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

TEST REPORT

For

Zebra Technologies Corporation

3 Overlook Point
Lincolnshire, IL 60069, USA

FCC ID: UZ7RE40
IC: 109AN-RE40

Report Type: Class II Permissive Change (FCC) Class IV Permissive Change (IC)	**Product Type:** RFID Module
Prepared By:	Michael Papa, RF Test Engineer
Report Number:	R2502044-247
Report Date:	2025-02-28
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ACCREDITED
CERTIFICATE #3297.02

* 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 "*"

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2502044-247	Class II Permissive Change (FCC) Class IV Permissive Change (IC) Report	2025-02-28

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: RE40, FCC ID: UZ7RE40, IC: 109AN-RE40 or the "EUT" as referred to in this report. The EUT is a RFID module. The EUT was installed in host device model number: ZT421 (similar model ZT411).

Based on manufacturer's declaration, the host devices were declared to be identical, and ZT421 was selected for testing.

1.2 Mechanical Description of EUT

The EUT Host device (ZT421) dimension measured approximately 495 mm (L) x 336 mm (W) x 324 mm (H) and weights approximately 18.14 kg.

The EUT Host device (ZT411) dimension measured approximately 495 mm (L) x 269 mm (W) x 324 mm (H) and weights approximately 16.33 kg.

The radio module (RE40) dimension measured approximately 120 mm (L) x 52 mm (W) x 22mm (H) and weighs approximately 0.1kg.

The data gathered was from a production sample provided by Zebra Technologies Corporation with S/N: 22286523070771

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.

This project is a Permissive Change submission for the purpose of enabling colocation of the WiFi/BT module (FCC ID: I28-WYSBHVDXP**,** IC ID: 3798B-WYSBHVDXP) with RFID module (FCC ID: UZ7RE40, IC: UZ7RE40).

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)

N/A

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 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.

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):
  - 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 C63.10-2020 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 "Toolbox – version 1.84.21488 CI", provided by Zebra Technologies Corporation. The software is compliant with the standard requirements being tested against.

Radio	Mode	Channel	Frequency (MHz)	Power Setting
RFID	-	-	902.75	Default
2.4 GHz WiFi	802.11b	6	2437	Default
5 GHz WiFi	802.11a	36	5180	Default
BT Classic	DH1	0	2402	Default
BT LE	2M PHY	0	2402	Default

Data rates used:
802.11b: 1Mbps
802.11a: 6Mbps

2.3 Equipment Modification

No modifications were made to the EUT during testing.

2.4 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude E7440	GCP4P A03 DPC

2.5 Remote Support Equipment

None.

2.6 Power Supply and Line Filters

None.

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
USB-A to USB-B	< 1	EUT	Laptop
Power Cable	2	EUT	Power Outlet

3 Summary of Test Results

FCC & ISEDC Rules	Description of Test	Results
FCC §2.1091, §15.247(i) ISEDC RSS-102	RF Exposure	Compliant
FCC §15.207 ISEDC RSS-Gen §8.8	AC Line Conducted Emissions	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 §2.1091, FCC §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.

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 ISED RSS-102 Issue 6:

6.6 Field reference level exposure exemption limits

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.

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

4.3 MPE Result

Note: The BTC conducted output power data were obtained from *Test Report Number: FR0D2423A issued by Sporton International Inc. On 05/05/2021*.
Note: The BLE conducted output power data were obtained from *Test Report Number: FR0D2423B issued by Sporton International Inc. On 05/05/2021*.
Note: The 2.4 GHz Wi-Fi conducted output power data were obtained from *Test Report Number: FR0D2423C issued by Sporton International Inc. On 05/05/2021*.
Note: The 5 GHz Wi-Fi conducted output power data were obtained from *Test Report Number: FR0D2423D issued by Sporton International Inc. On 05/05/2021*
Note: The RFID conducted output power data were obtained from *Test Report Number: FR051819 issued by Sporton International Inc. On 07/15/2020*.

Bluetooth Classic (FCC ID: I28-WYSBHVDXP)

Maximum output power at antenna input terminal (dBm):	11.72
Maximum output power at antenna input terminal (mW):	14.86
Prediction distance (cm):	20
Prediction frequency (MHz):	2402
Maximum Directional Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.00590
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 25 cm is 0.00590 mW/cm^2. Limit is 1 mW/cm^2.

Bluetooth Low Energy (FCC ID: I28-WYSBHVDXP)

Maximum output power at antenna input terminal (dBm):	8.60
Maximum output power at antenna input terminal (mW):	7.24
Prediction distance (cm):	20
Prediction frequency (MHz):	2402
Maximum Directional Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	2.0
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.00288
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 25 cm is 0.00288 mW/cm^2. Limit is 1 mW/cm^2.

2.4 GHz WiFi (FCC ID: I28-WYSBHVDXP)

Maximum output power at antenna input terminal (dBm):	16.90
Maximum output power at antenna input terminal (mW):	48.98
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Directional Antenna Gain, typical (dBi):	3.81
Maximum Antenna Gain (numeric):	2.4
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0234
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 0.0234 mW/cm^2. Limit is 1 mW/cm^2.

5 GHz WiFi (FCC ID: I28-WYSBHVDXP)

Maximum output power at antenna input terminal (dBm):	14.70
Maximum output power at antenna input terminal (mW):	29.51
Prediction distance (cm):	20
Prediction frequency (MHz):	5180
Maximum Directional Antenna Gain, typical (dBi):	5.0
Maximum Antenna Gain (numeric):	3.16
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0186
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 0.0186 mW/cm^2. Limit is 1 mW/cm^2.

RFID (FCC ID: UZ7RE40)

Maximum output power at antenna input terminal (dBm):	27.22
Maximum output power at antenna input terminal (mW):	527.23
Prediction distance (cm):	20
Prediction frequency (MHz):	902.75
Maximum Directional Antenna Gain, typical (dBi):	-30
Maximum Antenna Gain (numeric):	0.001
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0001
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.602

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.0001 mW/cm^2. Limit is 0.602 mW/cm^2.

Ratios for Collocation:

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
BT Classic	3.0	11.72	14.72	29.648	0.00590	1.0
RFID	-30	27.22	-2.78	0.527	0.0001	0.602

Sum of Ratios:

BT Classic + RFID: 0.00590/1.0 + 0.0001/0.602 = 0.006 < 1

For this device, a separation distance of 20 cm complies with the Simultaneous transmission limit of ≤ 1.0

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
BT LE	3	8.6	11.6	14.454	0.00288	1.0
RFID	-30	27.22	-2.78	0.527	0.0001	0.602

Sum of Ratios:

BT LE + RFID: 0.00288/1.0 + 0.0001/0.602 = 0.003 < 1

For this device, a separation distance of 20 cm complies with the Simultaneous transmission limit of ≤ 1.0

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
2.4 GHz WiFi	3.81	16.9	20.71	117.761	0.0234	1.0
RFID	-30	27.22	-2.78	0.527	0.0001	0.602

Sum of Ratios:

2.4 GHz WiFi + RFID: 0.0234/1.0 + 0.0001/0.602 = 0.0236 < 1

For this device, a separation distance of 20 cm complies with the Simultaneous transmission limit of ≤ 1.0

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
5 GHz WiFi	5.0	14.7	19.7	93.325	0.0186	1.0
RFID	-30	27.22	-2.78	0.527	0.0001	0.602

Sum of Ratios:

5 GHz WiFi + RFID: 0.0186/1.0 + 0.0001/0.602 = 0.0187 < 1

For this device, a separation distance of 20 cm complies with the Simultaneous transmission limit of ≤ 1.0

4.4 IC Exemption

RFID (IC: 109AN-RE40)

Maximum EIRP power = 27.22 dBm - 30 dBi = -2.78 dBm which is lesser than $1.31 \times 10^{-2} f^{0.6834}$ W= 1.37W = 31.37dBm.

Therefore, the RF Exposure evaluation is exempt

5 FCC §15.207 & ISEDC RSS-Gen §8.8 – AC Line Conducted Emissions

5.1 Applicable Standards

As per FCC §15.207 and ISEDC RSS-Gen Section 8.8: 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 (dBuV)	
	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

5.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2020 measurement procedure. The specification used were FCC §15.207 and ISEDC RSS-Gen §8.8 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.

5.3 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 were recorded in the peak, quasi-peak, and average detection mode. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

5.4 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:

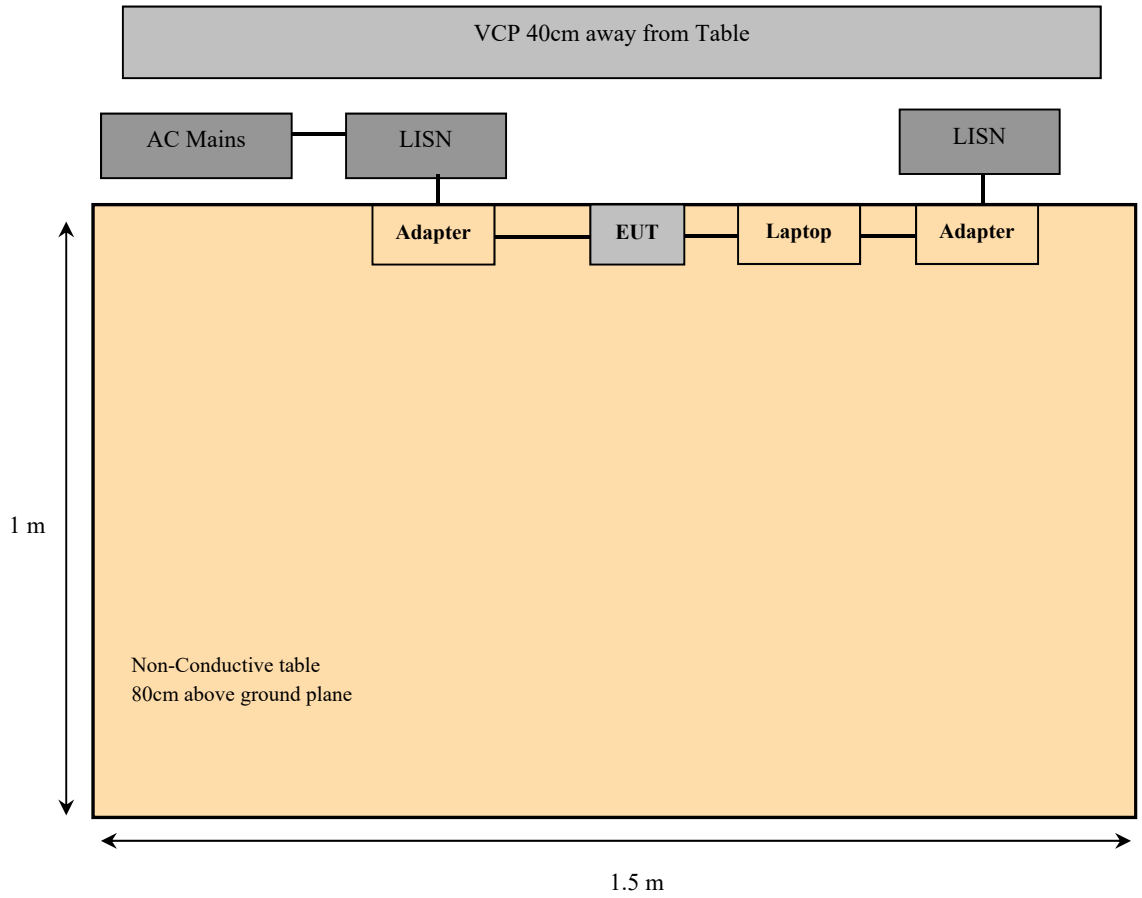
$$CA = Ai + CL + Atten$$

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + 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:

$$Margin = Corrected\ Amplitude - Limit$$

5.5 Test Setup Block Diagram



5.6 Test Equipment List and Details

BACL No	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
124	Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2024-06-19	1 year
681	Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101962	2024-09-17	6 months
732	FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2024-09-13	1 year
732	FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2024-03-05	1 year
1425	Pasternack	Ground Plane RG58 Coaxial Cable	PE3441-500CM	NA	2025-01-07	6 months

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:	18.9 to 19.3 ºC
Relative Humidity:	52 to 59 %
ATM Pressure:	102.6 kPa

The testing was performed by Michael Papa on 2025-02-24 at the ground plane.

5.8 Summary of Test Results

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

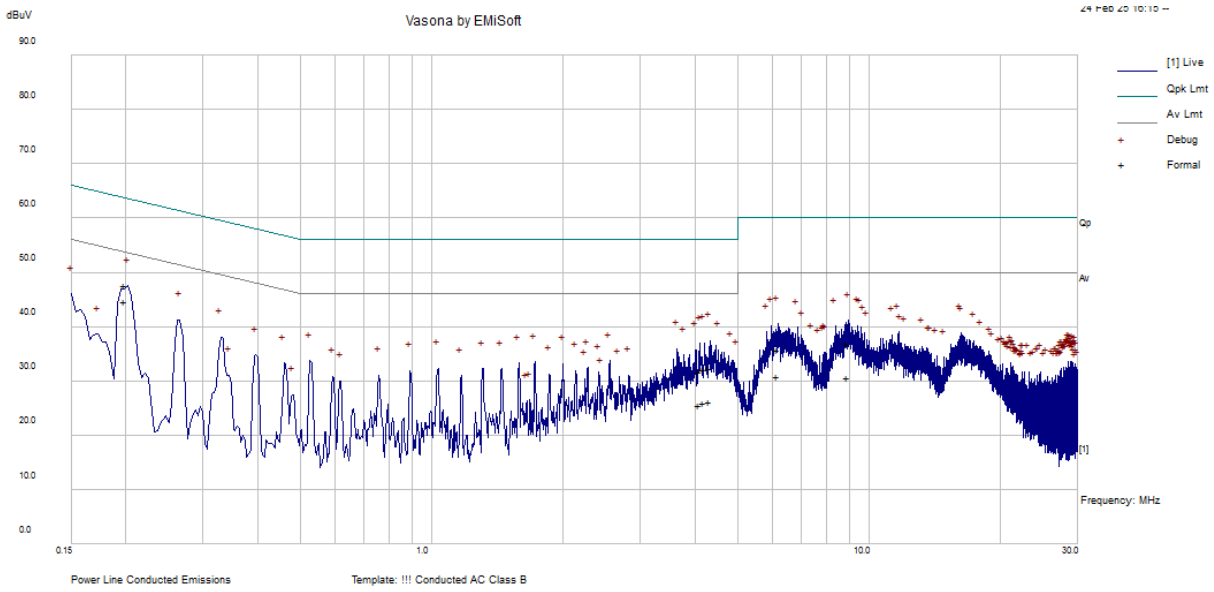
BLE+RFID

Worst Case – AC Line: 120V, 60Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Hot/Neutral)**	**Range (MHz)**
-8.89	0.19896	Hot	0.15 to 30

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

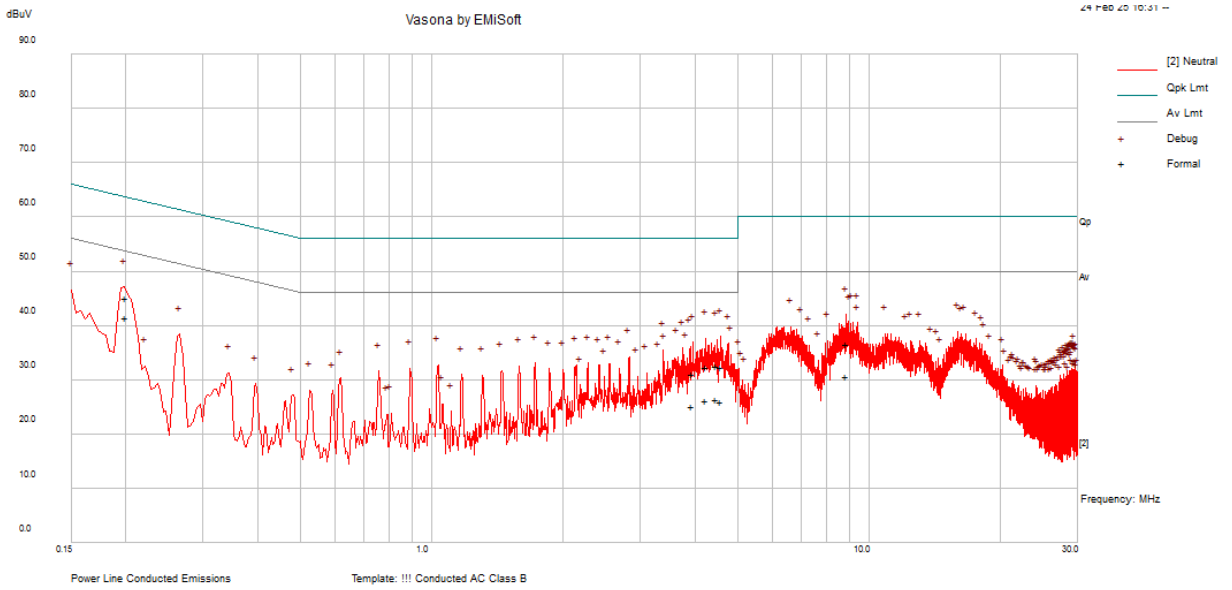
5.9 Conducted Emissions Test Plots and Data

AC Line: 120V, 60Hz, 2.4GHz WiFi (802.11b) + RFID – Hot Conductor



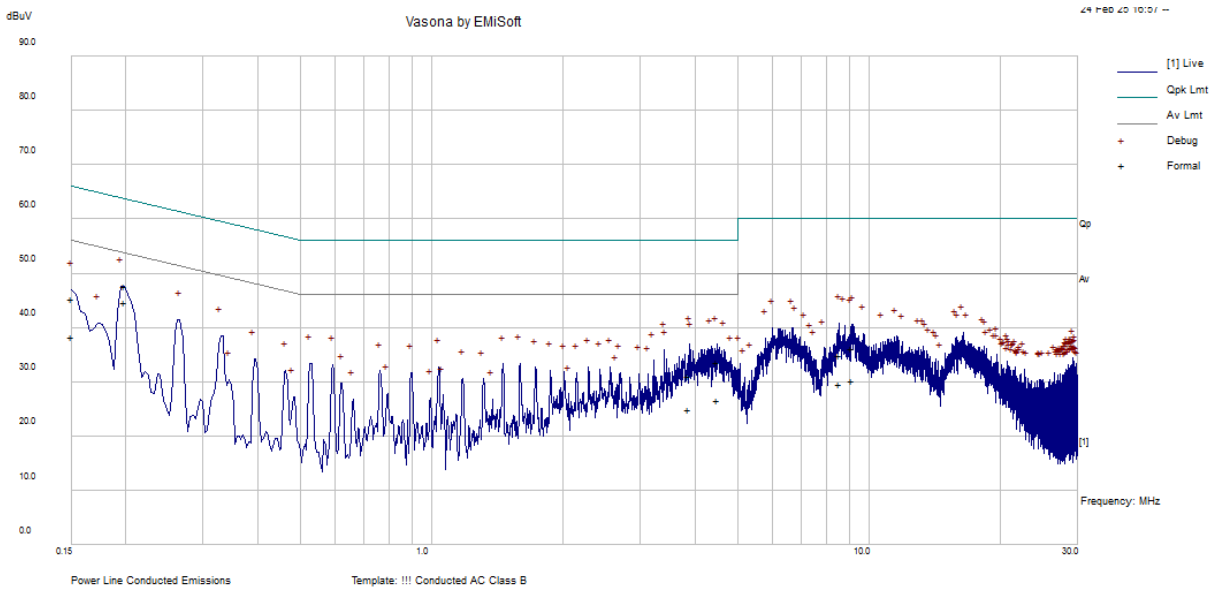
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.199001	36.25	11.38	47.63	63.65	-16.02	QP
4.320323	22.2	10.17	32.37	56	-23.63	QP
8.948232	26.58	10.24	36.82	60	-23.18	QP
4.180078	21.89	10.17	32.06	56	-23.94	QP
4.086731	21.5	10.17	31.67	56	-24.33	QP
6.179408	25.65	10.19	35.84	60	-24.16	QP
0.199001	33.3	11.38	44.68	53.65	-8.97	Ave
4.320323	15.92	10.17	26.09	46	-19.91	Ave
8.948232	20.46	10.24	30.7	50	-19.3	Ave
4.180078	15.69	10.17	25.86	46	-20.14	Ave
4.086731	15.43	10.17	25.6	46	-20.4	Ave
6.179408	20.75	10.19	30.94	50	-19.06	Ave

AC Line (via AC/DC Adapter): 120V, 60Hz, 2.4GHz WiFi (802.11b) + RFID – Neutral Conductor



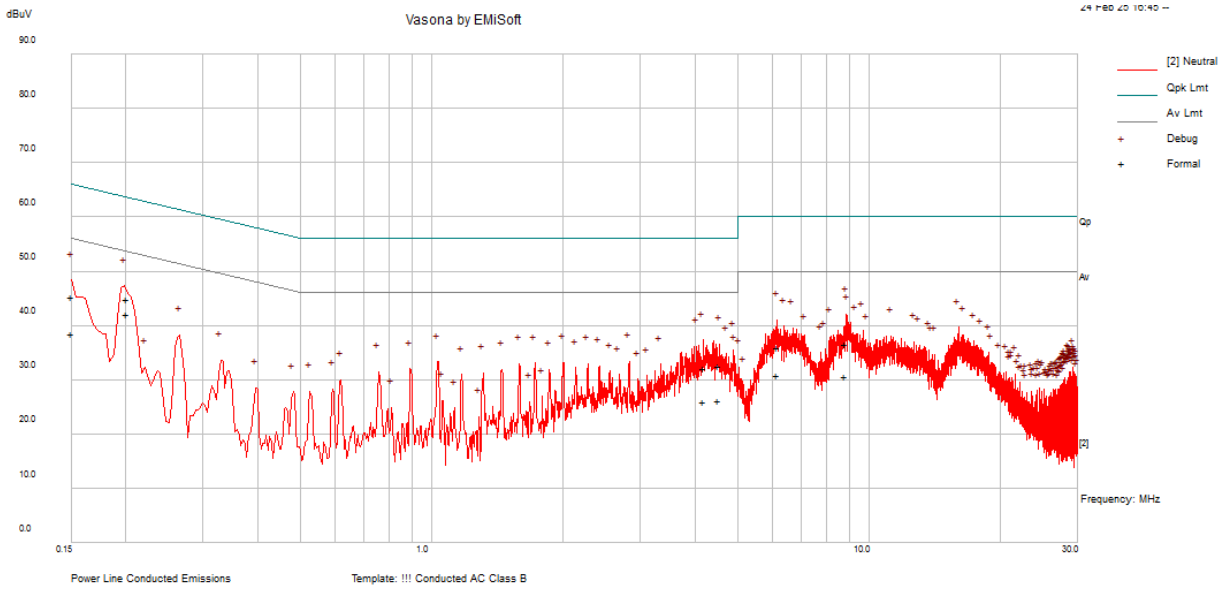
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.19932	33.77	11.37	45.14	63.64	-18.5	QP
8.854561	26.44	10.24	36.68	60	-23.32	QP
4.577448	22.07	10.18	32.25	56	-23.75	QP
4.234716	22.13	10.17	32.3	56	-23.7	QP
4.480826	22.45	10.18	32.63	56	-23.37	QP
3.949159	20.98	10.17	31.15	56	-24.85	QP
0.19932	30.12	11.37	41.49	53.64	-12.15	Ave
8.854561	20.4	10.24	30.64	50	-19.36	Ave
4.577448	15.72	10.17	25.89	46	-20.11	Ave
4.234716	16.02	10.18	26.2	46	-19.8	Ave
4.480826	16.26	10.17	26.43	46	-19.57	Ave
3.949159	14.91	10.17	25.08	46	-20.92	Ave

AC Line: 120V, 60Hz, 5GHz WiFi (802.11a) + RFID – Hot Conductor



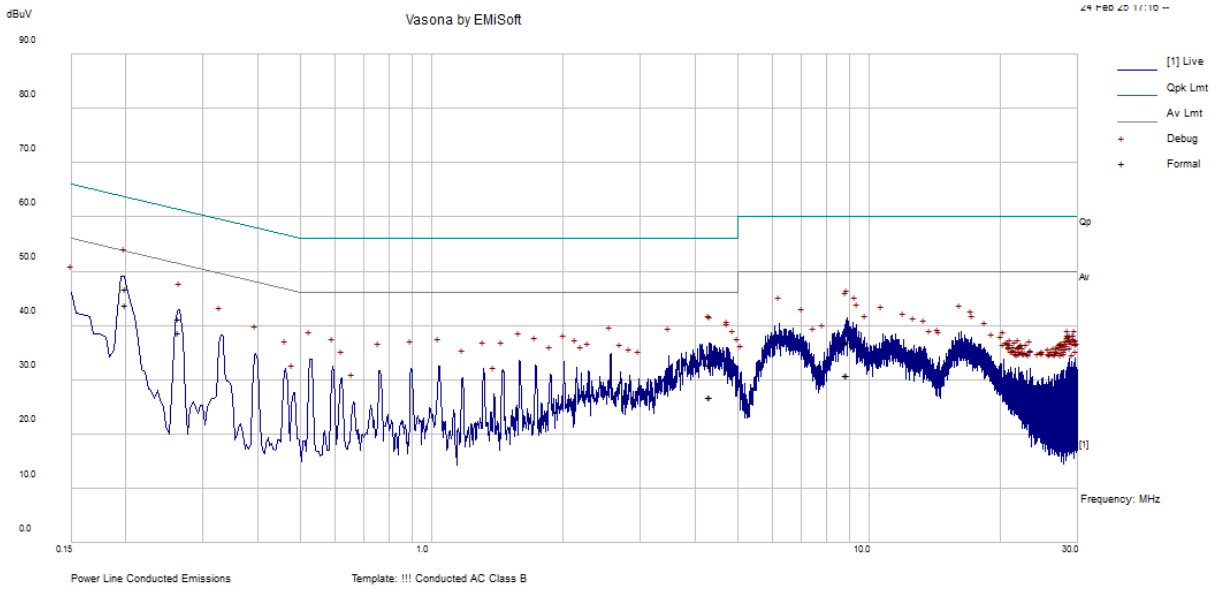
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.198666	36.22	11.39	47.61	63.67	-16.06	QP
0.15033	32.96	12.42	45.38	65.98	-20.6	QP
4.495802	23.34	10.17	33.51	56	-22.49	QP
3.86359	20.93	10.16	31.09	56	-24.91	QP
8.549584	24.69	10.23	34.92	60	-25.08	QP
9.166016	25.85	10.25	36.1	60	-23.9	QP
0.198666	33.34	11.38	44.72	53.67	-8.95	Ave
0.15033	25.85	12.42	38.27	55.98	-17.71	Ave
4.495802	16.45	10.18	26.63	46	-19.37	Ave
3.86359	14.82	10.16	24.98	46	-21.02	Ave
8.549584	19.4	10.23	29.63	50	-20.37	Ave
9.166016	19.95	10.24	30.19	50	-19.81	Ave

AC Line (via AC/DC Adapter): 120V, 60Hz, 5GHz WiFi (802.11a) + RFID – Neutral Conductor



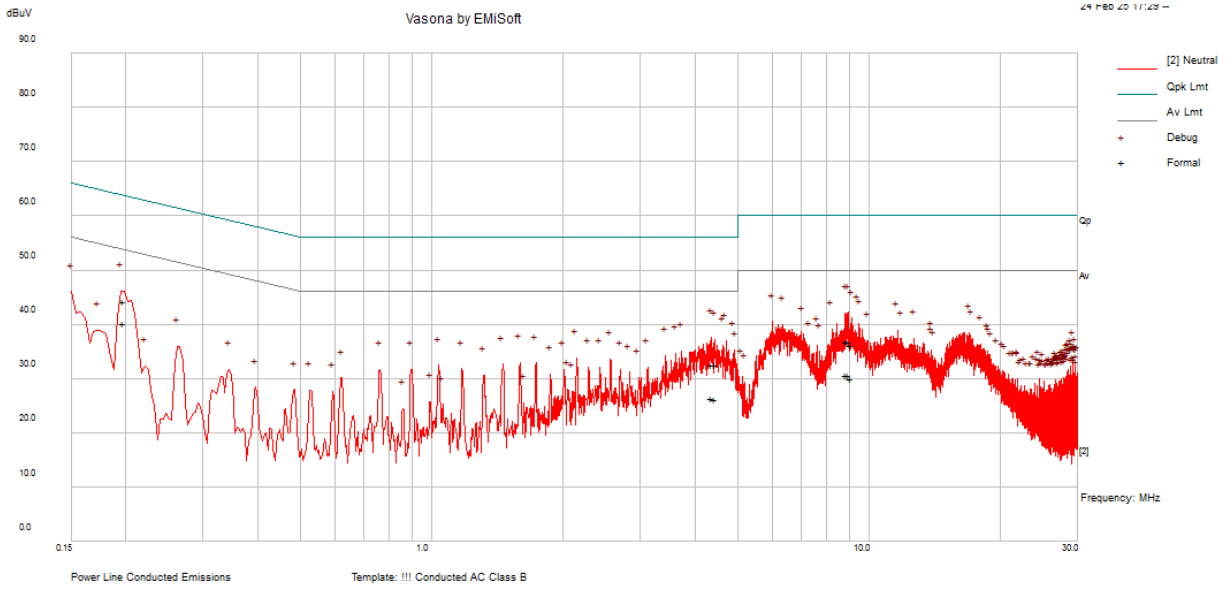
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
4.546577	21.42	10.17	31.59	56	-24.41	QP
4.158517	21.52	10.17	31.69	56	-24.31	QP
8.850118	25.79	10.24	36.03	60	-23.97	QP
6.15888	24.78	10.19	34.97	60	-25.03	QP
0.199176	32.75	11.38	44.13	63.64	-19.52	QP
0.150047	32.74	12.42	45.16	66	-20.83	QP
4.546577	15.09	10.17	25.26	46	-20.74	Ave
4.158517	15.51	10.17	25.68	46	-20.32	Ave
8.850118	19.65	10.24	29.89	50	-20.11	Ave
6.15888	19.77	10.2	29.97	50	-20.03	Ave
0.199176	28.71	11.37	40.08	53.64	-13.56	Ave
0.150047	25.97	12.43	38.4	56	-17.6	Ave

AC Line: 120V, 60Hz, Bluetooth Classic (GFKS DH1) + RFID – Hot Conductor



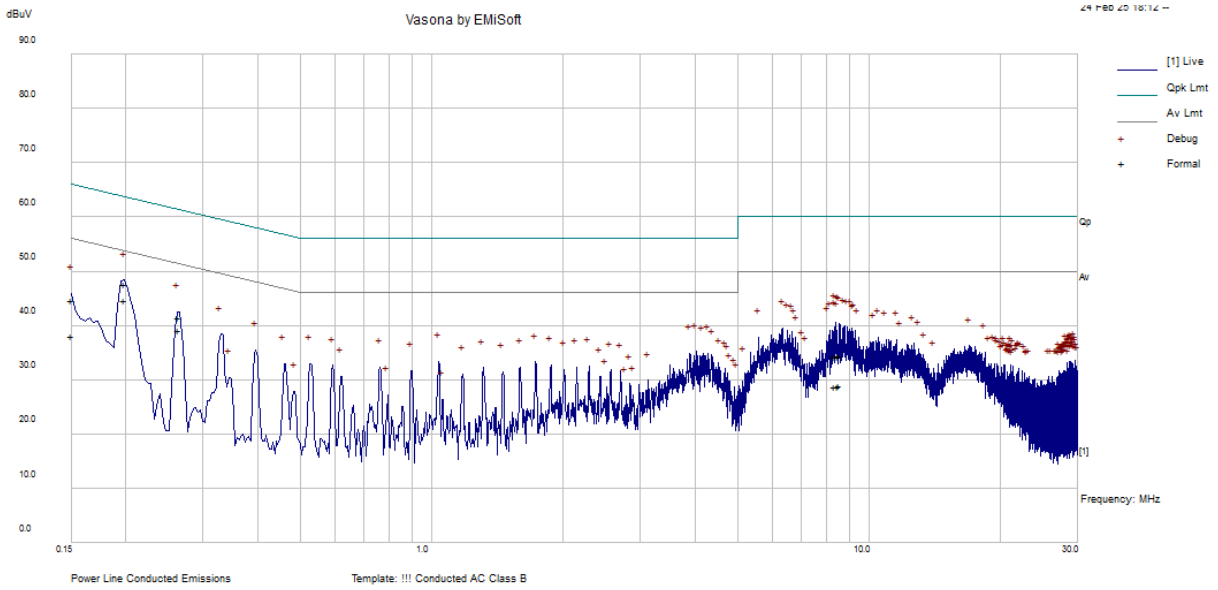
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.200418	35.38	11.36	46.74	63.59	-16.85	QP
0.263895	30.24	10.99	41.23	61.31	-20.07	QP
8.938719	26.72	10.24	36.96	60	-23.04	QP
8.872065	26.64	10.23	36.87	60	-23.13	QP
4.307574	22.55	10.17	32.72	56	-23.28	QP
4.330994	22.69	10.17	32.86	56	-23.14	QP
0.200418	32.37	11.36	43.73	53.59	-9.86	Ave
0.263895	27.8	10.99	38.79	51.31	-12.51	Ave
8.938719	20.5	10.24	30.74	50	-19.26	Ave
8.872065	20.64	10.23	30.87	50	-19.13	Ave
4.307574	16.55	10.17	26.72	46	-19.28	Ave
4.330994	16.57	10.17	26.74	46	-19.26	Ave

AC Line (via AC/DC Adapter): 120V, 60Hz, Bluetooth Classic (GFSK DH1) + RFID – Neutral Conductor



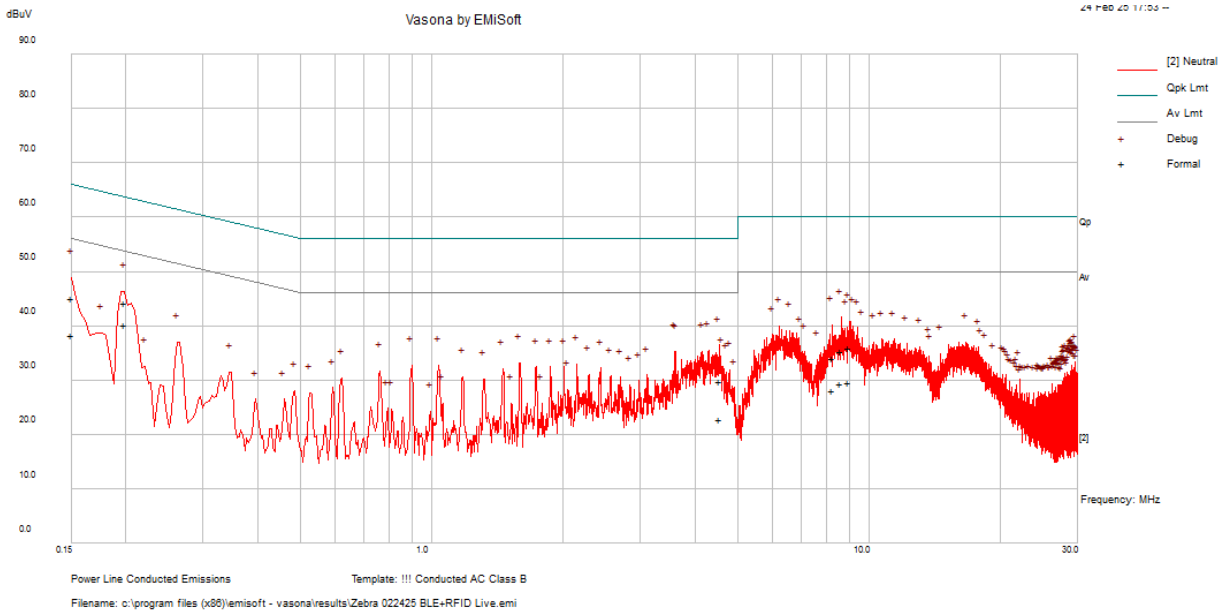
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.198018	32.9	11.4	44.3	63.69	-19.39	QP
8.970922	26.51	10.24	36.75	60	-23.25	QP
8.875345	26.47	10.24	36.71	60	-23.29	QP
4.369999	22.4	10.17	32.57	56	-23.43	QP
4.44827	22.31	10.17	32.48	56	-23.52	QP
9.107616	25.93	10.24	36.17	60	-23.83	QP
0.198018	28.7	11.39	40.09	53.69	-13.6	Ave
8.970922	20.46	10.24	30.7	50	-19.3	Ave
8.875345	20.39	10.24	30.63	50	-19.37	Ave
4.369999	16.3	10.18	26.48	46	-19.52	Ave
4.44827	15.97	10.17	26.14	46	-19.86	Ave
9.107616	19.82	10.24	30.06	50	-19.94	Ave

AC Line: 120V, 60Hz, Bluetooth LE (PHY2) + RFID – Hot Conductor



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.19896	36.27	11.38	47.65	63.65	-16.01	QP
0.264555	30.52	10.99	41.51	61.29	-19.78	QP
8.376102	23.97	10.23	34.2	60	-25.8	QP
8.511335	23.94	10.23	34.17	60	-25.83	QP
8.578519	24.19	10.23	34.42	60	-25.58	QP
0.15016	32.32	12.43	44.75	65.99	-21.24	QP
0.19896	33.38	11.38	44.76	53.65	-8.89	Ave
0.264555	28.06	10.99	39.05	51.29	-12.24	Ave
8.376102	18.45	10.23	28.68	50	-21.32	Ave
8.511335	18.44	10.23	28.67	50	-21.33	Ave
8.578519	18.68	10.23	28.91	50	-21.09	Ave
0.15016	25.56	12.43	37.99	55.99	-18.00	Ave

AC Line (via AC/DC Adapter): 120V, 60Hz, Bluetooth LE (PHY2) + RFID – Neutral Conductor



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.150098	32.7	12.43	45.13	65.99	-20.86	QP
0.198636	32.88	11.39	44.27	63.67	-19.4	QP
8.633021	24.98	10.24	35.22	60	-24.78	QP
8.99023	25.76	10.25	36.01	60	-23.99	QP
4.554642	19.67	10.17	29.84	56	-26.16	QP
8.238564	23.8	10.22	34.02	60	-25.98	QP
0.150098	25.94	12.43	38.37	55.99	-17.63	Ave
0.198636	28.79	11.39	40.18	53.67	-13.49	Ave
8.633021	19.06	10.24	29.3	50	-20.7	Ave
8.99023	19.42	10.25	29.67	50	-20.33	Ave
4.554642	12.54	10.17	22.71	46	-23.29	Ave
8.238564	17.95	10.22	28.17	50	-21.83	Ave

6 FCC §15.35(b), §15.205, §15.209, §15.247(d) & ISEDC RSS-247 §5.5, 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 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-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 ISEDC 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 (µV/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	Field Strength (micro volts/meter)	Measurement Distance (meters)
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 ISEDC 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 §15.247 and ISEDC RSS-247 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 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

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 = 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

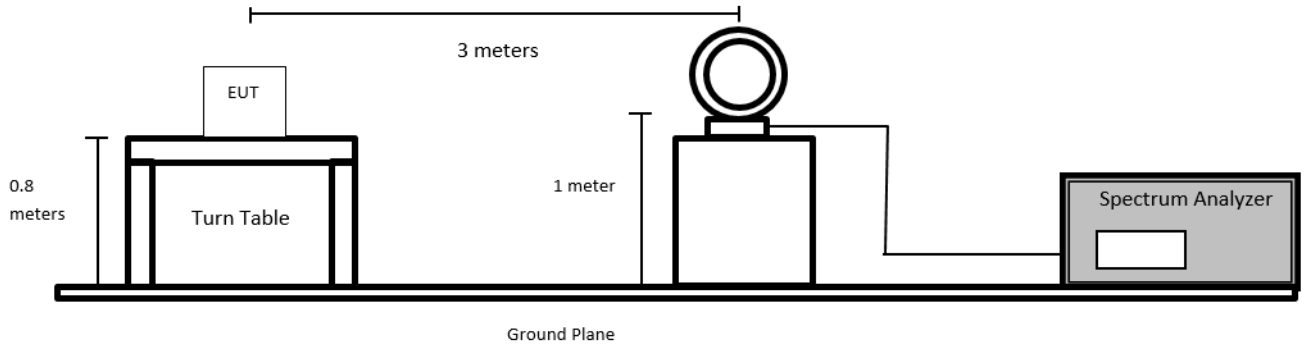
For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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:

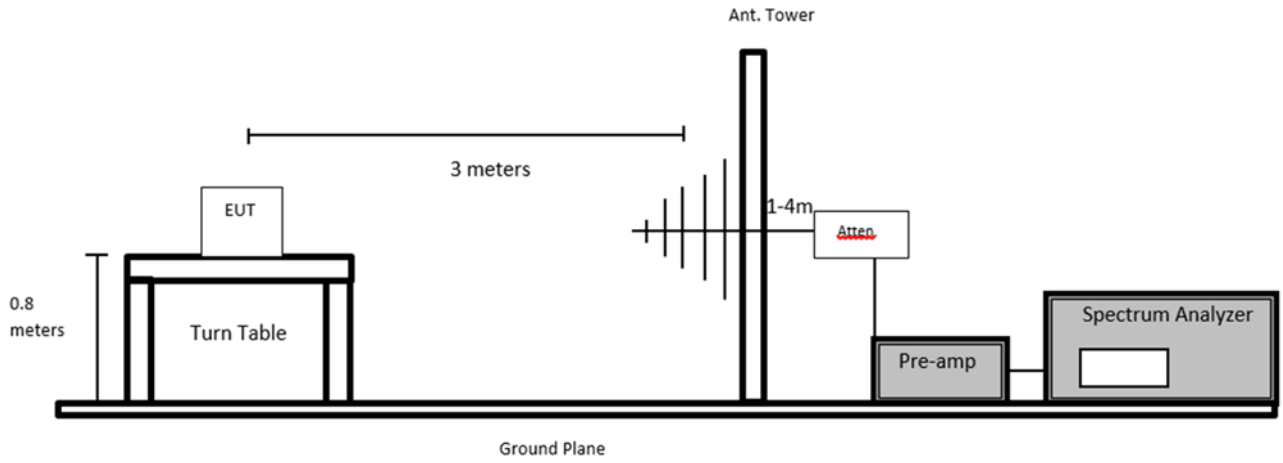
Margin = Corrected Amplitude – Limit

6.5 Test Setup Block Diagram

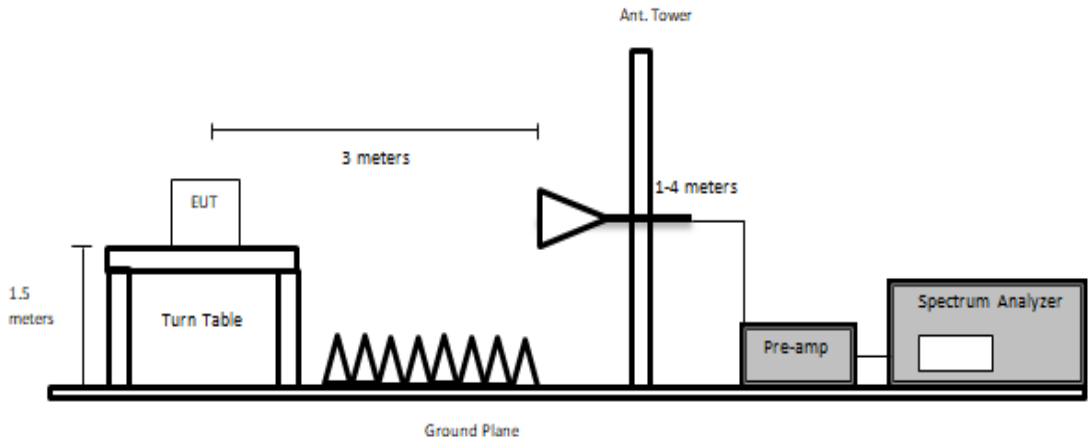
9 kHz to 30 MHz



30 MHz to 1 GHz



Above 1 GHz



6.6 Test Equipment List and Details

BACL No	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
327	Sunol Sciences	System Controller	SC110V	122303-1	N/R	N/R
1075	Sunol Sciences	Boresight Tower	TLT3	050119-7	N/R	N/R
1388	Sunol Sciences	Flush Mount Turntable	FM	112005-2	N/R	N/R
1432	Keysight Technologies	MXE EMI Receiver, Multi-touch	N9038B	MY60180008	2025-01-03	1 year
316	Sonoma Instruments	Preamplifier 10 kHz - 2.5 GHz	317	260406	2024-08-30	6 months
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2; 1504	2023-12-18	2 years
1245	-	6dB Attenuator	PE7390-6	01182018A	2023-12-18	2 years
1246	Hewlet Packard	RF Limiter	11867A	1734	2024-04-09	1 year
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
1456	Pasternack	11m LMR-400 RF Cable	PE3C0033-1100CM	NA	2025-01-27	6 months
1192	ETS Lindgren	Horn Antenna	3117	218973	2024-10-23	2 years
1397	Mini Circuit	CBL ASSY 2.92MM PLUG TO PLUG 12"	FL086-12KM+	QN2318110-2318	2024-08-16	6 months
1449	BACL	Preamplifier	BACL1313-A100M18G	4052472	2024-08-19	6 months
90	Wisewave	Horn Antenna	ARH-4223-02	10555-01	2023-05-02	2 years
1394	Mini Circuit	CBL ASSY 2.92MM PLUG TO PLUG 12"	FL086-12KM+	QN2318110-2318	2024-08-16	6 months
1451	BACL	Preamplifier	BACL-1313-A1840	4052432	2024-08-16	6 months
1334	Micro-Tronics	Notch Filter	BRM50702	G361	2024-12-31	1 year
387	Micro-Tronics	Notch Filter	BRC50703	6	2024-03-06	1 year
92	Wisewave	Horn Antenna	ARH-2823-02	10555-01	2024-06-26	2 years
393	Com-Power	Loop Antenna, 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:	18.9 to 19.3 ºC
Relative Humidity:	52 to 59 %
ATM Pressure:	102.6 kPa

The testing was performed by Michael Papa from 2024-02-06 to 2025-02-12 in 5m chamber 3.

6.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.209, 15.247 and ISEDC RSS-247 standards' radiated emissions limits, and had the worst margin of:

Worst Case – Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Configuration**
-2.13	268.27	Vertical	Bluetooth LE, 2402 MHz + RFID

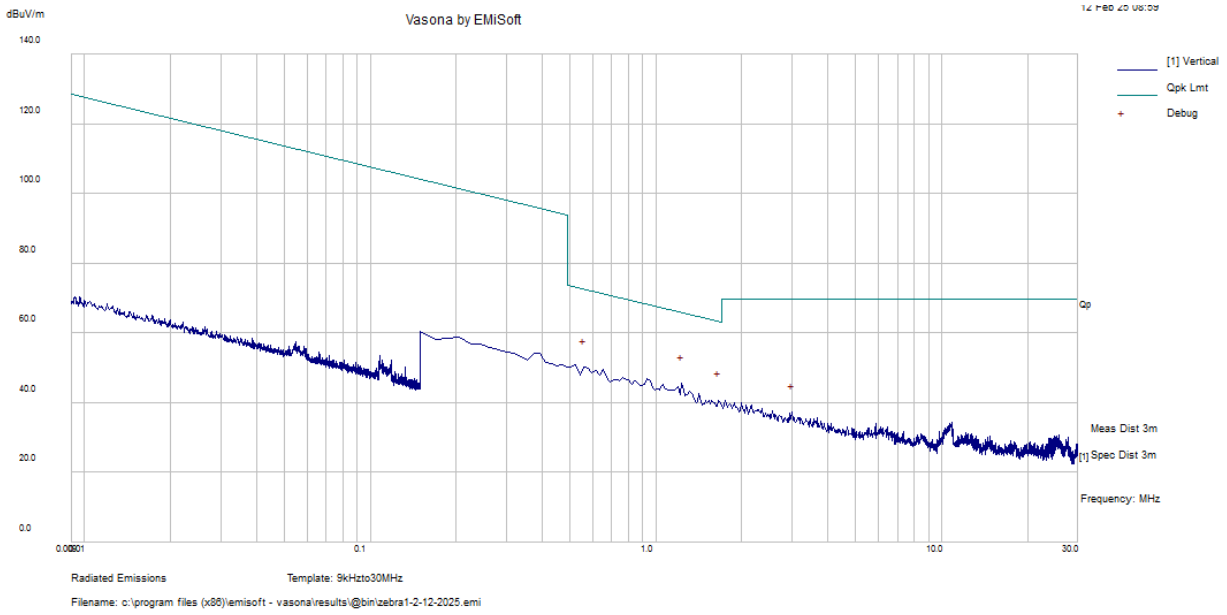
Please refer to the tables and plots in the next section for detailed test results.

6.9 Radiated Emissions Test Results

Note: *Pre-scan was performed in order to determine worst-case orientation of device with respect to measurement antenna in the X/Y/Z axis. Plots/data shown represent measurements made in worst-case orientation.*

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

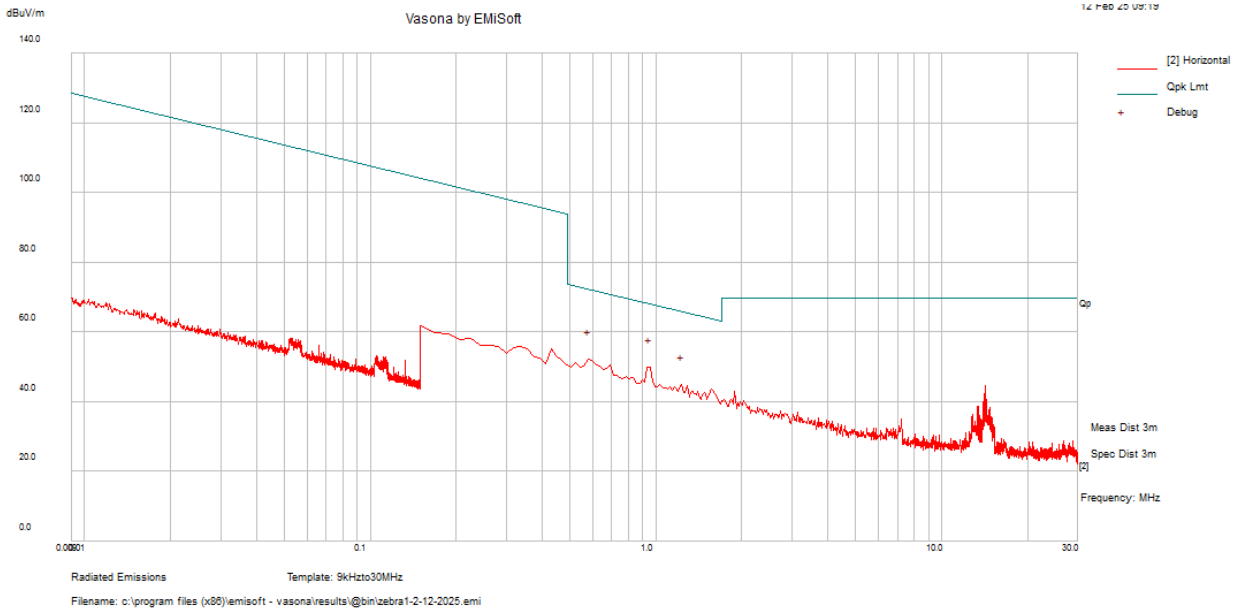
2.4GHz WiFi (802.11b), 2437MHz + RFID, Parallel



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1.232063	35.33	10.13	45.46	65.79	-20.33	Peak
1.661156	30.44	10.26	40.7	63.2	-22.49	Peak
0.560438	39.88	10.18	50.06	72.64	-22.58	Peak
3.004406	26.77	10.41	37.18	69.54	-32.36	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

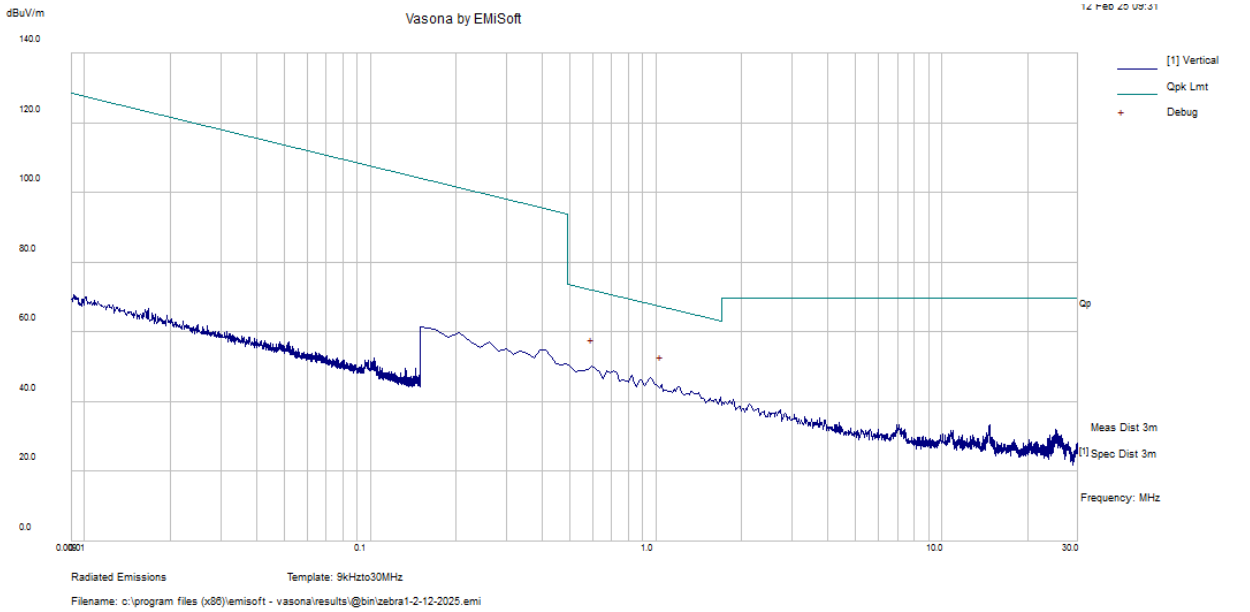
2.4GHz WiFi (802.11b), 2437MHz + RFID, Perpendicular



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
0.952219	39.79	10.06	49.85	68.03	-18.18	Peak
0.579094	42.02	10.17	52.19	72.35	-20.16	Peak
1.232063	34.82	10.14	44.96	65.79	-20.83	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

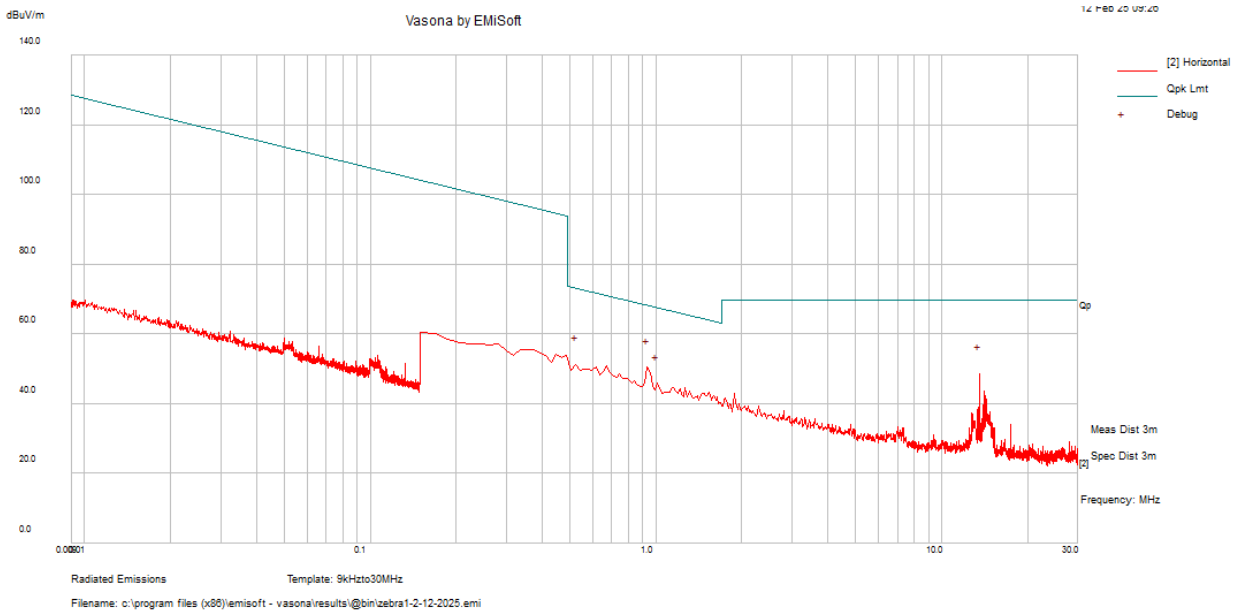
5GHz WiFi (802.11a), 5180MHz + RFID, Parallel



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
0.59775	39.96	10.17	50.13	72.08	-21.95	Peak
1.0455	34.81	10.07	44.88	67.22	-22.34	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

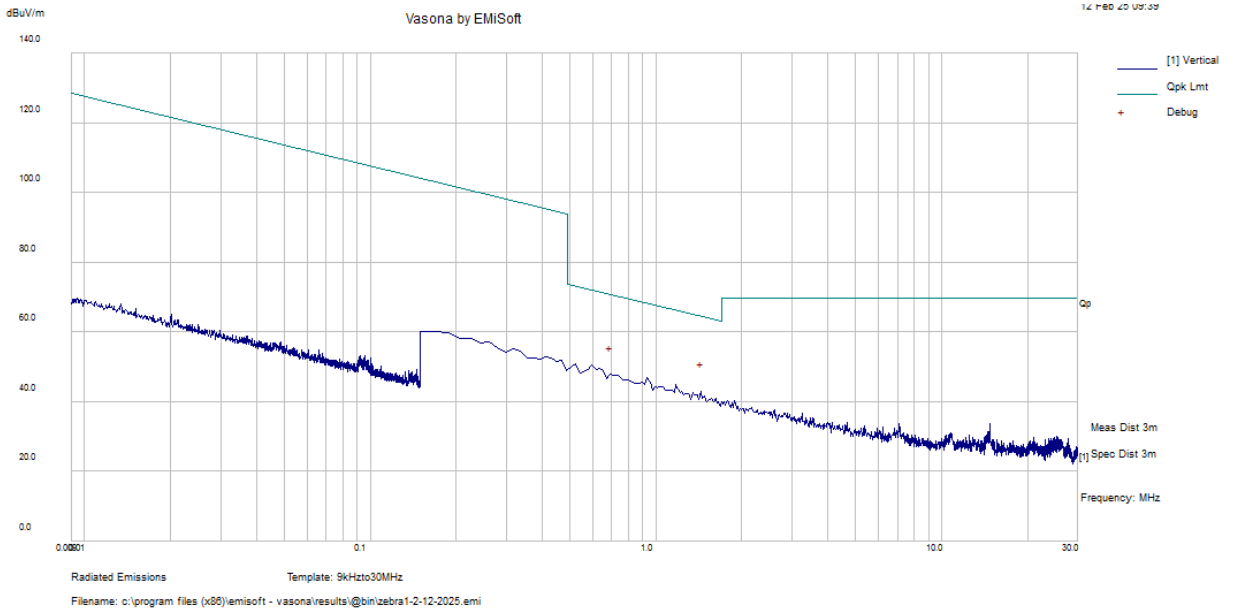
5GHz WiFi (802.11a), 5180MHz + RFID, Perpendicular



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
0.933563	40.41	10.05	50.46	68.2	-17.74	Peak
13.56384	38.23	10.45	48.68	69.54	-20.86	Peak
1.008188	35.72	10.06	45.78	67.53	-21.76	Peak
0.523125	41.12	10.18	51.3	73.23	-21.93	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

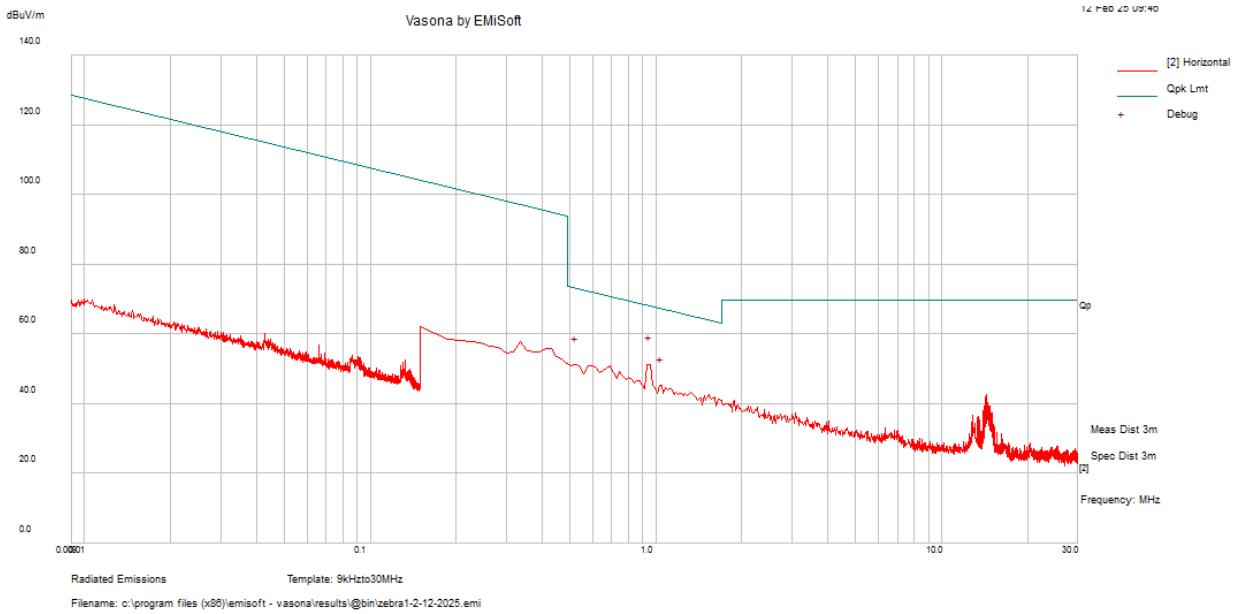
Bluetooth LE (PHY2), 2402 MHz + RFID, Parallel



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1.437281	32.74	10.21	42.95	64.45	-21.51	Peak
0.691031	37.58	10.13	47.71	70.82	-23.1	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

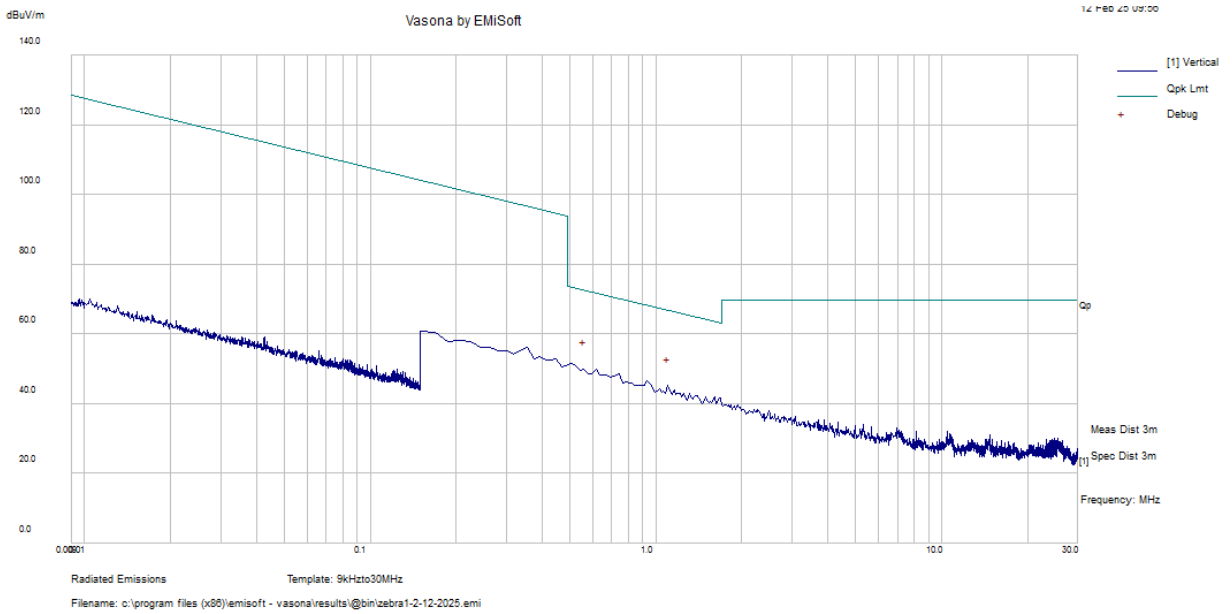
Bluetooth LE (PHY2), 2402 MHz + RFID, Perpendicular



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
0.952219	41.08	10.05	51.13	68.03	-16.90	Peak
1.0455	35.1	10.07	45.17	67.22	-22.05	Peak
0.523125	40.93	10.19	51.12	73.23	-22.11	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

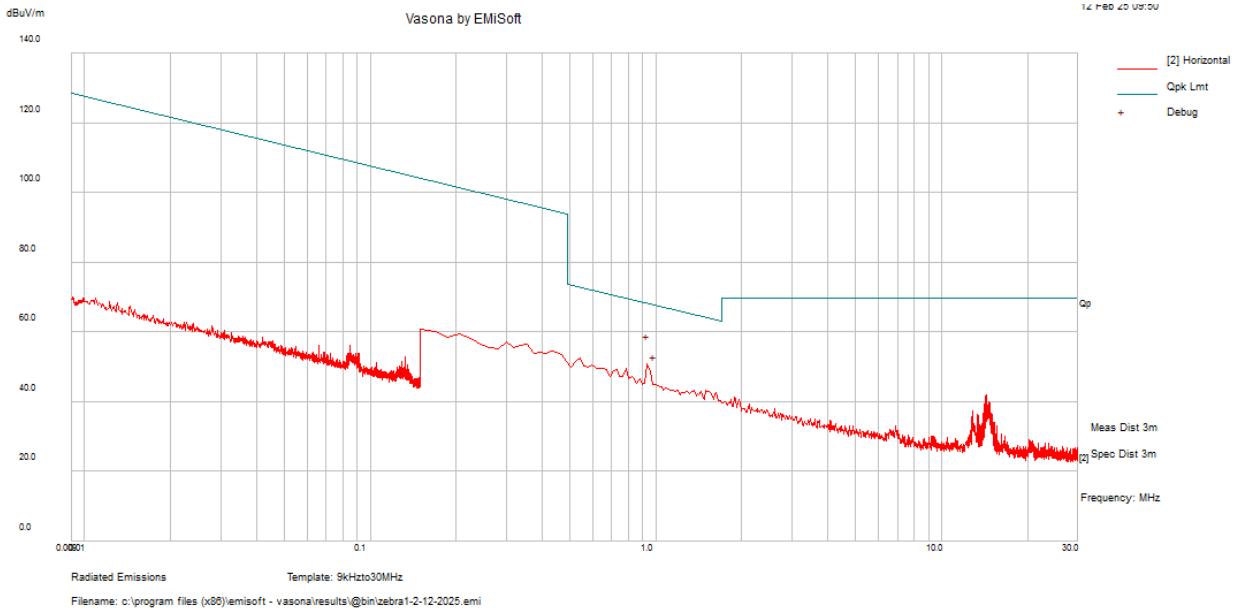
Bluetooth Classic (GFSK DH1), 2402 MHz + RFID, Parallel



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1.101469	34.97	10.10	45.07	66.77	-21.70	Peak
0.560438	39.8	10.18	49.98	72.64	-22.66	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

Bluetooth Classic (GFSK DH1), 2402 MHz + RFID, Perpendicular

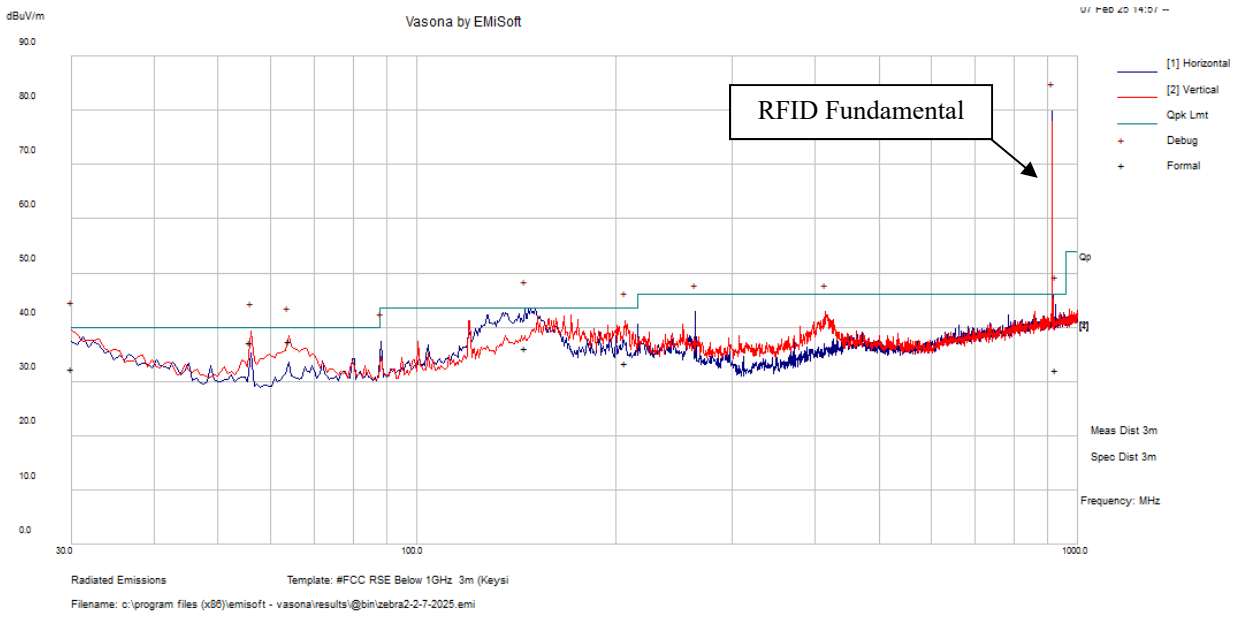


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
0.933563	40.94	10.06	51	68.2	-17.20	Peak
0.989531	34.84	10.05	44.89	67.7	-22.81	Peak

Note: Peak emissions are compared to QP limits to show worst-case compliance.

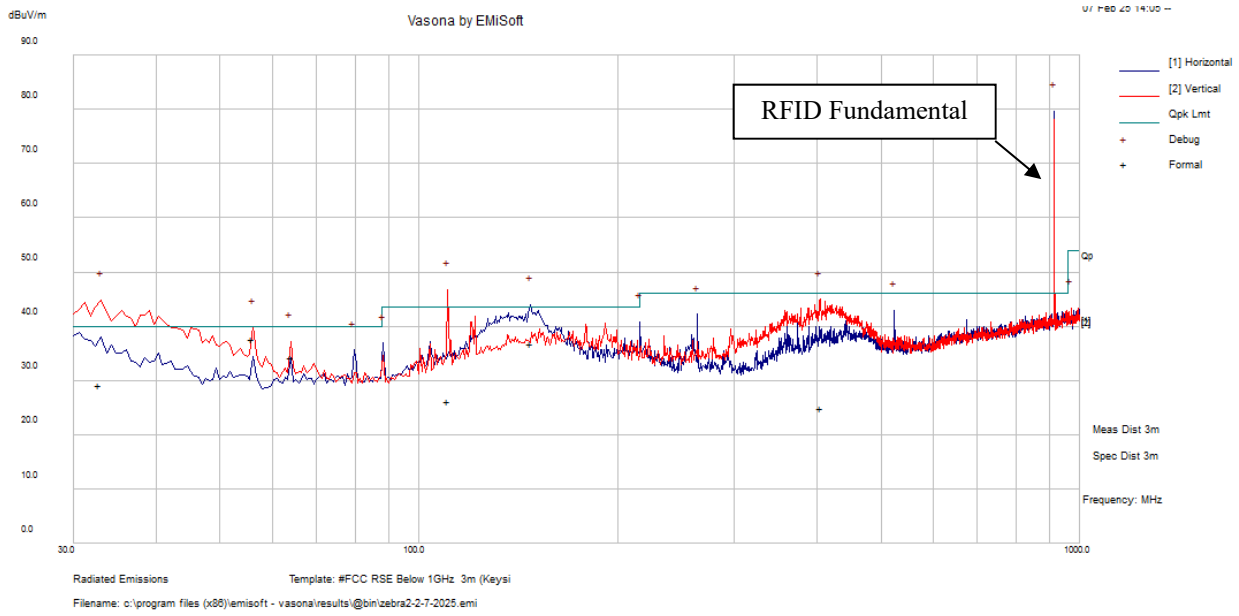
2) 30 MHz – 1 GHz, Measured at 3 meters

2.4GHz WiFi (802.11b), 2437MHz + RFID



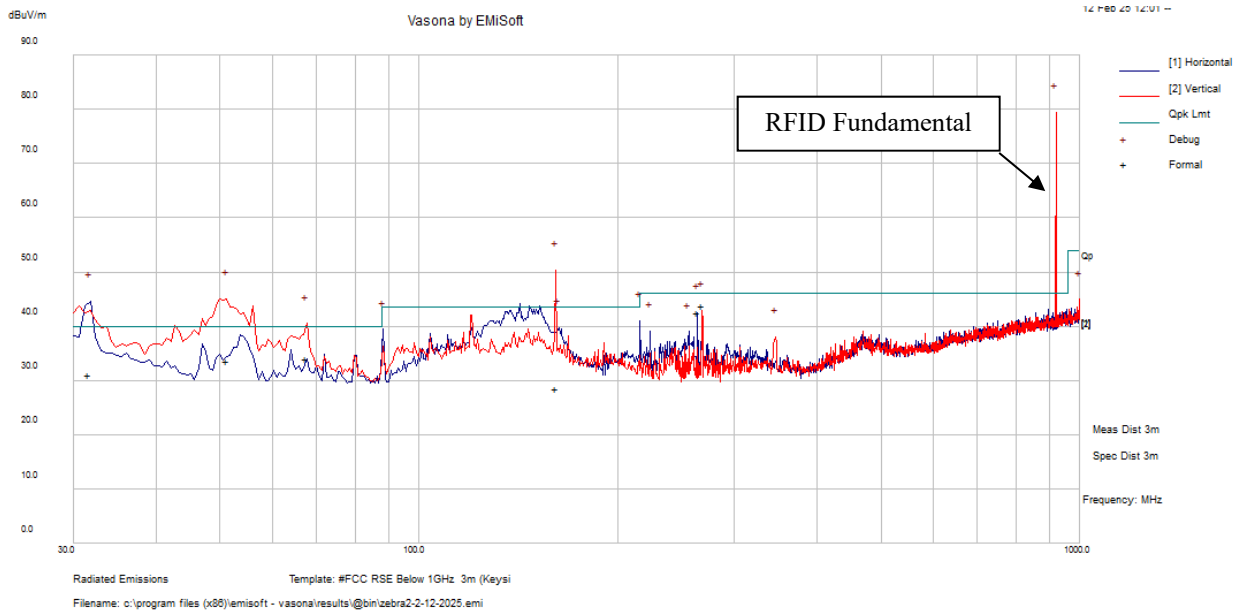
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
145.8034	43.92	-7.84	36.08	299	H	74	43.5	-7.42	QP
30.01636	33.02	-0.6	32.42	145	V	15	40	-7.58	QP
55.99781	51.02	-13.86	37.16	166	V	352	40	-2.84	QP
64.01375	50.58	-13.2	37.38	123	V	17	40	-2.62	QP
925.8103	28.08	4.14	32.22	295	H	37	46	-13.78	QP
206.5228	42.98	-9.57	33.41	112	V	154	43.5	-10.09	QP

5GHz WiFi (802.11a), 5180MHz + RFID



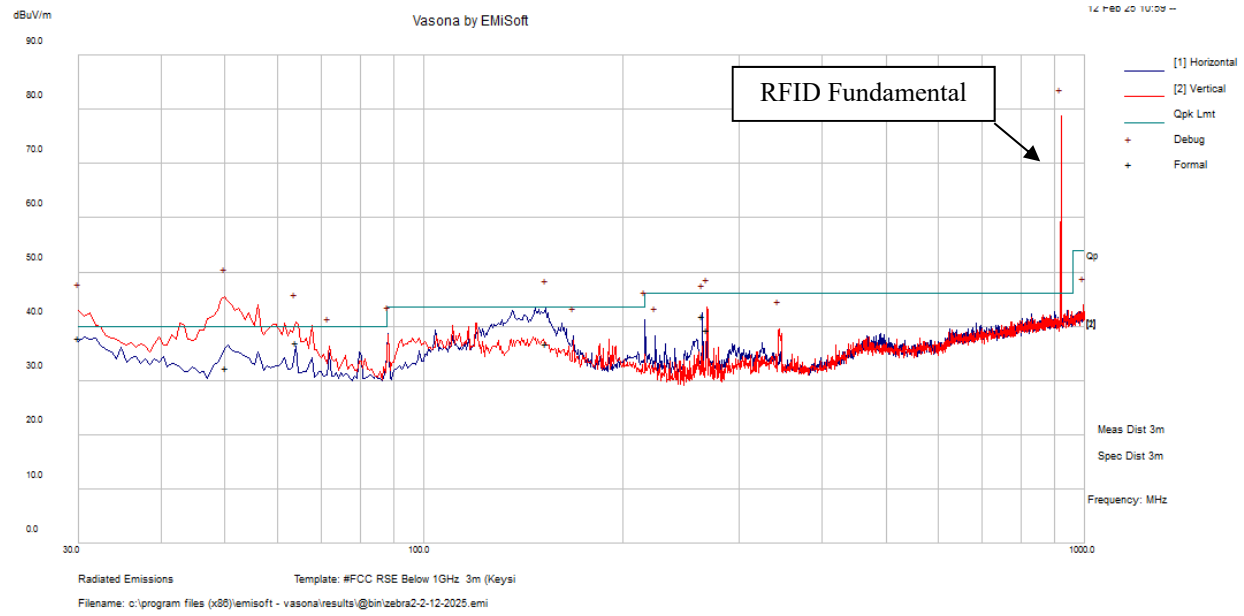
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
32.84063	31.8	-2.74	29.06	265	V	248	40	-10.94	QP
110.7766	33.9	-7.77	26.13	212	V	333	43.5	-17.38	QP
147.7169	44.73	-7.89	36.84	193	H	84	43.5	-6.66	QP
55.99813	51.5	-13.86	37.64	104	V	352	40	-2.36	QP
404.7638	28.89	-4.03	24.86	162	V	341	46	-21.14	QP
64.005	47.46	-13.2	34.26	154	V	7	40	-5.74	QP

Bluetooth LE (PHY2), 2402 MHz + 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
51.19938	47.24	-13.55	33.69	102	V	104	40	-6.31	QP
67.60594	46.93	-12.99	33.94	207	V	177	40	-6.06	QP
268.2744	**51.07**	**-7.2**	**43.87**	**104**	**V**	**137**	**46**	**-2.13**	**QP**
264.0097	50.02	-7.53	42.49	114	H	96	46	-3.51	QP
31.71094	33.06	-1.93	31.13	270	H	340	40	-8.87	QP
161.1716	36.65	-8.24	28.41	300	V	289	43.5	-15.09	QP

Bluetooth Classic (GFSK DH1), 2402 MHz + RFID



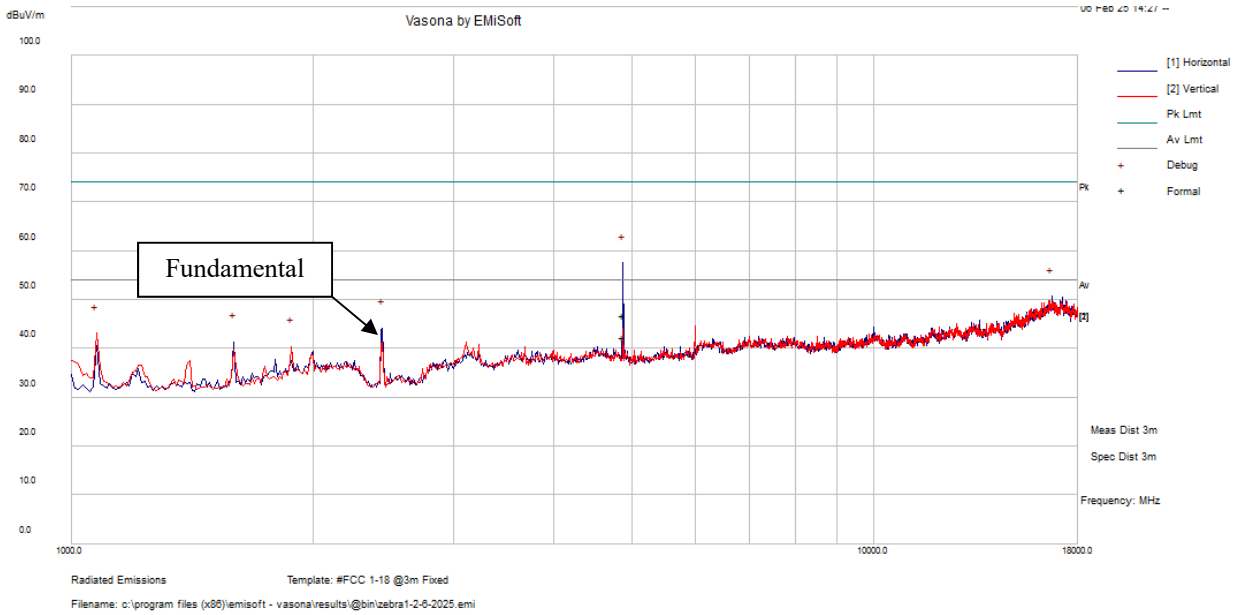
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
50.18344	45.63	-13.4	32.23	240	V	305	40	-7.77	QP
30.01015	38.42	-0.59	37.83	122	V	169	40	-2.17	QP
63.99156	50.15	-13.2	36.95	124	V	73	40	-3.05	QP
153.0588	44.82	-8.09	36.73	284	H	208	43.5	-6.77	QP
268.2938	46.47	-7.2	39.27	110	V	155	46	-6.73	QP
264.0094	49.51	-7.53	41.98	112	H	101	46	-4.02	QP

FCC/IC Limits for 1 GHz to 40 GHz			
Applicability	**(dBm)**	**(uV/m at 3meters)**	**(dBuV/m at 3meters)**
Restricted Band Average Limit	-	500	54[2]
Restricted Band Peak Limit[1]	-	-	74

Note 1: Restricted Band Peak Limit is defined to be 20dB higher than Average Limit.
Note 2: Above 1GHz limit calculation:
dBuV/m = 20*log(V/m) + 120 = 20*log((500 [uV/m]/1000000)) + 120 = 54 [dBuV/m]

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

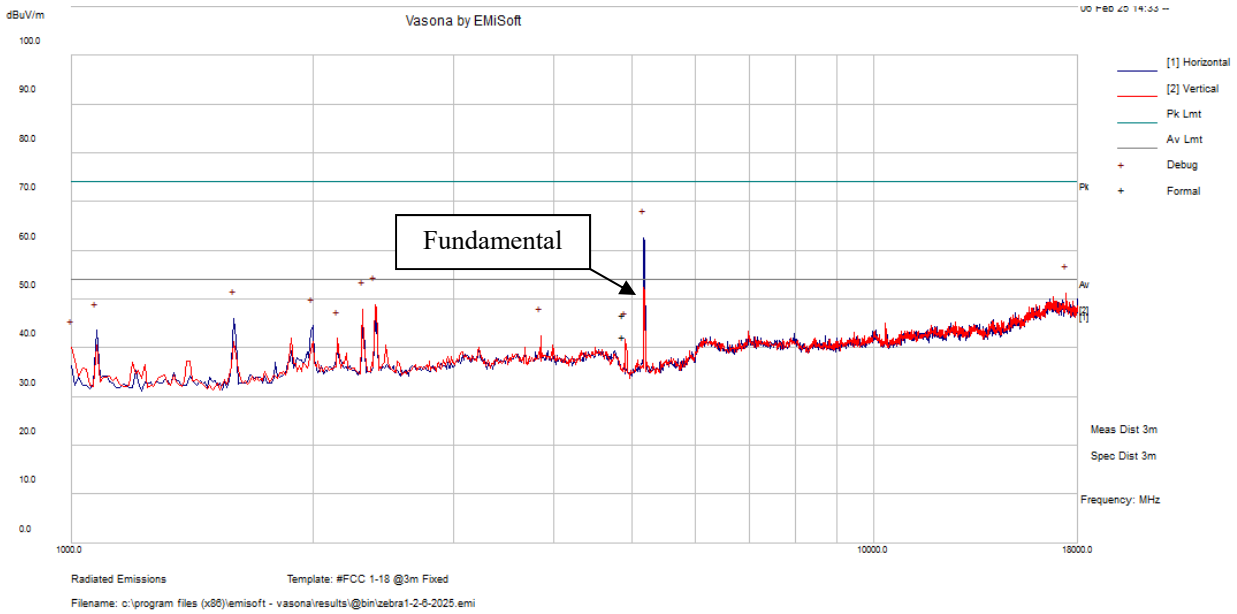
2.4GHz WiFi (802.11b), 2437MHz + RFID



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
4876.87	47.8	-1.06	46.74	194	H	171	74	-27.26	Peak
4876.87	43.47	-1.06	42.41	194	H	171	54	-11.59	Average

Note: The plot above shows that all peak emissions passed the average limits.

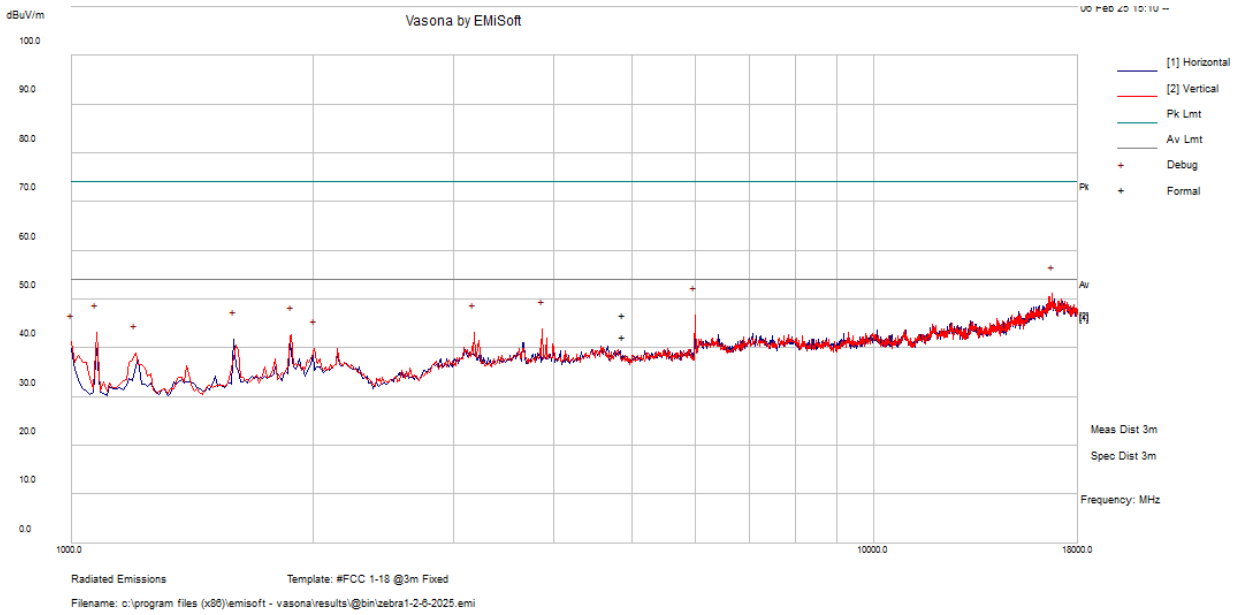
5GHz WiFi (802.11a), 5180MHz + RFID



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
17415.63	34.51	16.7	51.21	V	54	-2.80	Peak
2391.875	53.48	-4.57	48.91	V	54	-5.09	Peak
2306.875	52.95	-4.95	48	V	54	-6.00	Peak
1595	54.49	-8.5	45.99	H	54	-8.01	Peak
1998.75	49.14	-4.62	44.52	H	54	-9.48	Peak
1074.375	53.76	-10.18	43.58	H	54	-10.42	Peak

Note: The plot above shows that all peak emissions passed the average limits.

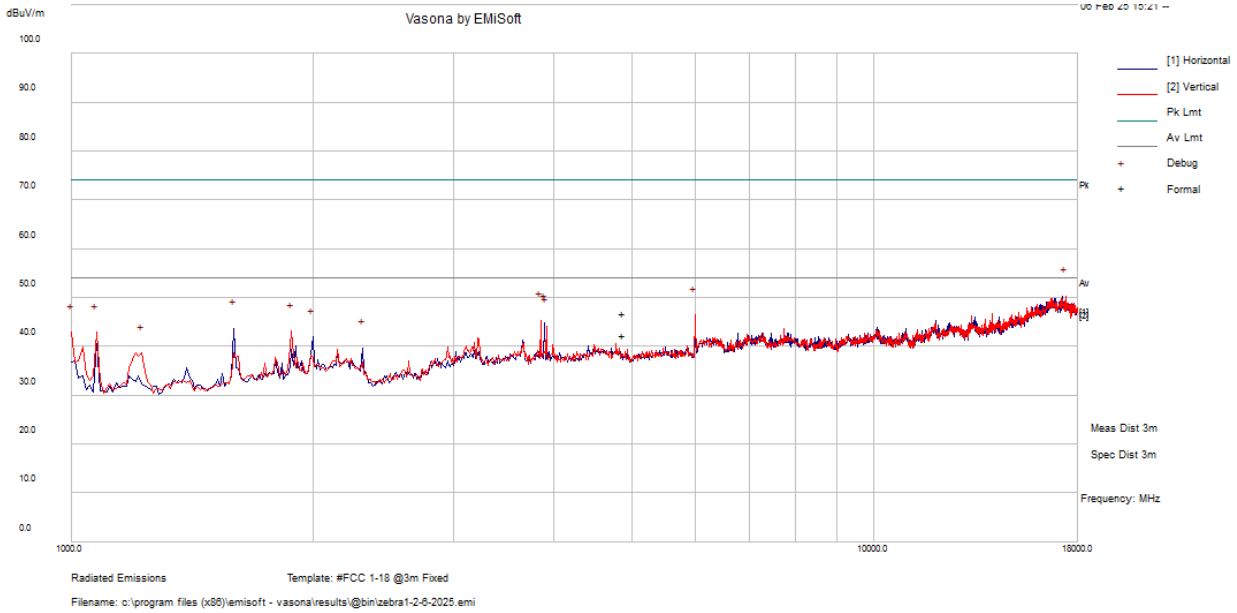
Bluetooth LE (PHY2), 2402 MHz + RFID



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
16714.38	33.94	17.17	51.11	V	54	-2.89	Peak
5993.75	46.48	0.29	46.77	V	54	-7.23	Peak
3868.75	45.09	-1.17	43.92	V	54	-10.08	Peak
3178.125	44.77	-1.51	43.26	V	54	-10.74	Peak
1074.375	53.37	-10.18	43.19	V	54	-10.81	Peak
1881.875	47.85	-5.12	42.73	V	54	-11.27	Peak

Note: The plot above shows that all peak emissions passed the average limits.

Bluetooth Classic (GFSK DH1), 2402 MHz + RFID

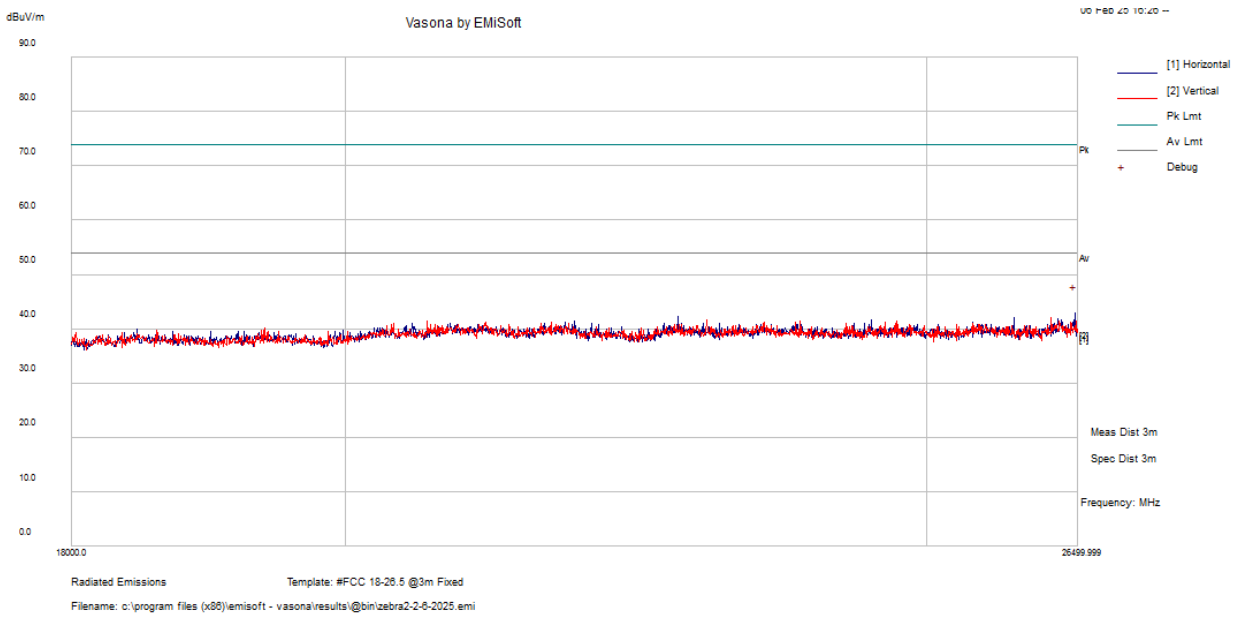


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
17373.13	33.69	16.59	50.28	V	54	-3.72	Peak
5993.75	46.12	0.29	46.41	V	54	-7.59	Peak
3847.5	46.5	-1.22	45.28	V	54	-8.72	Peak
3890	45.99	-1.12	44.87	H	54	-9.13	Peak
3911.25	45.23	-1.14	44.09	V	54	-9.91	Peak
1595	52.21	-8.5	43.71	H	54	-10.29	Peak

Note: The plot above shows that all peak emissions passed the average limits.

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

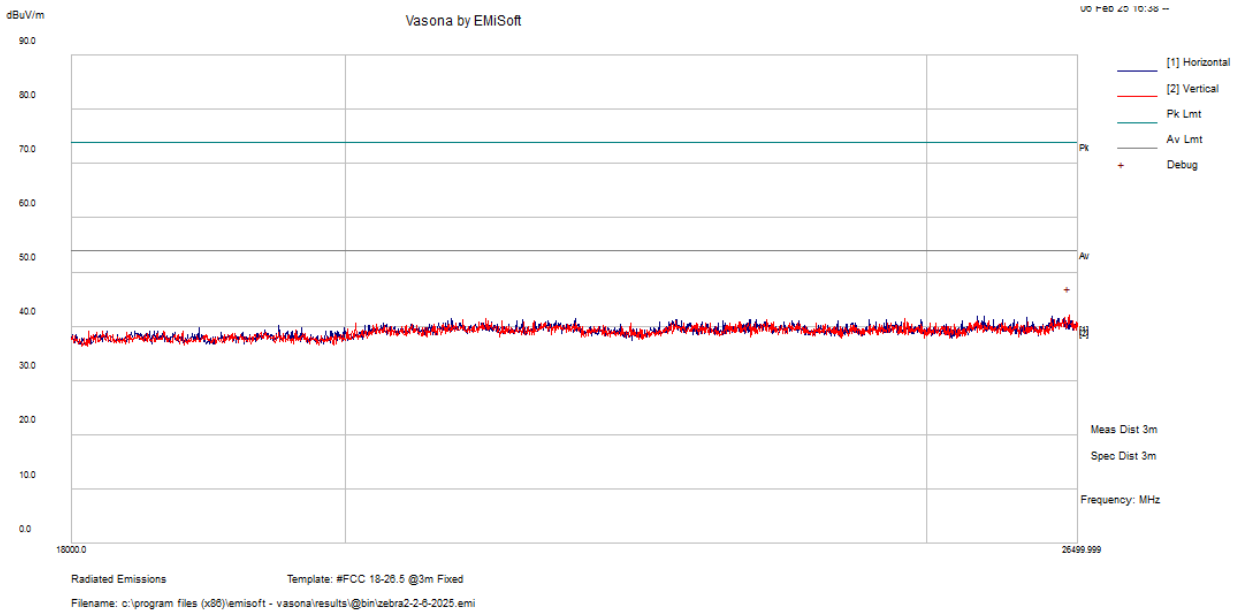
2.4GHz WiFi (802.11b), 2437MHz + RFID



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
26468.12	39.61	3.20	42.81	H	54	-11.19	Peak

Note: The plot above shows that all peak emissions passed the average limits.

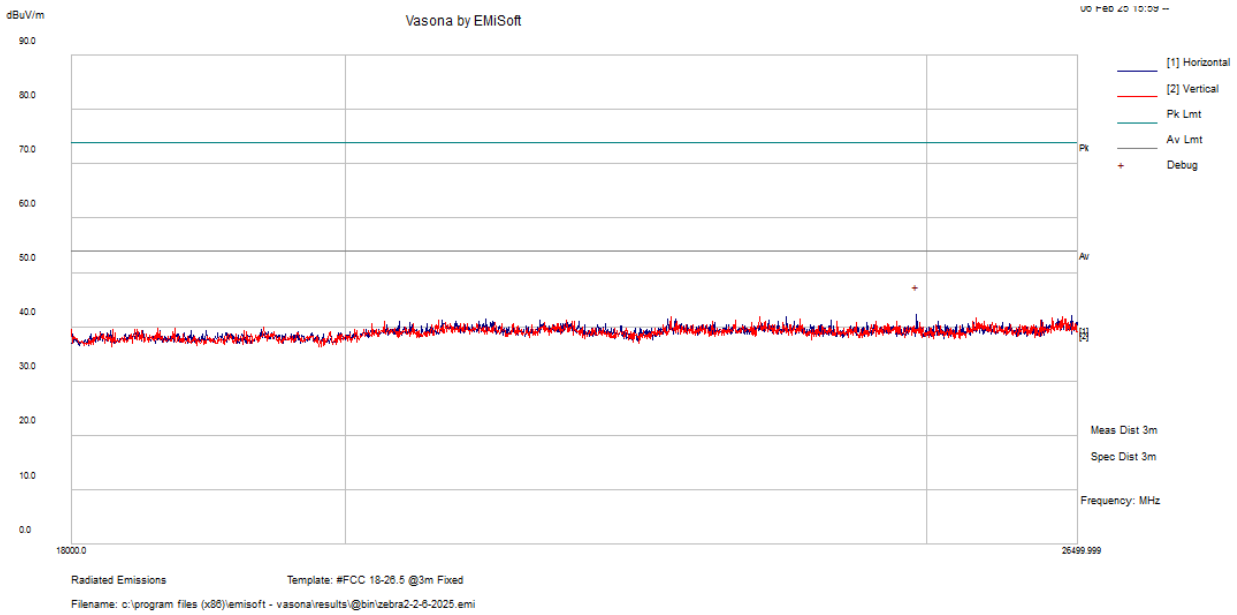
5GHz WiFi (802.11a), 5180MHz + RFID



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
26409.69	38.76	3.23	41.99	V	54	-12.01	Peak

Note: The plot above shows that all peak emissions passed the average limits.

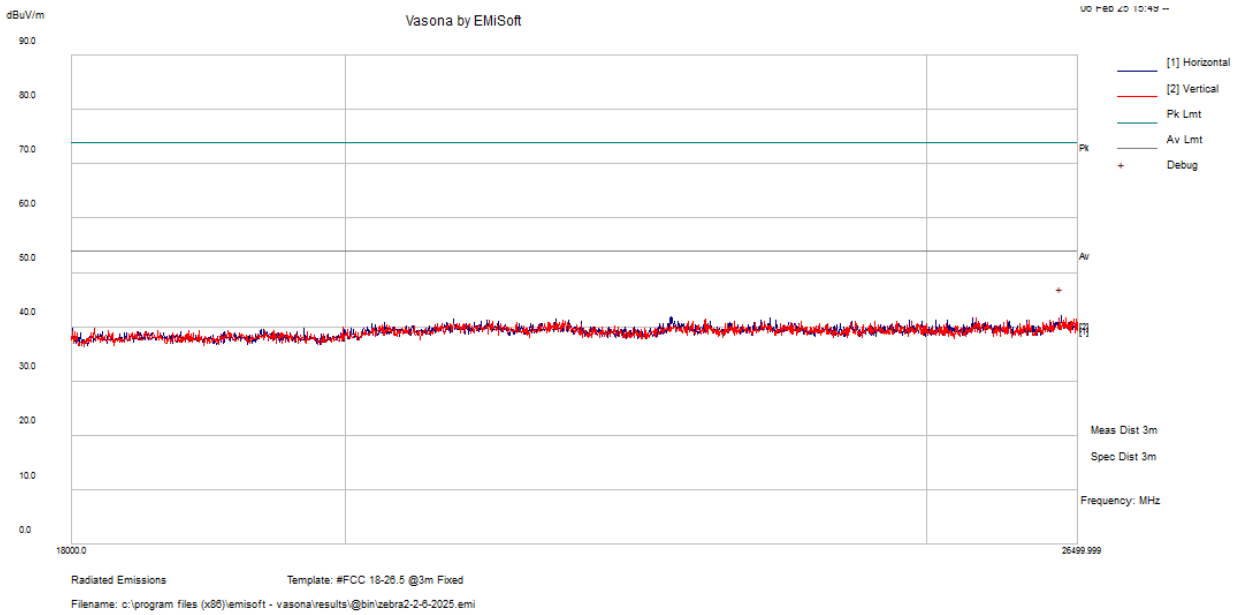
Bluetooth LE (PHY2), 2402 MHz + RFID



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
24906.25	40.54	1.75	42.29	H	54	-11.71	Peak

Note: The plot above shows that all peak emissions passed the average limits.

Bluetooth Classic (GFSK DH1), 2402 MHz + RFID

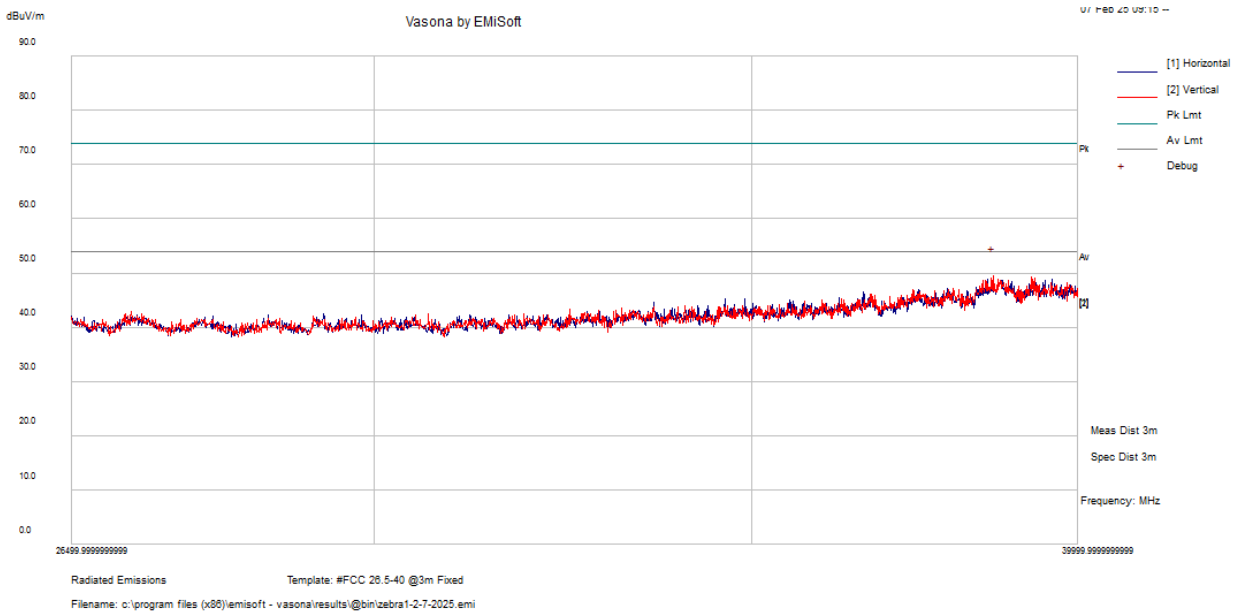


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
26330	38.82	3.13	41.95	H	54	-12.05	Peak

Note: The plot above shows that all peak emissions passed the average limits.

5) 26.5 GHz – 40 GHz, Measured at 3 meter

5GHz WiFi (802.11a), 5180MHz + RFID



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Limit (dBµV/m)	Margin (dB)	Detector
38633.13	38.08	11.49	49.57	V	54	-4.43	Peak

Note: The plot above shows that all peak emissions passed the average limits.

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 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 13th day of September 2024.

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

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