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

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	**Product Type:** RFID Module
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Report Number:	R2307262-247
Report Date:	2023-09-01
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ACCREDITED
CERTIFICATE #3297.02

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2307262-247	Class II Permissive Change	2023-09-01

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report was 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 RFID module. The EUT was installed in host device model number: ZT411 (similar model: ZT421). After pre-testing, ZT411 was determined to reflect worst-case results and thus chosen for formal testing.

1.2 Mechanical Description of the EUT

The EUT Host enclosure (ZT411) dimension measured approximately 40.0 cm (L) x 27.0 cm (W) x 32.0 cm (H) and weights approximately 15.85 kg.

The data gathered was from a production sample provided by Zebra Technologies Corporation with S/N: R2307262-1

1.3 Objective

This report was 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 2, February 2017.

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

This project is a Permissive Change II submission for the purpose of enabling colocation with a WiFi/BT module (FCC ID: I28MD-FXLAN11AC, IC: 3798B-FXLAN11AC) and a BT module (FCC ID: I28-ZBRZQ3BT, IC: 3798B-ZBRZQ3BT) separately.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance 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	±0.86 dB
Power Spectral Density, conducted	±0.86 dB
Unwanted Emissions, conducted	±2.76 dB
All emissions, radiated	±4.94 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-1, 3062A-2, and 3062A-3.

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

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

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2017 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 17025:2017 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 17025:2017 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

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

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

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

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

- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

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

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

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

5 Other
- For Water Coolers (ver. 3.0)

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

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 558074 D01 DTS Meas Guidance v05r02.

2.2 EUT Exercise Software

The test software used 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	Frequency (MHz)
RE40	Default	902.75
FXLAN11AC	BDR	2402
FXLAN11AC	802.11b	2412
FXLAN11AC	802.11n40	5550
ZBRZQ3BT	EDR	2402

2.3 Equipment Modifications

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

3 Summary of Test Results

Results reported relate only to the product tested.

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 §15.207 ISEDC RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
FCC §15.209, §15.247(d) ISEDC RSS-247 §5.5 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.

Note: UZ7RE40 module information was referenced from previous report: "FR051819", issued by Sporton International Inc. EMC & Wireless Communications Laboratory on 2020-07-15.

Note: I28-ZBRZQ3BT module information was referenced from previous report: "FCC_RF_SL17060501-ZBR-021-BLE_Rev2.0" issued by SIEMIC Laboratories on 2017-08-18.

Note: I28MD-FXLAN11AC module information was referenced from previous report: "FCC_RF_S15072901-ZBR-024_UNII Rev. 2.0", "FCC_RF_S15072901-ZBR-024_DTS Rev. 2.0", "FCC_RF_S15072901-ZBR-024_DSS Rev. 2.0" issued by SIEMIC Laboratories on 2015-11-20.

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 isotropically 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 Description

External/Internal/ Integral	Part Number	Antenna Type	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
Internal	-	Loop	900-930 MHz	-30

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

5.1 Applicable Standards

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

Limits for General Population/Uncontrolled Exposure

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

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

According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation — RF Exposure Evaluation

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

- below 20 MHzFootnote6 and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f$ 0.5 W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10-2 f 0.6834 W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

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

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 RF Exposure Evaluation Exemption for FCC

Worst Case Co-location MPE Calculation: BT(I28MD-FXLAN11AC) and RFID(UZ7RE40)

Radio	Max EIRP (dBm)	Evaluated Distance (cm)	Worst-Case Exposure Level	Limit	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case							
BLE	11.17	20	0.0026 mW/cm^2	1.0 mW/cm^2	0.130%	0.135%	100%
RFID	-3.00	20	0.0000997 mW/cm^2	1.0 mW/cm^2	0.00499%		

Worst Case Co-location MPE Calculation: 2.4 Wi-Fi(I28MD-FXLAN11AC) and RFID(UZ7RE40)

Radio	Max EIRP (dBm)	Evaluated Distance (cm)	Worst-Case Exposure Level	Limit	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case							
Wi-Fi	19.77	20	0.0189 mW/cm^2	1.0 mW/cm^2	0.945%	0.950%	100%
RFID	-3.00	20	0.0000997 mW/cm^2	1.0 mW/cm^2	0.00499%		

Worst Case Co-location MPE Calculation: 5 Wi-Fi(I28MD-FXLAN11AC) and RFID(UZ7RE40)

Radio	Max EIRP (dBm)	Evaluated Distance (cm)	Worst-Case Exposure Level	Limit	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case							
Wi-Fi	19.76	20	0.0188 mW/cm^2	1.0 mW/cm^2	0.940%	0.945%	100%
RFID	-3.00	20	0.0000997 mW/cm^2	1.0 mW/cm^2	0.00499%		

Worst Case Co-location MPE Calculation: BT(I28-ZBRZQ3BT) and RFID(UZ7RE40)

Radio	Max EIRP (dBm)	Evaluated Distance (cm)	Worst-Case Exposure Level	Limit	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case							
BLE	6.41	20	0.00087 mW/cm^2	1.0 mW/cm^2	0.044%	0.048%	100%
RFID	-3.00	20	0.0000997 mW/cm^2	1.0 mW/cm^2	0.00499%		

5.4 RF Exposure Evaluation Exemption for IC

RFID (109AN-RE40)

Maximum EIRP power = 27.00 dBm + -30.00 dBi = -3.00 dBm which is lesser than $1.31\times10^{-2}f^{0.6834}$ = 1.371 W = 31.37 dBm.

Therefore, the RF exposure Evaluation is exempt.

6 FCC §15.207, ISEDC RSS-Gen §8.8 – AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207(a): Except as shown in paragraphs (b) and (c) of this section, 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 frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with the logarithm of the frequency		

As per ISEDC RSS-Gen §8.8 AC power-line conducted emissions limits:

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in Table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in Table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 – AC power-line conducted emissions limits

Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56[Note 1]	56 to 46 [Note 1]
0.5 – 5	56	46
5 – 30	60	50
Note 1: The level decreases linearly with the logarithm of the frequency.		

6.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart C 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 bundle when necessary.

The EUT was connected (via LISN-1) to 120V, 60Hz AC power source.

6.3 Test Procedure

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

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

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

Below 1000 MHz, the Resolution Bandwidth was set to 120 kHz and the Video Bandwidth was set to 300 kHz for each sweep. The receiver automatically sets to these values.

6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Correction Factor (CF) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + CF$$

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Correction Factor (13.7 dB)

The Correction Factor is calculated by adding Cable loss (CL), LISN calibration factor, and attenuation of the impulse limiter and the high pass filter. The basic equation is as follows:

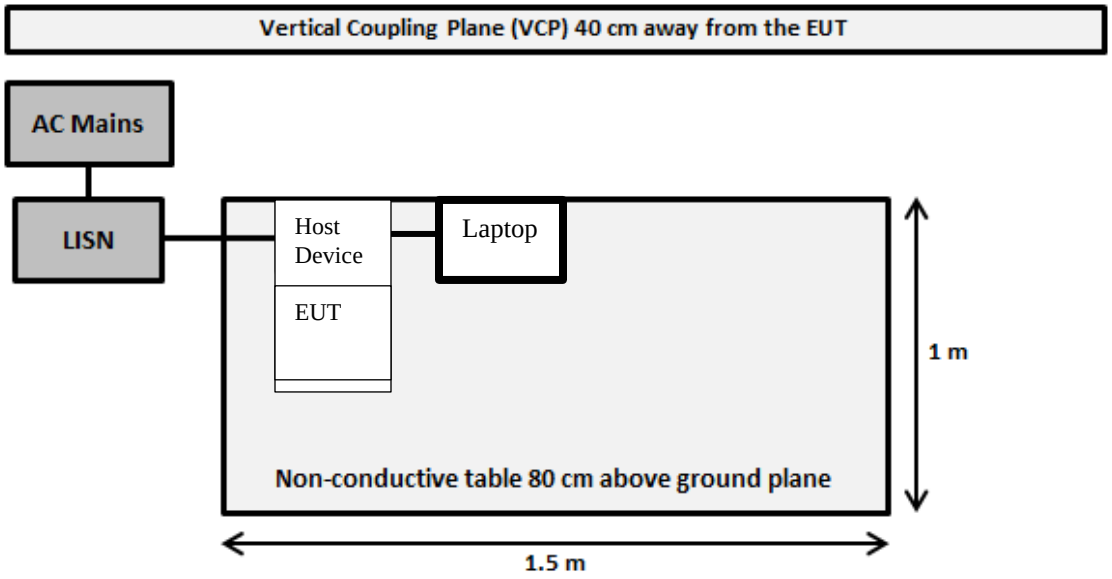
$$CF = CL + \text{LISN calibration factor} + \text{Attenuation}$$

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.5 dB) + LISN calibration factor (0.2 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:

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

6.5 Test Setup Block Diagram



6.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
124	Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	2023-05-11	1 year
680	Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101964	2023-06-20	6 months
724	Solar Electronics Company	High Pass Filter	Type 7930-100	7930150202	2023-06-28	6 months
732	FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2022-09-01	1 year
1226	Fairview Microwave	Micro-Coax Cable	FMC0101223-240	210241	2022-09-12	1 year
348	California Instruments	AC Power Source	5001ix-208	57079	Calibration not Required	Calibration not Required

Note: cable and notch filters included in the test set-up will be checked each time before testing.

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

6.7 Test Environmental Conditions

Temperature:	23.1 to 24.1 °C
Relative Humidity:	54.0-56.1 %
ATM Pressure:	101.9 kPa

The testing was performed by Kevin Nguyen on 2023-08-25 in Ground Plane Site.

6.8 Summary of Test Results

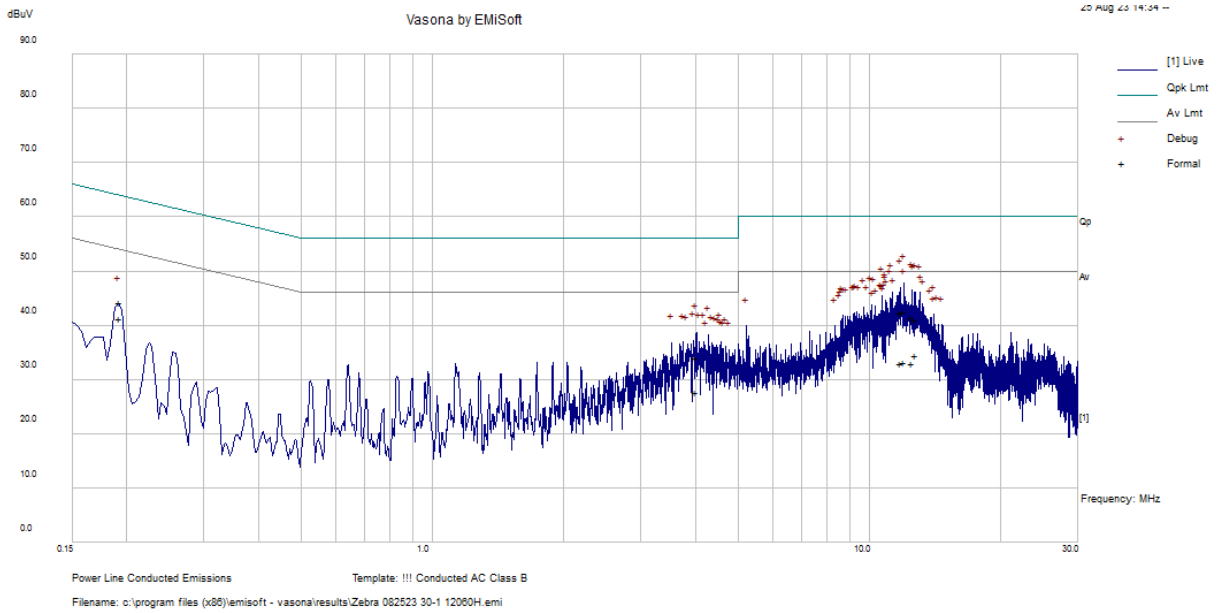
According to the data hereinafter, the EUT complied with the FCC Part 15C and ISEDC RSS-247 standards' radiated emissions limits, and had the worst margin of:

Worst Case – AC Line : 120V, 60Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Hot/Neutral)**	**Frequency Range**
-7.47	0.192091	Neutral	150 kHz to 30 MHz

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

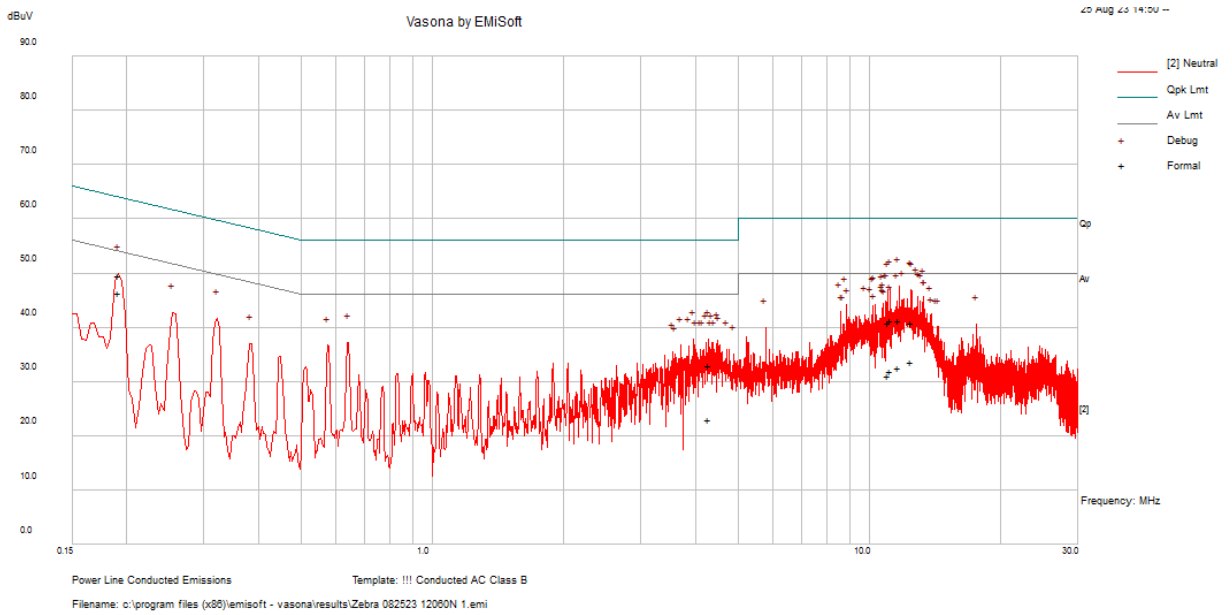
6.9 AC Line Conducted Emissions Test Results

AC Line: 2.4 Wi-Fi + RFID: 120V, 60Hz – Hot Conductor



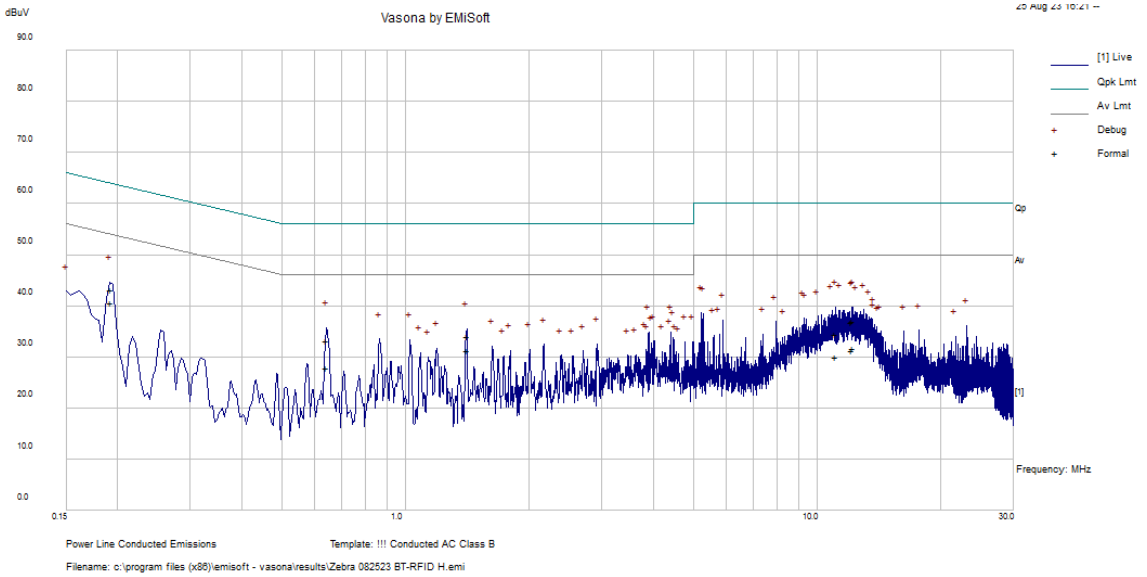
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
11.999846	32.32	10.26	42.58	60	-17.42	QP
11.786675	32.17	10.26	42.43	60	-17.57	QP
12.532227	31.2	10.28	41.48	60	-18.52	QP
12.745043	30.84	10.27	41.11	60	-18.89	QP
4.01434	23.82	10.16	33.98	56	-22.02	QP
0.192577	33.22	11.01	44.23	63.92	-19.69	QP
11.999846	22.94	10.26	33.2	50	-16.8	Ave
11.786675	22.69	10.26	32.95	50	-17.05	Ave
12.532227	22.75	10.28	33.03	50	-16.97	Ave
12.745043	24.16	10.27	34.43	50	-15.57	Ave
4.01434	17.4	10.16	27.56	46	-18.44	Ave
0.192577	30.3	11.01	41.31	53.92	-12.61	Ave

AC Line: 2.4 Wi-Fi + RFID: 120V, 60Hz – Neutral Conductor



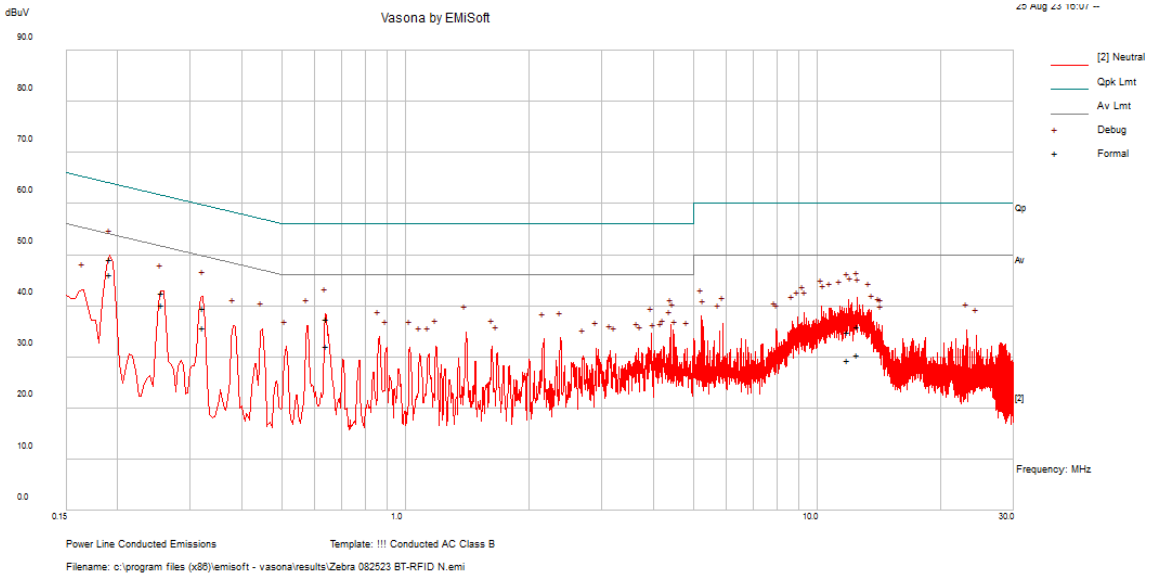
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
11.685843	31.02	10.25	41.27	60	-18.73	QP
11.146833	31.1	10.25	41.35	60	-18.65	QP
12.424735	30.49	10.26	40.75	60	-19.25	QP
11.037891	30.56	10.25	40.81	60	-19.19	QP
0.191479	38.55	11.01	49.56	63.97	-14.41	QP
4.287238	22.79	10.16	32.95	56	-23.05	QP
11.685843	22.31	10.25	32.56	50	-17.44	Ave
11.146833	21.67	10.25	31.92	50	-18.08	Ave
12.424735	23.36	10.26	33.62	50	-16.38	Ave
11.037891	20.85	10.25	31.1	50	-18.9	Ave
0.191479	35.44	11.01	46.45	53.97	-7.52	Ave
4.287238	12.74	10.16	22.9	46	-23.1	Ave

AC Line: BT(FXLAN11AC) + RFID: 120V, 60Hz – Hot Conductor



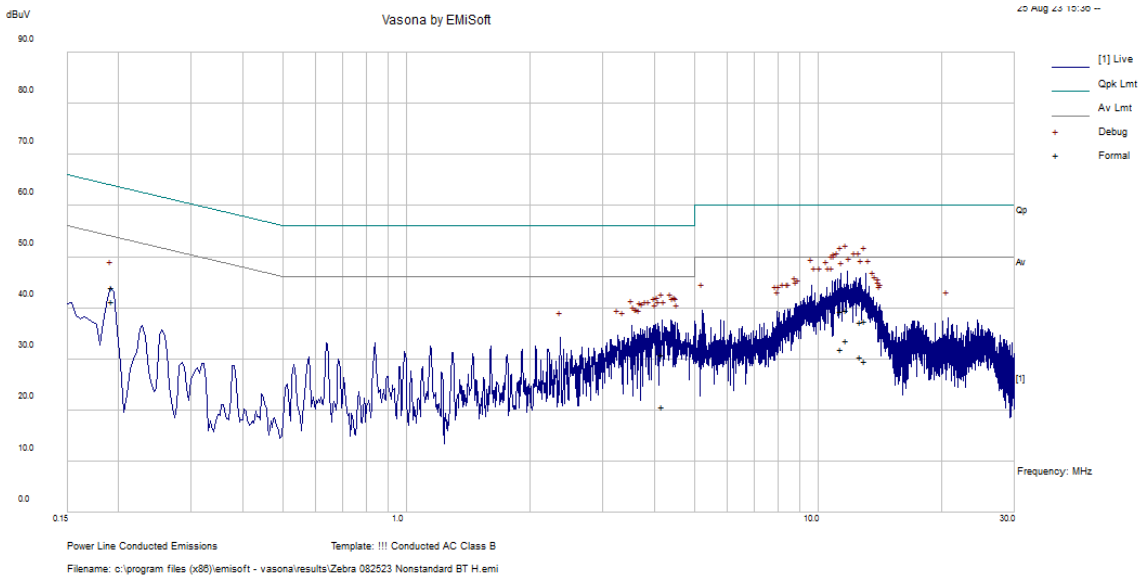
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.192991	32.16	11.01	43.17	63.91	-20.74	QP
11.102444	24.27	10.25	34.52	60	-25.48	QP
12.198921	26.76	10.27	37.03	60	-22.97	QP
0.64254	22.84	10.43	33.27	56	-22.73	QP
12.137803	26.56	10.26	36.82	60	-23.18	QP
1.411548	23.89	10.19	34.08	56	-21.92	QP
0.192991	29.66	11	40.66	53.91	-13.25	Ave
11.102444	19.65	10.25	29.9	50	-20.1	Ave
12.198921	21.4	10.26	31.66	50	-18.34	Ave
0.64254	17.51	10.42	27.93	46	-18.07	Ave
12.137803	21.07	10.26	31.33	50	-18.67	Ave
1.411548	21.04	10.19	31.23	46	-14.77	Ave

AC Line: BT(FXLAN11AC) + RFID: 120V, 60Hz – Neutral Conductor



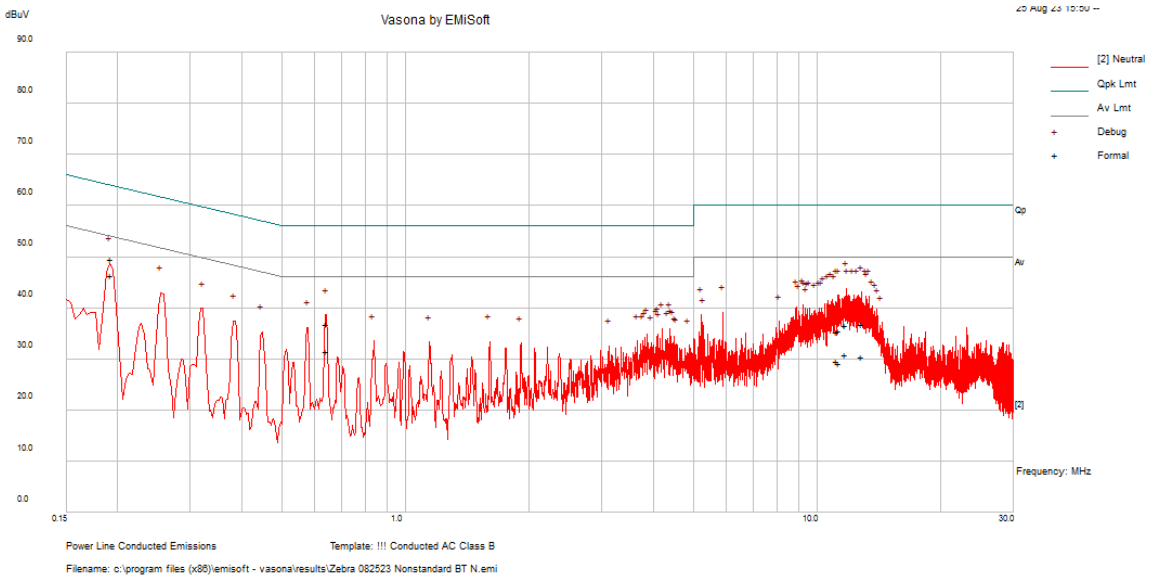
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.191947	38.11	11.01	49.12	63.95	-14.83	QP
0.642481	26.96	10.43	37.39	56	-18.61	QP
0.322135	28.61	10.88	39.49	59.65	-20.16	QP
12.502109	25.61	10.27	35.88	60	-24.12	QP
0.256912	31.54	10.96	42.5	61.53	-19.03	QP
11.897677	24.54	10.26	34.8	60	-25.2	QP
0.191947	35.11	11.01	46.12	53.95	-7.83	Ave
0.642481	21.69	10.43	32.12	46	-13.88	Ave
0.322135	24.94	10.89	35.83	49.65	-13.82	Ave
12.502109	20.18	10.27	30.45	50	-19.55	Ave
0.256912	29.22	10.96	40.18	51.53	-11.35	Ave
11.897677	19.11	10.26	29.37	50	-20.63	Ave

AC Line: BT(ZBRZQ3BT) + RFID: 120V, 60Hz – Hot Conductor



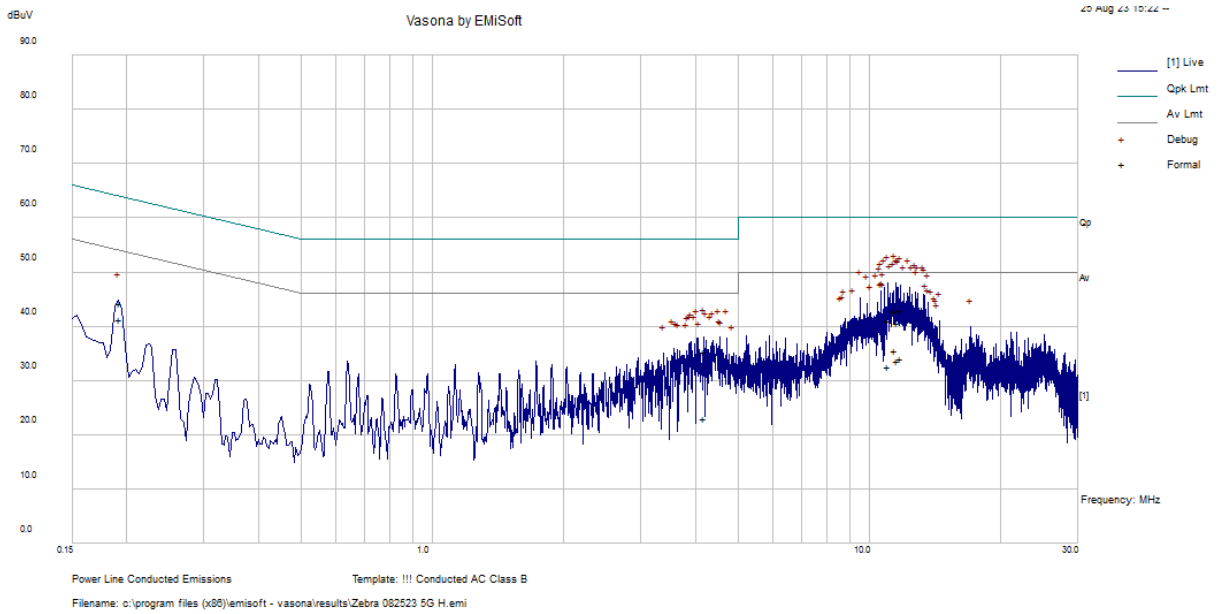
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
11.744492	29.2	10.26	39.46	60	-20.54	QP
11.36149	29.18	10.25	39.43	60	-20.57	QP
13.019615	27.23	10.28	37.51	60	-22.49	QP
12.648781	27.01	10.28	37.29	60	-22.71	QP
4.178611	20.7	10.16	30.86	56	-25.14	QP
0.192829	33.1	11.01	44.11	63.91	-19.81	QP
11.744492	23.28	10.26	33.54	50	-16.46	Ave
11.36149	21.65	10.25	31.9	50	-18.1	Ave
13.019615	19.33	10.28	29.61	50	-20.39	Ave
12.648781	20.06	10.28	30.34	50	-19.66	Ave
4.178611	10.5	10.16	20.66	46	-25.34	Ave
0.192829	30.18	11.01	41.19	53.91	-12.73	Ave

AC Line: BT (ZBRZQ3BT) + RFID: 120V, 60Hz – Neutral Conductor



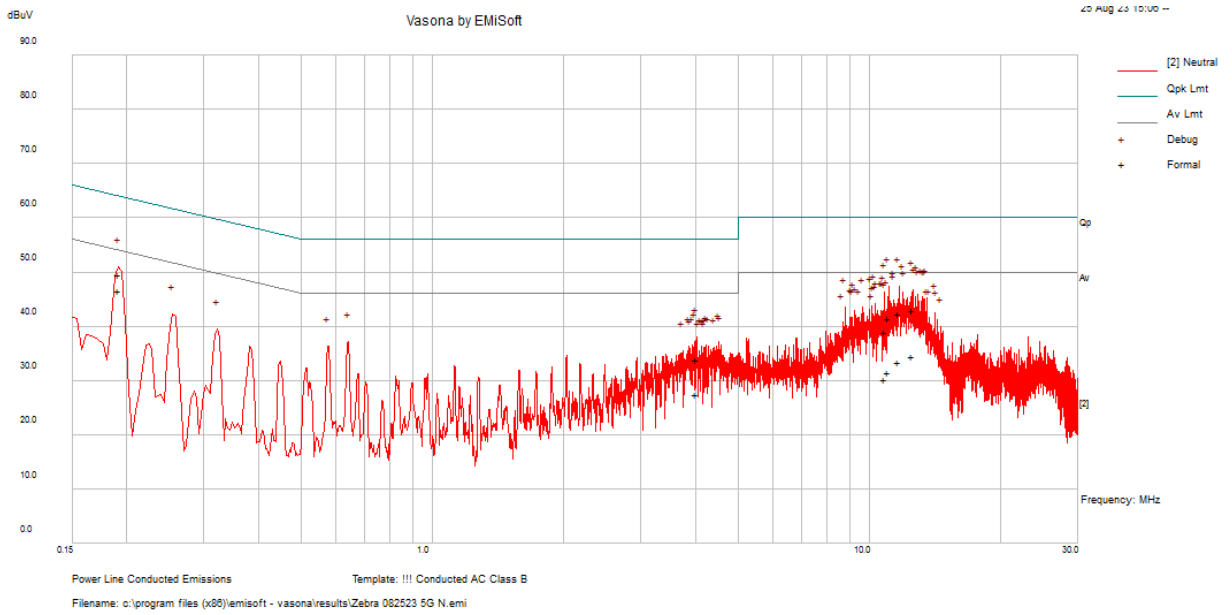
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.192325	38.47	11.01	49.48	63.94	-14.46	QP
11.755055	26.36	10.25	36.61	60	-23.39	QP
12.812016	26.52	10.28	36.8	60	-23.2	QP
0.642846	26.37	10.43	36.8	56	-19.2	QP
11.275109	25.24	10.25	35.49	60	-24.51	QP
11.20276	24.95	10.26	35.21	60	-24.79	QP
0.192325	35.37	11.01	46.38	53.94	-7.56	Ave
11.755055	20.63	10.26	30.89	50	-19.11	Ave
12.812016	20.11	10.28	30.39	50	-19.61	Ave
0.642846	20.97	10.42	31.39	46	-14.61	Ave
11.275109	18.97	10.25	29.22	50	-20.78	Ave
11.20276	19.21	10.26	29.47	50	-20.53	Ave

AC Line: 120V, 60Hz – Hot Conductor[5GHz Wifi + RFID]



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
11.464716	32.6	10.25	42.85	60	-17.15	QP
11.038783	30.82	10.25	41.07	60	-18.93	QP
11.792949	32.66	10.26	42.92	60	-17.08	QP
11.583589	30.41	10.25	40.66	60	-19.34	QP
4.178166	25.13	10.17	35.3	56	-20.7	QP
0.193135	33.3	11	44.3	63.9	-19.6	QP
11.464716	25.18	10.25	35.43	50	-14.57	Ave
11.038783	22.2	10.25	32.45	50	-17.55	Ave
11.792949	23.67	10.26	33.93	50	-16.07	Ave
11.583589	23.33	10.25	33.58	50	-16.42	Ave
4.178166	12.73	10.17	22.9	46	-23.1	Ave
0.193135	30.35	11	41.35	53.9	-12.55	Ave

AC Line: 120V, 60Hz – Neutral Conductor[5GHz Wifi + RFID]



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
11.039796	31.2	10.25	41.45	60	-18.55	QP
11.681649	31.97	10.25	42.22	60	-17.78	QP
0.192091	38.62	11.01	49.63	63.95	-14.32	QP
12.544716	32.7	10.27	42.97	60	-17.03	QP
10.832038	28.59	10.25	38.84	60	-21.16	QP
4.01641	23.72	10.16	33.88	56	-22.12	QP
11.039796	21.26	10.25	31.51	50	-18.49	Ave
11.681649	23.18	10.25	33.43	50	-16.57	Ave
0.192091	35.47	11.01	46.48	53.95	-7.47	Ave
12.544716	24.27	10.27	34.54	50	-15.46	Ave
10.832038	19.85	10.25	30.1	50	-19.9	Ave
4.01641	17.23	10.16	27.39	46	-18.61	Ave

7 FCC §15.209, §15.247(d) & ISEDC RSS-247 §5.5, RSS-Gen §8.9, §8.10 - Spurious Radiated Emissions

7.1 Applicable Standards

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

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

MHz	MHz	MHz	GHz
0.090 – 0.110	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	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	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 FCC §15.247(d),

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

As per ISEDC RSS-Gen 8.9,

Except when the requirements applicable to a given device state otherwise, emission from license-exempt transmitters shall company with the field strength limits shown in the table below. Additional, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

General Field Strength Limits for License-Exemption Transmitters at Frequencies above 30 MHz

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

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

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

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

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart C 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 bundle when necessary.

7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT was set 3 meter away from the testing antenna, which was varied from 1-4 meter, and the EUT was placed on a turntable, which was 0.8 meter and 1.5 meter above the ground plane for below and above 1000 MHz measurements, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

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

Above 1000 MHz:

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

7.4 Corrected Amplitude & Margin Calculation

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

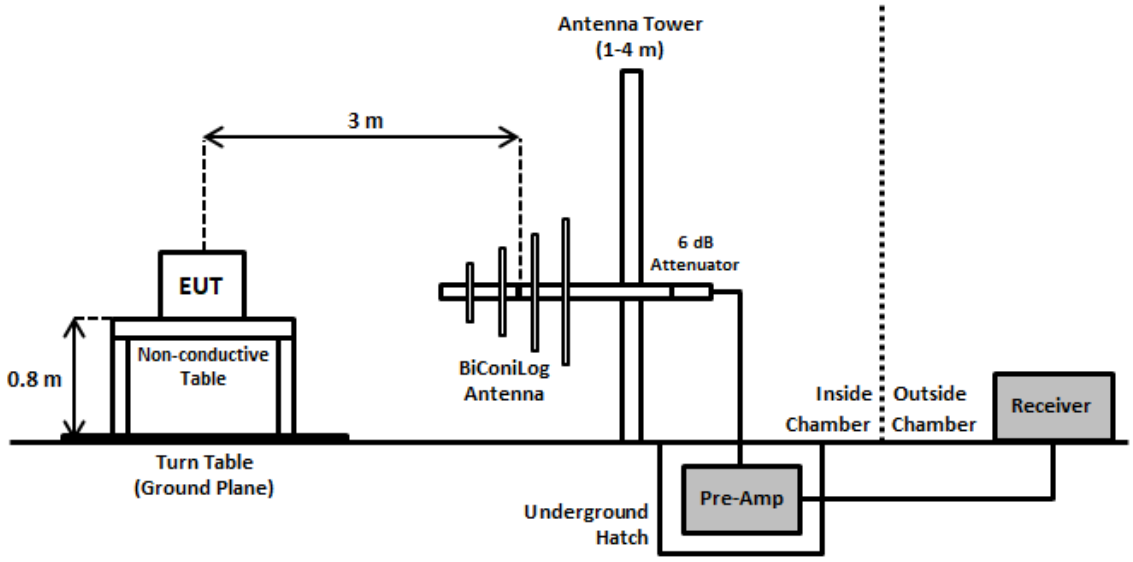
For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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:

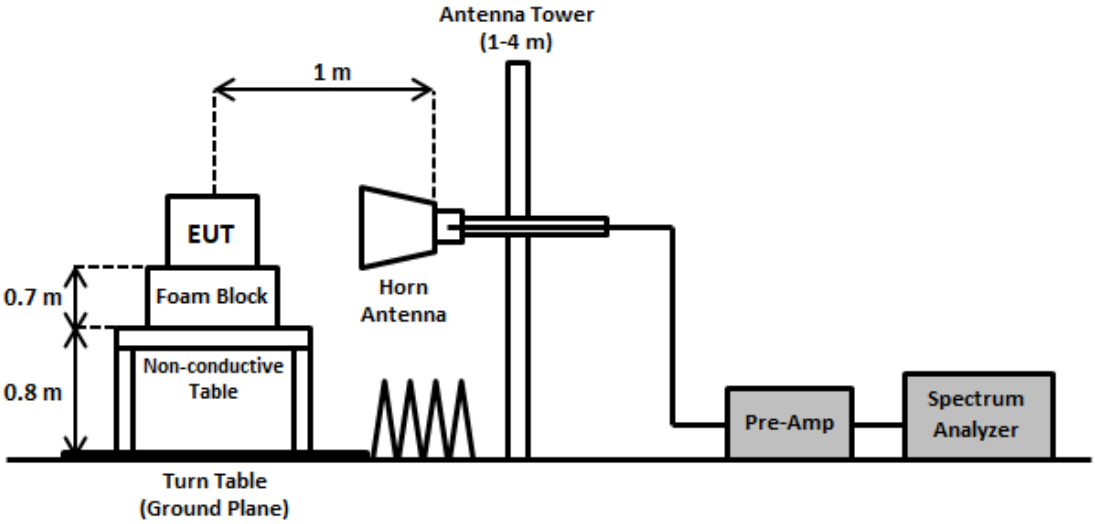
Margin = Corrected Amplitude – Limit

7.5 Test Setup Block Diagram

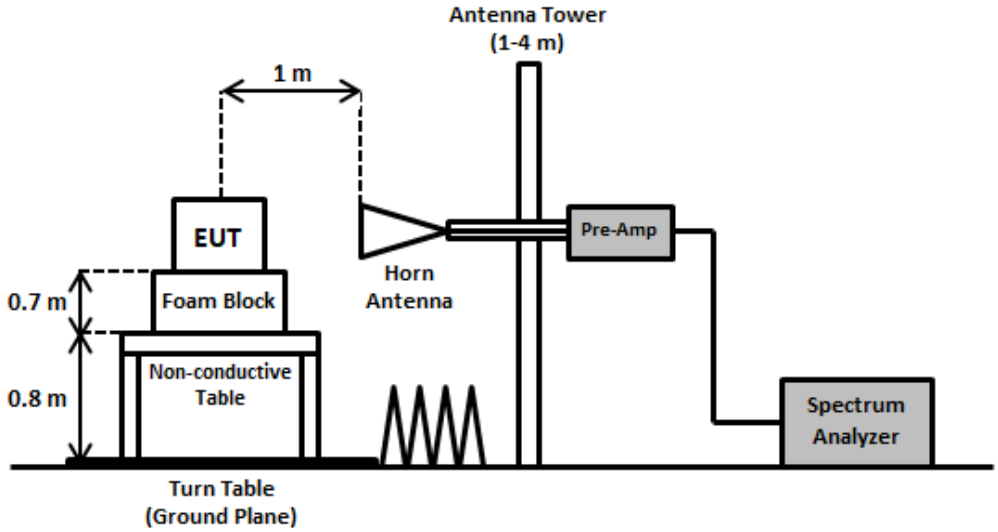
30 MHz to 1000 MHz



1 GHz to 18 GHz



> 18 GHz



7.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
310	Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950.03	100338	2023-05-11	1 year
624	Agilent	Analyzer, Spectrum	E4446A	MY48250238	2023-05-12	1 year
316	Sonoma Instruments	Preamplifier 10kHz-2.5GHz	317	260406	2023-04-12	6 months
658	HP / Agilant	Pre-Amplifier	8449B OPT HO2	3008A01103	2023-06-13	1 year
827	AH Systems	Preamplifier	PAM 1840 VH	170	2023-05-17	1 year
91	Wisewave	Antenna, Horn 18-26.5GHz	ARH-4223-02	10555-02	2022-03-08	2 years
92	Wisewave	Antenna, Horn 26.5-40GHz	ARH-2823-02	10555-01	2022-03-17	2 years
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2	2021-11-22	2 years
393	Com-Power	Loop Active Antenna	AL-130	17043	2023-05-26	2 years
1192	ETS Lindgren	Horn Antenna	3117	00218973	2022-09-29	2 years
1186	Pasternack	Coaxial Cable, RG214	PE3062-1050CM	N/A	2023-04-14	6 months
1247	Utiflex	Micro - Coax	N/A	N/A	2023-06-13	1 year
1248	Pasternack	RG214 COAX Cable	PE3062	N/A	2023-04-14	6 months
1249	Time Microwave	LMR-400 Cable Dc-3 GHz	AE13684	2k80612-5 6fts	2023-04-13	6 months
1295	Carlisle	10m Ultra Low Loss Coaxial Cable	UFB142A-1-3937-200200	64639890912-001	2023-05-04	6 months
1329	Pasternack	2.92mm short coaxial cable	PE360-12	N/A	2023-06-09	6 months
1346	RFMW	2.92mm 10ft RF cable	KMSE-160SAW-240.0-KSME	N/A	2023-06-23	6 months
672	Micro-Tronics	Notch Filter 2.4-2.6 GHz	BRM50701	160	2023-03-09	1 year
1245	-	6dB Attenuator	PE7390-6	01182018A	2021-11-22	2 years
1246	HP	RF Limiter	11867A	01734	2023-04-13	1 year
N/A	Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R

Note: cable and notch filters included in the test set-up will be checked each time before testing.

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

7.7 Test Environmental Conditions

Temperature:	23.1 to 24.1 °C
Relative Humidity:	54.0-56.1 %
ATM Pressure:	101.9 kPa

The testing was performed by Deepak Mishra on 2023-08-15 to 2023-08-19 and by Arturo Reyes and Shankar Pangeni on 2023-08-23 in 5m chamber 3.

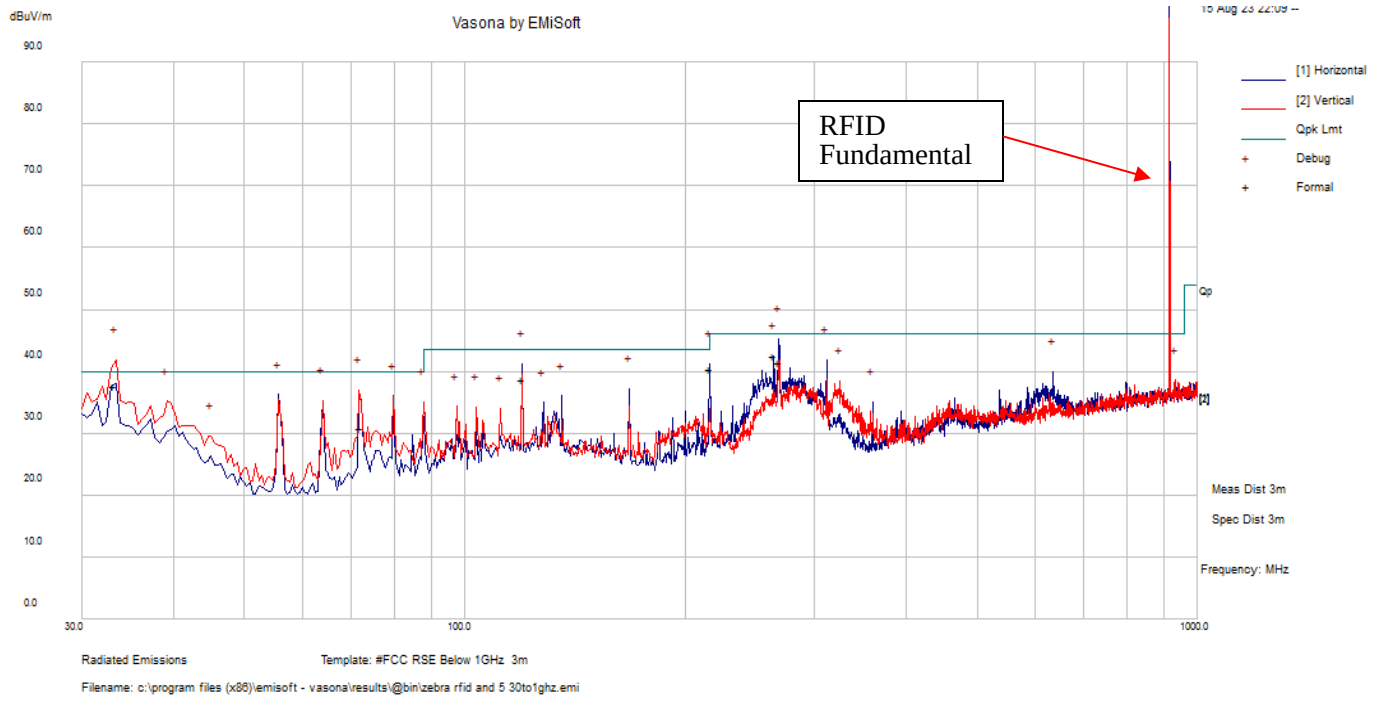
7.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15C and ISEDC RSS-247 standards' radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-0.64	119.97375	Vertical	RFID+BT

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

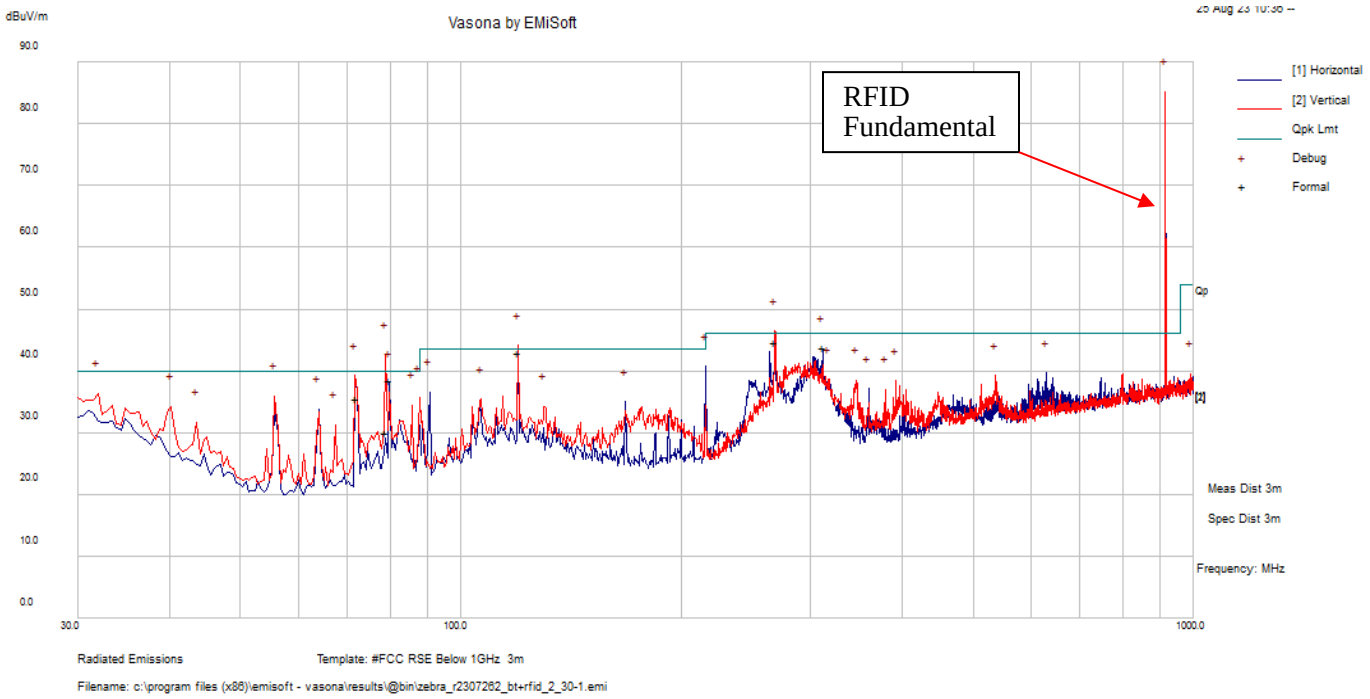
7.9 Radiated Emissions Test Results



30 MHz to 1000 MHz Worst Case, Measured at 3 meters[5GHz Wifi + RFID]

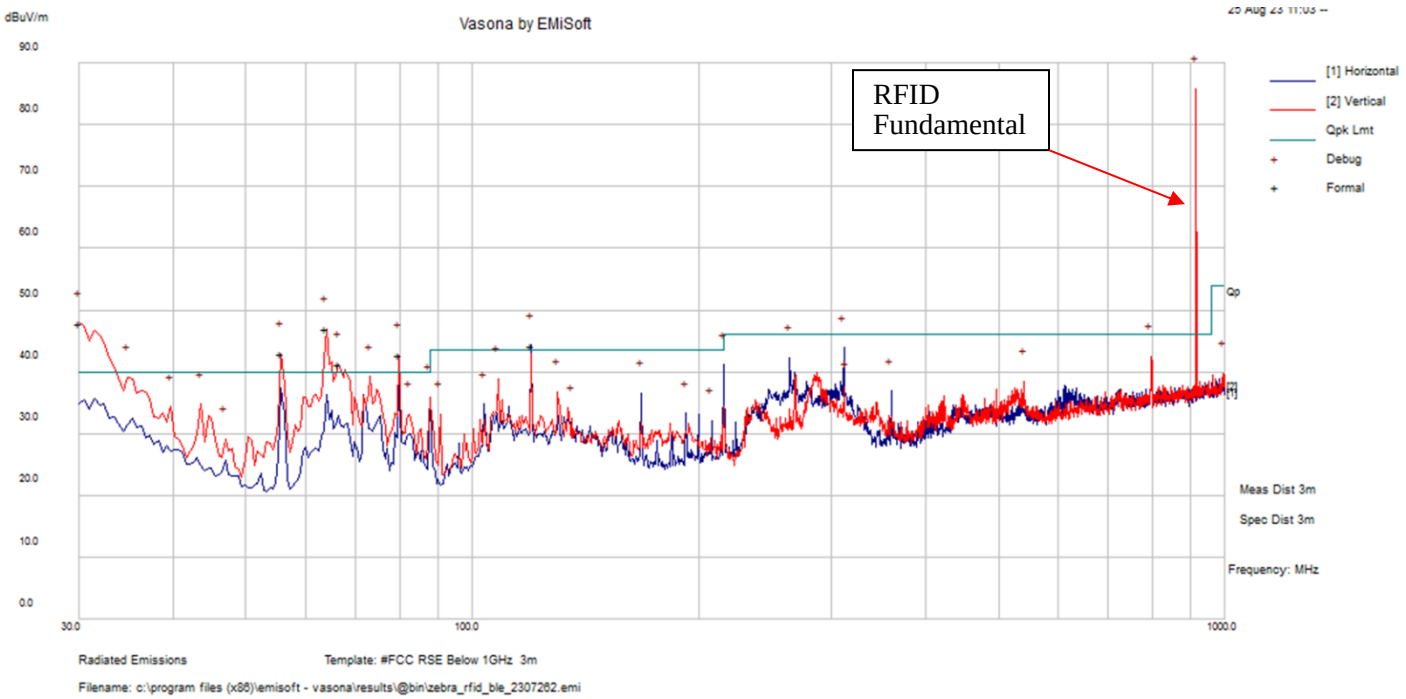
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
33.27	40.77	-3.13	37.64	122	V	23	40	-2.36	QP
268.31375	49.32	-7.86	41.46	126	H	288	46	-4.54	QP
119.975	45.52	-6.77	38.75	174	H	96	43.5	-4.75	QP
216.0025	50.81	-10.32	40.49	105	H	98	46	-5.51	QP
71.96	44.08	-13.23	30.85	278	V	181	40	-9.15	QP
264.01925	50.8	-8.21	42.59	130	H	84	46	-3.41	QP

30 MHz to 1000 MHz Worst Case: RFID+BT(I28MD-FXLAN11AC), Measured at 3 meters



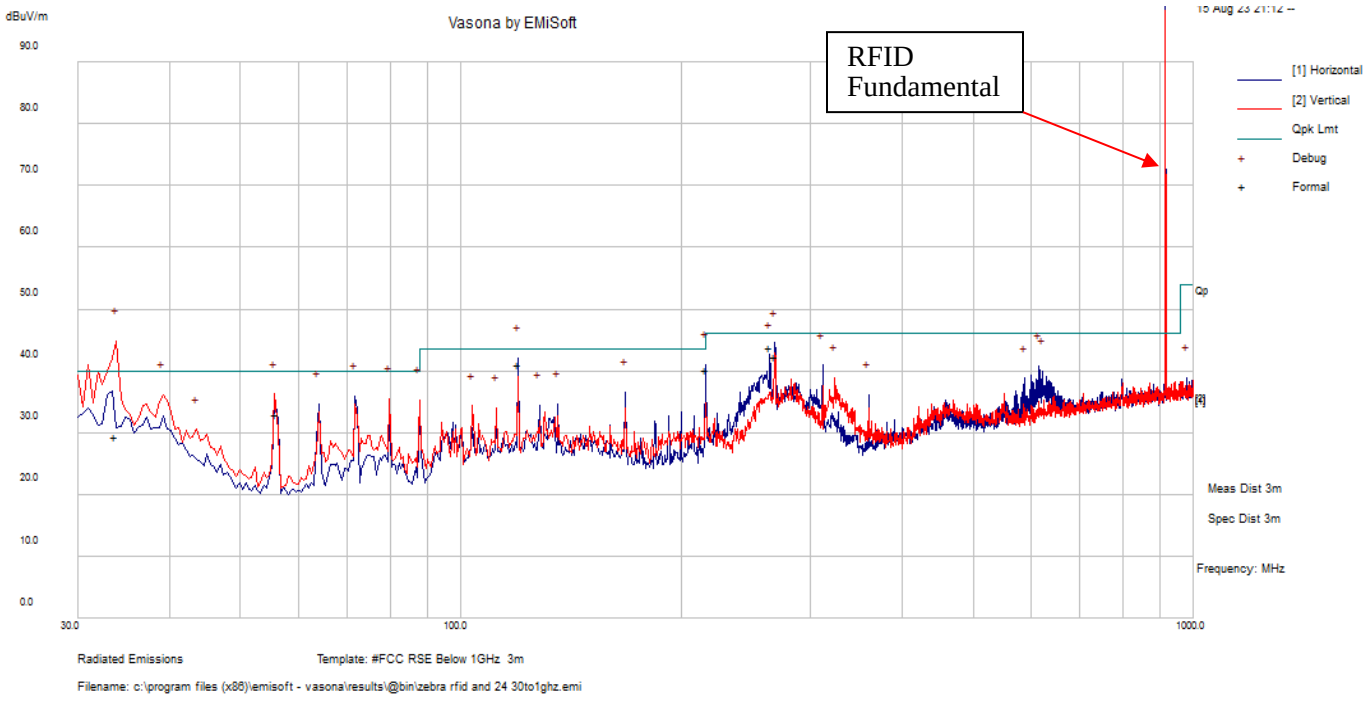
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
78.969	43.45	-13.44	30.01	V	110	31	40	-9.99	QP
119.97375	49.63	-6.77	42.86	V	109	272	43.5	-0.64	QP
268.33475	52.61	-7.86	44.75	V	101	62	46	-1.25	QP
71.96	48.66	-13.23	35.43	V	101	85	40	-4.57	QP
79.97675	51.98	-13.45	38.53	H	229	255	40	-1.47	QP
312.021	50.8	-7.08	43.72	H	102	210	46	-2.28	QP

30 MHz to 1000 MHz Worst Case: RFID+BT(I28-ZBRZQ3BT), Measured at 3 meters



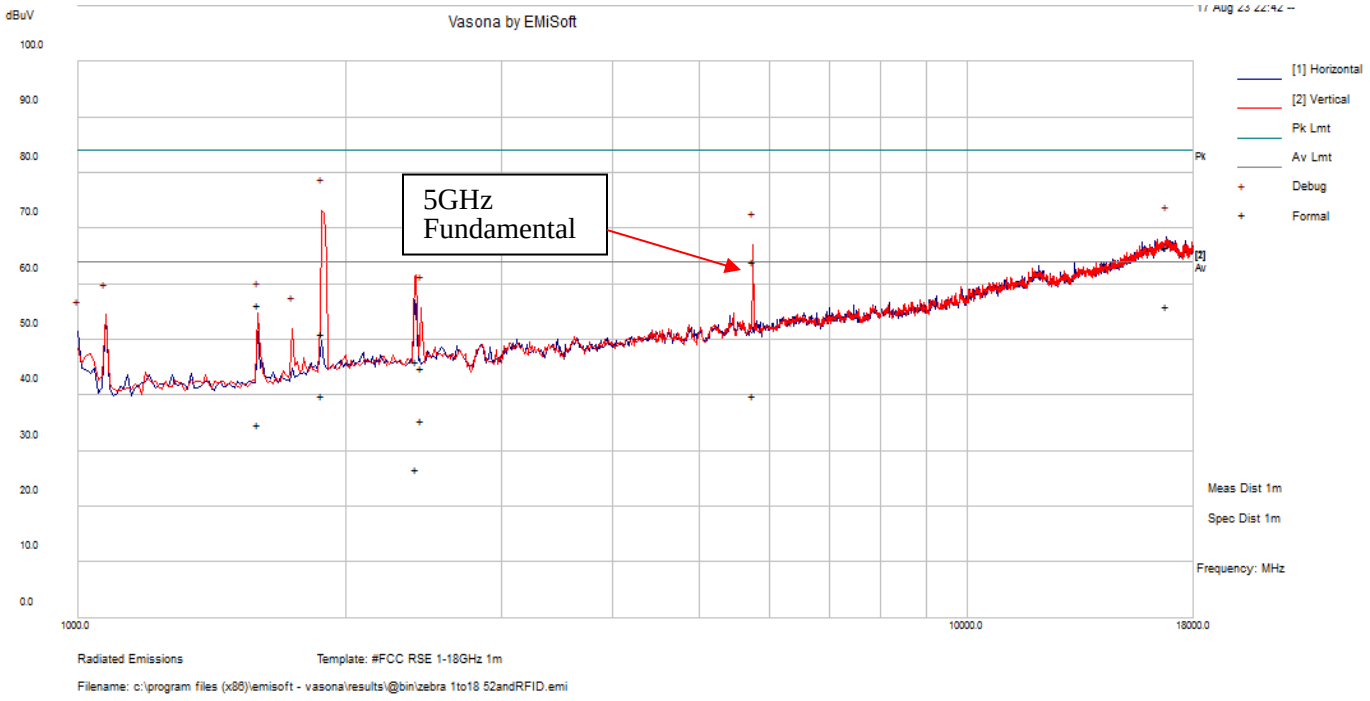
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
64.0085	47.95	-13.44	34.51	V	110	31	40	-5.49	QP
30.00117	31.04	-0.97	30.07	V	109	272	43.5	-13.43	QP
55.9515	47.63	-13.75	33.88	V	101	62	46	-12.12	QP
80	50.02	-13.45	36.57	V	101	85	40	-3.43	QP
66.40575	30.61	-13.34	17.27	H	229	255	40	-22.73	QP
119.9735	48.52	-6.77	41.75	H	102	210	46	-4.25	QP

30 MHz to 1000 MHz Worst Case: RFID+2.4 Wi-Fi, Measured at 3 meters



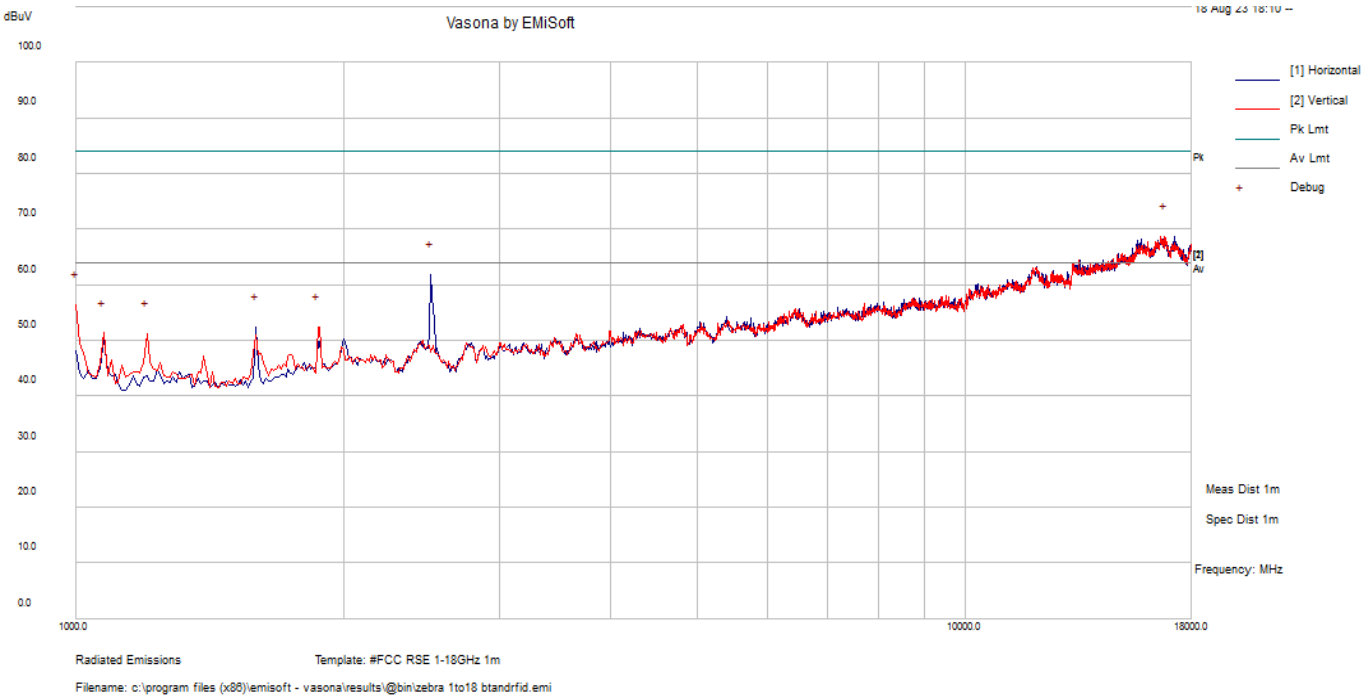
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
33.79675	32.83	-3.52	29.31	V	128	119	40	-10.69	QP
119.97125	47.91	-6.77	41.14	H	172	40	43.5	-2.36	QP
268.13975	50.21	-7.87	42.34	H	121	216	46	-3.66	QP
215.98925	50.56	-10.32	40.24	H	109	58	43.5	-3.26	QP
264.00075	51.92	-8.21	43.71	H	104	78	46	-2.29	QP
55.95075	46.71	-13.75	32.96	V	122	352	40	-7.04	QP

1 GHz to 18 GHz Worst Case, Measured at 1 meter[5GHz Wifi + RFID]



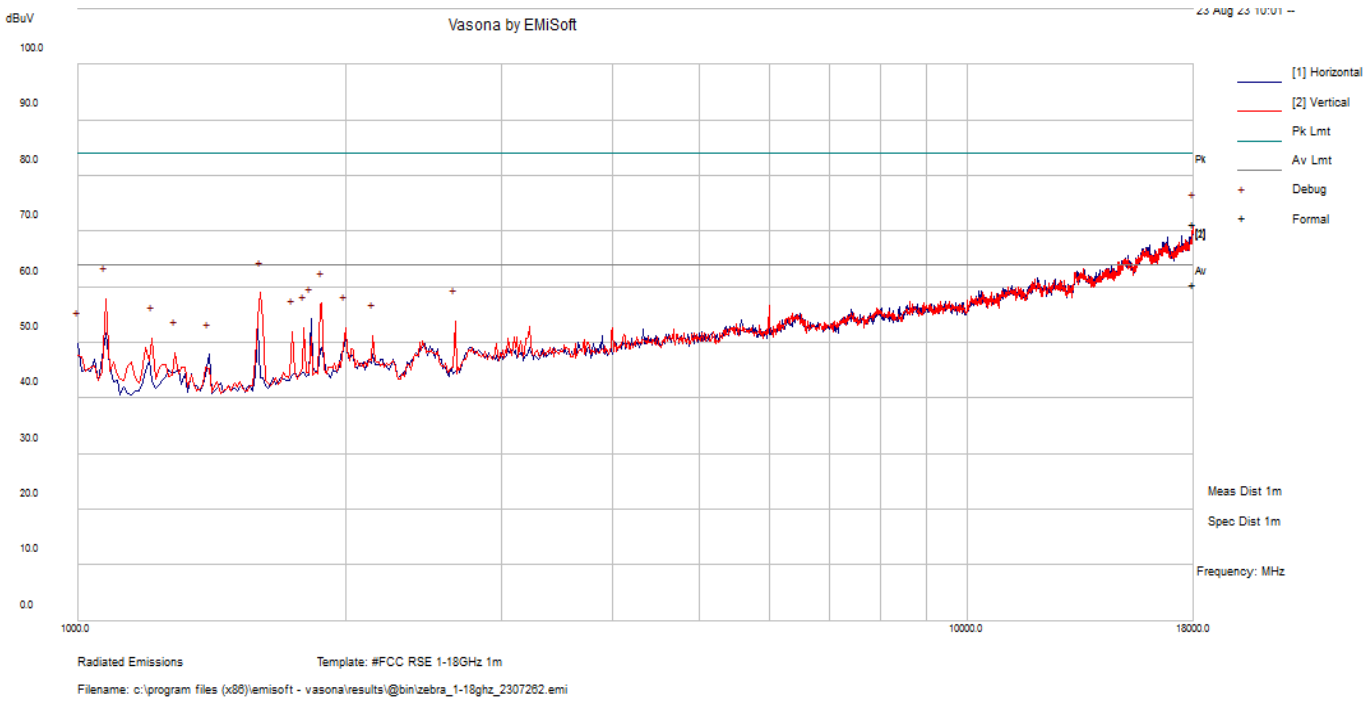
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
1880.615	53.57	-2.54	51.03	101	V	277	84	-32.97	Peak
16779.898	45.26	21.32	66.58	169	H	59	84	-17.42	Peak
2402.8725	46.82	-0.65	46.17	241	V	308	84	-37.83	Peak
2433.1625	45.26	-0.38	44.88	151	V	298	84	-39.12	Peak
1593.755	62.06	-5.85	56.21	165	V	111	84	-27.79	Peak
1880.615	42.51	-2.54	39.97	101	V	277	64	-24.03	Average
16779.898	34.58	21.32	55.9	169	H	59	64	-8.1	Average
2402.8725	27.27	-0.65	26.62	241	V	308	64	-37.38	Average
2433.1625	35.92	-0.38	35.54	151	V	298	64	-28.46	Average
1593.755	40.68	-5.85	34.83	165	V	111	64	-29.17	Average

1 GHz to 18 GHz Worst Case: RFID+BT(I28MD-FXLAN11AC), Measured at 1 meter



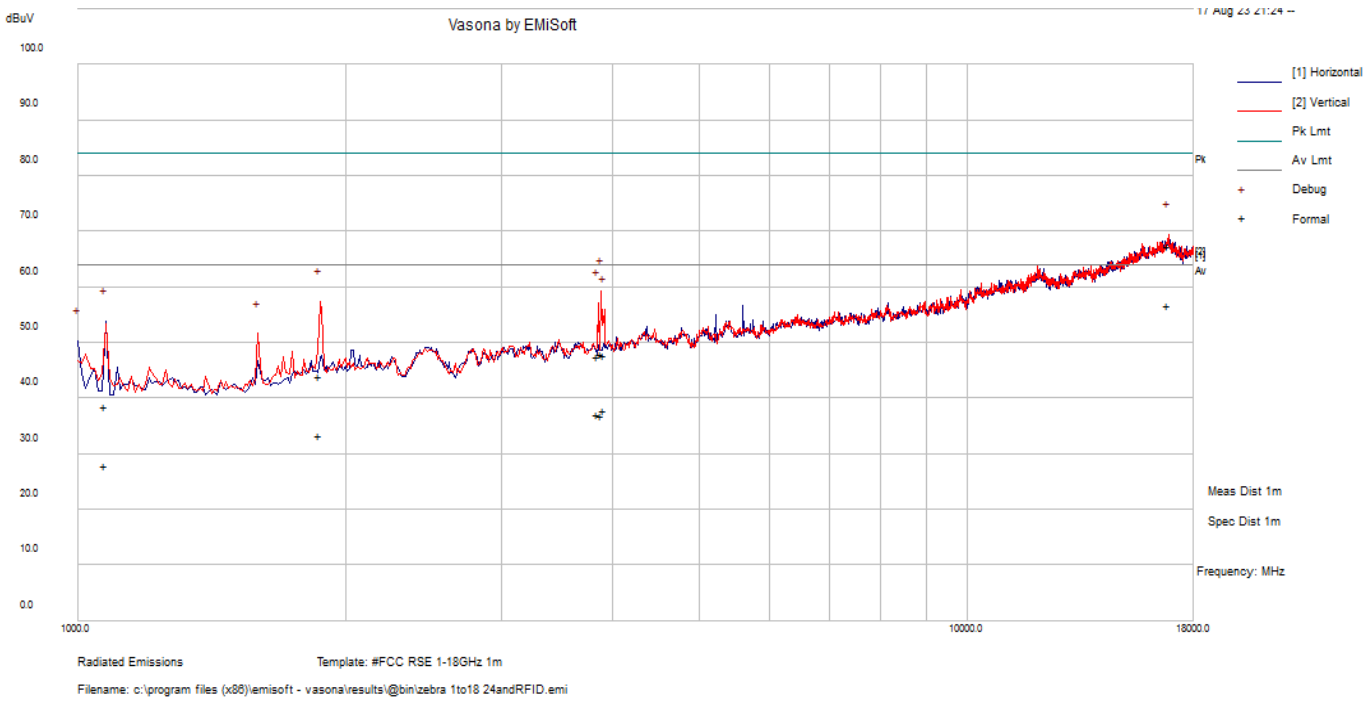
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
16767.685	44.98	21.32	66.3	V	172	37	84	-17.7	Peak
16767.685	34.5	21.32	55.9	V	172	37	64	-8.0	Average

1 GHz to 18 GHz Worst Case: RFID+BT(I28-ZBRZQ3BT), Measured at 1 meter



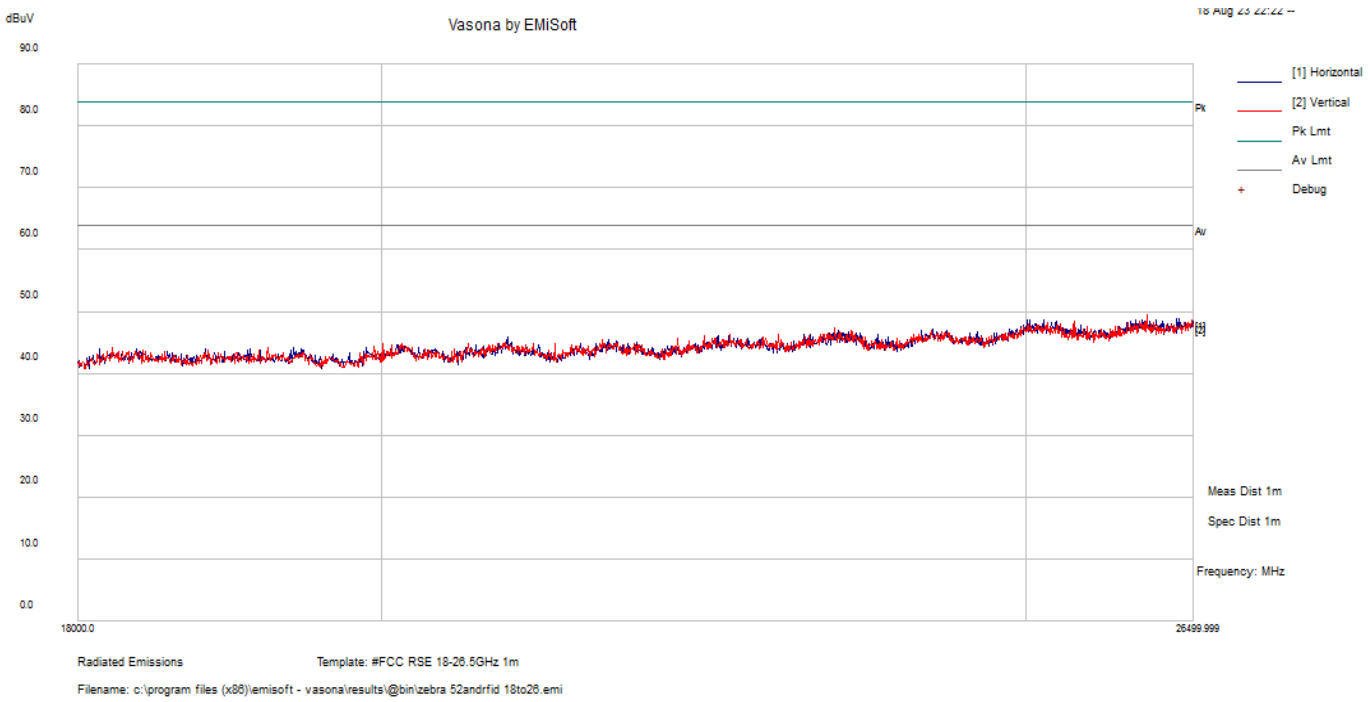
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
17977.52	45.82	25.5	71.32	H	247	89	84	-12.68	Peak
17977.52	35.1	25.5	60.6	H	247	89	64	-3.4	Average

1 GHz to 18 GHz Worst Case: RFID+2.4 Wi-Fi, Measured at 1 meter

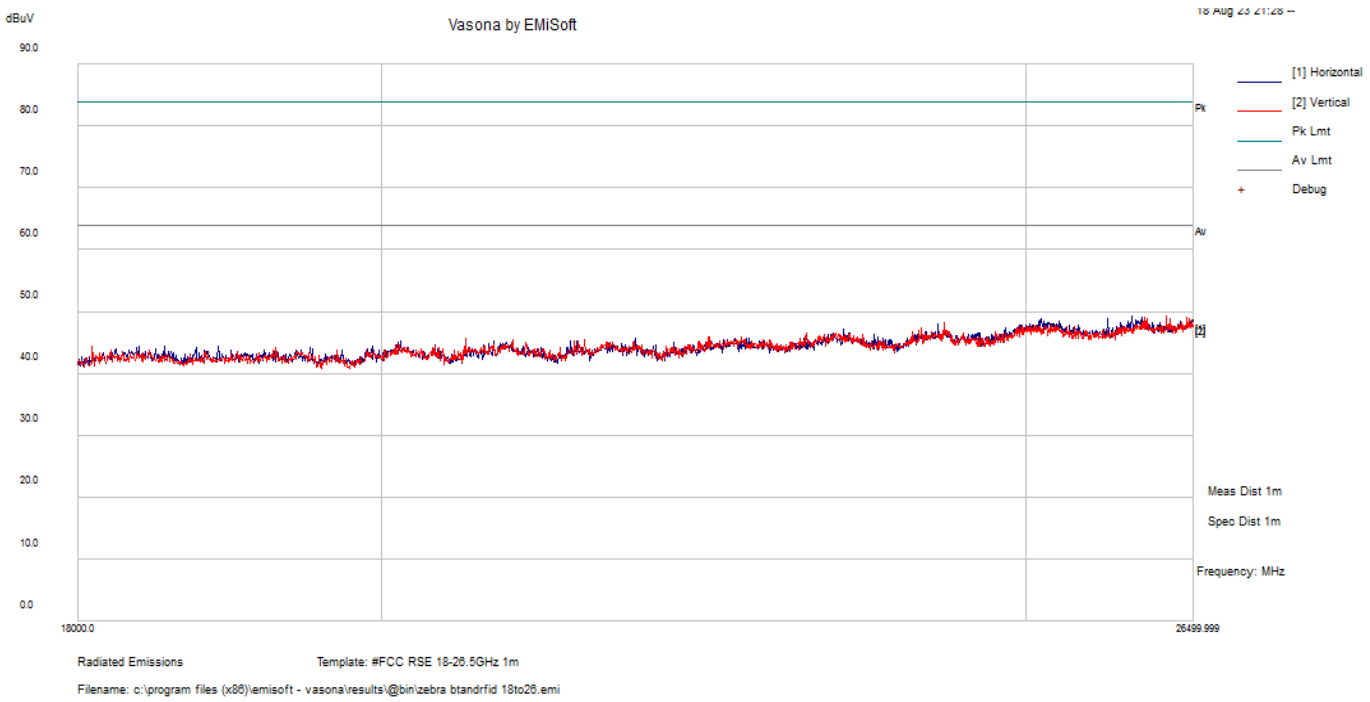


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
16863.315	45.63	21.7	67.33	V	164	112	84	-16.67	Peak
16863.315	34.97	21.7	56.67	V	164	112	64	-7.33	Average

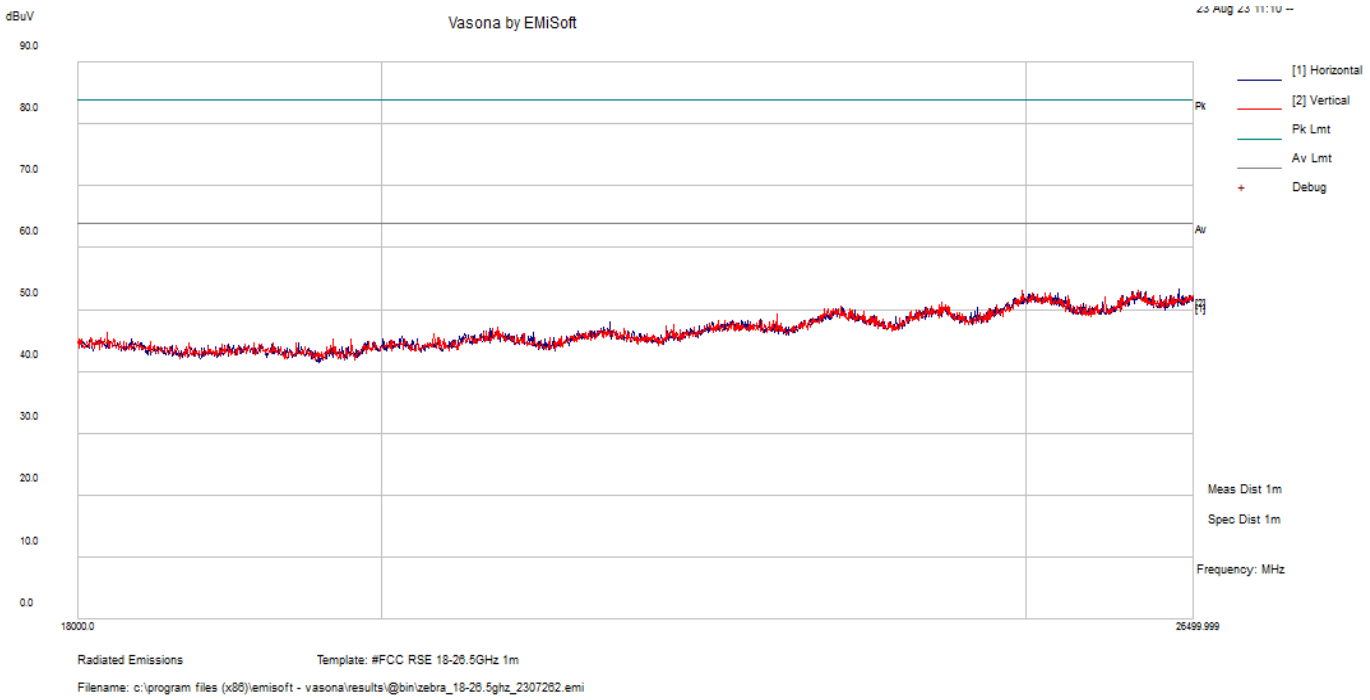
18 GHz to 26.5 GHz Worst Case, Measured at 1 meter[5GHz Wifi + RFID]



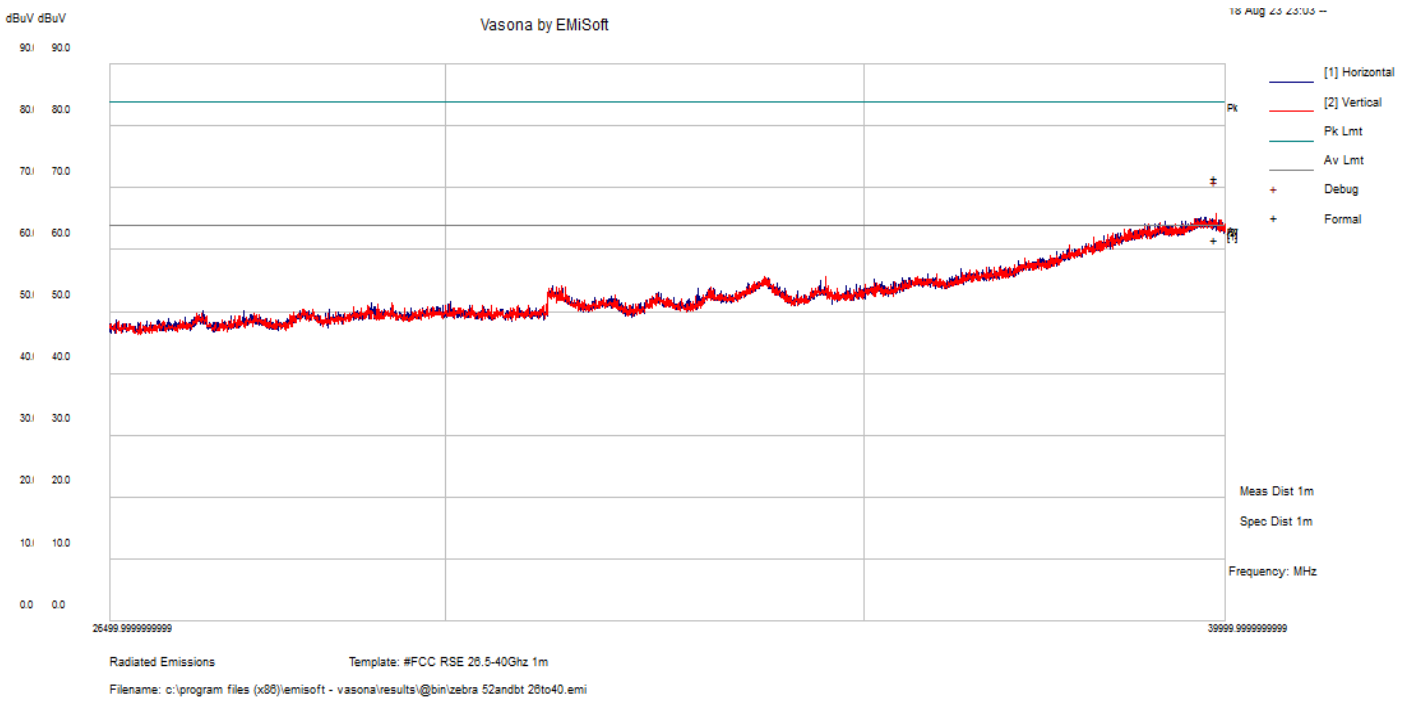
18 GHz to 26.5 GHz Worst Case: RFID+BT(I28MD-FXLAN11AC), Measured at 1 meter



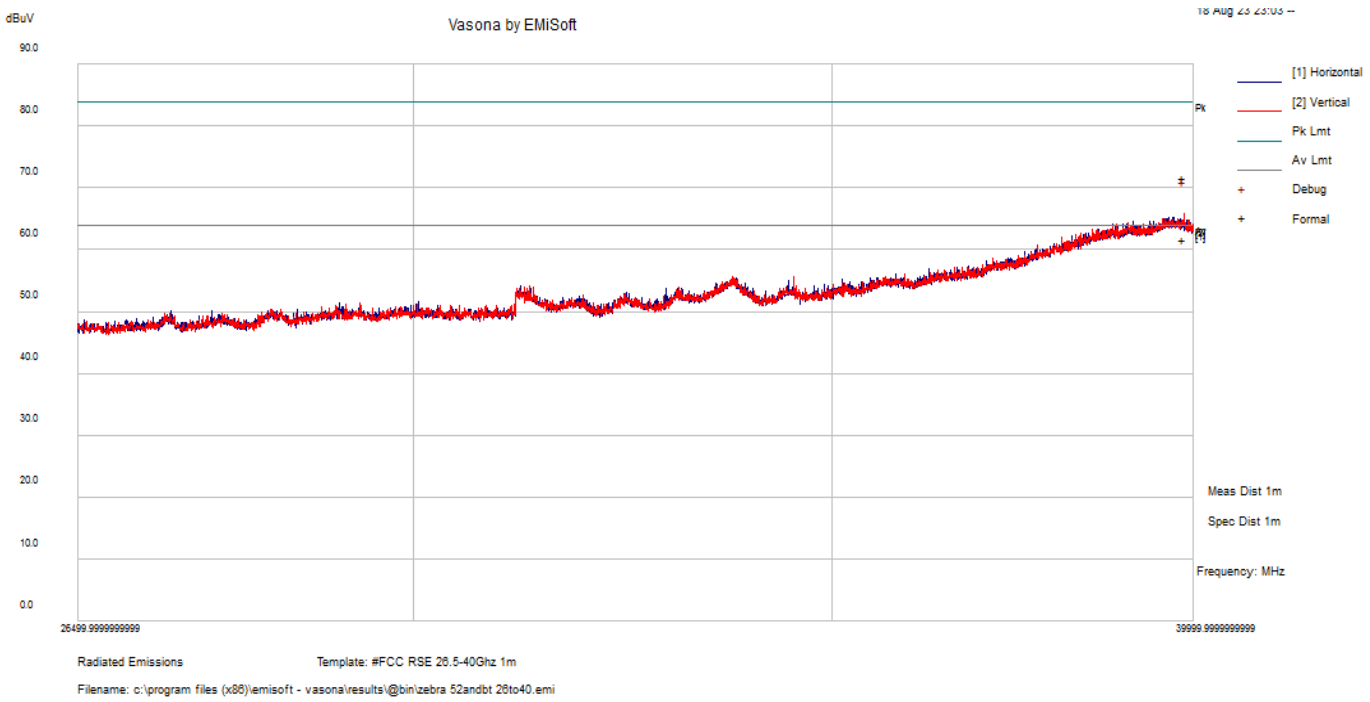
18 GHz to 26.5 GHz Worst Case: RFID+BT(I28-ZBRZQ3BT), Measured at 1 meter



18 GHz to 26.5 GHz Worst Case: RFID+2.4 Wi-Fi, Measured at 1 meter



26.5 to 40 GHz Worst Case, Measured at 1 meter[5GHz Wifi + RFID]



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (Peak/QP/ Average)
39855.521	55.55	16.19	71.74	243	V	344	84	-12.26	Peak
39855.521	45.38	16.19	61.57	243	V	344	64	-2.43	Average

8 Annex A (Normative) – Test Setup Photographs

Please refer to the attachment.

9 Annex B (Normative) – EUT External Photographs

Please refer to the attachment.

10 Annex C (Normative) – EUT Internal Photographs

Please refer to the attachment.

11 Annex D (Normative) – A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIACE 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 21st day of December 2022.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2024

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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