





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

For

ChargePoint, Inc.

253 E. Hacienda Ave,
Campbell, CA 95008, USA

**FCC ID: W38-LB2AE
IC: 8854A-LB2AE**

Report Type: Class II Permissive Change Report	Product Type: Smart Antenna
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Note: This test report was prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This test report shall not be used by the customer to claim product certification, approval, or endorsement by A2LA or any agency of the United States Government or any foreign government.

* This test report may contain data and test methods that are not covered by BACL's scope of accreditation as of the test report date shown above. These items are marked within the test report text with an asterisk "*"

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2405152-247	Class II Permissive Change Report	2024-07-25

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report is prepared on behalf of *ChargePoint, Inc.*, and their product model: LB2AE, FCC ID: W38-LB2AE, IC: 8854A-LB2AE, the “EUT” as referred to in this report. The EUT contains a pre-certified Cellular module FCC ID: XMR202212EG25GL, IC: 10224A-2022EG25GL. The EUT is a Smart Antenna with Bluetooth, Cellular, and 2.4GHz/5GHz Wi-Fi capabilities.

Model Number	LB2AE
FCC ID	BT & Wi-Fi: W38-LB2AE Cellular: XMR202212EG25GL
IC	BT & Wi-Fi: 8854A-LB2AE Cellular: 10224A-2022EG25GL
Operating Frequency	2400 – 2485MHz
Modulation	802.11b/g/n20
Channel Spacing	20MHz
Antenna Gain	3.94 dBi

1.2 Mechanical Description of EUT

The UUT measures approximately 54.0 cm (L) x 17.0 cm (W) x 5.0 (H) and weighs approximately 0.6 kg.

The data gathered was from a production sample provided by ChargePoint, Inc. with S/N: REW-72-002940-01

1.3 Objective

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

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

NOTE: this report is for the purpose of adding a new antenna. The new antenna will be comprised of two identical antennas that operate in diversity mode meaning that they will only transmit one path at a time. Through pre-testing, it was determined that measurement results were identical between paths and thus one was chosen to reflect performance of both.

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 may be which result in lowering the immunity should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing and/or I/O cable changes, etc.).

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart E, Equipment Class: NII with FCC ID: W38-LB2AE, IC: 8854A-LB2AE

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	±0.57 dB
Power Spectral Density, conducted	±1.48 dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2°C
Humidity	±5%
DC and low frequency voltages	±1.0%
Time	±2%
Duty Cycle	±3%

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-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 - ISED) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
 - o BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
 - o NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
 - o EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
 - o Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
 - o Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
 - o ENERGY STAR Recognized Test Laboratory – US EPA
 - o Telecommunications Certification Body (TCB) – US FCC;
 - o Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

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

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

2.2 EUT Exercise Software

The exercising software used during testing was “Tera Term”. The software is compliant with the standard requirements being tested against.

Radio	Modulation	Channel	Frequency (MHz)	Power Setting
2.4 GHz Wi-Fi	802.11b	Low	2412	17
		Middle	2437	17
		High	2462	17
	802.11g	Low	2412	12
		Middle	2437	16
		High	2462	12
	802.11n20	Low	2412	12
		Middle	2437	14
		High	2462	12
Bluetooth	BLE	Low	2402	Default
		Middle	2442	Default
		High	2480	Default
	DH1	Low	2402	Default
		Middle	2442	Default
		High	2480	Default
	2DH1	Low	2402	Default
		Middle	2442	Default
		High	2480	Default
	3DH1	Low	2402	Default
		Middle	2442	Default
		High	2480	Default

Data rates used:
 802.11b: 1Mbps
 802.11g: 6 Mbps
 802.11n20: MCS0

2.3 Equipment Modification

No modifications were made to the EUT during testing.

2.4 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude 5401

2.5 Remote Support Equipment

Manufacturer	Description	Serial Number
ChargePoint, Inc.	Universal Controller Board	32-A10197-06-01-22511A000044

2.6 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
OpenPeak	5VDC 4A Wall Adapter Switching Power Supply	LFS054000D-A8S	EPS050400H
MeanWell	48V 1.25A Wall Adapter Switching Power Supply	SGA60U46	SGA60U48-P1J

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
USB-A to USB-Micro B	1.5	Universal Controller Board	Laptop
USB-A to USB-C	1.5	Universal Controller Board	Laptop
USB-B to USB-C	1	Universal Controller Board	EUT

3 Summary of Test Results

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

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

4 FCC §15.203 & ISEDC RSS-Gen §6.8 – Antenna Requirements

4.1 Applicable Standards

According to FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

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

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

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

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

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

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

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

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

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

4.2 Antenna Description

External/Internal/ Integral	Part Number	Antenna Type	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
Integral	AMAN1003030ST 06	Dielectric Chip	2400-2485	3.94

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

5.1 Applicable Standards

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

According to FCC §2.1091 and §1.1310(e)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

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

f = frequency in MHz

* = Plane-wave equivalent power density

According to ISEDC RSS-102 Issue 6 Section 6.6: 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 $4.49/f0.5W$ (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 $1.31 \times 10^{-2} f0.6834W$ (adjusted for tune-up tolerance), where f is in MHz
- at or above 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

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

5.2 MPE Prediction

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

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

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

5.3 MPE Result

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
BLE	2402	3.94	6.5	10.44	11.07	0.002	1.0
BT Classic	2402	3.94	7	10.94	12.42	0.002	1.0
2.4 GHz Wi-Fi	2412	3.94	19	22.94	196.79	0.039	1.0
LTE	1710	5.58	25	30.58	1142.9	0.23	1.0

Worst Case Sum of Ratios:

$$2.4\text{Wifi} + \text{LTE: } 0.039/1.0 + 0.23/1.0 = 0.269 < 1$$

For the different combination of transmitters, a separation distance of 20 cm complies with the SAR simultaneous transmission limit of ≤ 1.0 .

5.4 IC Exemption

2.4 GHz Wi-Fi

The EIRP of this device is 22.94 dBm (196.79 mW) which is less than the exemption threshold, i.e., $1.31 \times 10^{-2} \times f^{(0.6834)} = 2.68 \text{ W}$. Therefore, the RF exposure evaluation is exempt.

BLE

The EIRP of this device is 10.44 dBm (11.07 mW) which is less than the exemption threshold, i.e., $1.31 \times 10^{-2} \times f^{(0.6834)} = 2.67 \text{ W}$. Therefore, the RF exposure evaluation is exempt.

BT Classic

The EIRP of this device is 10.94 dBm (12.42 mW) which is less than the exemption threshold, i.e., $1.31 \times 10^{-2} \times f^{(0.6834)} = 2.67 \text{ W}$. Therefore, the RF exposure evaluation is exempt.

LTE

The EIRP of this device is 30.58 dBm (1142.9 mW) which is less than the exemption threshold, i.e., $1.31 \times 10^{-2} \times f^{(0.6834)} = 2.12 \text{ W}$. Therefore, the RF exposure evaluation is exempt.

Worst Case Sum of Ratios:

WLAN 5Wifi + LTE: $0.19679/2.68 + 1.14/2.12 = 0.611 < 1$

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	16.42 – 16.423	960 – 1240	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5.35 – 5.46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 – 167.17	3332 – 3339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3345.8 – 3358	23.6 – 24.0
12.29 – 12.293	240 – 285	3600 – 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 ISED 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 ISED RSS-Gen §8.9,

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

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

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

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

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

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

As per ISED RSS-Gen §8.10(c),

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

Table 7 – Restricted frequency bands^{Note 1}

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

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

6.2 Test Setup

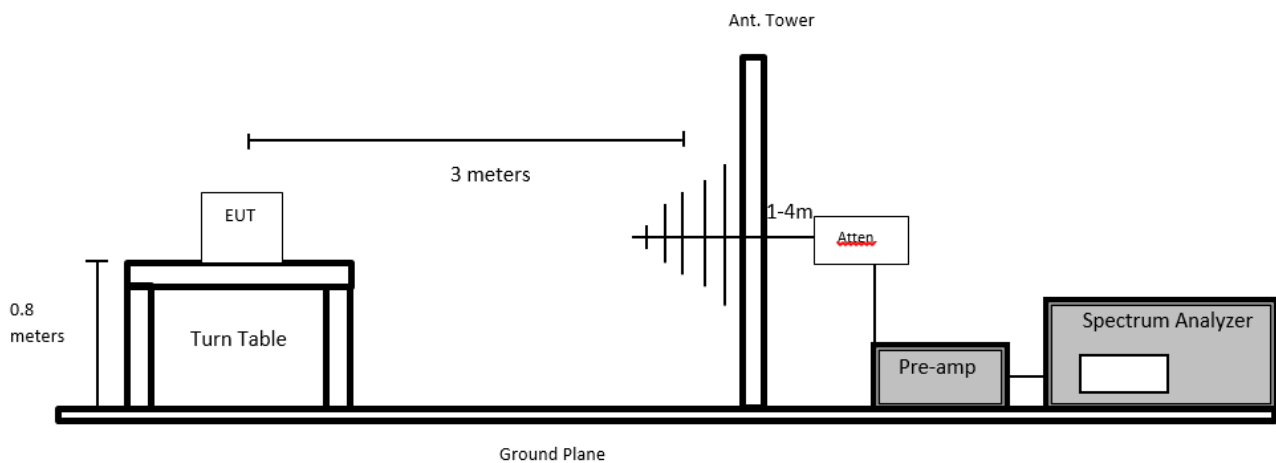
The radiated emissions tests were performed in the 5-meter chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC §15.247 and ISED RSS-247 limits.

The spacing between the peripherals was 10 centimeters.

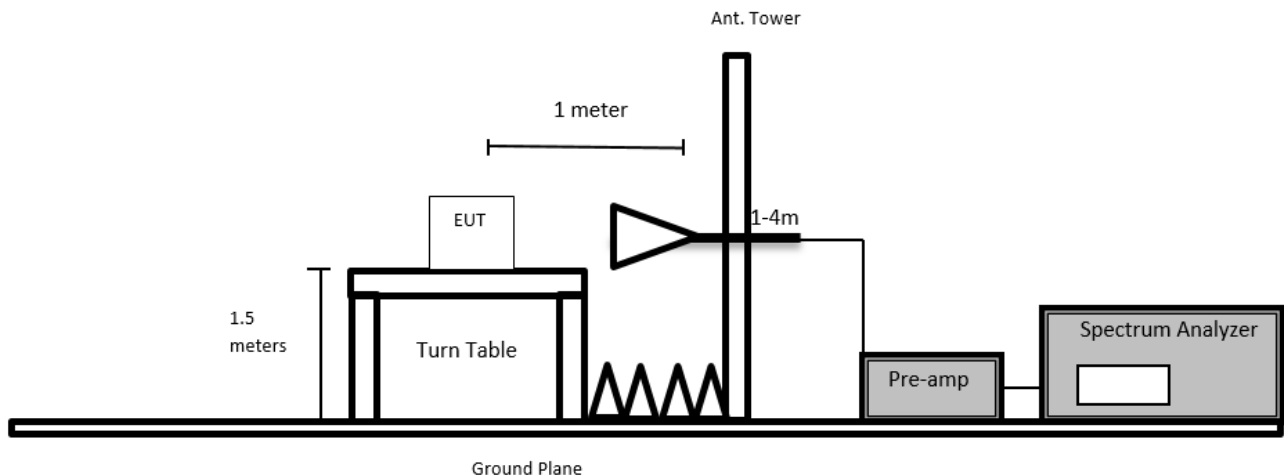
External I/O cables were draped along the edge of the test table and bundled when necessary.

6.3 Test Setup Diagrams

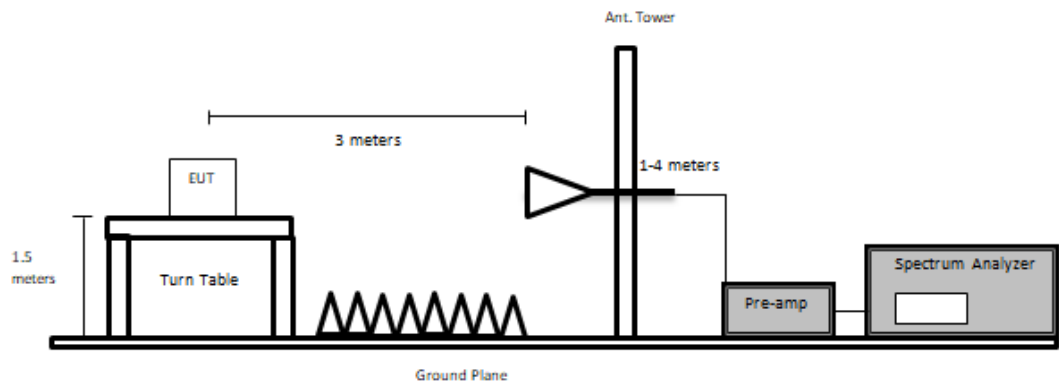
Below 1 GHz



Above 1 GHz at 1m



Above 1 GHz at 3m



6.4 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 = 3MHz, 100 trace average sweeps / Sweep = Auto

6.5 Corrected Amplitude and Margin Calculation

For emissions below 1 GHz,

The Corrected Amplitude (CA) is calculated by adding the Correction Factor to the S.A. Reading. The basic equation is as follows:

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

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

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

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

The “Margin” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

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

For emission above 1 GHz,

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

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

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

The “Margin” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

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

6.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
310	Rhode & Schwarz	EMI Test Receiver	ESCI 1166.5950.03	100338	2024-05-29	1 year
424	Agilent	Spectrum Analyzer	E4440A	US45303156	2024-03-06	1 year
614	Rhode & Schwarz	Wideband Radio Communication Tester	CMW500	1201.0002K50-120503-Um	2024-06-11	1 year
327	Sunol Science Corp	System Controller	SC110V	122303-1	N/R	N/A
1075	Sunol Sciences	Boresight Tower	TLT3	050119-7	N/R	N/A
1388	Sunol Sciences	Flush Mount Turntable	FM	112005-2	N/R	N/A
316	Sonoma Instruments	Preamplifier 10 kHz - 2.5 GHz	317	260406	2024-02-27	6 months
658	HP/Agilent	Pre-Amplifier	8449B OPT HO2	3008A01103	2024-06-18	6 months
827	AH Systems	Preamplifier	PAM 1840 VH	170	2024-05-05	6 months
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2; 1504	2023-12-18	2 years
1192	ETS Lindgren	Horn Antenna	3117	00218973	2022-09-29	2 years
91	ETS Lindgren	Horn Antenna	ARH-4223-02	10555-02	2024-03-14	2 years
188	Sunol Sciences	Horn Antenna	DRH-118	A052704	2023-11-06	2 years
1186	Pasternack	Coaxial Cable, RG214	PE3062-1050CM	1	2024-04-09	1 year
1248	Pasternack	RG214 COAX Cable	PE3062	-	2024-04-04	1 year
1249	Time Microwave	LMR-400 Cable Dc-3 Ghz	AE13684	2k80612-5 6fts	2024-04-09	1 year
1353	RFMW	2.92mm 10ft RF Cable DC to 40 GHz	PICA-29M29M-F150-120	NA	2024-01-24	6 months
1356	Pasternack	N 28ft RF Cable	RG213	062421	2023-12-11	1 year
-	-	RF Cable (x2)	-	-	Each Time ¹	Each Time ¹
1245	-	6dB Attenuator	PE7390-6	01182018A	2022-11-22	2 year
1246	HP	RF Limiter	11867A	01734	2024-04-09	1 year
672	Micro -Tronics	2.4-2.6 GHz Notch Filter	BRM50701	160	2024-03-06	1 year
920	UMTS	Notch Filter 1865 - 2025 Mhz	-	938147A 60656 0944	Each Time ¹	Each Time ¹

Note¹: cables, attenuators and notch filters included in the test set-up were 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:	21 to 22°C
Relative Humidity:	42 to 47%
ATM Pressure:	101.7 kPa

The testing was performed by Arturo Reyes from 2024-06-20 to 2024-07-15 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 ISERC RSS-247 standards’ radiated emissions limits, and had the worst margin of:

Worst Case – Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Configuration
-0.51	698.815	Vertical	802.11b 2437 MHz

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

6.9 Radiated Emissions Test Results

Note 1: For radiated band edge measurements, please refer to Annex B.

Note 2: The EUT is not transmitting at below 30 MHz, thus 9 kHz to 30 MHz was not evaluated for Spurious Emissions.

Note 3: Peak detector was used in comparison to QP limit in some cases to show worst-case compliance

Note 4: All peaks exceeding the limit line in the graph fall out of restricted bands and thus 30dBc limit (FCC 15.247(d)/RSS-247 5.5) was instead applied.

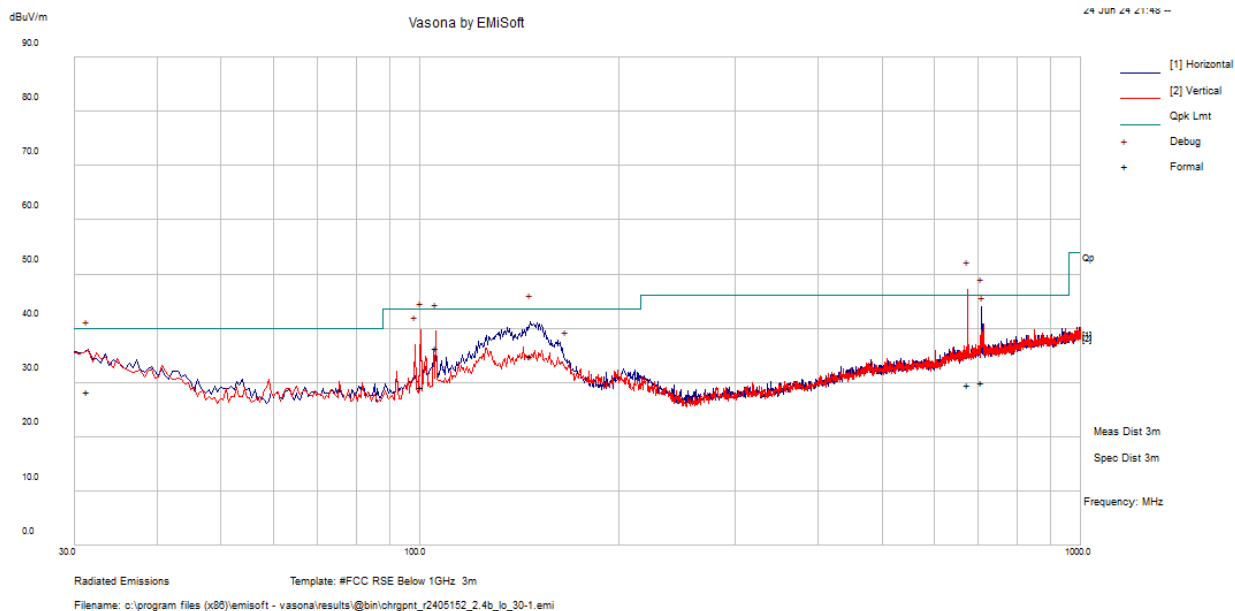
Fundamental measured for 802.11b middle channel: $(118.09\text{ dBuV/m @ 3m}) - 30\text{ dB} = 88.09\text{ dBuV/m @ 3m}$

Note 5: As per ANSI C63.10 Clause 5.6.2.2, 802.11b, 802.11g, BLE and DH1 were determined to be the worst-case modes per modulation family and were used for the following testing.

Note 6: In cases where Peak emissions were shown to comply with average/QP limits, such emissions' measurements positions (i.e. azimuth and height) are shown in nearest step size since scan was performed with a peak/max. hold trace at all positions.

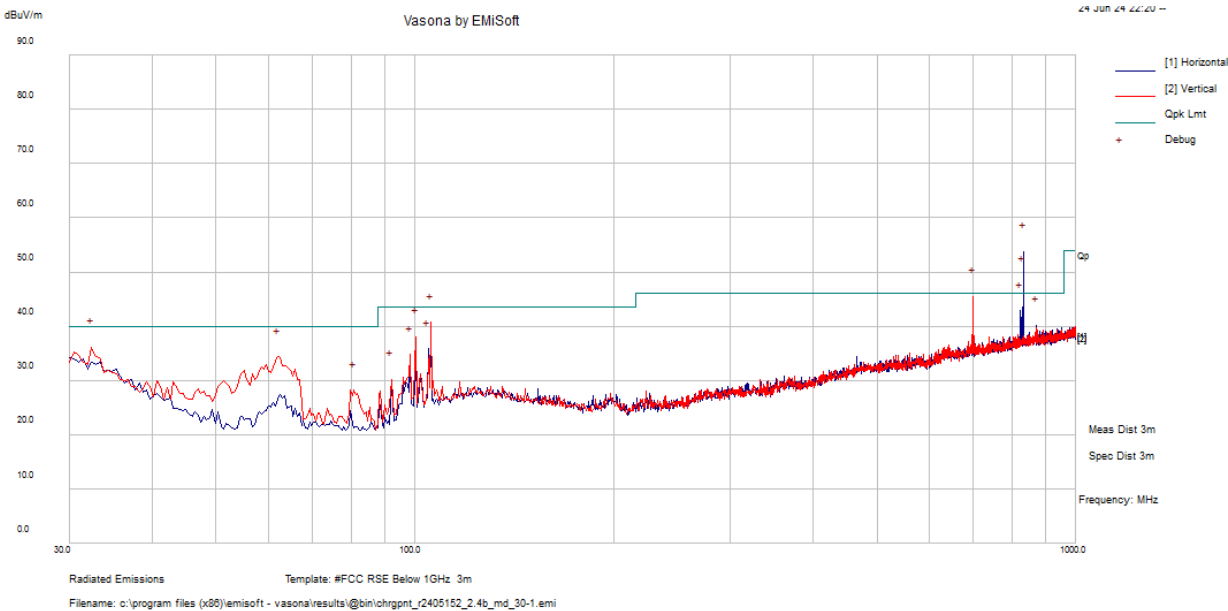
1) 30 MHz – 1 GHz, Measured at 3 meters

802.11b, 2412 MHz



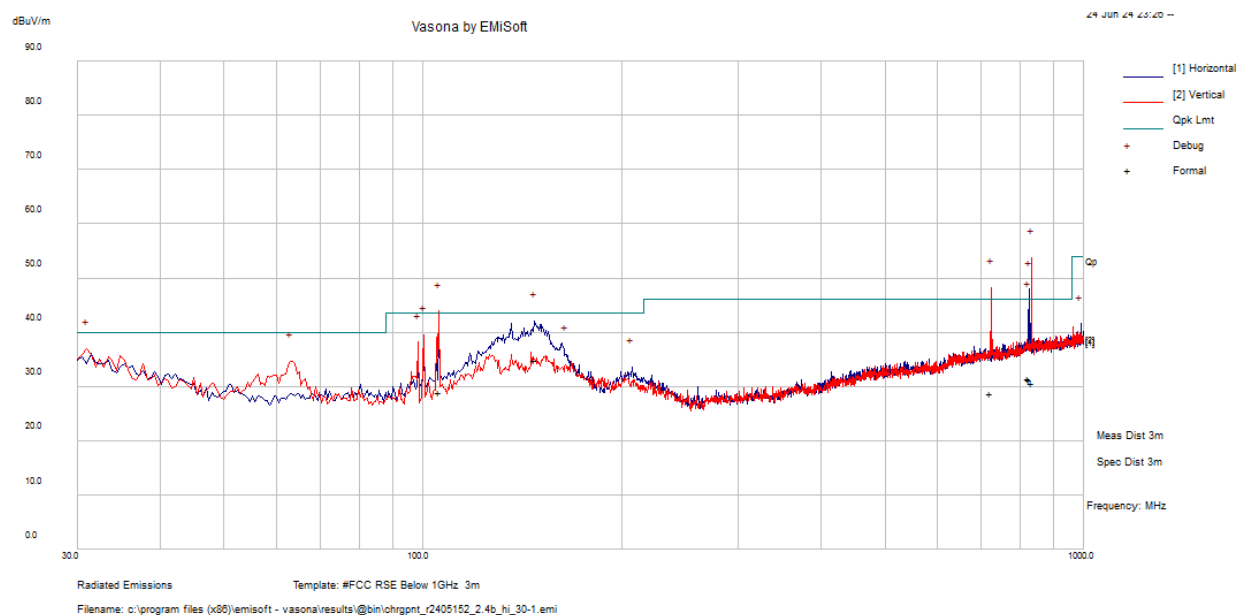
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
673.8583	28.19	1.3	29.49	126	V	229	46	-16.51	QP
707.296	28.03	1.99	30.02	202	H	176	46	-15.98	QP
147.0928	42.98	-8.03	34.95	232	H	177	43.5	-8.55	QP
31.3755	30.32	-2	28.32	135	H	291	40	-11.68	QP
100.264	39.18	-10.08	29.1	113	V	172	43.5	-14.4	QP
105.6795	45.08	-8.77	36.31	117	V	102	43.5	-7.19	QP

802.11b, 2437 MHz



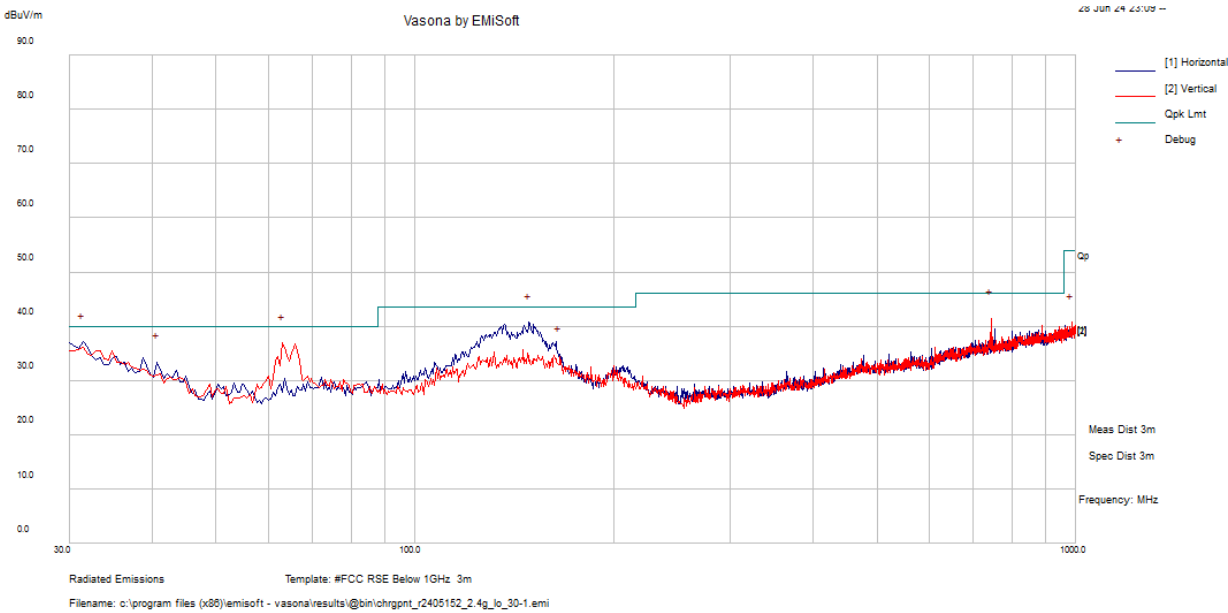
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
833.16	50.29	3.51	53.8	200	H	0	88.09	-34.29	Peak
832.19	44.18	3.51	47.69	100	H	0	88.09	-40.4	Peak
698.815	43.56	1.93	45.49	100	V	0	46	-0.51	Peak
105.66	49.47	-8.78	40.69	100	V	0	43.5	-2.81	Peak
824.915	39.33	3.52	42.85	200	H	0	46	-3.15	Peak
32.425	38.94	-2.78	36.16	200	V	0	40	-3.84	Peak

802.11b, 2462 MHz



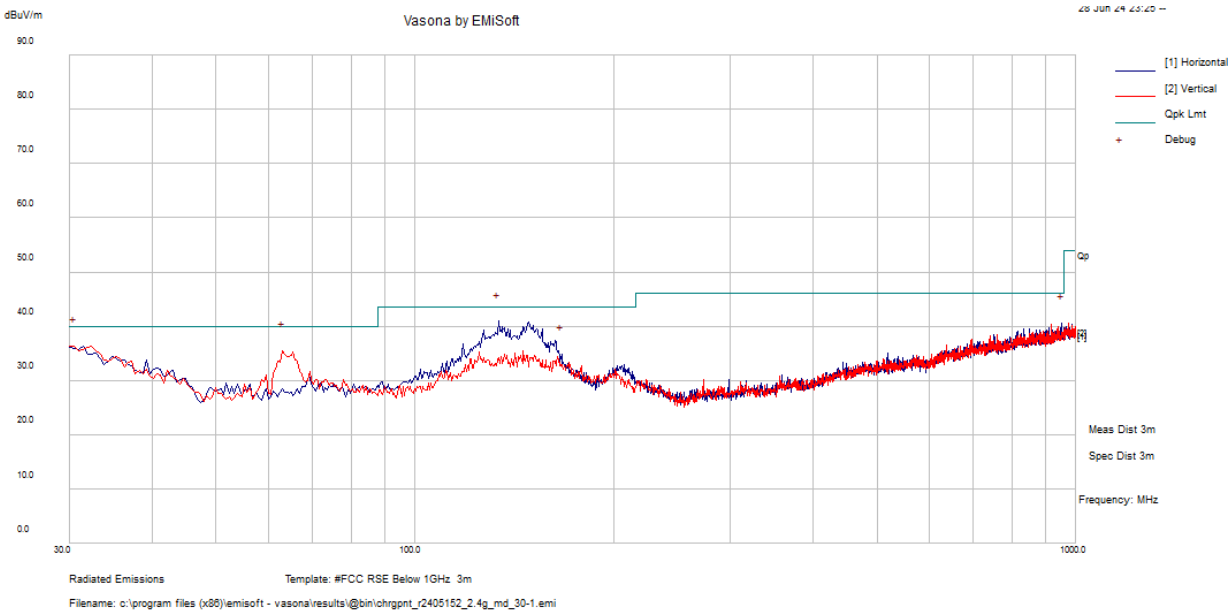
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
833.3713	27.19	3.51	30.7	147	V	141	46	-15.3	QP
723.786	26.7	2.02	28.72	128	V	223	46	-17.28	QP
827.6813	27.86	3.5	31.36	296	H	55	46	-14.64	QP
105.7595	37.69	-8.76	28.93	129	V	56	43.5	-14.57	QP
147.4408	42.98	-8.03	34.95	294	H	338	43.5	-8.55	QP
825.1075	27.92	3.52	31.44	200	H	94	46	-14.56	QP

802.11g, 2412 MHz



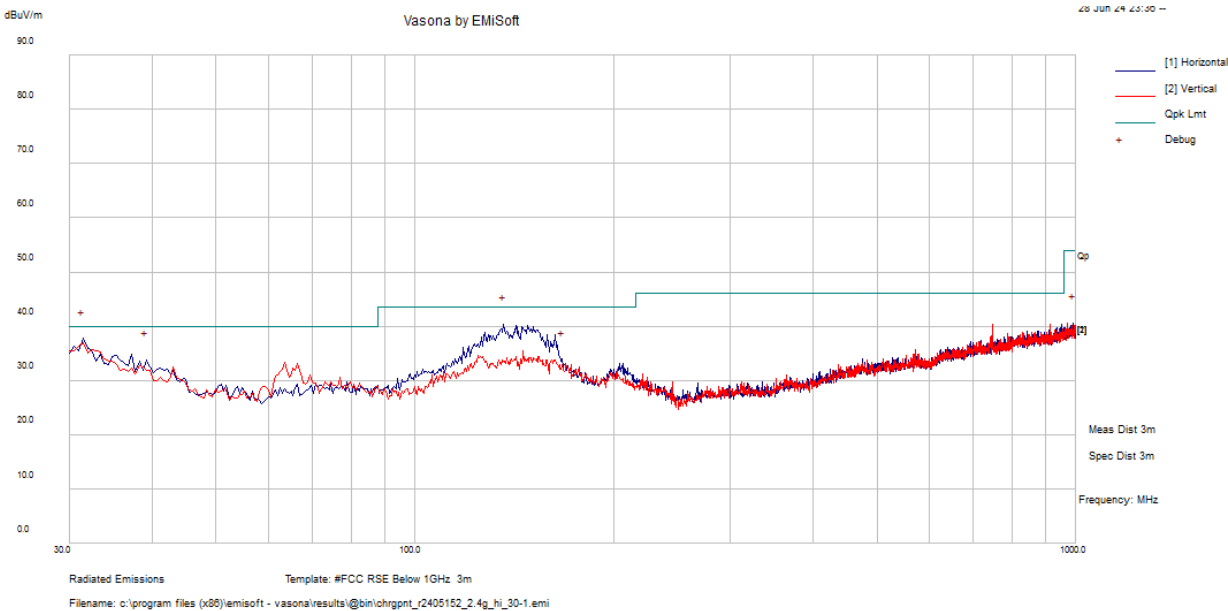
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
148.825	48.86	-8.2	40.66	300	H	360	43.5	-2.84	Peak
31.455	39.12	-2.03	37.09	300	H	360	40	-2.91	Peak
62.98	50.43	-13.58	36.85	100	V	360	40	-3.15	Peak
743.92	39.01	2.44	41.45	300	V	360	46	-4.55	Peak
40.67	41.59	-8.28	33.31	300	H	360	40	-6.69	Peak
165.315	43.46	-8.69	34.77	300	H	360	43.5	-8.73	Peak

802.11g, 2437 MHz

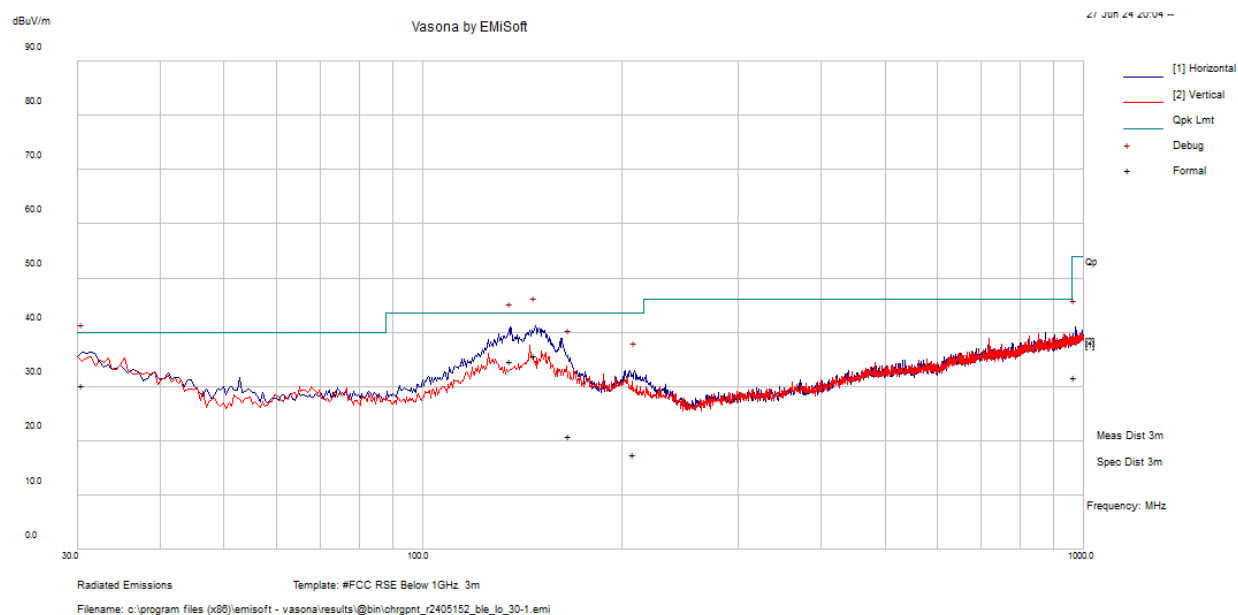


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
133.79	48.12	-7.19	40.93	300	H	360	43.5	-2.57	Peak
30.485	37.62	-1.28	36.34	300	V	360	40	-3.66	Peak
62.98	49.1	-13.59	35.51	100	V	360	40	-4.49	Peak
951.015	35.74	4.84	40.58	100	H	360	46	-5.42	Peak
166.77	43.59	-8.79	34.8	300	H	360	43.5	-8.7	Peak
149.224	48.58	-8.22	40.36	100	H	7	43.5	-3.14	Peak

802.11g, 2462 MHz

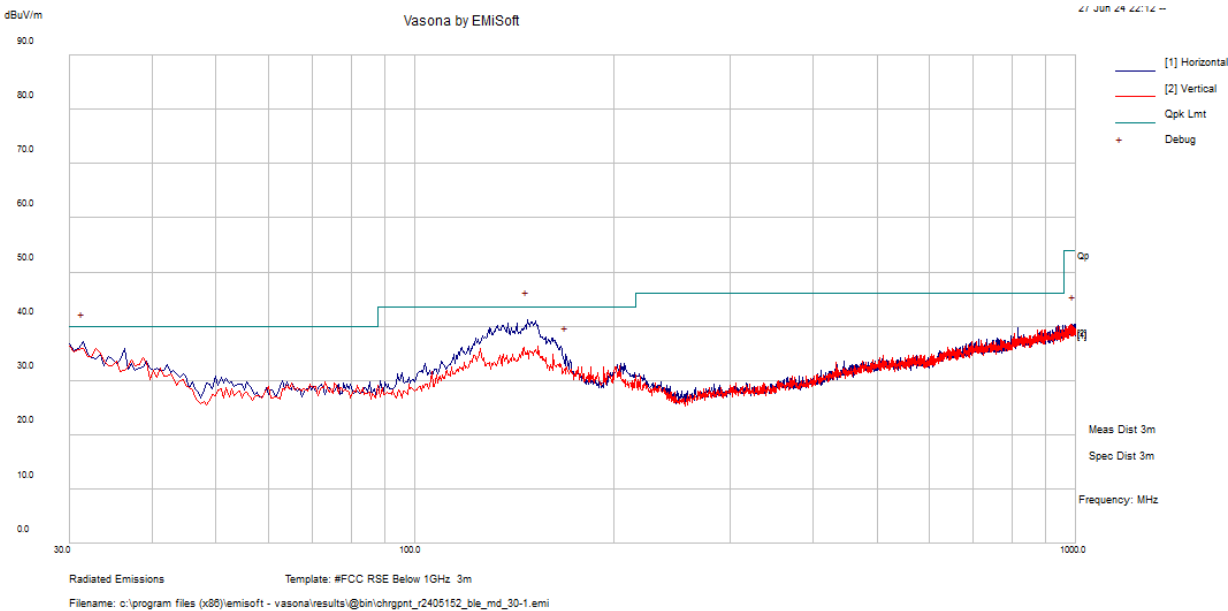


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
31.455	39.76	-2.03	37.73	300	H	360	40	-2.27	Peak
136.215	47.76	-7.36	40.4	300	H	360	43.5	-3.1	Peak
39.215	41.03	-7.26	33.77	300	H	360	40	-6.23	Peak
167.255	42.71	-8.81	33.9	300	H	360	43.5	-9.6	Peak
992.24	35.06	5.56	40.62	100	H	360	54	-13.38	Peak
64.546	44.22	-13.46	30.76	100	H	7	40	-9.24	Peak

BLE, 2402 MHz

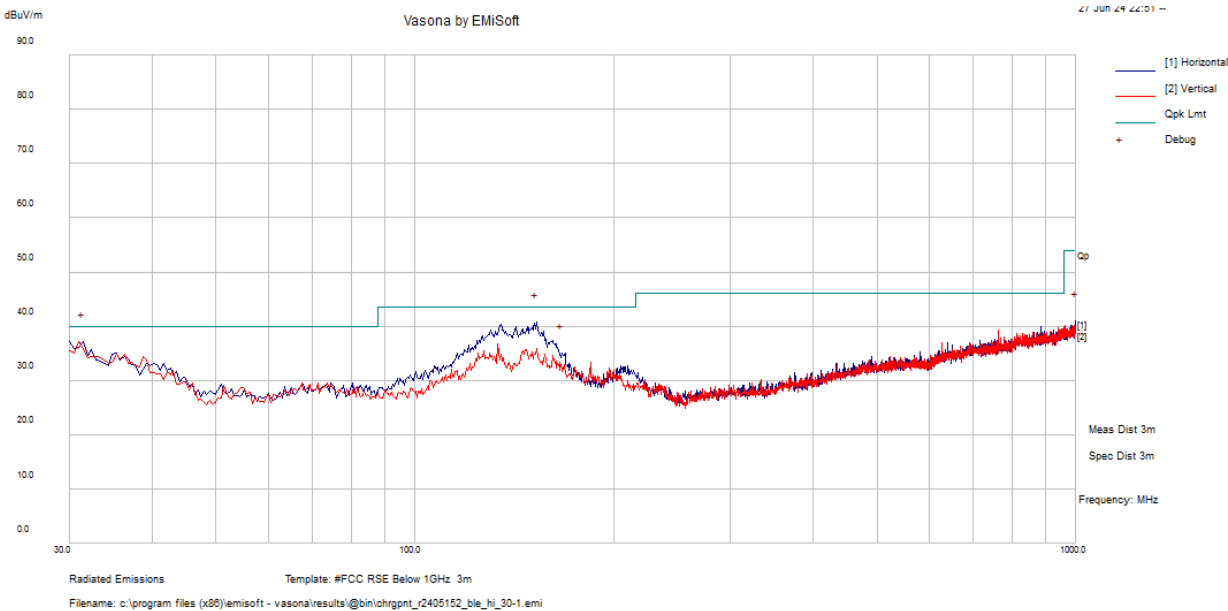
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
147.8463	43.76	-8.04	35.72	224	H	352	43.5	-7.78	QP
135.589	41.79	-7.18	34.61	293	H	308	43.5	-8.89	QP
30.5445	31.51	-1.36	30.15	210	H	27	40	-9.85	QP
166.5995	29.41	-8.63	20.78	220	H	203	43.5	-22.72	QP
208.834	27.4	-9.89	17.51	236	H	186	43.5	-25.99	QP
969.724	26.8	4.9	31.7	186	H	60	54	-22.3	QP

BLE, 2442 MHz



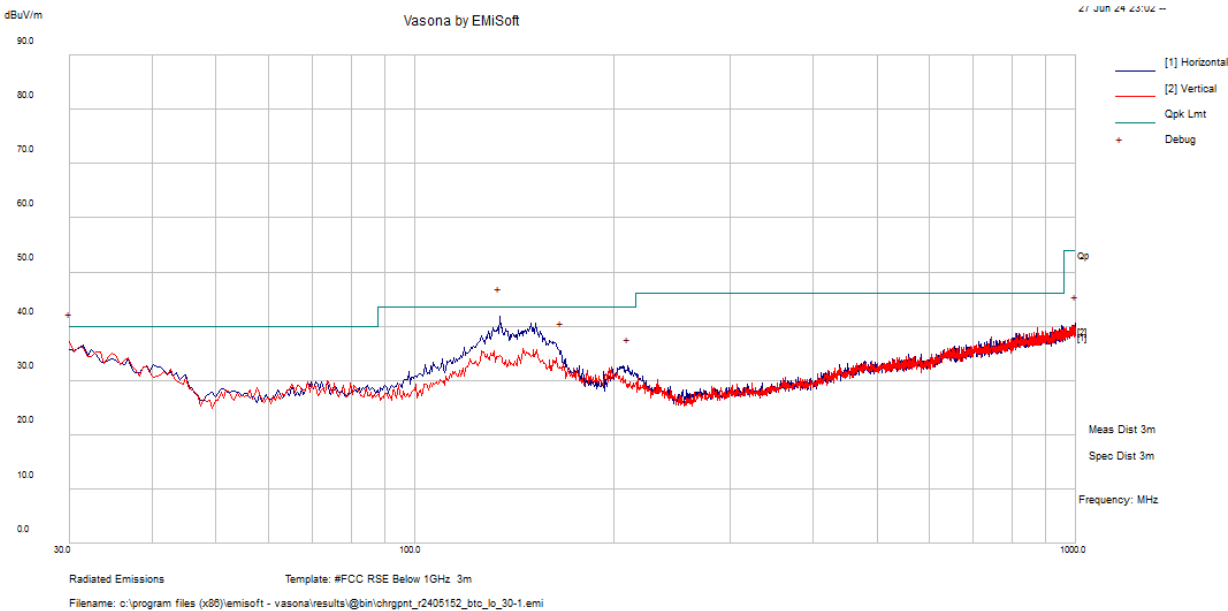
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
147.855	49.25	-8.08	41.17	200	H	360	43.5	-2.33	Peak
31.455	39.29	-2.09	37.2	200	H	360	40	-2.8	Peak
169.195	43.59	-8.85	34.74	300	H	360	43.5	-8.76	Peak
993.695	34.85	5.5	40.35	200	H	360	54	-13.65	Peak
130.608	45.95	-6.89	39.06	100	H	352	43.5	-4.44	Peak
967.236	34.16	5.01	39.17	100	H	352	54	-14.83	Peak

BLE, 2480 MHz



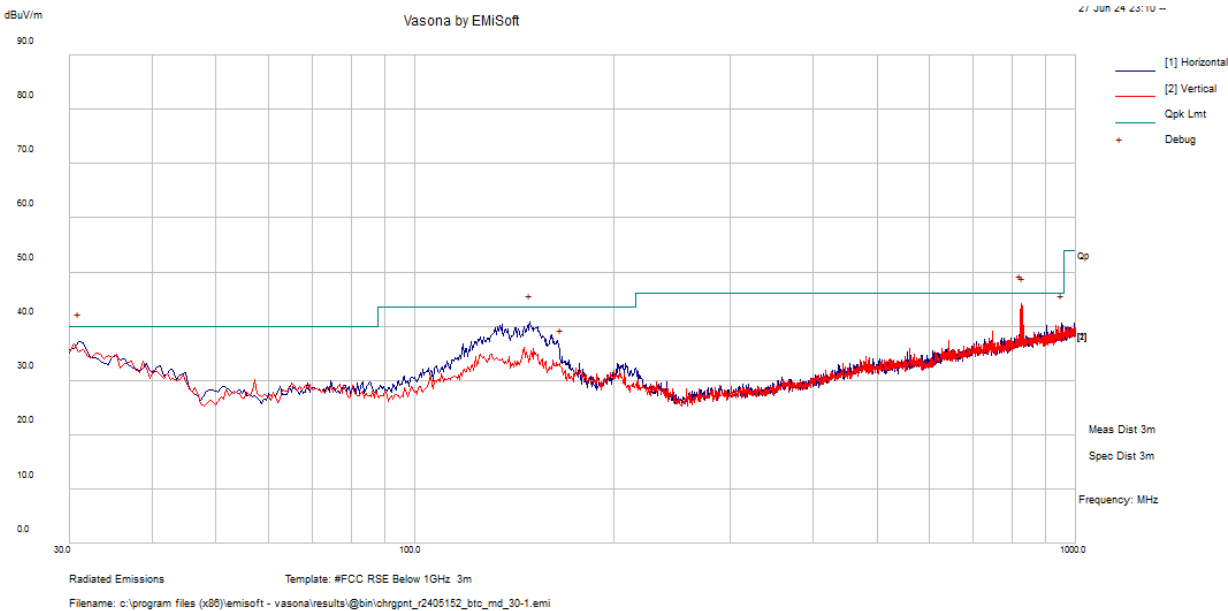
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
152.705	49.02	-8.26	40.76	300	H	360	43.5	-2.74	Peak
31.455	39.25	-2.1	37.15	300	H	360	40	-2.85	Peak
166.77	43.79	-8.68	35.11	300	H	360	43.5	-8.39	Peak
1000	35.52	5.61	41.13	100	H	360	54	-12.87	Peak
892.291	34.09	4.08	38.17	101	H	7	46	-7.83	Peak
132.918	45.47	-7.05	38.42	101	H	7	43.5	-5.08	Peak

DH1, 2402 MHz



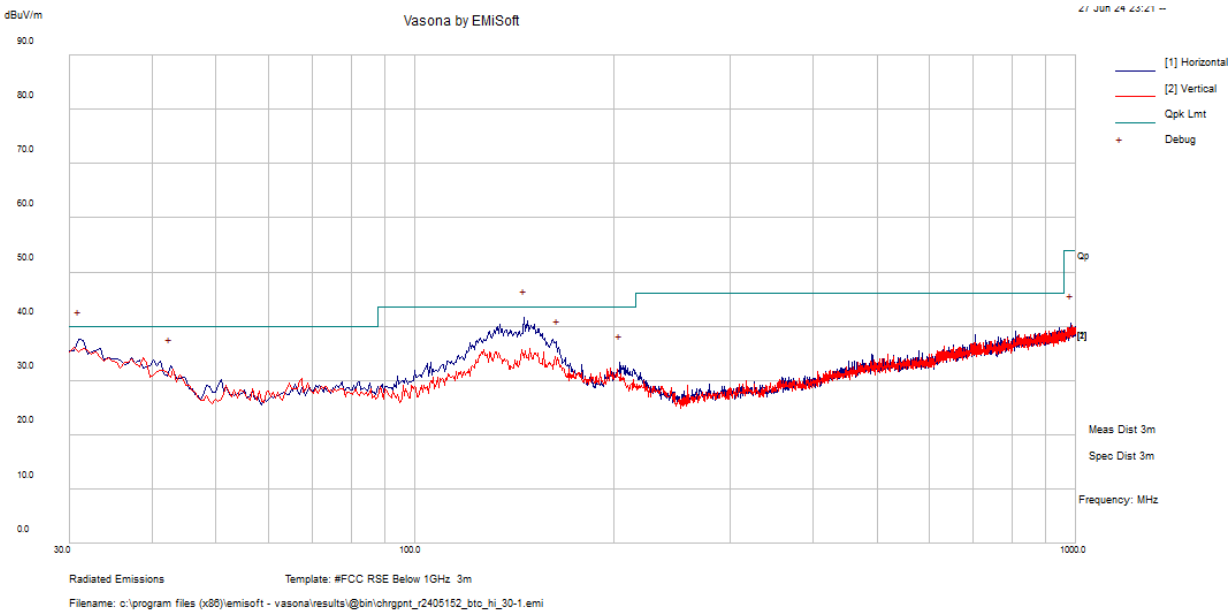
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector
134.275	48.93	-7.13	41.8	300	H	360	43.5	-1.7	Peak
30	38.15	-0.96	37.19	300	V	360	40	-2.81	Peak
166.285	44.1	-8.65	35.45	300	H	360	43.5	-8.05	Peak
209.935	42.71	-10.06	32.65	300	H	360	43.5	-10.85	Peak
999.515	34.84	5.6	40.44	300	H	360	54	-13.56	Peak
955.438	34.34	4.77	39.11	101	H	7	46	-6.89	Peak

DH1, 2442 MHz



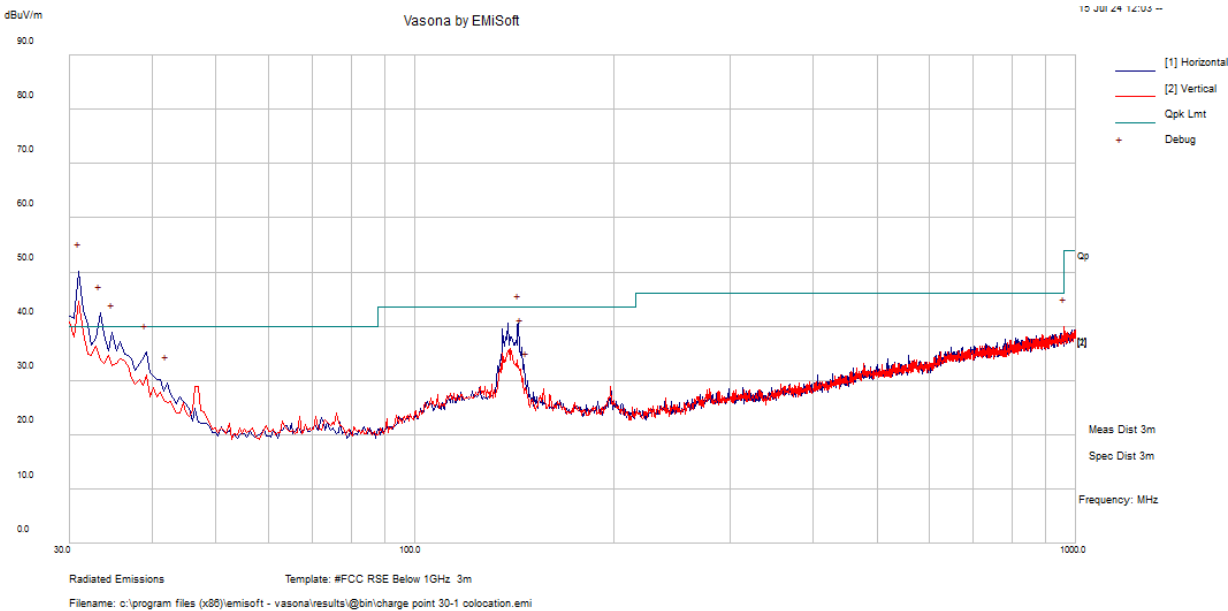
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
825.4	40.67	3.59	44.26	100	V	360	46	-1.74	Peak
831.22	40.27	3.56	43.83	100	V	360	46	-2.17	Peak
30.97	38.95	-1.72	37.23	300	H	360	40	-2.77	Peak
149.31	48.78	-8.12	40.66	300	H	360	43.5	-2.84	Peak
952.955	35.84	4.74	40.58	300	H	360	46	-5.42	Peak
166.77	43.02	-8.68	34.34	300	H	360	43.5	-9.16	Peak

DH1, 2480 MHz

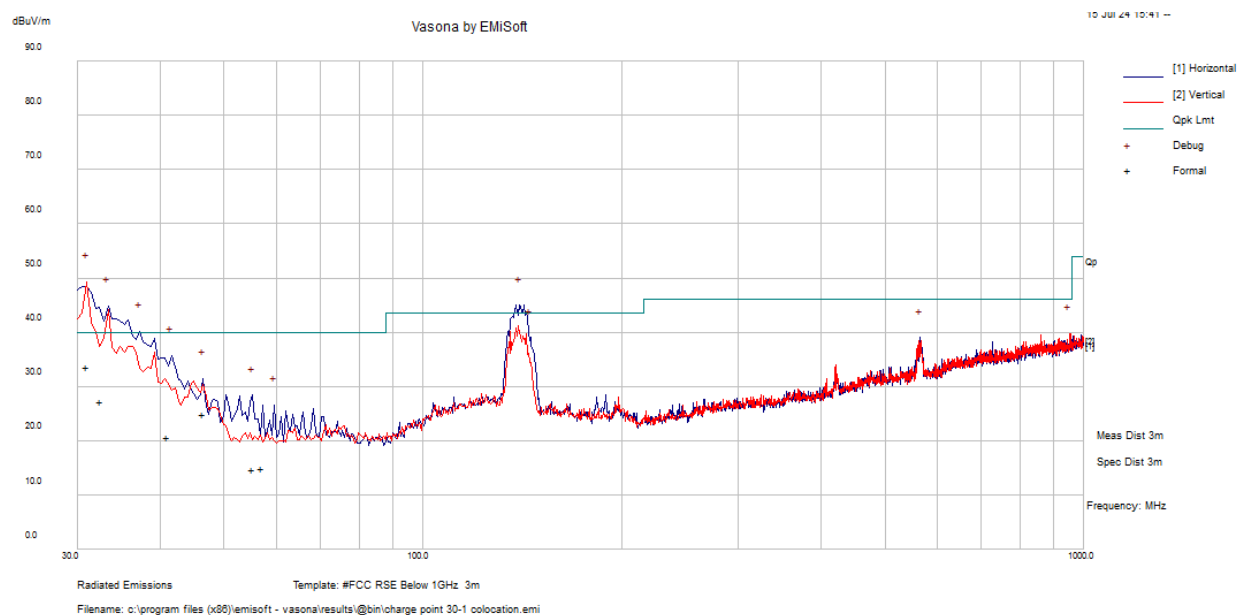


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
146.4	49.62	-8.05	41.57	300	H	360	43.5	-1.93	Peak
30.97	39.38	-1.71	37.67	300	H	360	40	-2.33	Peak
42.61	42.23	-9.64	32.59	300	H	360	40	-7.41	Peak
164.83	44.55	-8.56	35.99	300	H	360	43.5	-7.51	Peak
204.115	42.53	-9.28	33.25	300	H	360	43.5	-10.25	Peak
983.51	35.25	5.31	40.56	300	H	360	54	-13.44	Peak

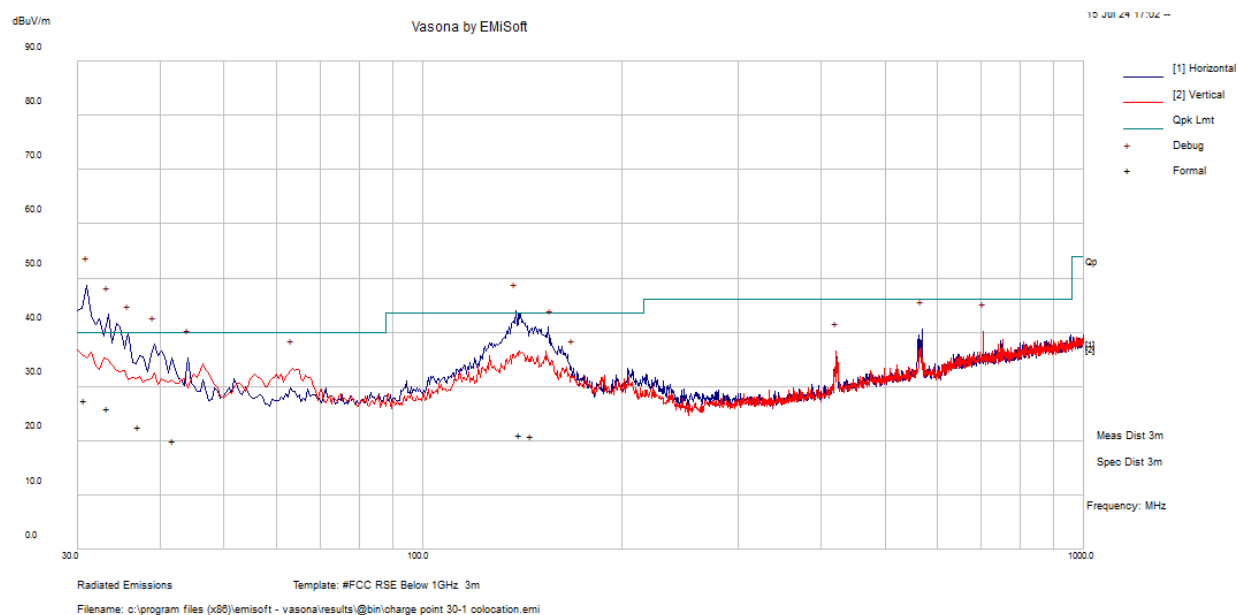
2.4 GHz Wi-Fi + LTE, 2437 MHz



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
30.94725	29.02	-1.53	27.49	190	H	334	40	-12.51	QP
33.15	29.34	-3.12	26.22	201	H	223	40	-13.78	QP
34.60475	29.16	-3.99	25.17	297	H	74	40	-14.83	QP
143.5025	28.1	-7.79	20.31	105	H	352	43.5	-23.19	QP
39.3115	29	-7.22	21.78	147	H	109	40	-18.22	QP
144.9618	28.17	-7.88	20.29	109	H	352	43.5	-23.21	QP

BLE + LTE, 2442 MHz

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
30.8205	28.97	-1.43	27.54	226	V	161	40	-12.46	QP
33.351	29.24	-3.25	25.99	180	H	136	40	-14.01	QP
139.9683	28.63	-7.49	21.14	146	H	352	43.5	-22.36	QP
37.1925	28.19	-5.68	22.51	163	H	305	40	-17.49	QP
41.87225	29.07	-8.96	20.11	264	H	265	40	-19.89	QP
145.577	28.85	-7.91	20.94	280	H	128	43.5	-22.56	QP

BTC + LTE, 2442 MHz

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
30.95425	30.22	-1.53	28.69	151	H	62	40	-11.31	QP
33.1765	30.55	-3.14	27.41	206	H	22	40	-12.59	QP
138.3118	41.38	-7.34	34.04	202	H	353	43.5	-9.46	QP
35.814	32.16	-4.76	27.4	243	H	331	40	-12.6	QP
39.06475	33.02	-7.03	25.99	199	H	123	40	-14.01	QP
156.249	40.55	-8.22	32.33	174	H	213	43.5	-11.17	QP

FCC/IC Limits for 1 GHz to 26.5 GHz				
Applicability	(dBm)	(uV/m at 3meters)	(dBuV/m at 3meters)	(dBuV/m at 1meter)
Restricted Band Average Limit	-	500	54 ²	63.54 ³
Restricted Band Peak Limit ¹	-	-	74	83.54

Note 1: Restricted Band Peak Limit is defined to be 20dB higher than Average Limit.

Note 2: Above 1GHz limit calculation:

$$\text{dBuV/m} = 20 \cdot \log(\text{V/m}) + 120 = 20 \cdot \log((500 [\text{uV/m}]/1000000)) + 120 = 54 [\text{dBuV/m}]$$

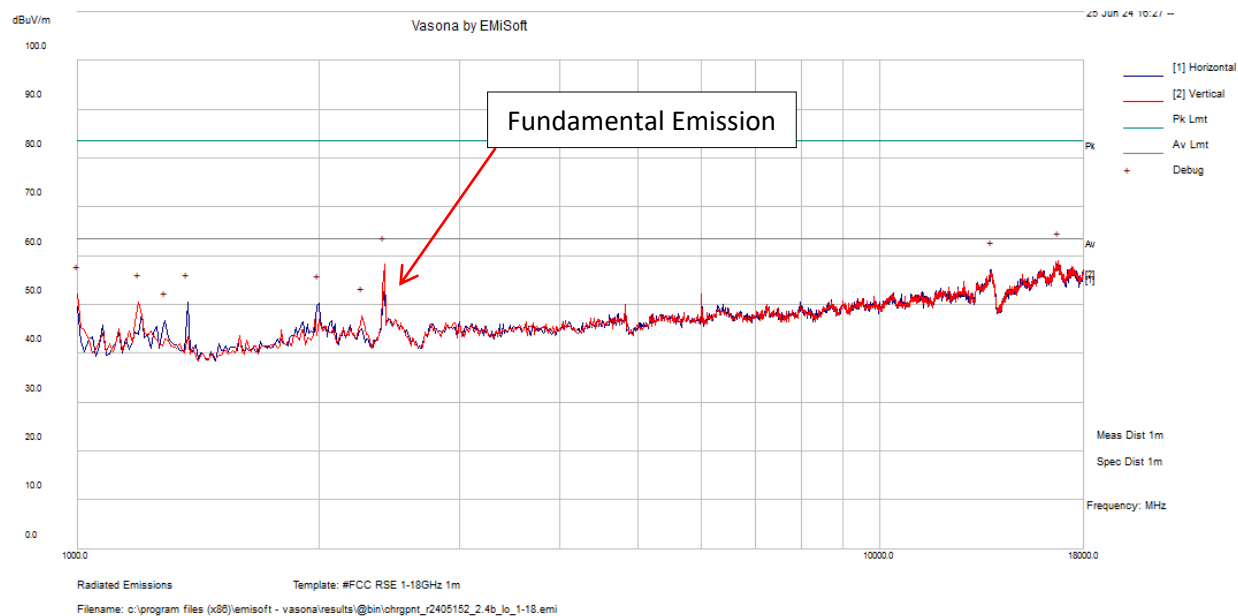
Note 3: Limits at 1 meter are determined by applying a Distance correction factor accounts for extrapolation from 1 meter to 3 meters. Formula used is as follows: $20 \cdot \log(3 \text{ meters} / 1 \text{ meter}) = 9.54$ (According to ANSI C63.10-2013 Section 9.4). Extrapolation calculation from 3m to 1m distance:

$$54 [\text{dBuV/m at 3m}] + 9.54 [\text{dB}] = 63.54 [\text{dBuV/m at 1m}]$$

Note 4: Ports terminated for radiated measurements.

2) 1 GHz – 18 GHz, Measured at 1 meter

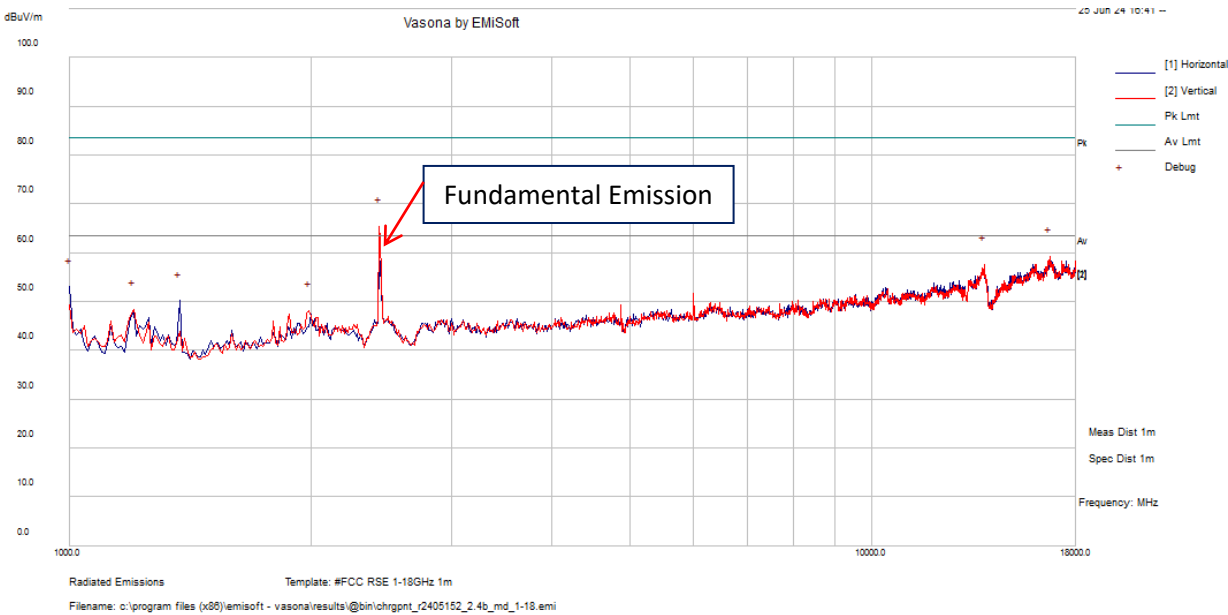
802.11b, 2412 MHz



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
16714.38	46.98	12.02	59	300	V	360	63.54	-4.54	Peak
13803.13	45.05	12.06	57.11	100	H	360	63.54	-6.43	Peak

Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.

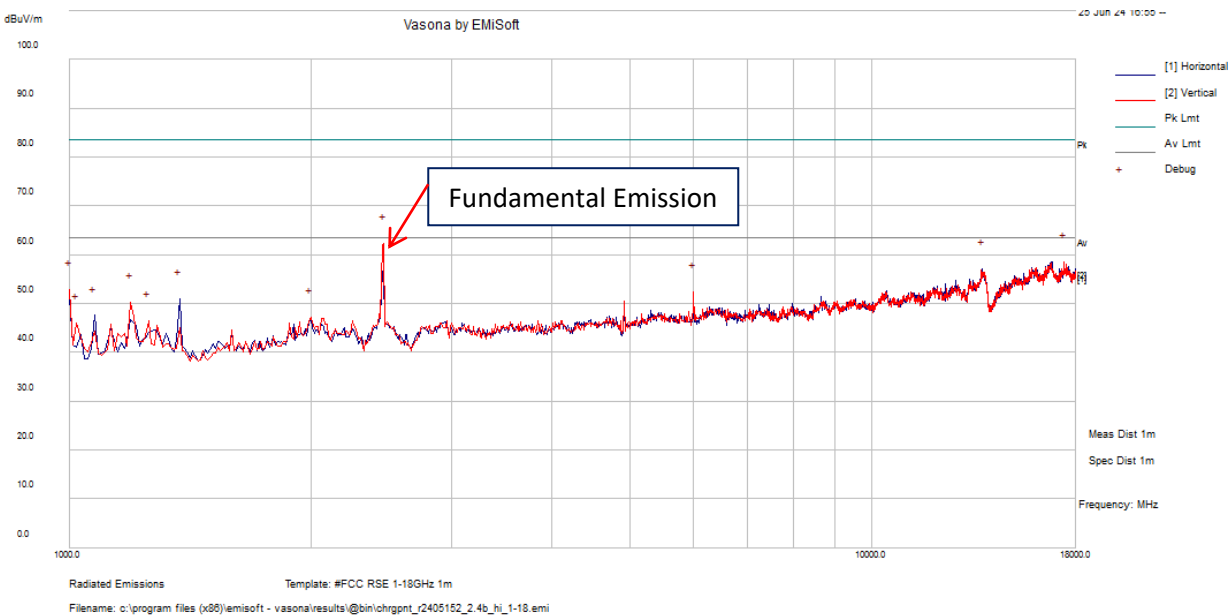
802.11b, 2437 MHz



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
16693.13	47.27	12	59.27	200	V	360	63.54	-4.27	Peak
13824.38	45.81	11.82	57.63	200	V	360	63.54	-5.91	Peak

Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.

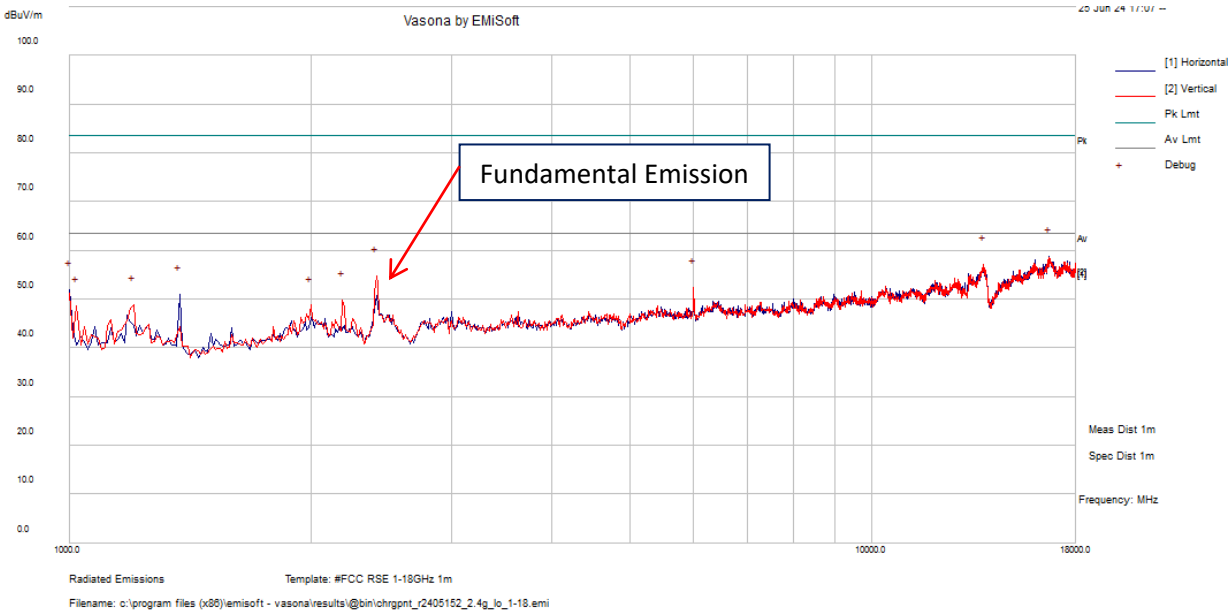
802.11b, 2462 MHz



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
17405	47.7	10.93	58.63	300	V	360	63.54	-4.91	Peak
13750	45.59	11.58	57.17	200	H	360	63.54	-6.38	Peak

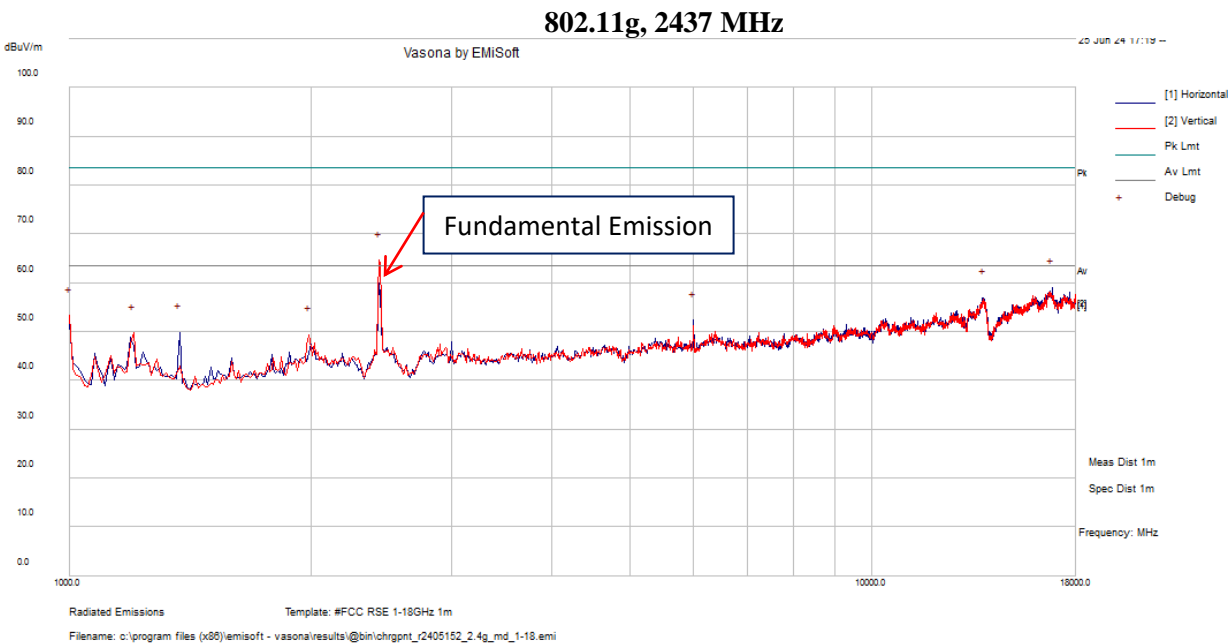
Note: The plot above shows that all peak emissions from 1 to 18 GHz passed the average limits.

802.11g, 2412 MHz



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
16661.25	47.02	11.71	58.73	100	H	360	63.54	-4.82	Peak
13803.13	45.03	12.06	57.09	200	V	360	63.54	-6.45	Peak

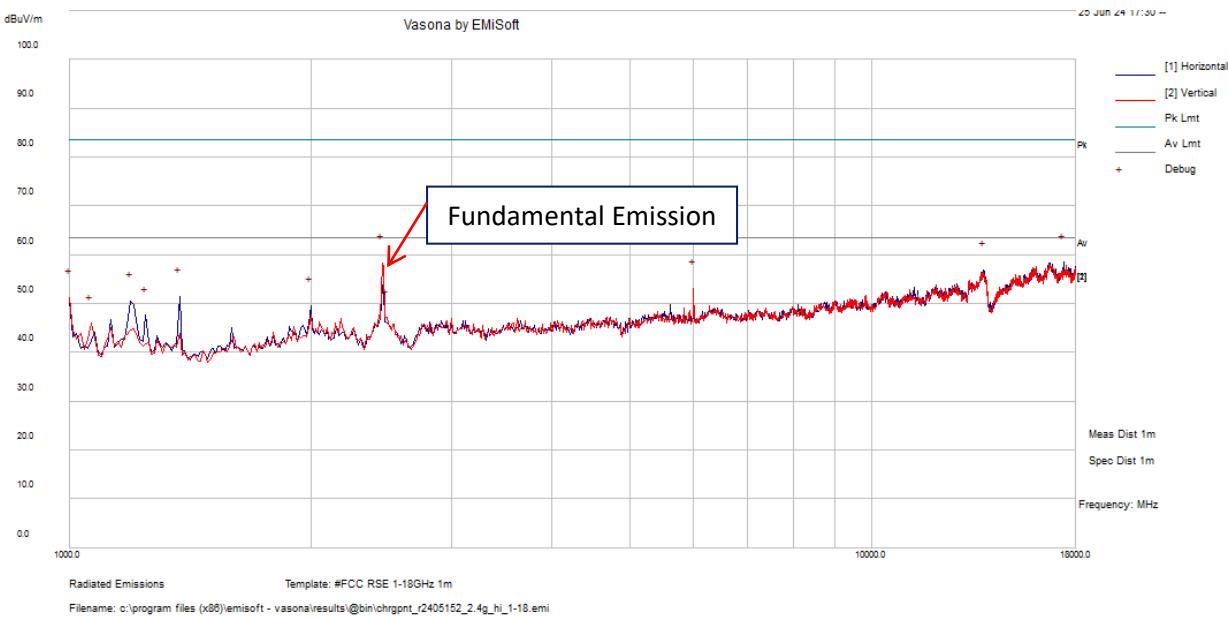
Note: The plot above shows that all peak emissions from 1 to 18 GHz passed the average limits.



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
16810	47.17	11.83	59	100	H	360	63.54	-4.54	Peak
13803.13	44.81	12.05	56.86	300	H	360	63.54	-6.68	Peak

Note: The plot above shows that all peak emissions from 1 to 18 GHz passed the average limits.

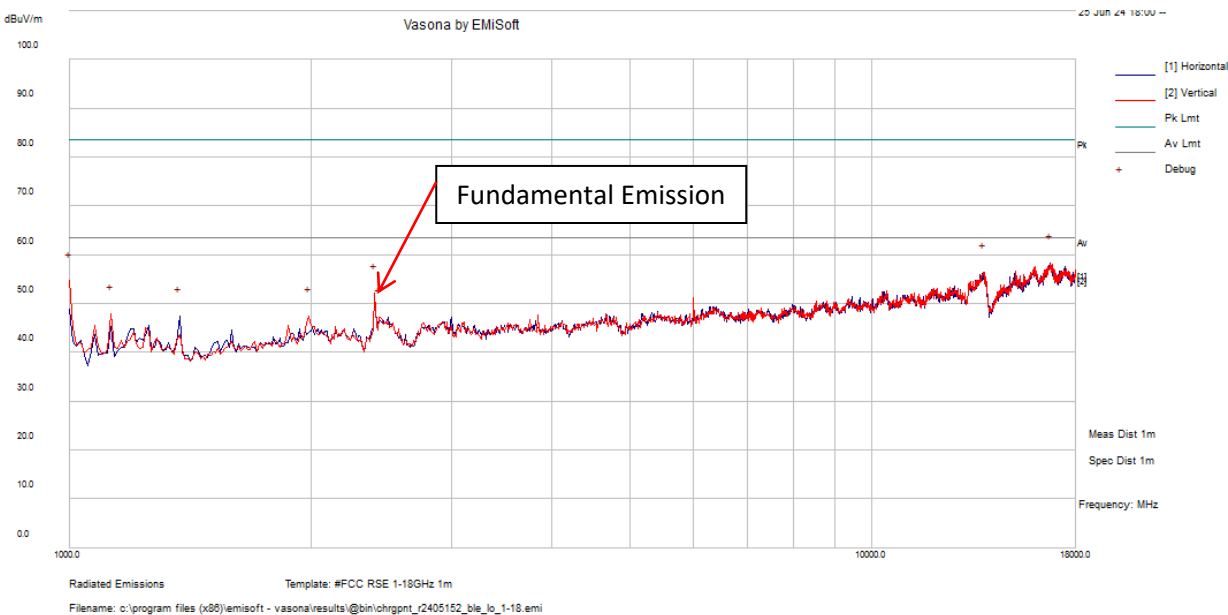
802.11g, 2462 MHz



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
17373.13	47.46	10.98	58.44	200	H	360	63.54	-5.1	Peak
13803.13	44.83	12.05	56.88	200	H	360	63.54	-6.66	Peak

Note: The plot above shows that all peak emissions from 1 to 18 GHz passed the average limits.

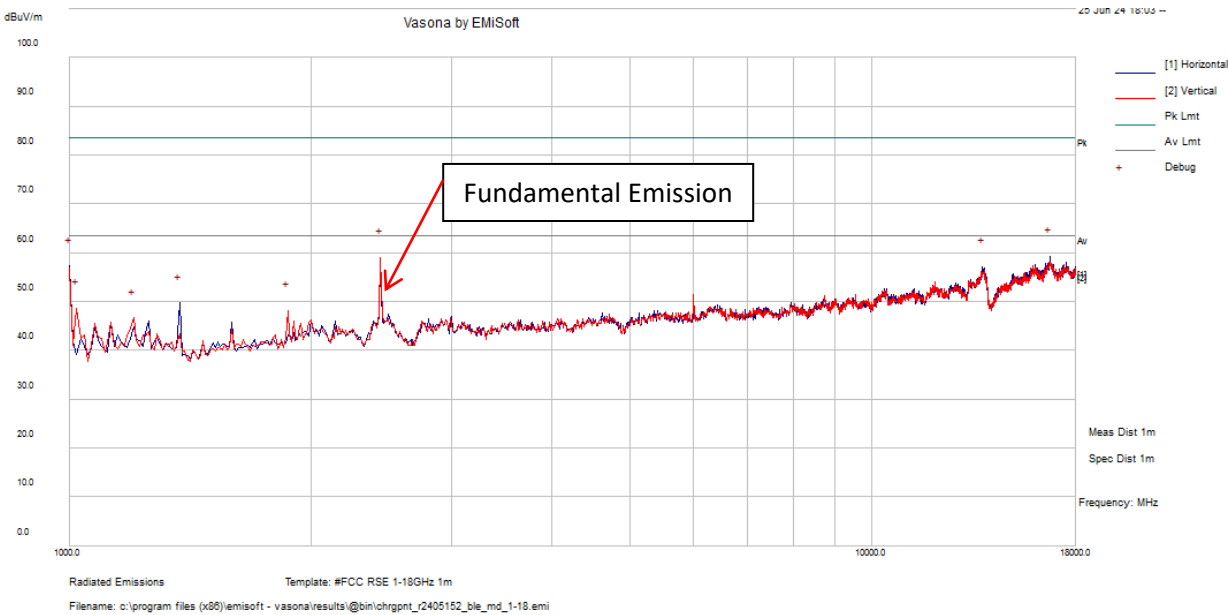
BLE, 2402 MHz



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
16735.63	46.41	11.97	58.38	300	H	360	63.54	-5.17	Peak
13824.38	44.64	11.82	56.46	300	V	360	63.54	-7.08	Peak

Note: The plot above shows that all peak emissions from 1 to 18 GHz passed the average limits.

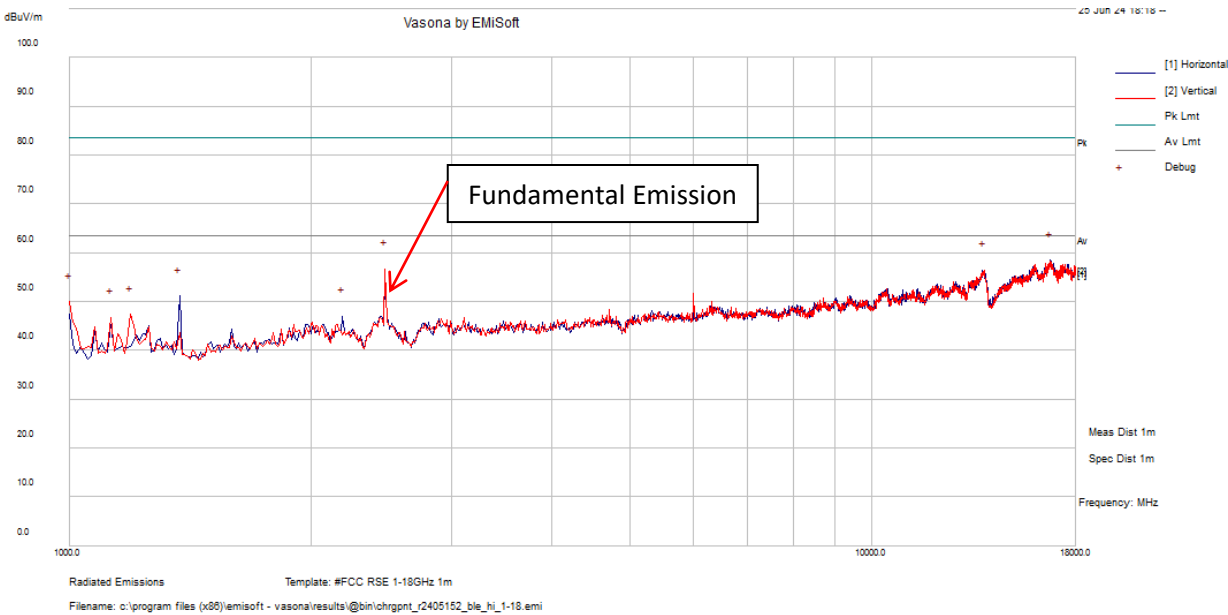
BLE, 2442 MHz



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
16703.75	47.28	12.06	59.34	100	H	360	63.54	-4.2	Peak
1000	69.73	-12.46	57.27	100	H	360	63.54	-6.28	Peak

Note: The plot above shows that all peak emissions from 1 to 18 GHz passed the average limits.

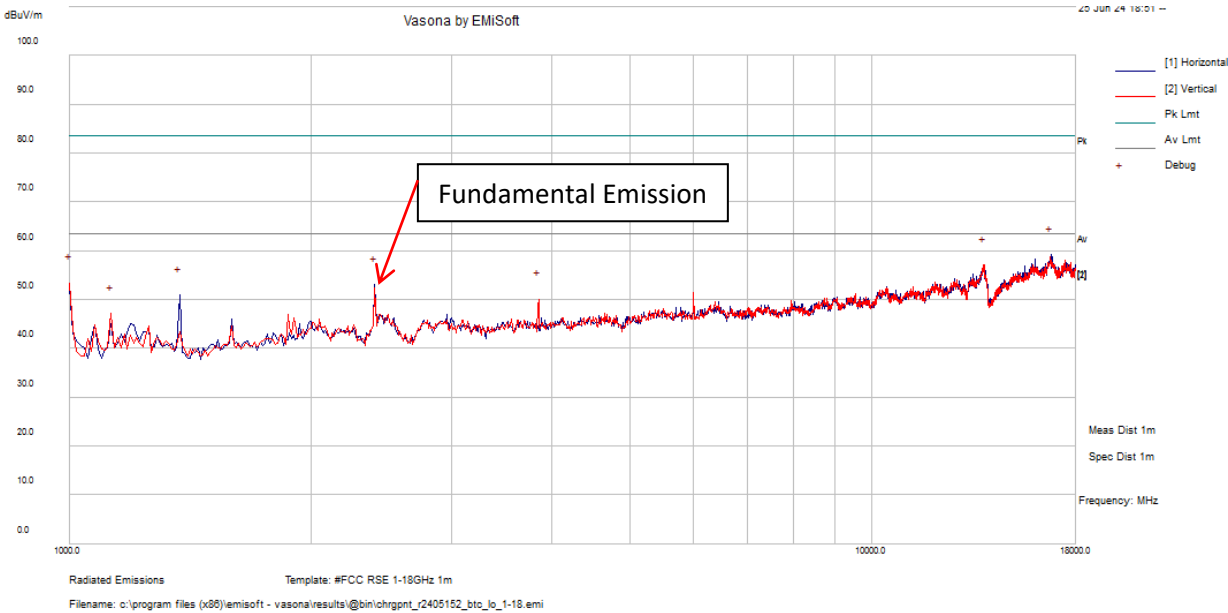
BLE, 2480 MHz



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
16714.38	46.38	12.02	58.4	300	H	360	63.54	-5.14	Peak
13824.38	44.67	11.82	56.49	200	V	360	63.54	-7.05	Peak

Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.

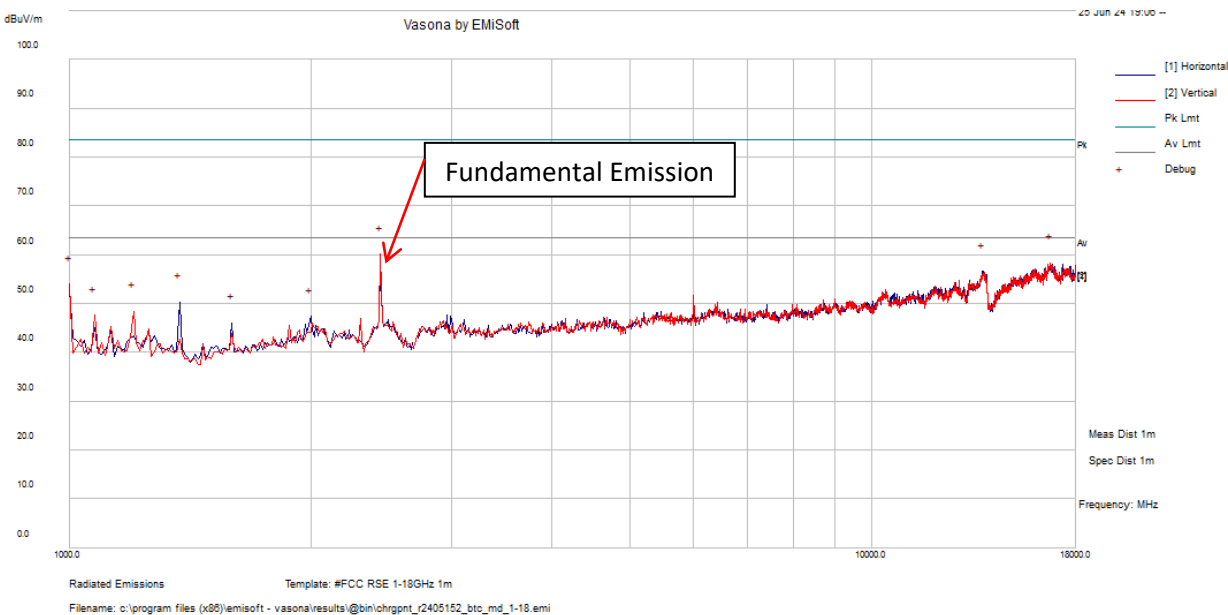
DH1, 2402 MHz



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
16746.25	47.23	11.93	59.16	200	H	360	63.54	-4.38	Peak
13824.38	45.23	11.83	57.06	300	V	360	63.54	-6.48	Peak

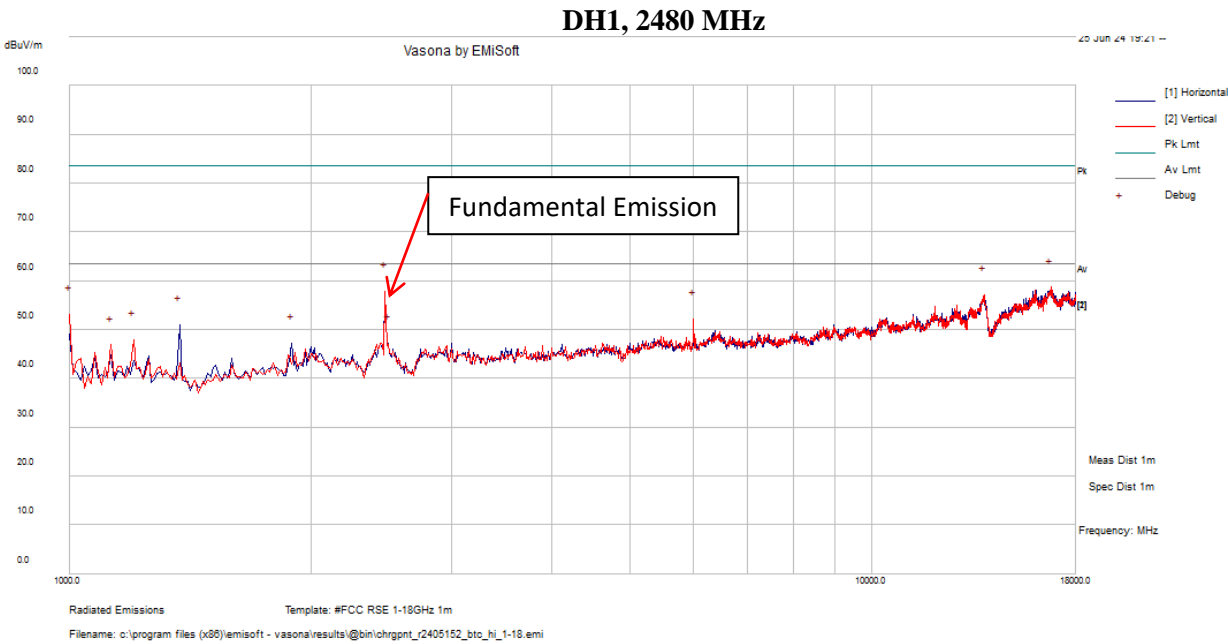
Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.

DH1, 2442 MHz



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
16714.38	46.36	12.03	58.39	100	H	360	63.54	-5.15	Peak
13771.25	44.79	11.79	56.58	300	H	360	63.54	-6.96	Peak

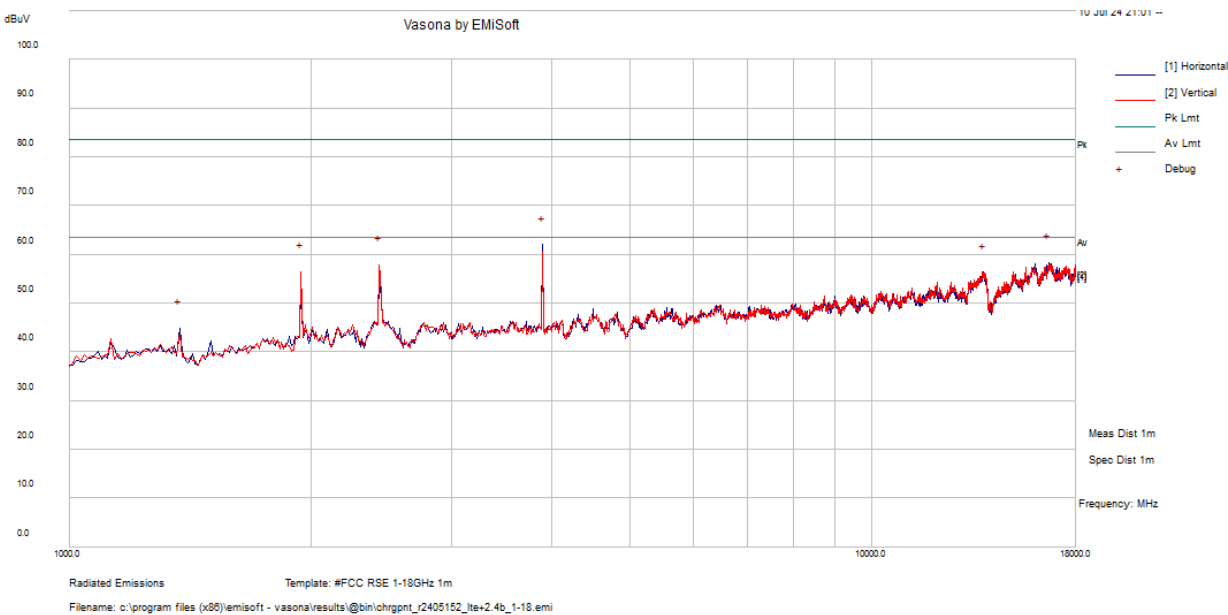
Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.



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
16746.25	46.75	11.93	58.68	300	V	360	63.54	-4.86	Peak
13824.38	45.35	11.82	57.17	200	V	360	63.54	-6.37	Peak

Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.

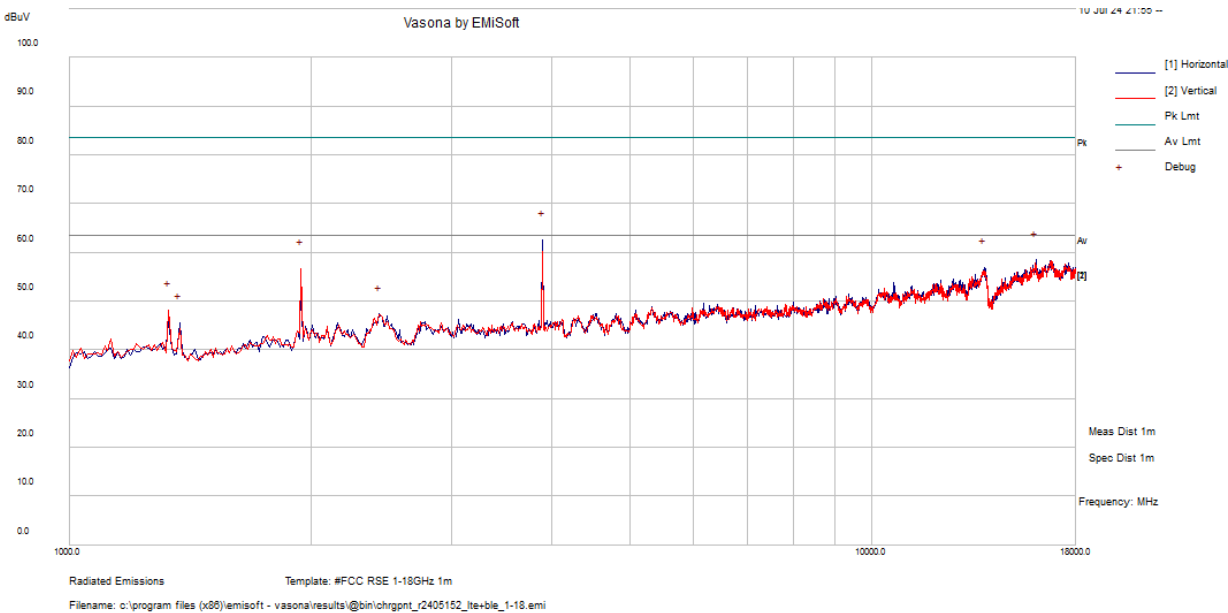
2.4 GHz Wi-Fi + LTE, 2437 MHz



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
3890	63.71	-1.77	61.94	200	H	0	63.54	-1.6	Peak
16640	46.71	11.57	58.28	100	H	0	63.54	-5.27	Peak

Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.

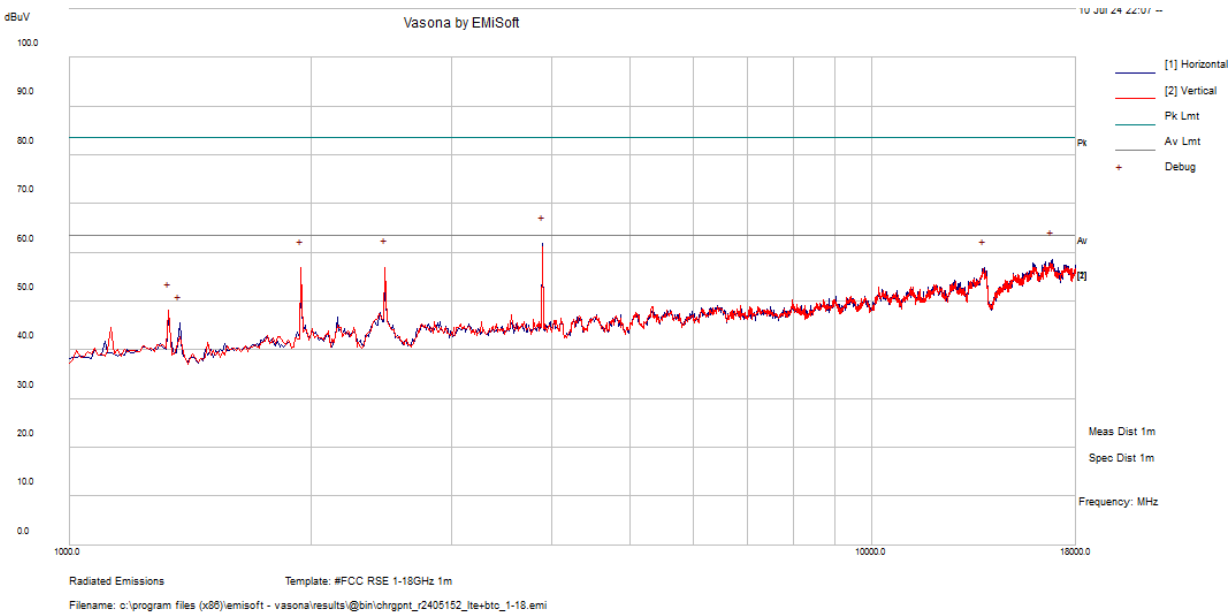
BLE + LTE, 2442 MHz



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
3890	64.28	-1.77	62.51	200	H	0	63.54	-1.03	Peak
16045	48.28	10.15	58.43	100	H	0	63.54	-5.11	Peak

Note: The plot above shows that all peak emissions from 1 to 18GHz passed the average limits.

BTC + LTE, 2442 MHz

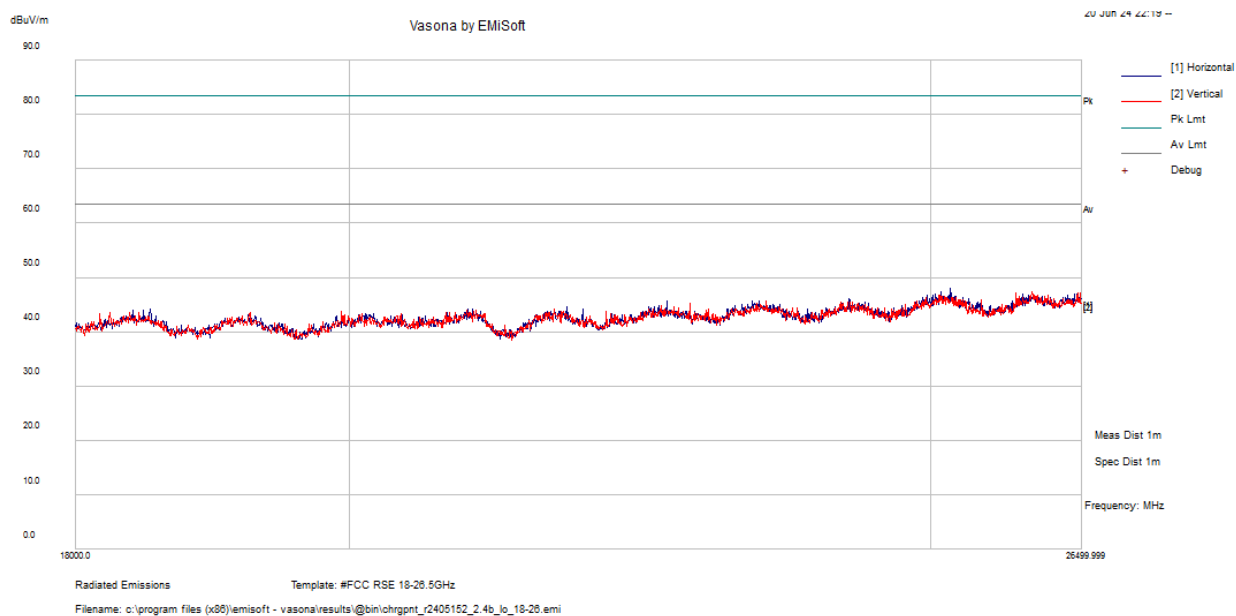


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
3890	63.54	-1.76	61.78	200	H	0	63.54	-1.76	Peak
16799.38	46.67	11.85	58.52	200	H	0	63.54	-5.02	Peak

Note: The plot above shows that all peak emissions from 1 to 18 GHz passed the average limits.

3) 18 GHz – 26.5 GHz, Measured at 1 meter

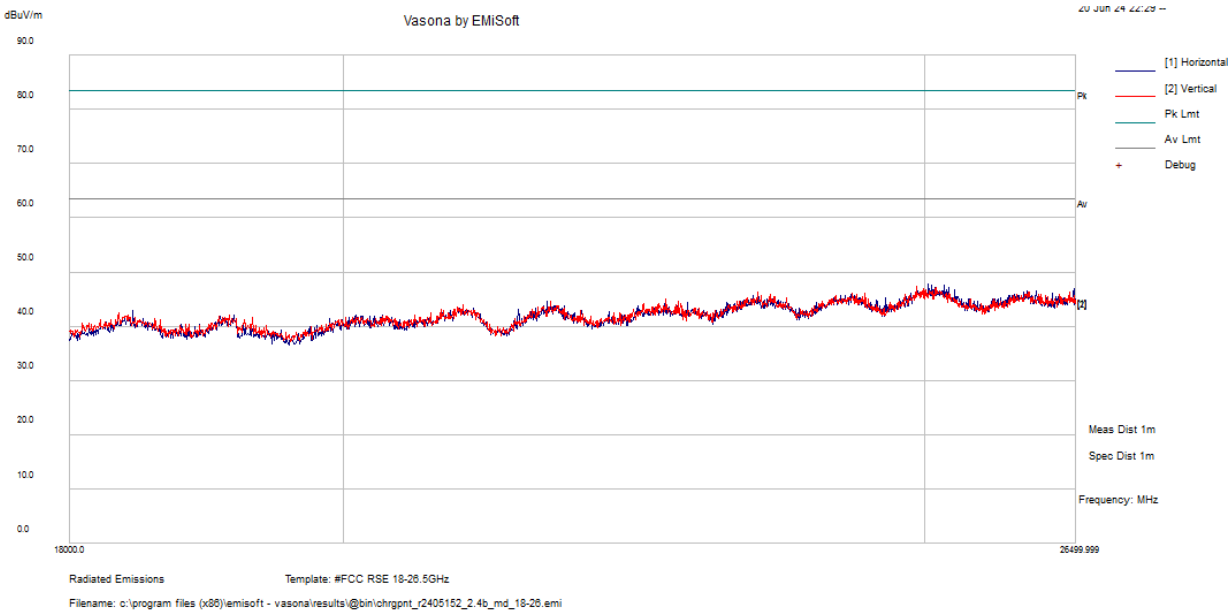
802.11b, 2412 MHz



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
25194.02	40.64	7.2	47.84	200	V	352	63.54	-15.7	Peak

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

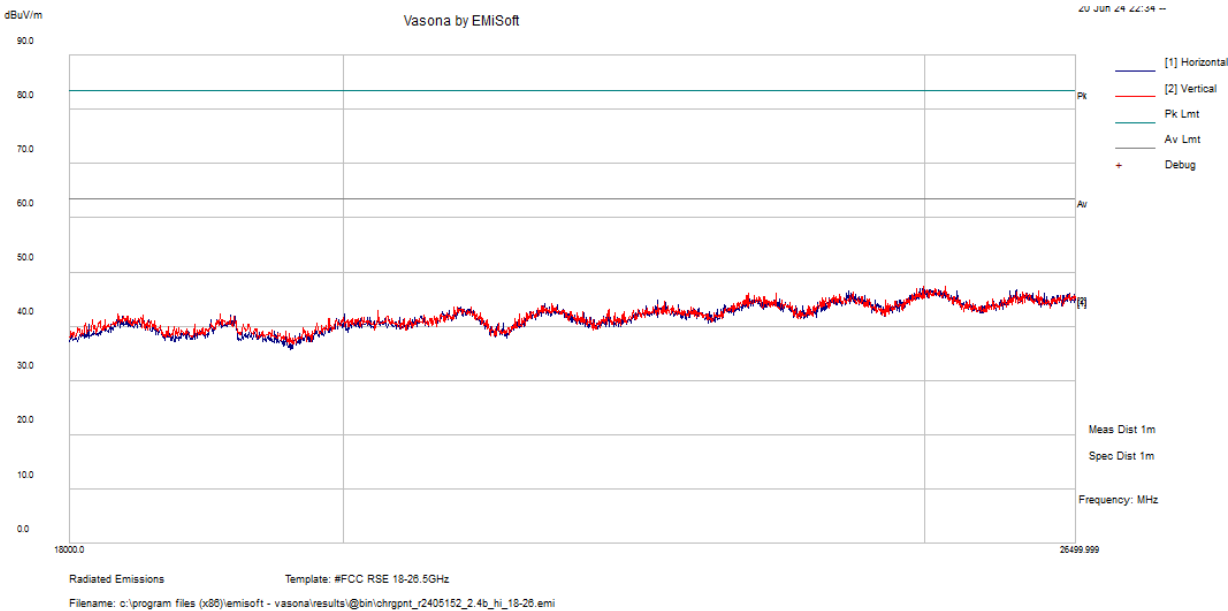
802.11b, 2437 MHz



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
25188.09	40.21	7.21	47.42	200	V	352	63.54	-16.12	Peak

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

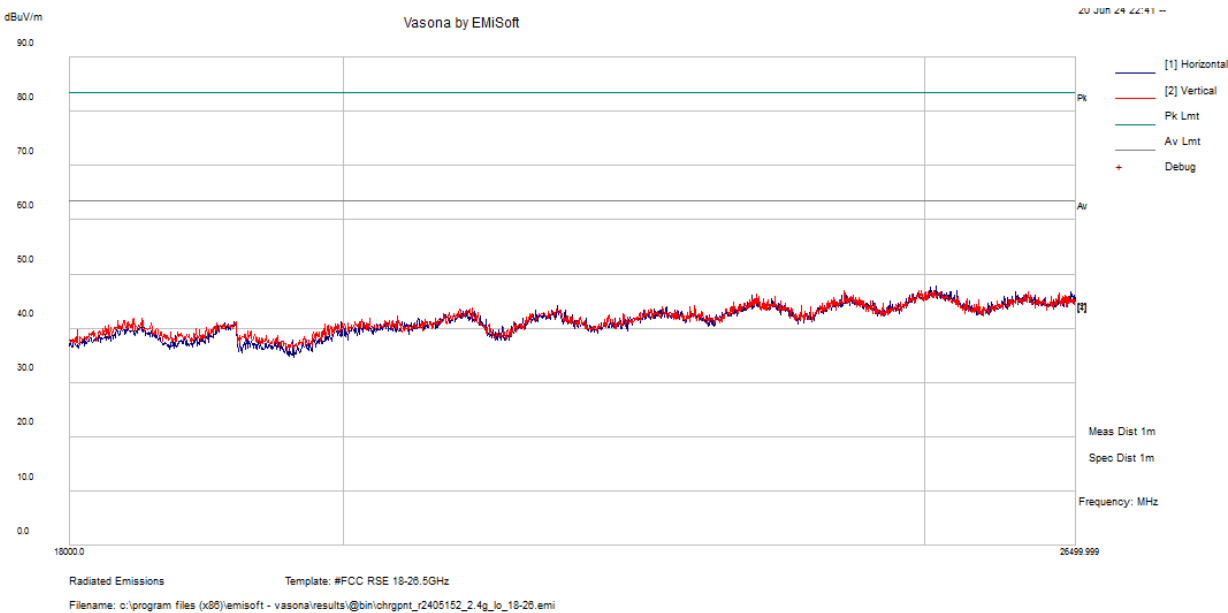
802.11b, 2462 MHz



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
24988.01	39.43	7.19	46.62	200	V	352	63.54	-16.92	Peak

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

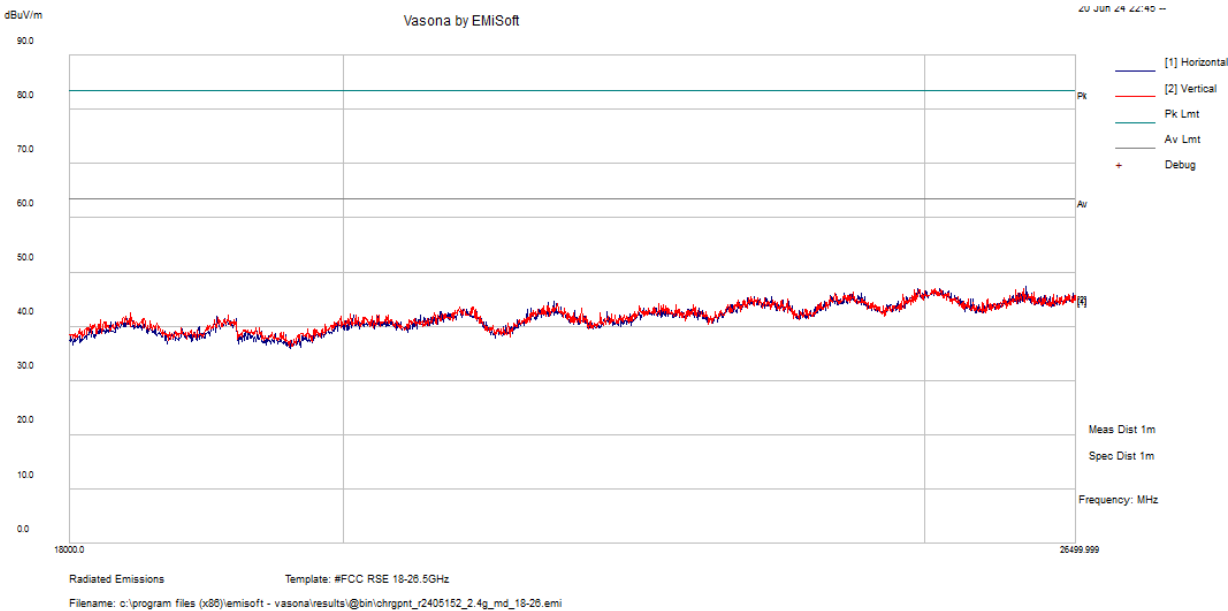
802.11g, 2412 MHz



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
24988.01	39.43	7.19	46.62	200	V	352	63.54	-16.92	Peak

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

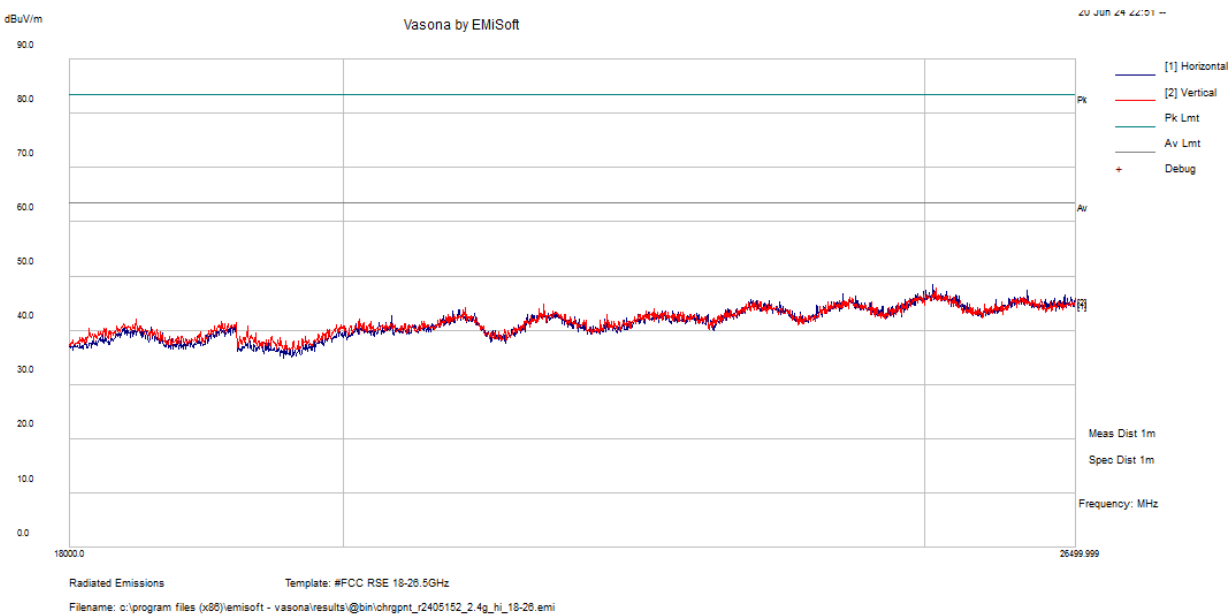
802.11g, 2437 MHz



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
24938.06	39.82	7.1	46.92	200	V	352	63.54	-16.62	Peak

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

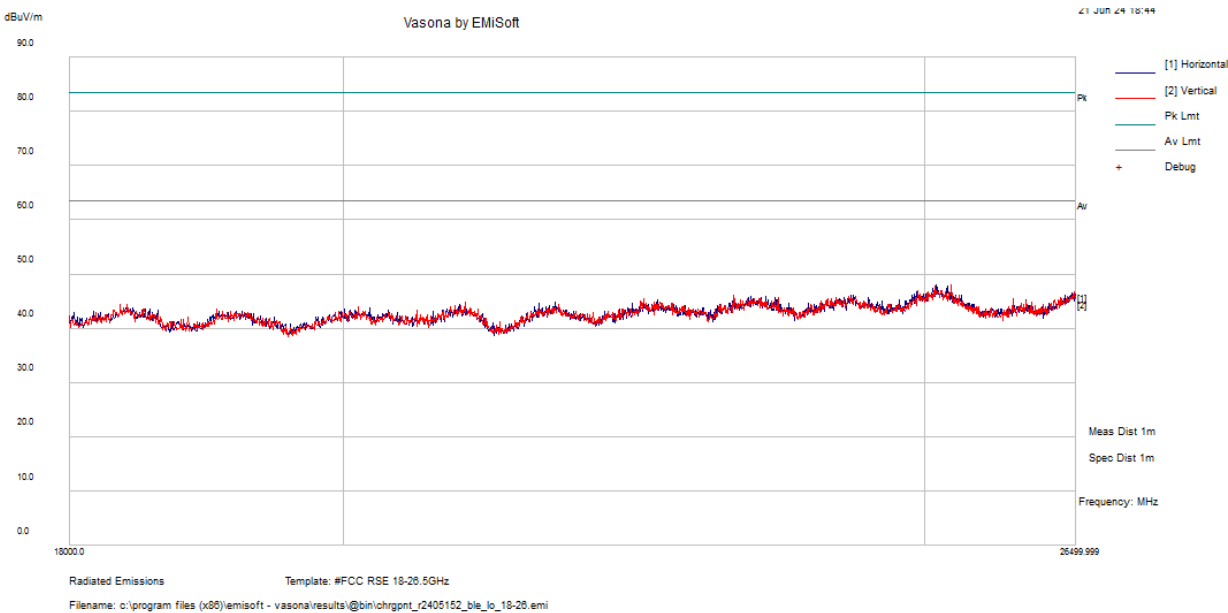
802.11g, 2462 MHz



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
25079.35	40.29	7.38	47.67	200	V	352	63.54	-15.87	Peak

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

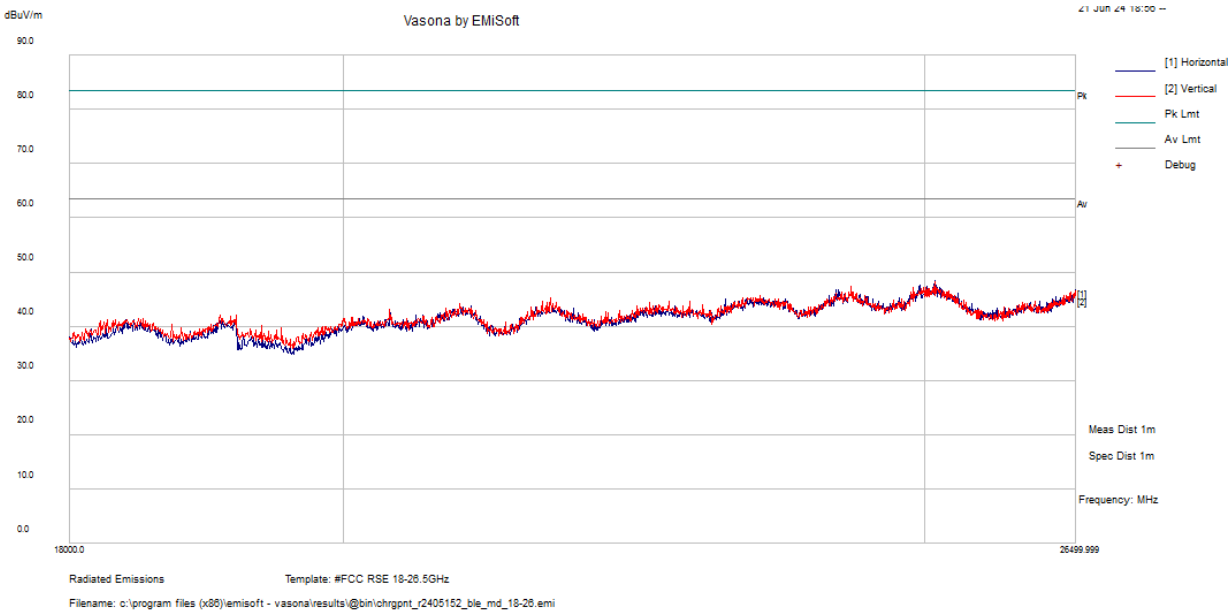
BLE, 2402 MHz



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
25123.36	40.18	7.37	47.55	200	V	7	63.54	-15.99	Peak

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

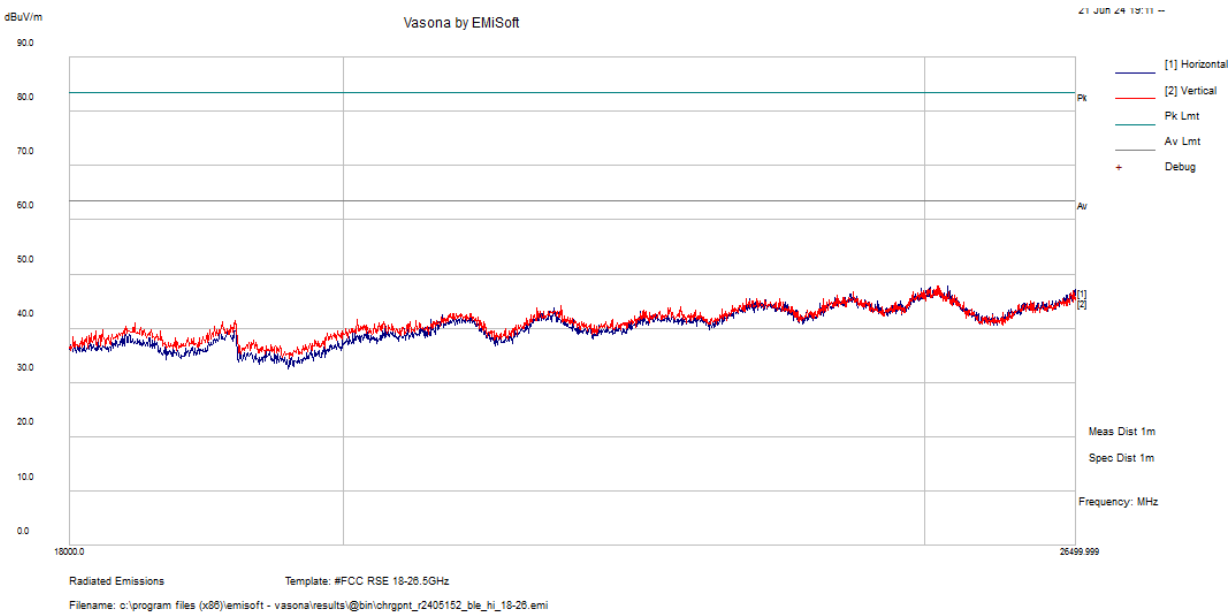
BLE, 2442 MHz



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
25103.95	40.81	7.41	48.22	200	V	7	63.54	-15.32	Peak

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

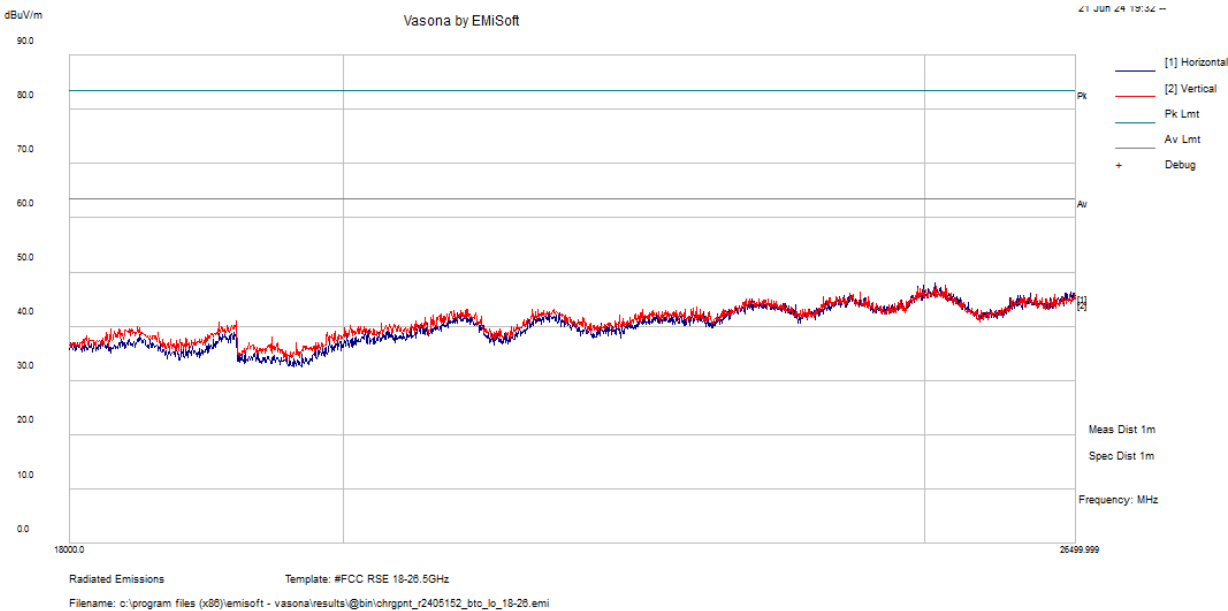
BLE, 2480 MHz



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
25230.24	40.67	7.1	47.77	200	V	7	63.54	-15.77	Peak

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

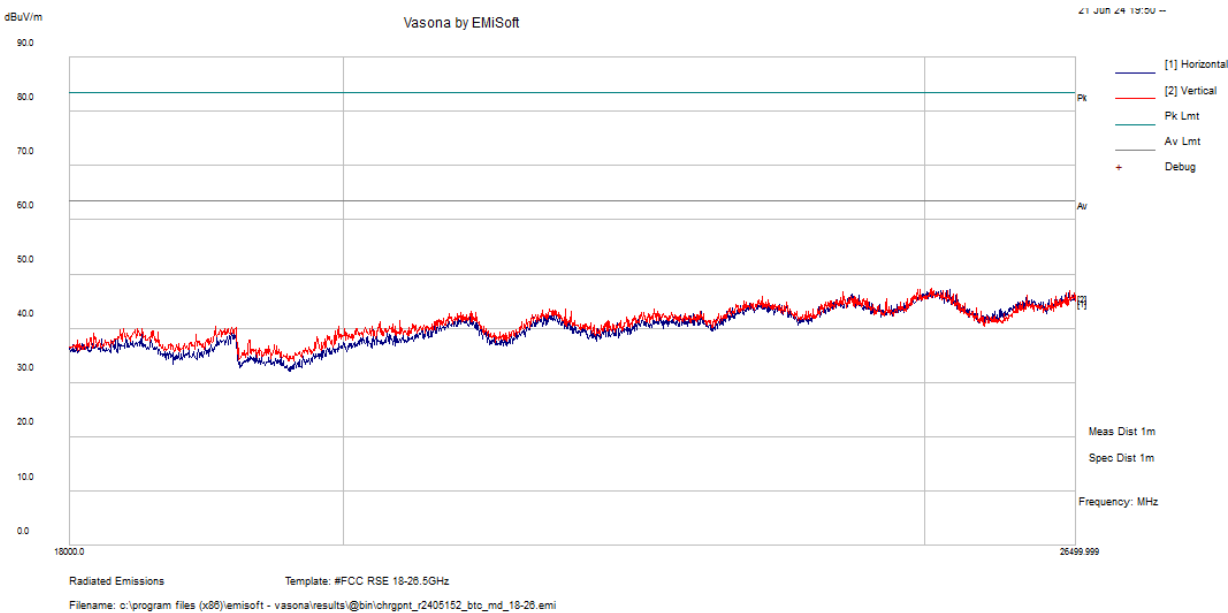
DH1, 2402 MHz



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
25108.98	40.39	7.4	47.79	200	V	7	63.54	-15.75	Peak

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

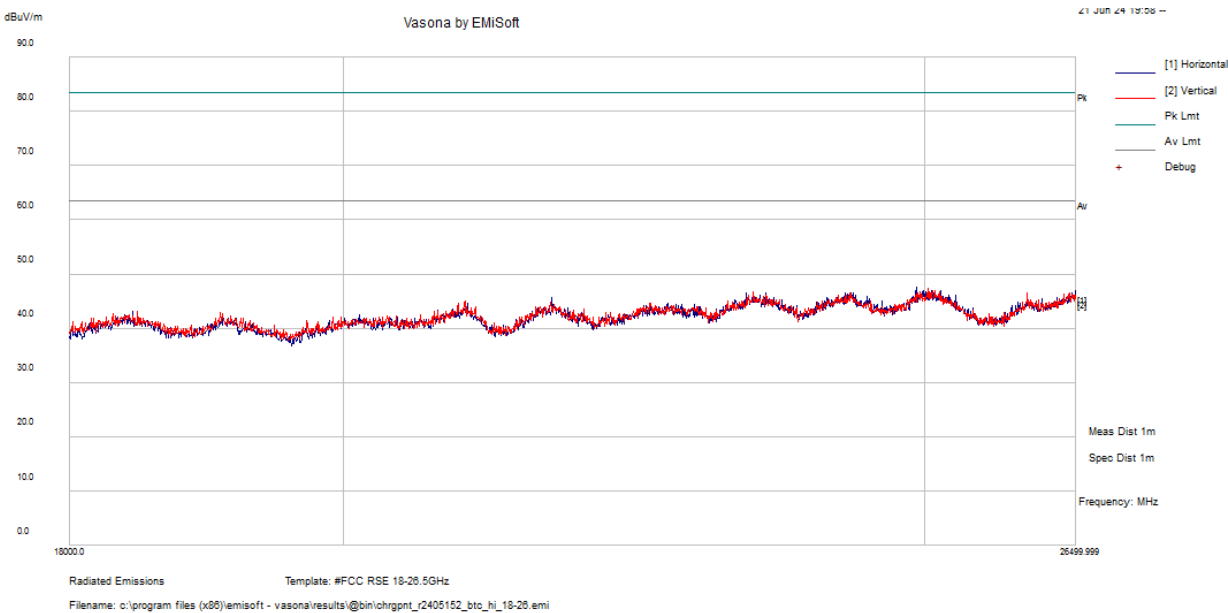
DH1, 2442 MHz



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
25251.51	39.97	7.05	47.02	200	V	7	63.54	-16.52	Peak

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

DH1, 2480 MHz



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
24923.83	39.63	7.07	46.7	150	V	180	63.54	-16.84	Peak

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

Vasona by EMISoft

10 Jul 24 13:20 --

dBuV/m

90.0

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

10000.0

26499.999

Frequency: MHz

Meas Dist 1m

Spec Dist 1m

[1] Horizontal

[2] Vertical

Pk Lmt

Av Lmt

Debug

Pk

Av

[2]

Radiated Emissions

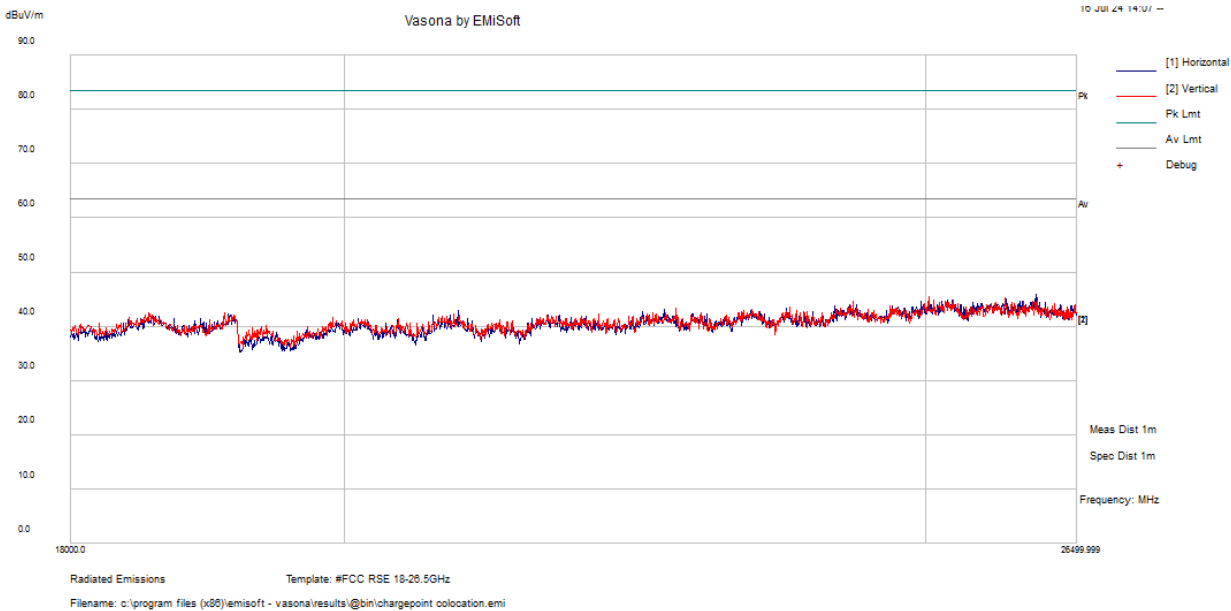
Template: #FCC RSE 18-26.5GHz

Filename: c:\program files (x86)\emisoft - vasona\results\@bin\chargepoint colocation.emi

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
26023.84	38.02	7.36	45.38	200	V	7	63.54	-18.16	Peak

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

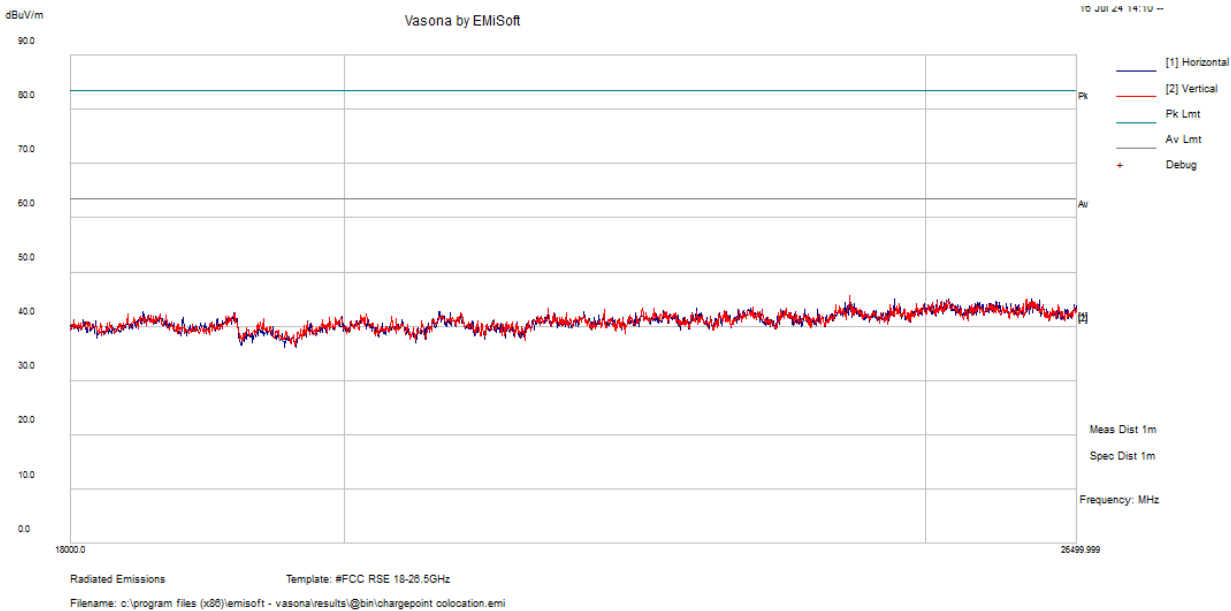
BLE + LTE, 2442 MHz



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
26113.37	36.18	7.29	43.47	200	V	7	63.54	-20.07	Peak

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

BTC + LTE, 2442 MHz



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
24706.77	38.13	5.75	43.88	200	V	7	63.54	-19.66	Peak

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

7 Annex A – FCC §15.209 Band Edges Measurements

Please refer to the attachment.

8 Appendix A (Normative) – EUT Test Setup Photographs

Please refer to the attachment.

9 Appendix B (Normative) – EUT External Photographs

Please refer to the attachment.

10 Appendix C (Normative) – EUT Internal Photographs

Please refer to the attachment.

11 Appendix D (Normative) – A2LA Electrical Testing Certificate



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

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

--- END OF REPORT ---