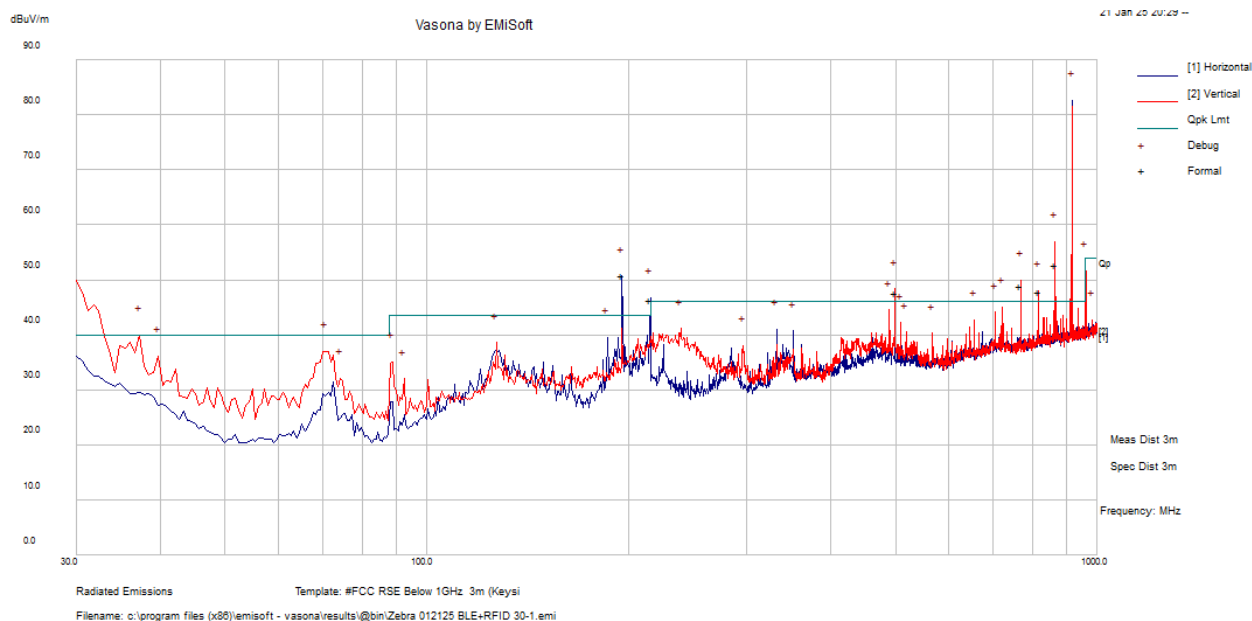


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBuV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBuV/m)	Margin (dB)	Detector
864.9881	49.26	6.08	55.34	102	V	114	85.1	-29.76	QP
195.7109	57.66	-7.49	50.17	156	H	223	85.1	-34.93	QP
768.8941	43.47	4.65	48.13	108	V	343	85.1	-36.97	QP
215.2813	55.67	-9.14	46.53	143	H	213	85.1	-38.57	QP
816.9044	41.59	5.65	47.24	158	V	113	85.1	-37.86	QP
68.16375	52.56	-12.78	39.78	136	V	352	85.1	-45.32	QP

Note 1: All emissions exceeding the limit line in the graph fall out of restricted bands and thus 30dBc limit (FCC 15.247(d)/RSS-247 5.5) was instead applied.

Note 2: Fundamental measured for 2.4 GHz Wi-Fi, 2437 MHz, 802.11b mode: (16.9+3.0+95.2) dBuV/m @3m – 30dB = 85.1 dBuV/m @3m

Co-location: Bluetooth LE + RFID

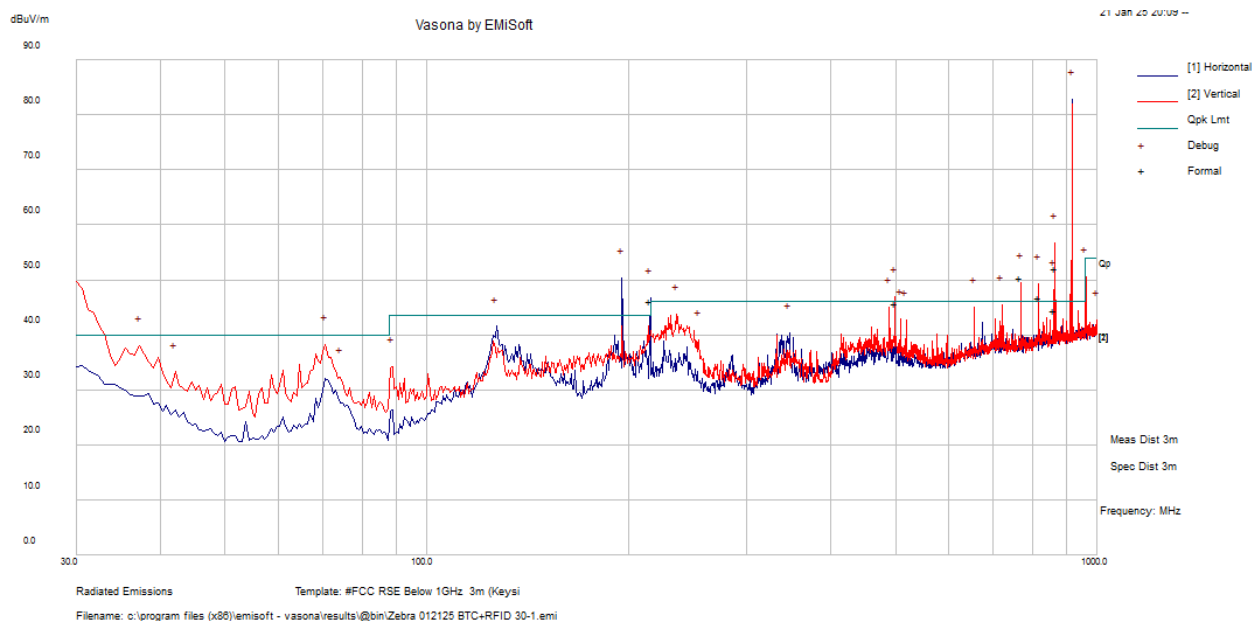


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
864.9675	46.7	6.08	52.78	106	V	149	76.8	-24.02	QP
195.7059	58.35	-7.49	50.86	119	H	229	76.8	-25.94	QP
768.8466	44.22	4.65	48.88	110	V	0	76.8	-27.92	QP
215.2659	55.44	-9.14	46.3	118	H	70	76.8	-30.5	QP
499.0575	47.65	-0.02	47.62	108	V	312	76.8	-29.18	QP
816.9197	42.24	5.65	47.89	100	V	110	76.8	-28.91	QP

Note 1: All emissions exceeding the limit line in the graph fall out of restricted bands and thus 30dBc limit (FCC 15.247(d)/RSS-247 5.5) was instead applied.

Note 2: Fundamental measured for Bluetooth LE, 2402 MHz, 2M PHY mode (Low Channel): (8.6+3+95.2) dBuV/m @3m – 30dB = 76.8 dBuV/m @3m

Co-location: Bluetooth Classic + RFID



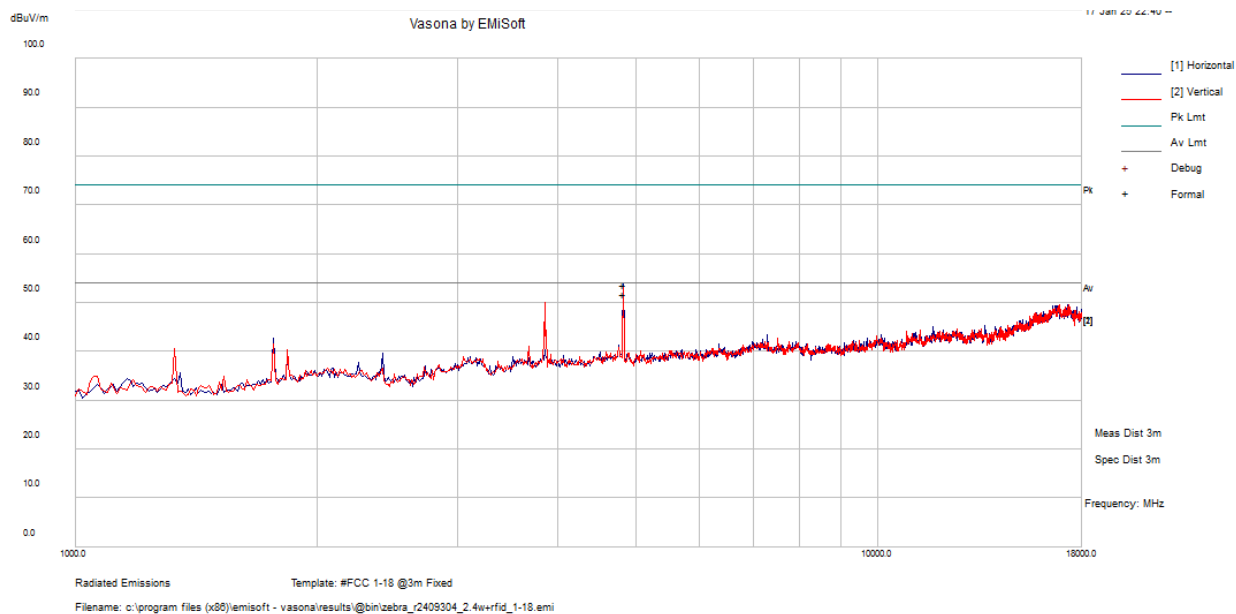
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
864.9759	46	6.08	52.08	107	V	151	79.92	-27.84	QP
768.8875	45.77	4.65	50.43	108	V	3	79.92	-29.49	QP
816.8913	41.24	5.65	46.89	109	V	360	79.92	-33.03	QP
215.2803	55.27	-9.14	46.13	129	H	223	79.92	-33.79	QP
861.1378	38.43	6.02	44.45	107	V	360	79.92	-35.47	QP
499.0563	45.65	-0.02	45.63	112	V	328	79.92	-34.29	QP

Note 1: All emissions exceeding the limit line in the graph fall out of restricted bands and thus 30dBc limit (FCC 15.247(d)/RSS-247 5.5) was instead applied.

Note 2: Fundamental measured for Bluetooth Classic, 2402 MHz, DH1 mode (Low Channel): (11.72+3+95.2) dBuV/m @3m – 30 dB = 79.92 dBuV/m @3m)

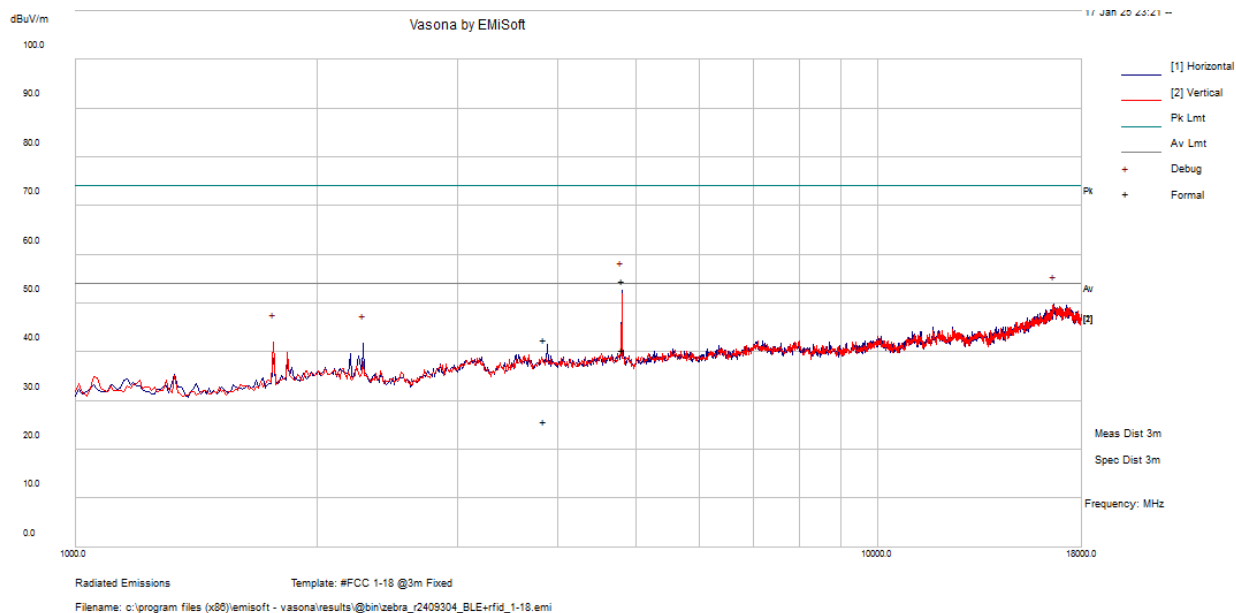
3) 1 GHz – 18 GHz, Measured at 3 meters

Co-location: 2.4 GHz Wi-Fi + RFID



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
4824.18	54.04	-0.44	53.6	211	H	164	74	-20.4	Peak
4824.18	52.24	-0.44	51.8	211	H	164	54	-2.2	Avg.

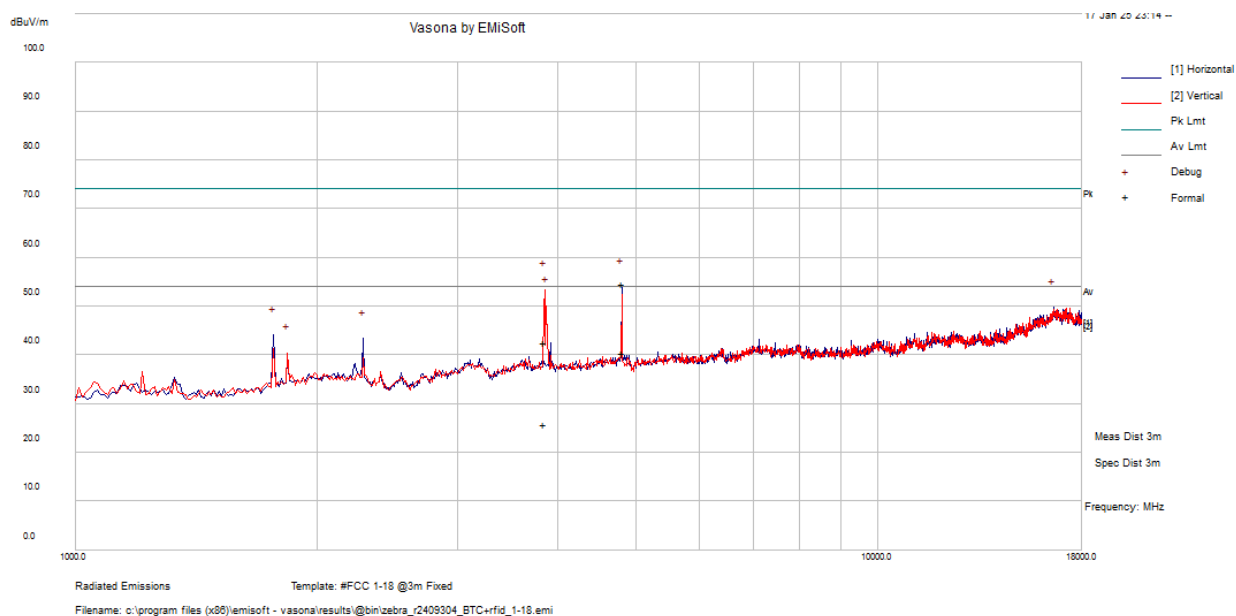
Co-location: Bluetooth LE + RFID



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
4803.75	52.97	-0.26	52.71	200	H	160	54	-1.29	Peak

Note: The Peak measurement is used to show compliance, which is evaluated against the Average Limit.

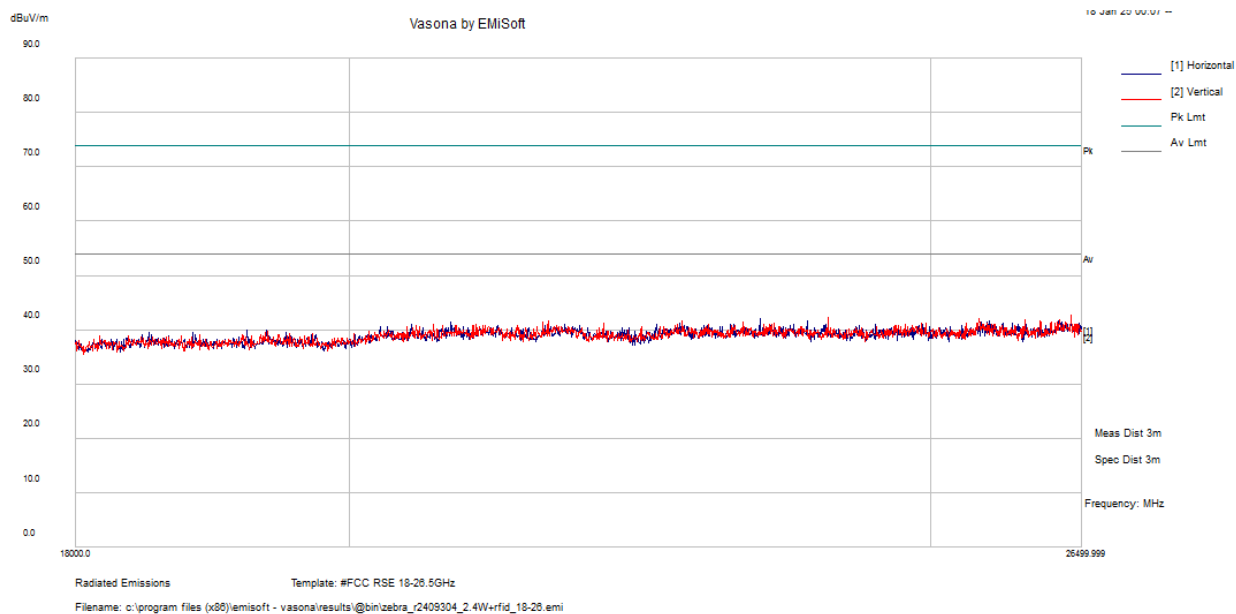
Co-location: Bluetooth Classic + RFID



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
4805.5675	54.88	-0.28	54.6	206	H	152	74	-19.4	Peak
4805.5675	40.6	-0.28	40.32	206	H	152	54	-13.68	Avg.

4) 18 GHz – 26.5 GHz, Measured at 3 meters

Co-location: 2.4 GHz Wi-Fi + RFID

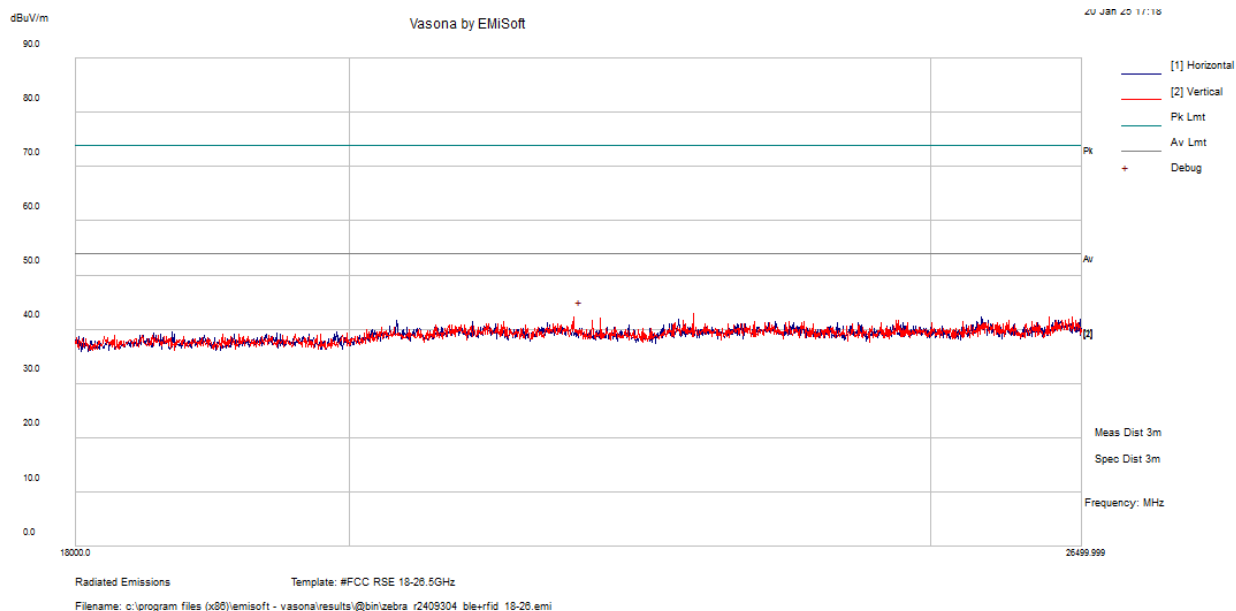


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
24034.209	50.84	-9.04	41.80	200	V	7	54	-12.20	Peak

Note 1: The Peak measurement is used to show compliance, which is evaluated against the Average Limit.

Note 2: The plot above shows that there were no emissions above the noise floor at 18-26.5GHz frequency range.

Co-location: Bluetooth LE + RFID

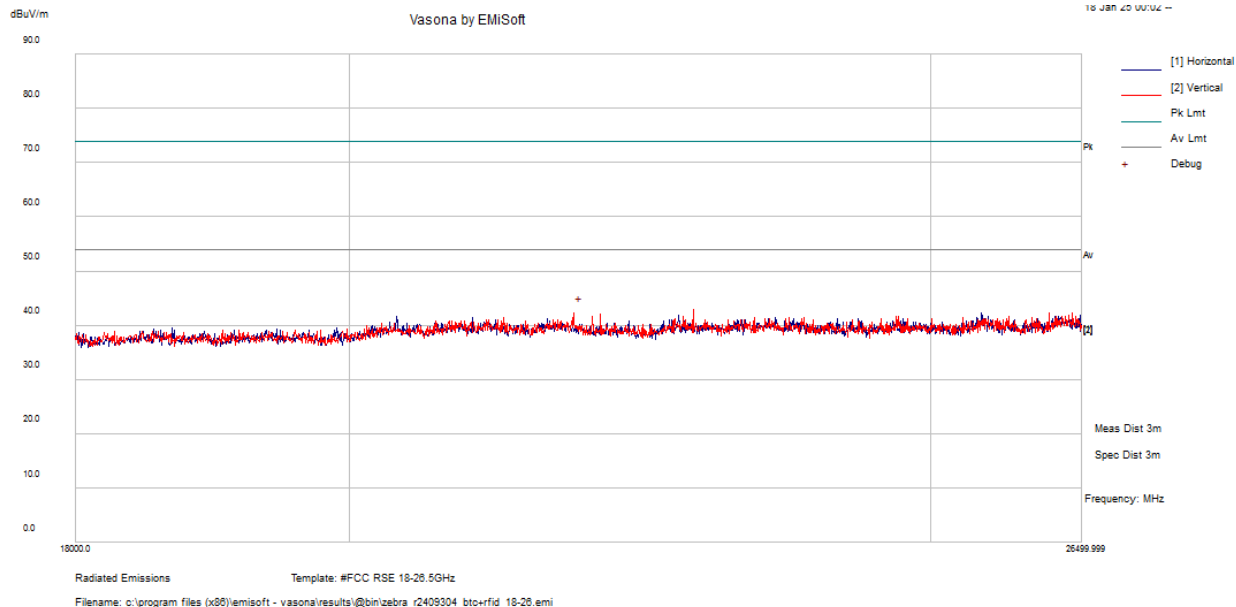


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
26295.8	38.24	2.84	41.08	200	V	7	54	-12.92	Peak

Note 1: The Peak measurement is used to show compliance, which is evaluated against the Average Limit.

Note 2: The plot above shows that there were no emissions above the noise floor at 18-26.5GHz frequency range.

Co-location: Bluetooth Classic + RFID



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
21848.778	40.25	-0.24	40.01	200	V	7	54	-13.99	Peak

Note 1: The Peak measurement is used to show compliance, which is evaluated against the Average Limit.

Note 2: The plot above shows that there were no emissions above the noise floor at 18-26.5GHz frequency range.

7 Appendix A (Normative) – EUT Test Setup Photographs

Please refer to the attachment.

8 Appendix B (Normative) – EUT External Photographs

Please refer to the attachment

9 Appendix C (Normative) – EUT Internal Photographs

Please refer to the attachment

10 Appendix D (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 13th day of September 2024.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2026

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 ---