FCC PART 15, SUBPART F
ISED RSS-220, ISSUE 1, JULY 2018

TEST REPORT

For

Swivl

1450 El Camino Real
Melno Park, CA 94025, USA

FCC ID: 2AX46UWB01
IC: 26786-UWB01

Report Type:	**Product Type:**
Class II Permissive Change	Educational Tablet

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ACCREDITED
CERTIFICATE #3297.02

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2306213-519-01	Class II Permissive Change	2023-09-13

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report was prepared on behalf of *Swivl*, and their product model: *The Pulse*, FCC ID: 2AX46UWB01 IC: 26786-UWB01, or the "EUT" as referred to in this report. The EUT is a tablet that supports 802.11 a/b/g/n/ac Wi-Fi, Bluetooth, DECT, and Ultra-Wide Band (UWB) capabilities.

1.2 Mechanical Description of UUT

The EUT measures approximately (with frame) 20.5 cm (L) x 32.7 cm (W_{front})/25.6 cm (W_{rear}) x 132 mm (H); (without frame) 14.5 cm ($L_{bottom\ base}$)/4.1 cm ($L_{top\ base}$) x 22.5 cm (W_{tablet})/20 cm (W_{base}) x 48.3 cm (H), and weighs approximately 5.35 kg.

The data gathered is from a production samples provided by Swivl with BACL assigned serial numbers: R2306213-1, R2306213-4

1.3 Objective

This report was prepared on behalf of *Swivl* in accordance with Part 2, Subpart J, and Part 15, Subpart and F of the Federal Communication Commission's rules and ISED RSS-220 Issue 1, July 2018.

This project was a Permissive Change II submission for the purpose of changing antenna and enabling co-location with DECT radio module (FCC ID: Y82-SC14S, IC: 9576A-SC14S) and Wifi/BT module (FCC ID: 2AX46WFBTA, IC: 26786-WFBTA).

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 393761 D01 UWB FAQ v02: Ultra-Wideband (UWB) Devices Frequently Asked Questions.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 º C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

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

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

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

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

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2017 by A2LA (Test Laboratory Accreditation Certificate Number 3297.01),*** 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 3297.02)*** 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 3297.03)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

- 1 Electronics and Office Equipment:
  - for Telephony (ver. 3.0)
  - for Audio/Video (ver. 3.0)
  - for Battery Charging Systems (ver. 1.1)
  - for Set-top Boxes & Cable Boxes (ver. 4.1)
  - for Televisions (ver. 6.1)
  - for Computers (ver. 6.0)
  - for Displays (ver. 6.0)
  - for Imaging Equipment (ver. 2.0)
  - for Computer Servers (ver. 2.0)
- 2 Commercial Food Service Equipment

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

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

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

5 Other
- For Water Coolers (ver. 3.0)

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

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

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013.

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

2.2 EUT Exercise Software

The EUT was configured to transmit through Command Prompt and Qualcomm Radio Control Tool 4. The software is compliant with the standard requirements being tested against.

Radio	Frequency (MHz)	Power Setting
UWB	6489.6 MHz (Channel 5)	44
		44
	7987.2 MHz (Channel 9)	44
		44

Radio	Frequency (MHz)	Power Setting
DECT	1921.536	Default

Radio	Frequency (MHz)	Modulation	Power Setting
2.4Wifi	2437	802.11b	Default
5Wifi	5500	802.11a	Default
BT	2440	GFSK	Default

2.3 Equipment Modifications

N/A

2.4 Local Support Equipment

N/A

2.5 Remote Support Equipment

Manufacturer	Description	Model
Royal	Switching Power Supply	BI48G-120400-E2
Lenovo	Laptop	IdeaPad 3 15ITL6

2.6 Interface Ports and Cabling

Cable Description	Length (m)	To	From
USB-C to USB-C	< 1m	Laptop	EUT
Charger	< 1m	EUT	Switching Power Supply

3 Summary of Test Results

Results reported relate only to the product tested.

FCC and ISED Rules	Description of Test	Results
FCC §15.203 ISED RSS-220 §5.1(b), ISED RSS-Gen §6.8	Antenna Requirement	Compliant
FCC §15.207 ISED RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
FCC §2.1091, §1.1310(d) (3) ISED RSS-102	RF Exposure	Compliant
FCC §2.1053, §15.205, §15.209, §15.519(c) ISED RSS-220 §3.4, 5.3.1(c)(d) ISED RSS-Gen §8.9 & §8.10	Radiated Emissions	Compliant
FCC §15.503(d),§15.519(b) ISED RSS-220 §5.1(a) ISED RSS-Gen§6.7	Emission Bandwidth	Compliant[1]
FCC §15.519(e) ISED RSS-220 §5.3.1(g)	Peak Fundamental Emission	Compliant
FCC §15.519(a)(1) ISED RSS-220 §5.3.1(b)	Cease Transmission	Compliant[1]

Note[1]: Please refer to test report number: "GZCR211102142301" issued by SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory on 2021-12-01 for detailed UWB test results.

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 & ISED RSS-220 §5.1(b), 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.

According to ISED 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 [enter the device's ISED certification number] 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	Frequency (MHz)	Maximum Antenna Gain (dBi)	Antenna Type
Integral	6489.6 - 7987.2	3.32	Patch

The antenna gain is information provided by the customer.

5 FCC §2.1091, §1.1310(d) (3) & ISED RSS-102 - RF Exposure

5.1 Applicable Standards

As per FCC §1.1310(d) (3), At operating frequencies above 6 GHz, the MPE limits listed in Table 1 in paragraph (e)(1) of this section shall be used in all cases to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b) of this part.

TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*($900/f^2$)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

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

According to ISED RSS-102 Issue 5 Section 3, devices operating above 6 GHz regardless of the separation distance shall undergo an RF exposure evaluation.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	**Electric Field (V/m rms)**	**Magnetic Field (A/m rms)**	**Power Density (W/m^2)**	**Reference Period (minutes)**
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

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

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

5.2 MPE Prediction

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

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

Where: S = power density
EIRP = Effective Isotropic Radiated Power
R = distance to the center of radiation of the antenna

5.3 MPE Results for FCC

Note: maximum EIRP determined from worst-case peak UWB limit of 0dBm/50MHz.

UWB Standalone

Maximum EIRP (dBm):	0
Maximum EIRP (mW):	1
Prediction distance (cm):	20
Prediction frequency (MHz):	6489.6
Power density of prediction frequency at 20 cm (mW/cm^2):	0.0002
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
Power density of prediction frequency at 20 cm (W/m^2):	0.002
IC MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

Radio Co-location

Simultaneous transmission among 2.4 GHz Wi-Fi, DECT, and UWB.

Worst Case Co-location MPE Calculation: 2.4 GHz Wi-Fi + DECT + UWB

Radio	Max EIRP (dBm)	Evaluated Distance (cm)	Worst-Case Exposure (mW/cm^2)	Limit (mW)	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case							
2.4 GHz Wi-Fi	20.22	20	0.0209	1	0.6967%	2.6%	100%
DECT	20	20	0.019	1	1.9%		
UWB	0	20	0.0002	1	0.02%		

Simultaneous transmission among BT, DECT, and UWB.

Worst Case Co-location MPE Calculation: BT + DECT + UWB

Radio	Max EIRP (dBm)	Evaluated Distance (cm)	Worst-Case Exposure (mW/cm^2)	Limit (mW/cm^2)	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case							
BLE	10.53	20	0.00225	1	0.075%	2.0%	100%
DECT	20	20	0.019	1	1.9%		
UWB	0	20	0.0002	1	0.02%		

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Simultaneous transmission among 5 GHz Wi-Fi, DECT, and UWB.

Worst Case Co-location MPE Calculation: 5 GHz Wi-Fi + DECT + UWB

Radio	Max EIRP (dBm)	Evaluated Distance (cm)	Worst-Case Exposure (mW/cm^2)	Limit (mW)	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case							
5 GHz Wi-Fi	17.58	20	0.0114	1	0.38%	2.3%	100%
DECT	20	20	0.019	1	1.9%		
UWB	0	20	0.0002	1	0.02%		

Note: 2.4 GHz Wi-Fi, 5 GHz Wi-Fi, Bluetooth transmit from the same module and cannot transmit at the same time.
Note: DECT "Max EIRP" is actually Maximum Output Power since antenna gain results in lower EIRP.

5.4 RF Exposure Evaluation Exemption for IC

UWB:
The e.i.r.p of this device is 0 dBm (1 mW), which is less than the exemption threshold, i.e., 5 W. Therefore, the RF exposure evaluation is exempt.

Wifi/BT(worst-case):
The e.i.r.p of this device is 20.22 dBm (105.2 mW), which is less than the exemption threshold, i.e., 1.31x10^-2*f^0.6834W = 2.68W. Therefore, the RF exposure evaluation is exempt.

DECT:
The e.i.r.p of this device is 20 dBm (100 mW), which is less than the exemption threshold, i.e., 1.31x10^-2*f^0.6834W = 2.30W. Therefore, the RF exposure evaluation is exempt.

Worst Case Co-location:

0.001/5 + 0.1052/2.68 + 0.1/2.3 = 0.1 < 1

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 through an AC/DC Adapter.

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:

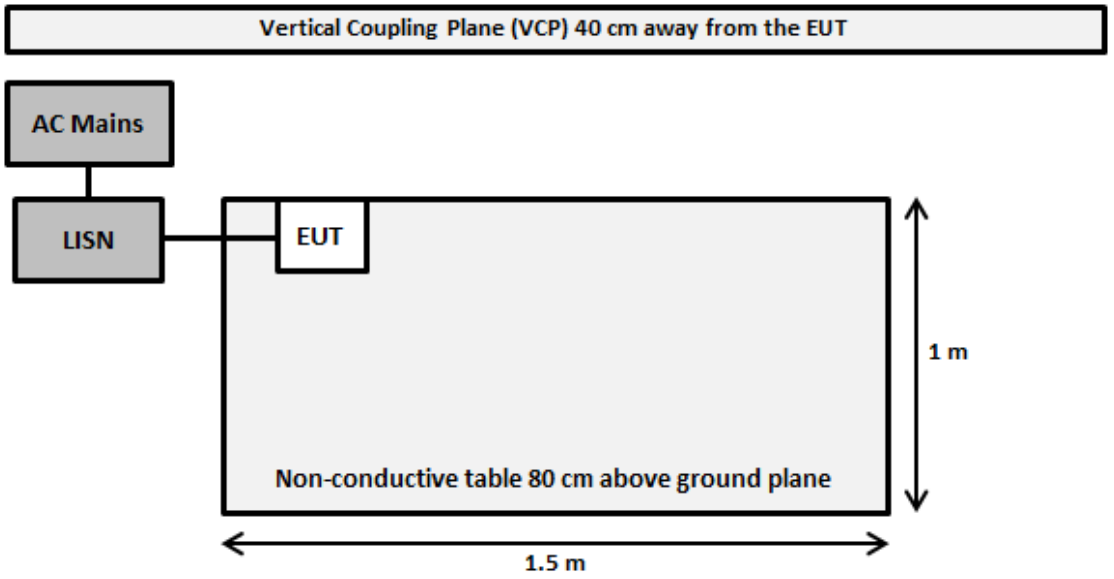
$$CF= CL + LISN\ calibration\ factor + Attenuation$$

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:

$$Margin = Corrected\ Amplitude – Limit$$

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
733	FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160130	2023-01-17	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 Felix Lugo on 2023-09-01 in Ground Plane Site.

6.8 Summary of Test Results

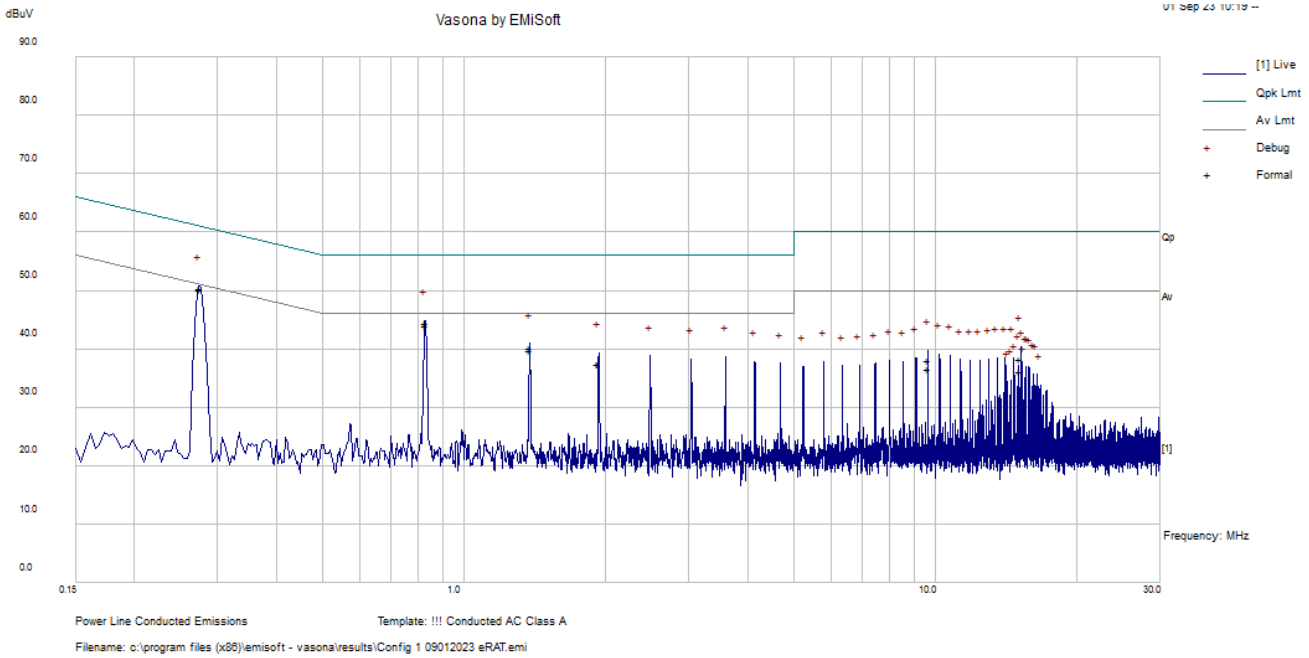
According to the data hereinafter, the EUT complied with the FCC Part 15C and ISEDC RSS-Gen standards' radiated emissions limits, and had the worst margin of:

Worst Case – AC Line (via AC/DC Adapter): 120V, 60Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Hot/Neutral)**	**Frequency Range**
-0.56	0.27629	Hot	150 kHz to 30 MHz

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

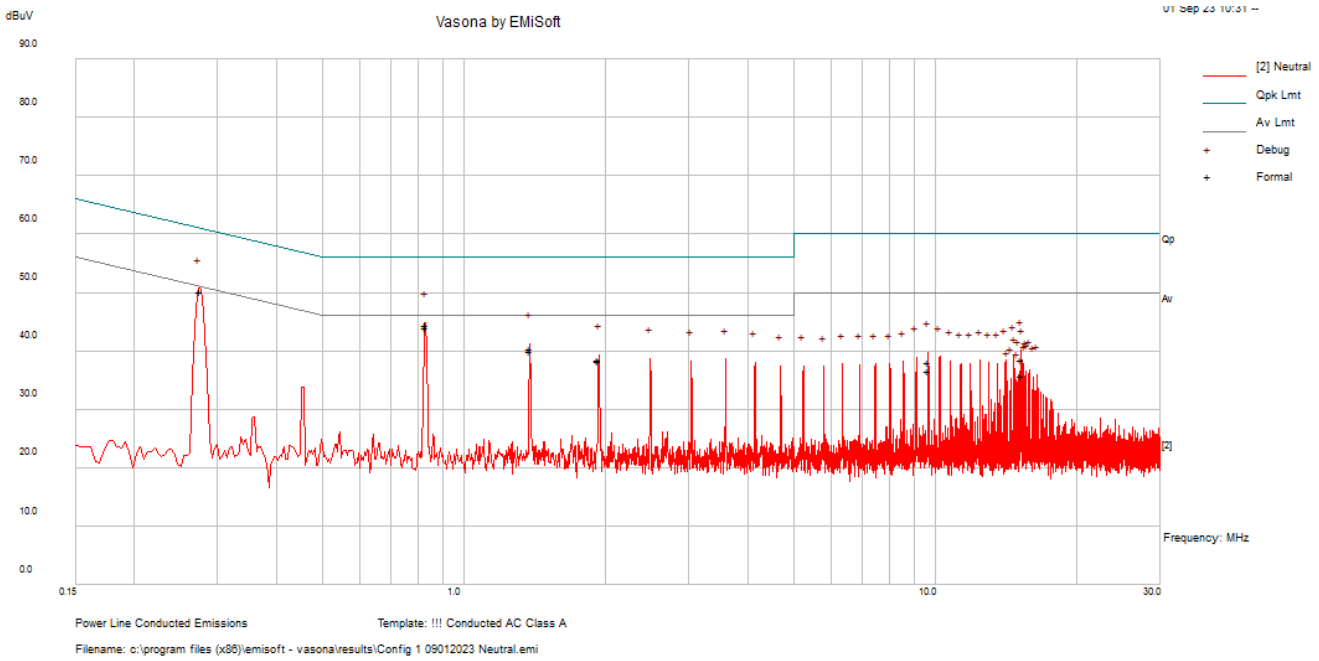
6.9 AC Line Conducted Emissions Test Results

AC Line (via AC/DC Adapter) 2.4Wifi+UWB+DECT: 120V, 60Hz – Hot Conductor



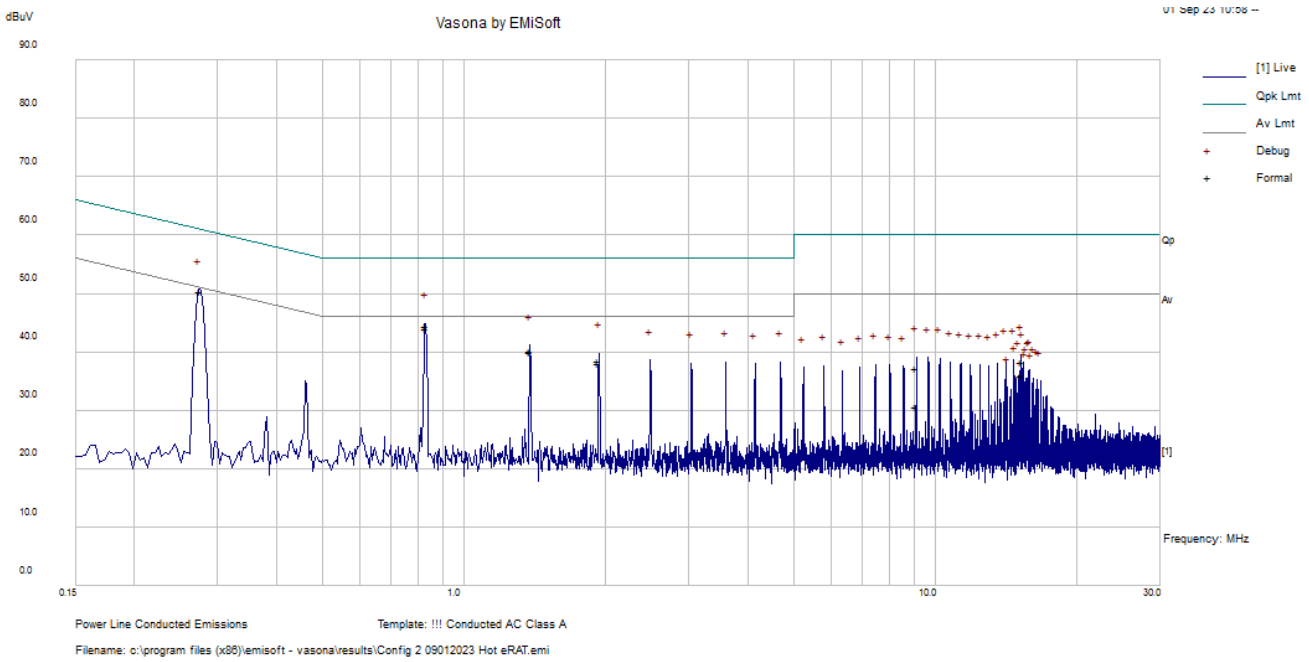
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.828048	33.77	10.31	44.08	56	-11.92	QP
0.27566	39.69	10.58	50.27	60.95	-10.68	QP
1.37806	29.6	10.17	39.77	56	-16.23	QP
15.16836	27.98	10.33	38.31	60	-21.69	QP
9.654608	27.89	10.21	38.1	60	-21.9	QP
1.92872	27.38	10.14	37.52	56	-18.48	QP
0.828048	34.06	10.31	44.37	46	-1.63	Ave
0.27566	39.74	10.58	50.32	50.95	-0.63	Ave
1.37806	29.93	10.17	40.1	46	-5.9	Ave
15.16836	25.75	10.33	36.08	50	-13.92	Ave
9.654608	26.36	10.21	36.57	50	-13.43	Ave
1.92872	27.24	10.14	37.38	46	-8.62	Ave

AC Line (via AC/DC Adapter) 2.4Wifi+UWB+DECT: 120V, 60Hz – Neutral Conductor



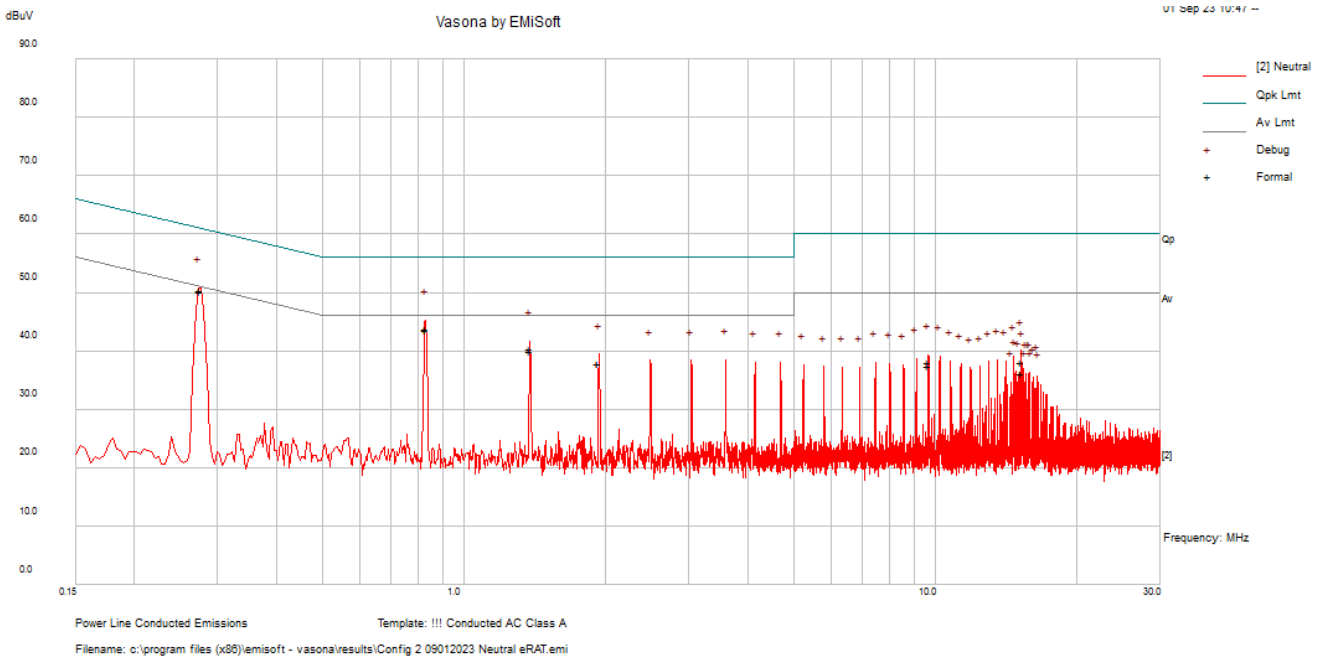
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.828053	33.79	10.31	44.1	56	-11.9	QP
0.275282	39.6	10.58	50.18	60.96	-10.78	QP
1.379104	29.77	10.17	39.94	56	-16.06	QP
15.176507	28.13	10.33	38.46	60	-21.54	QP
9.660473	27.89	10.21	38.1	60	-21.9	QP
1.931623	28.11	10.14	38.25	56	-17.75	QP
0.828053	34.05	10.31	44.36	46	-1.64	Ave
0.275282	39.67	10.58	50.25	50.96	-0.71	Ave
1.379104	30.18	10.17	40.35	46	-5.65	Ave
15.176507	25.45	10.33	35.78	50	-14.22	Ave
9.660473	26.4	10.21	36.61	50	-13.39	Ave
1.931623	28.47	10.14	38.61	46	-7.39	Ave

AC Line (via AC/DC Adapter) 5Wifi+UWB+DECT: 120V, 60Hz – Hot Conductor



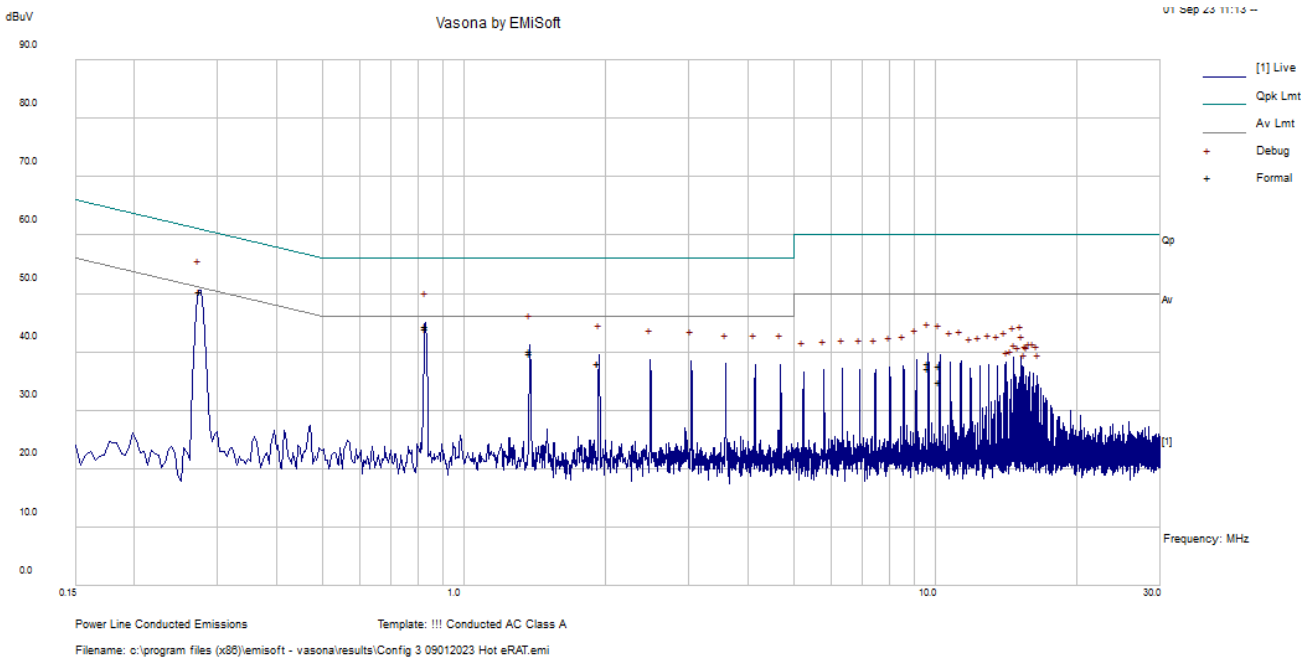
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.828233	33.81	10.31	44.12	56	-11.88	QP
0.2762	39.72	10.58	50.3	60.93	-10.63	QP
1.381233	29.73	10.17	39.9	56	-16.1	QP
1.932397	28.01	10.14	38.15	56	-17.85	QP
15.18847	27.85	10.33	38.18	60	-21.82	QP
9.115647	27.09	10.2	37.29	60	-22.71	QP
0.828233	34.15	10.31	44.46	46	-1.54	Ave
0.2762	39.78	10.58	50.36	50.93	-0.57	Ave
1.381233	30.09	10.17	40.26	46	-5.74	Ave
1.932397	28.38	10.14	38.52	46	-7.48	Ave
15.18847	25.69	10.33	36.02	50	-13.98	Ave
9.115647	20.52	10.2	30.72	50	-19.28	Ave

AC Line (via AC/DC Adapter) 5Wifi+UWB+DECT: 120V, 60Hz – Neutral Conductor



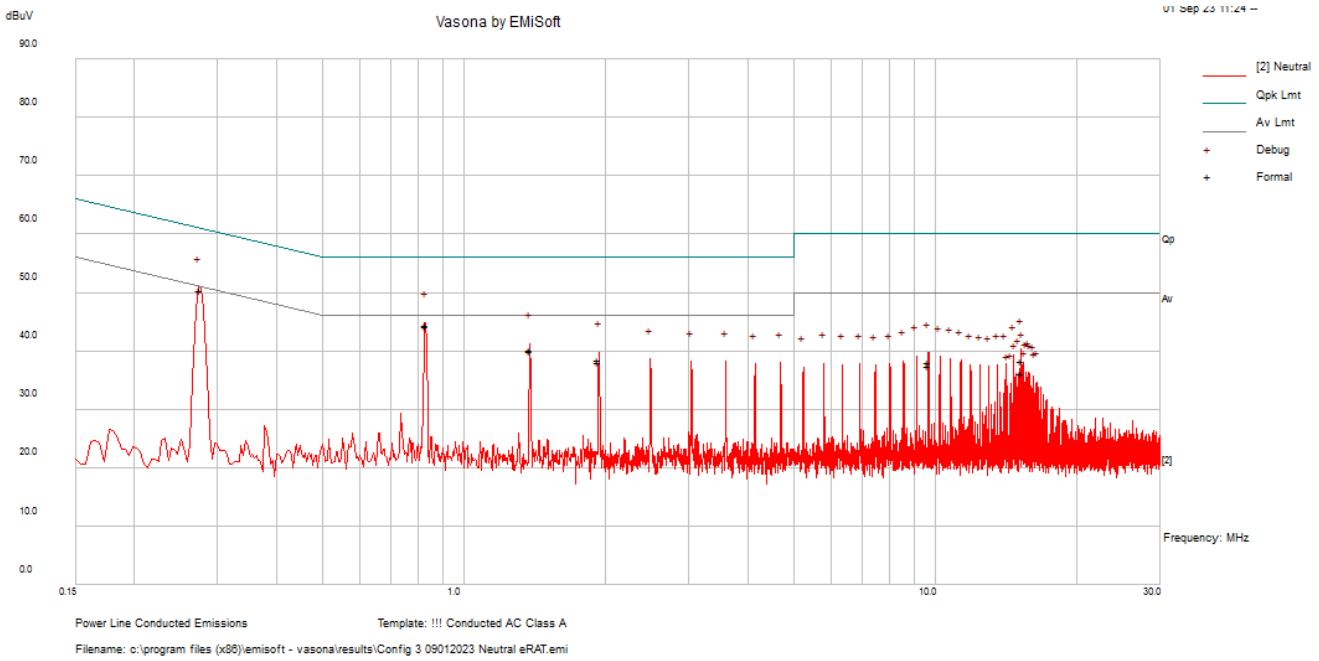
Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.829439	33.38	10.31	43.69	56	-12.31	QP
0.2762	39.69	10.58	50.27	60.93	-10.66	QP
1.379703	29.78	10.17	39.95	56	-16.05	QP
15.177677	27.83	10.33	38.16	60	-21.84	QP
1.930831	27.68	10.14	37.82	56	-18.18	QP
9.660802	27.95	10.21	38.16	60	-21.84	QP
0.829439	33.55	10.31	43.86	46	-2.14	Ave
0.2762	39.76	10.58	50.34	50.93	-0.59	Ave
1.379703	30.16	10.17	40.33	46	-5.67	Ave
15.177677	25.86	10.33	36.19	50	-13.81	Ave
1.930831	27.64	10.14	37.78	46	-8.22	Ave
9.660802	27.14	10.21	37.35	50	-12.65	Ave

AC Line (via AC/DC Adapter) BT+UWB+DECT: 120V, 60Hz – Hot Conductor



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.828413	33.82	10.31	44.13	56	-11.87	QP
0.27629	39.74	10.58	50.32	60.93	-10.61	QP
1.381012	29.7	10.17	39.87	56	-16.13	QP
9.663047	27.78	10.21	37.99	60	-22.01	QP
10.218516	27.48	10.23	37.71	60	-22.29	QP
1.931659	27.91	10.14	38.05	56	-17.95	QP
0.828413	34.16	10.31	44.47	46	-1.53	Ave
0.27629	39.79	10.58	50.37	50.93	-0.56	Ave
1.381012	30.05	10.17	40.22	46	-5.78	Ave
9.663047	27.04	10.21	37.25	50	-12.75	Ave
10.218516	24.74	10.23	34.97	50	-15.03	Ave
1.931659	28.01	10.14	38.15	46	-7.85	Ave

AC Line (via AC/DC Adapter) BT+UWB+DECT: 120V, 60Hz – Neutral Conductor



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.275822	39.73	10.58	50.31	60.94	-10.63	QP
0.828053	33.84	10.31	44.15	56	-11.85	QP
1.379806	29.71	10.17	39.88	56	-16.12	QP
15.19165	27.97	10.33	38.3	60	-21.7	QP
1.932487	27.98	10.14	38.12	56	-17.88	QP
9.666184	27.87	10.21	38.08	60	-21.92	QP
0.275822	39.78	10.58	50.36	50.94	-0.58	Ave
0.828053	34.18	10.31	44.49	46	-1.51	Ave
1.379806	29.96	10.17	40.13	46	-5.87	Ave
15.19165	25.81	10.33	36.14	50	-13.86	Ave
1.932487	28.4	10.14	38.54	46	-7.46	Ave
9.666184	27.13	10.21	37.34	50	-12.66	Ave

7 FCC §2.1053, §15.205, §15.209, §15.519(c), ISED RSS-220 §3.4, 5.3.1(c)(d), ISED RSS-Gen §8.9 & §8.10 - Spurious Radiated Emissions: Co-location

7.1 Applicable Standards

As per FCC §15.35: Unless otherwise specified, On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

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

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.519 (c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in § 15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
960–1610	−75.3
1610–1990	−63.3
1990–3100	−61.3
3100–10600	−41.3
Above 10600	−61.3

As per ISED RSS-220 §3.4: Radiated emissions at or below 960 MHz for all subclasses of UWB device shall not exceed the following limits. Measurements of radiated emissions at and below 960 MHz are to be made using a CISPR quasi-peak detector. CISPR measurement bandwidth specifications are to be used.

Frequency (MHz)	Field Strength (Microvolts/m)	Measurement Distance (Metres)	E.i.r.p. (dBmW)
0.009-0.490	2,400/F (F in kHz)	300	10 log (17.28 / F^2) (F in kHz)
0.490-1.705	24,000/F (F in kHz)	30	10 log (17.28 / F^2) (F in kHz)
1.705-30	30	30	-45.7
30-88	100	3	-55.2
88-216	150	3	-51.7
216-960	200	3	-49.2

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average emissions detector.

As per ISED RSS-220 §5.3.1(c): Radiated emissions at or below 960 MHz from a device shall not exceed the limits in section 3.4.

As per ISED RSS-220 §5.3.1(d): Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

Hand-held (Outdoor) Communication, Measurement, Location Sensing, and Tracking Devices	
Frequency	**E.i.r.p. in a Resolution Bandwidth of 1 MHz**
960-1 610 MHz	-75.3 dBm
1.61-4.75 GHz	-70.0 dBm
4.75-10.6 GHz	-41.3 dBm
Above 10.6 GHz	-61.3 dBm

As per ISED 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.

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, Subpart F, and ISEDC RSS-220, 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.

7.3 Test Procedure

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

The EUT was set 3 meter away from the testing antenna, which was varied from 1-4 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

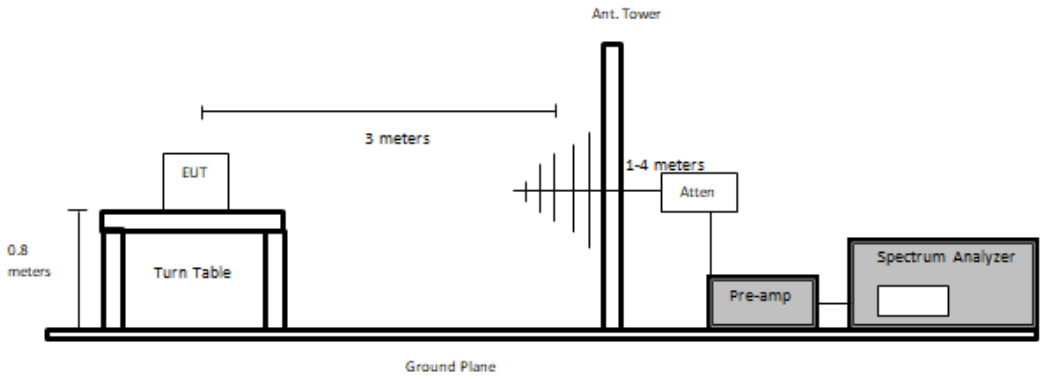
For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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:

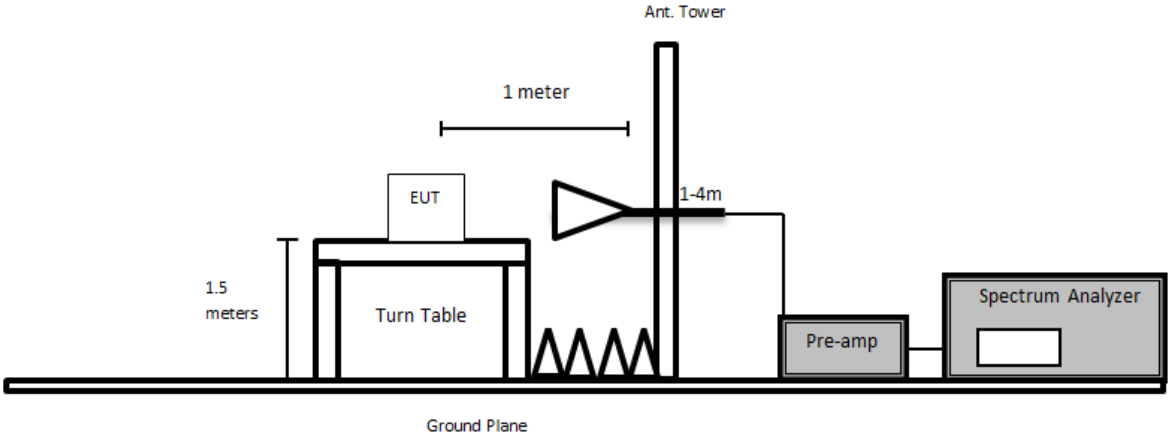
Margin = Corrected Amplitude – Limit

7.5 Test Setup Block Diagram

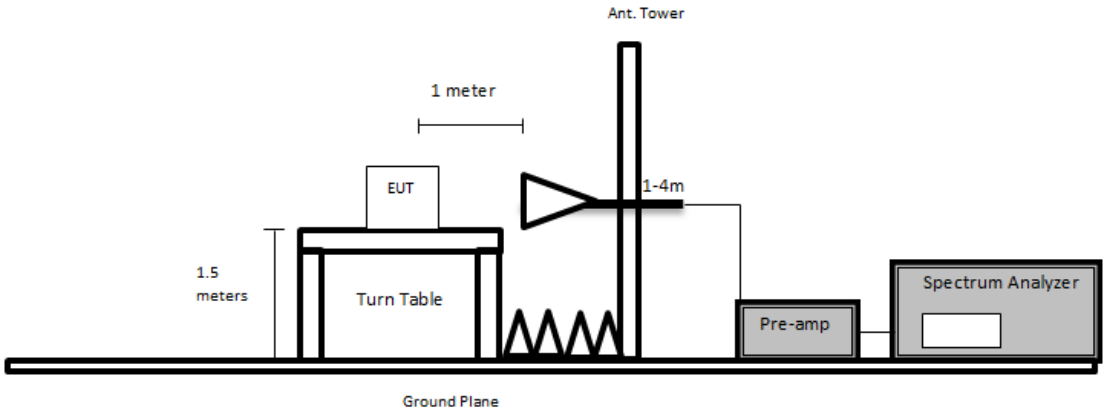
30 MHz to 1 GHz (Asset #321 Antenna used):



1 GHz to 18 GHz



18 GHz to 40 GHz



7.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250 238	2023-05-12	1 year
310	Rohde & Schwarz	EMI Test Receiver 9 kHz to 3 GHz	ESCI 1166.5950.03	100338	2023-05-11	1 year
327	Sunol Science Corp	System Controller	SC110V	122303-1	N/R	N/A
316	Sonoma Instruments	Preamplifier 10 kHz - 2.5 GHz	317	260406	2023-04-12	6 months
658	HP/Agilent	Pre-Amplifier	8449B OPT HO2	3008A011 3	2023-06-13	1 year
827	AH Systems	Preamplifier	PAM 1840 VH	170	2023-05-17	1 year
91	Wisewave	Horn Antenna	ARH-4223-02	10555-02	2022-03-08	2 years
230	Wisewave	Horn Antenna	ARH-2823-02	10555-02	2022-03-08	2 years
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2; 1504	2021-11-22	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	Uti flex	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	2023-04-14	6 months
1295	Carlisle	10m Ultra Low Loss Coaxial Cable	UFB142A-1-3937-200200	646398909 12-001	2023-05-04	6 months
1354	RFMW	2.92mm 10ft RF Cable	P1CA-29M29M-F150-120	N/A	2023-02-24	1 year
672	Micro Tronics	2.4~2.6 GHz Notch Filter	BRM50701	160	2023-03-09	1 year
926	UMTS	Notch Filter 1865 - 2025 MHz	N/A	938147B 60656 0944	Each Time[1]	Each Time[1]
1245	N/A	6dB Attenuator	PE7390-6	01182018 A	2021-11-21	2 years
1246	HP	RF Limiter	11867A	01734	2023-04-13	1 year

Note[1]: equipment 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:	20-22 ºC
Relative Humidity:	42-50 %
ATM Pressure:	102.7 kPa

The testing was performed by Steven Lianto from 2023-07-03 to 2023-08-18 in 5m chamber 3.

7.8 Summary of Test Results

According to the data hereinafter, the EUT complied with FCC Part 15C, Part 15F, and ISEDC RSS-220, RSS-Gen standard's radiated emissions limits, and had the worst margin of:

Mode: Colocation			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Configuration**
-1.43	2699.9875	Horizontal	5Wifi+UWB+DECT

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

7.9 Radiated Emissions Test Results

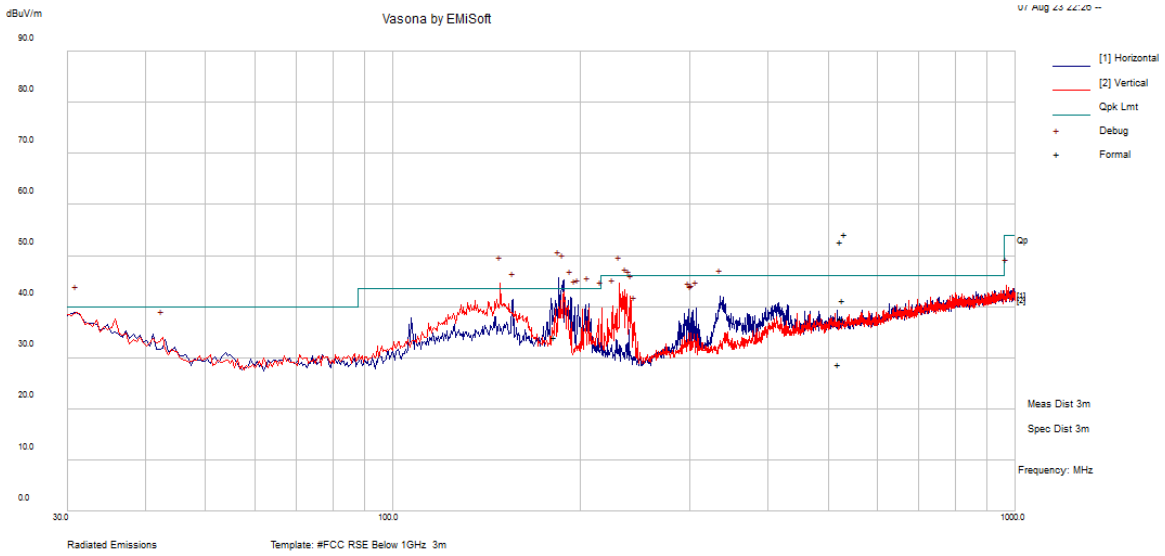
Note: Pre-scan was performed in order to determine worst-case orientation of device with respect to measurement antenna. Plots/data shown represent measurements made in worst-case orientation.

FCC/IC Limits for 1 GHz to 40 GHz				
Applicability	**(dBm)**	**(uV/m at 3meters)**	**(dBuV/m at 3meters)**	**(dBuV/m at 1meter)[2]**
Restricted Band Average Limit	-	500	54	64
Restricted Band Peak Limit[1]	-	-	74	84

Note[1]: Restricted Band Peak Limit is defined to be 20dB higher than Average Limit.
Note[2]: Limits at 1 meter are determined by applying a Distance correction factor accounts for extrapolation from 1 meters to 3 meters. Formula used is as follows: 20*log(3meters/1meter) = 9.54 (According to ANSI C63.10-2013 Section 9.4)

1) 30 MHz – 1 GHz Measured at 3 meters

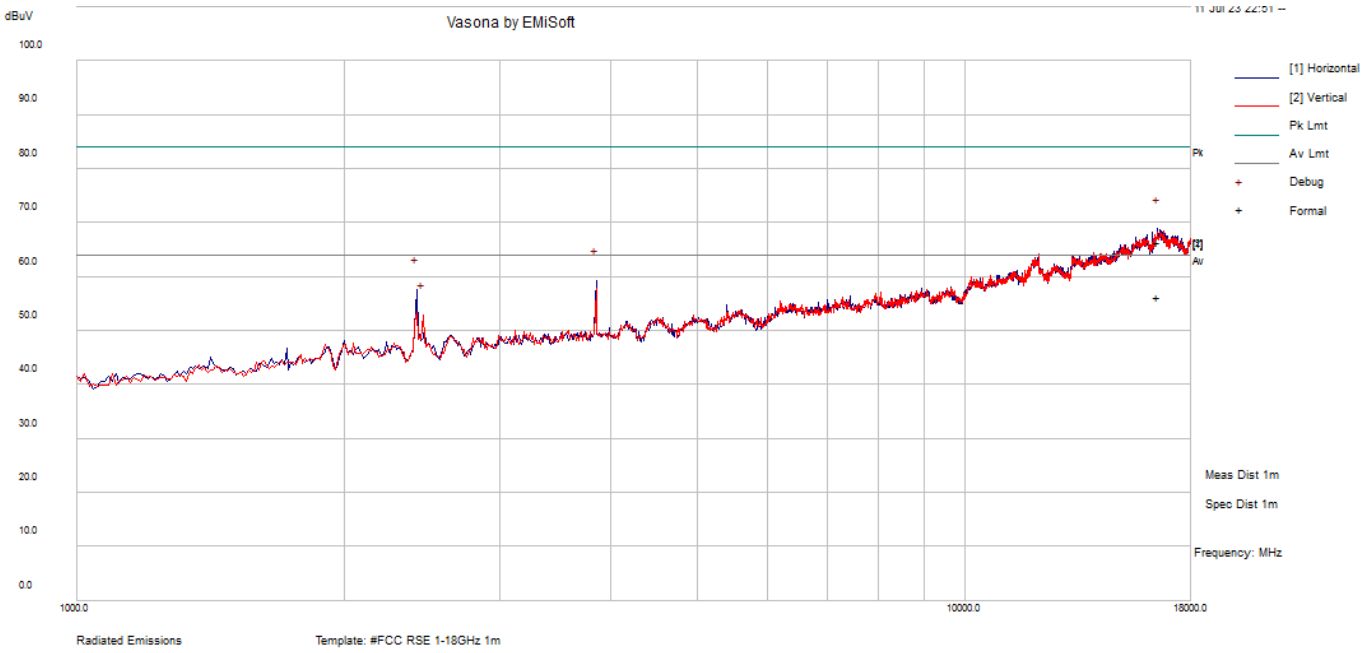
5 Wifi+UWB+DECT (Worst-case)



Frequency (MHz)	S.A. Reading (dBµV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
184.576	42.81	-9.56	33.25	H	282	265	43.5	-10.25	QP
188.266	44.05	-9.3	34.75	H	189	25	43.5	-8.75	QP
148.57725	43.02	-8.17	34.85	V	240	94	43.5	-8.65	QP
30.8355	32.14	-1.62	30.52	V	299	181	40	-9.48	QP
231.512	37.29	-9.87	27.42	V	188	274	46	-18.58	QP
193.046	40.43	-8.99	31.44	H	264	7	43.5	-12.06	QP

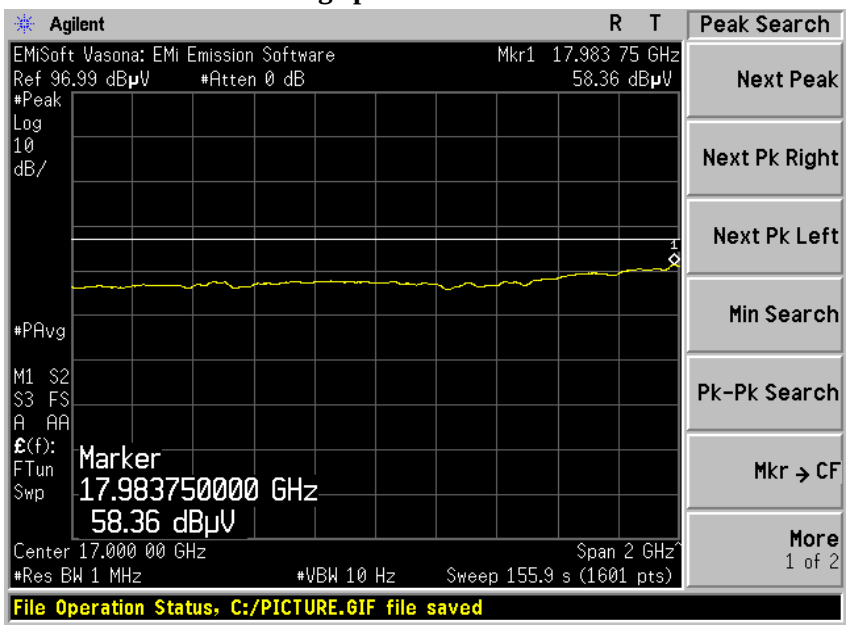
2) 1 GHz – 18 GHz Measured at 1 meters

2.4 Wifi+UWB+DECT



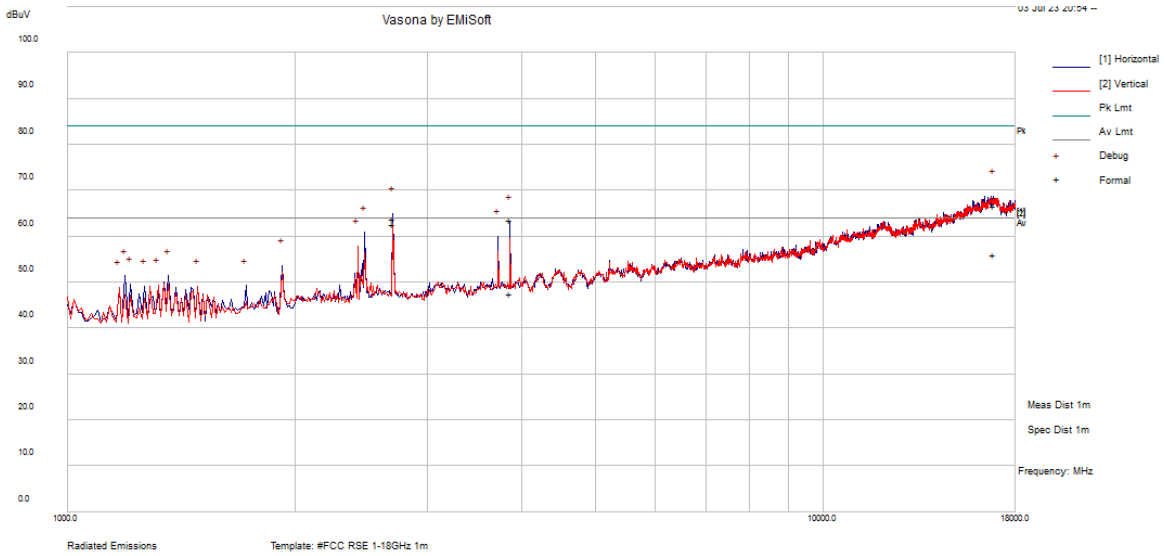
Note: above plot shows all peak emissions below 16GHz pass under average limits

Average plot for 16 – 18 GHz



Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz

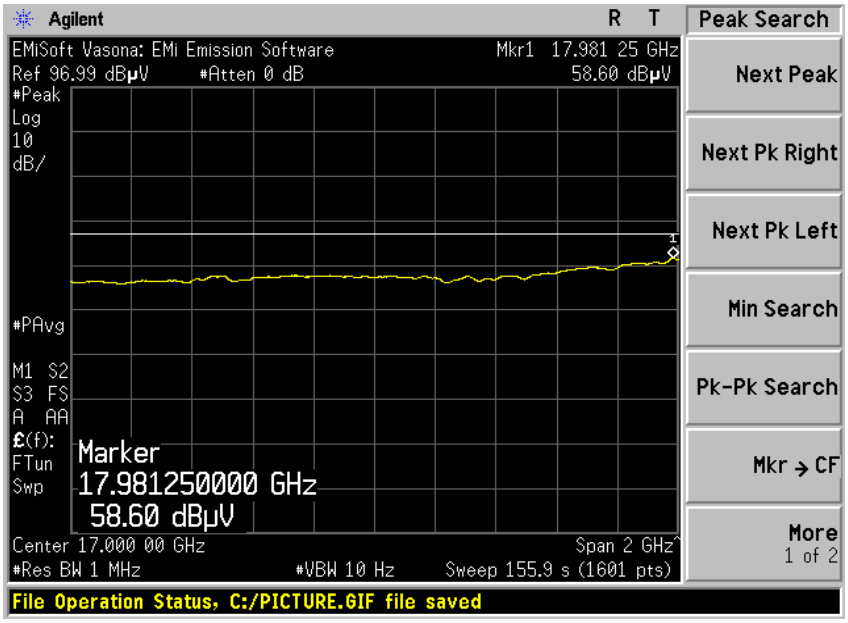
5 Wifi+UWB+DECT



Frequency (MHz)	S.A. Reading (dBµV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
2699.9875	63.83	-0.05	63.78	182	H	140	84	-20.22	Peak
3857.2825	60.61	3.01	63.62	211	H	173	84	-20.38	Peak
2699.9875	62.62	-0.05	62.57	182	H	140	64	-1.43	Average
3857.2825	44.52	3.02	47.54	211	H	173	64	-16.46	Average

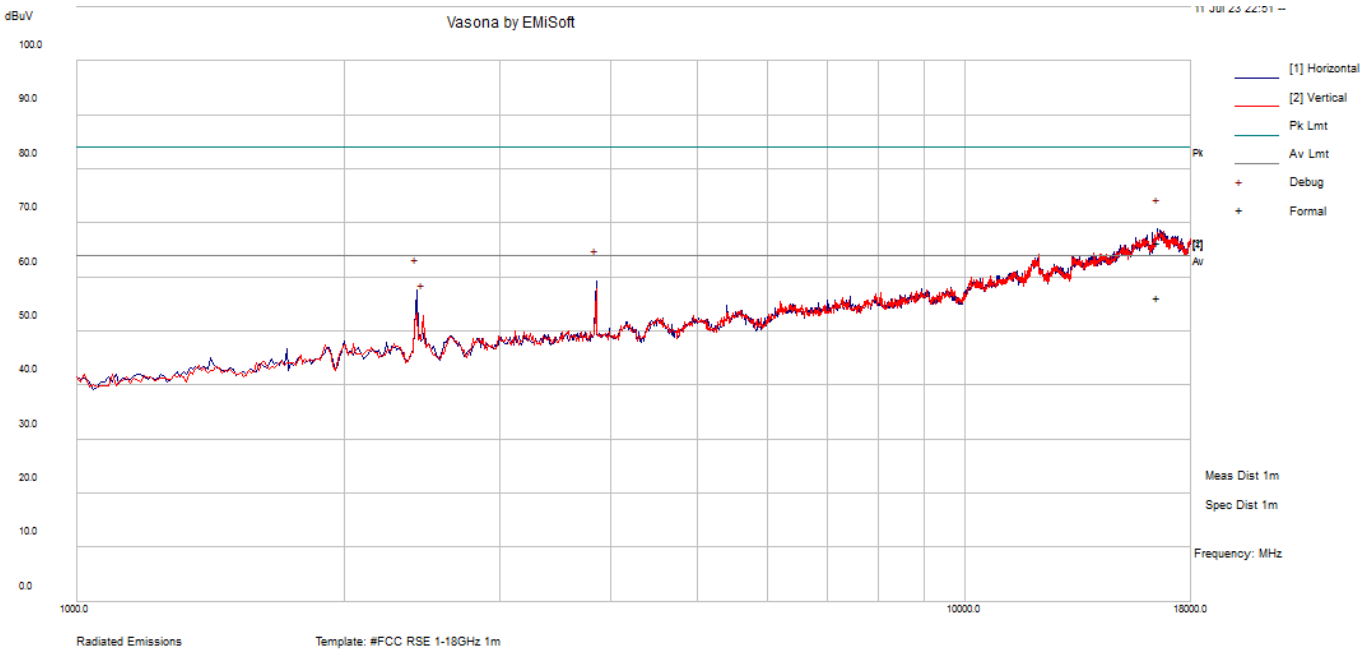
Note: above plot and table shows all emissions below 16GHz pass appropriate limits

Average plot for 16 – 18 GHz



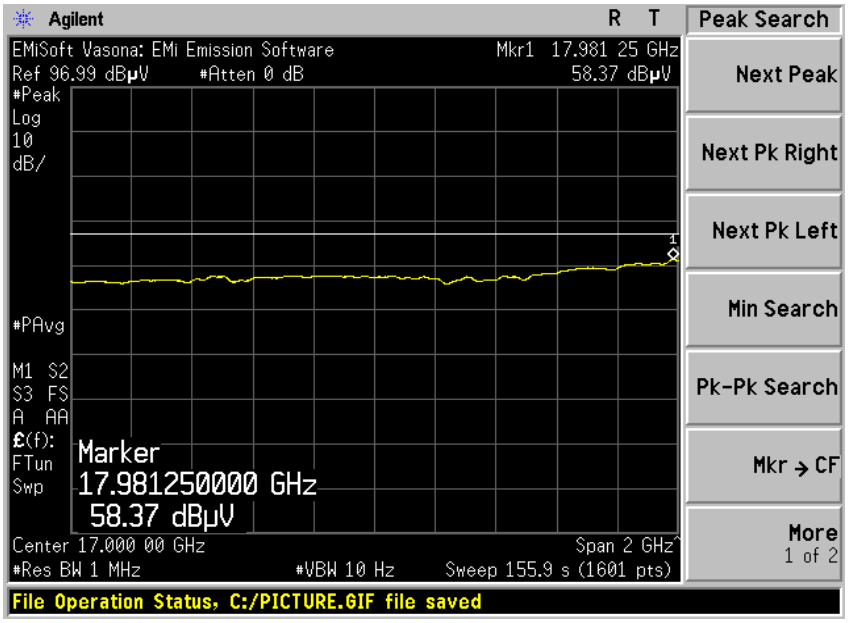
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz

BT+UWB+DECT



Note: above plot shows all peak emissions below 16GHz pass under average limits

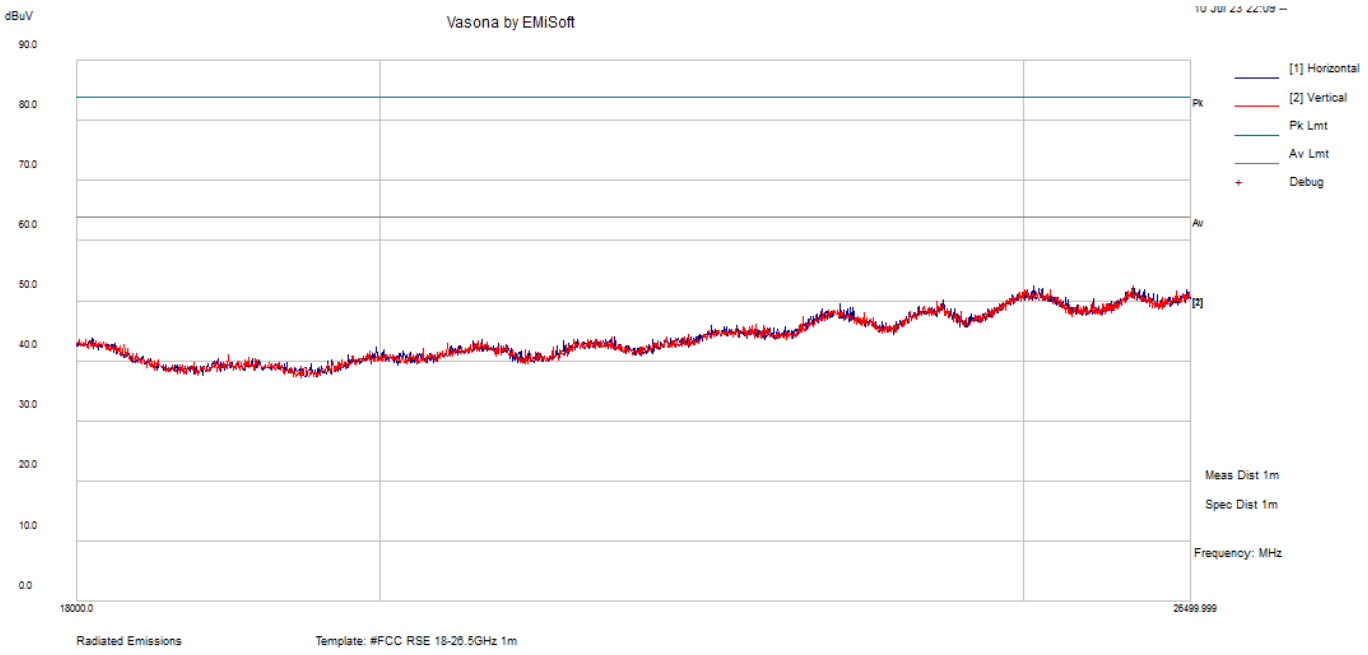
Average plot for 16 – 18 GHz



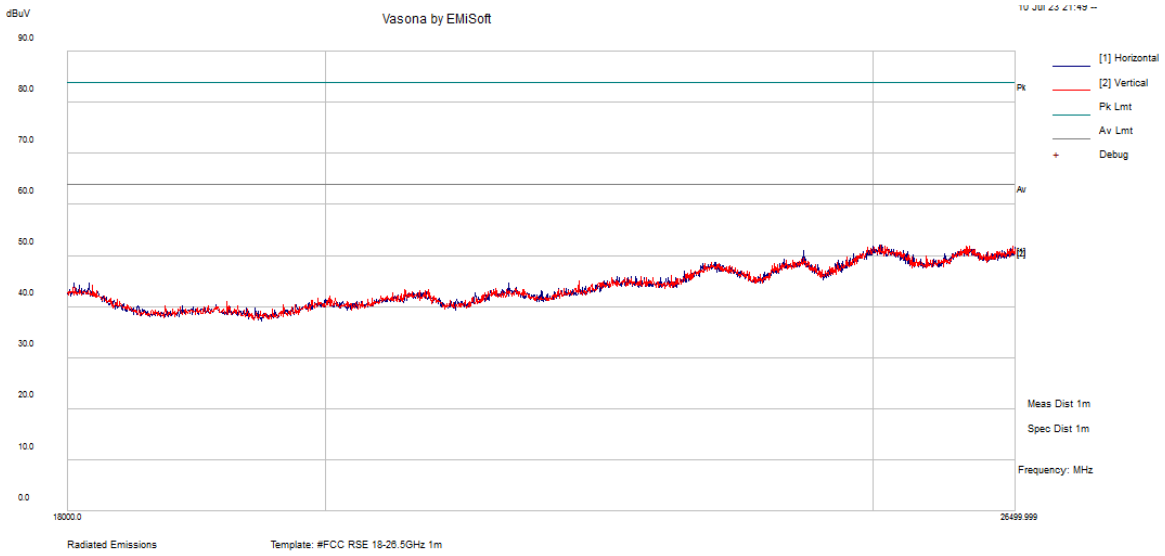
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz

3) 18 GHz – 26.5 GHz Measured at 1 meters

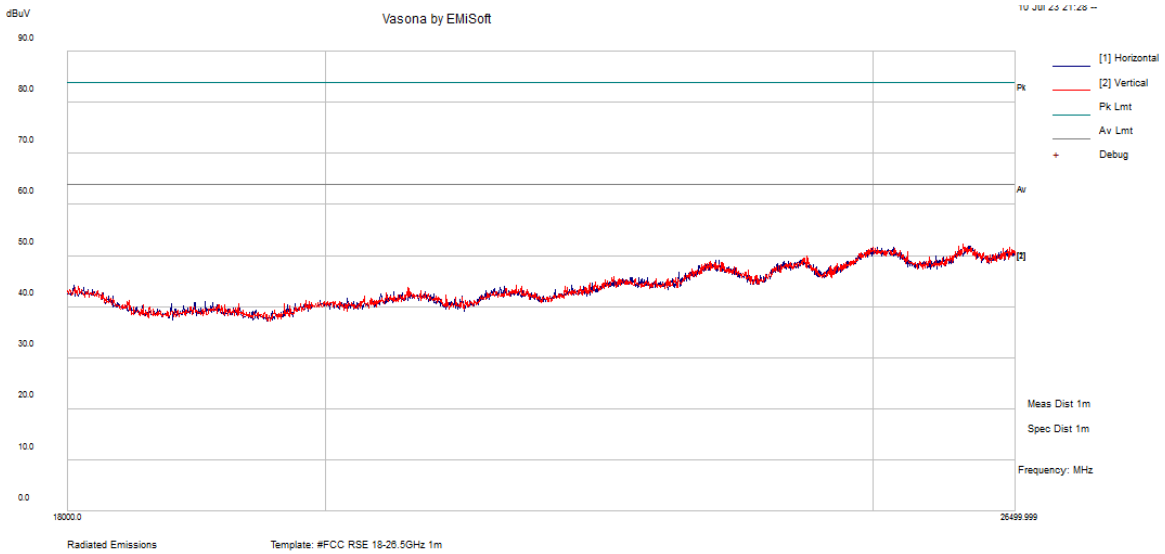
2.4 Wifi+UWB+DECT



5 Wifi+UWB+DECT

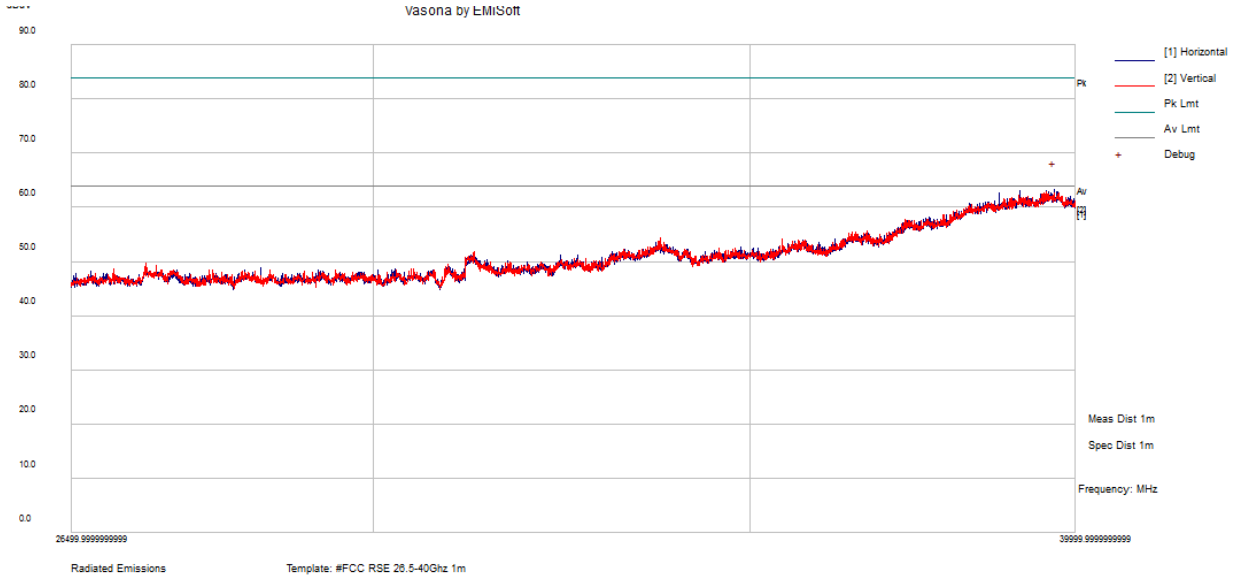


BTC+UWB+DECT

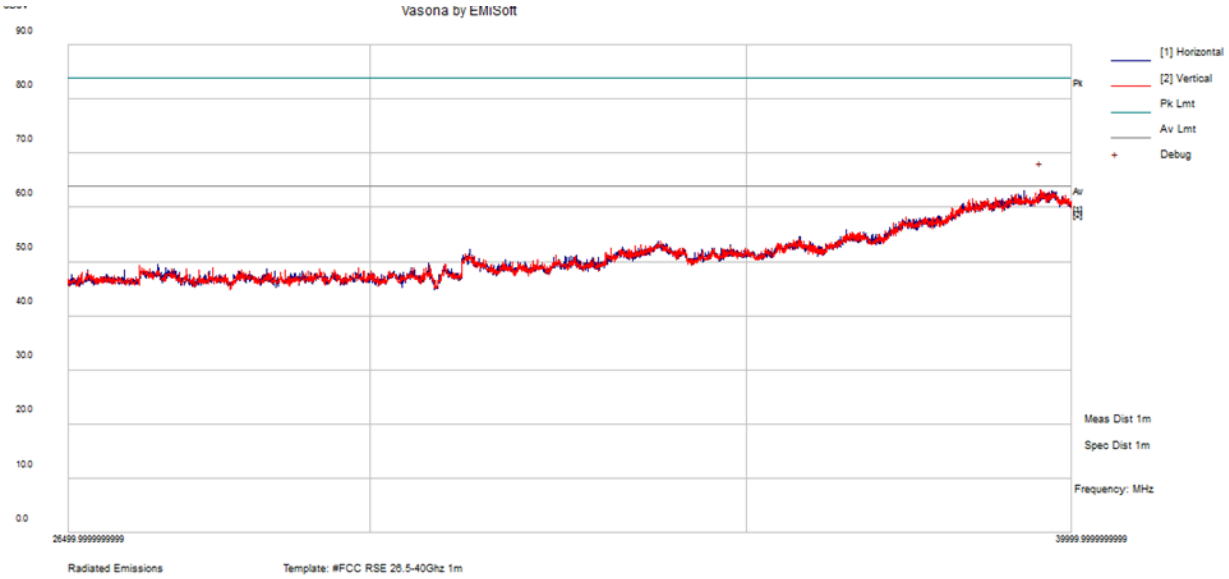

dBuV
Vasona by EMiSoft
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Pk
Av
[2]
[1] Horizontal
[2] Vertical
Pk Lmt
Av Lmt
Debug
Meas Dist 1m
Spec Dist 1m
Frequency: MHz
18000.0
26499.999
Radiated Emissions
Template: #FCC RSE 18-26.5GHz 1m

4) 26.5 GHz – 40 GHz at 1 meters

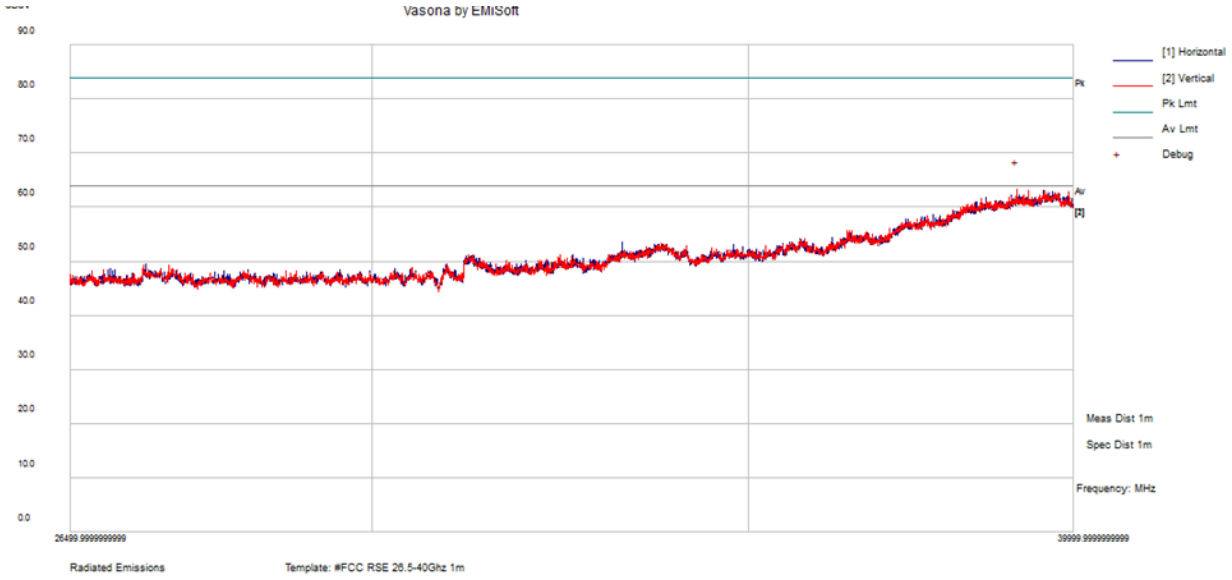
2.4 Wifi+UWB+DECT



5 Wifi+UWB+DECT



BT+UWB+DECT


Vasona by EMISoft
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
[1] Horizontal
[2] Vertical
Pk Lmt
Av Lmt
Debug
Pk
Av
[2]
Meas Dist 1m
Spec Dist 1m
Frequency: MHz
26499.999999999
39999.999999999
Radiated Emissions
Template: #FCC RSE 26.5-40Ghz 1m

8 FCC §15.209, §15.519(c), (d) & ISED RSS-220 §3.4, §5.3.1(d), (e), RSS-Gen §8.9, §8.10 - Radiated Emissions

8.1 Applicable Standards

As per FCC §15.519(c), the radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209.

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) 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	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 – 4400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per ISED RSS-Gen §8.9, except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in the table below. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

General Field Strength Limits at Frequencies above 30 MHz

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

As per ISED RSS-220 §5.3.1(c), Radiated emissions at or below 960 MHz from a device shall not exceed the limits in section 3.4.

As per ISED RSS-220 §3.4, Radiated emissions at or below 960 MHz for all subclasses of UWB device shall not exceed the following limits. Measurements of radiated emissions at and below 960 MHz are to be made using a CISPR quasi-peak detector. CISPR measurement bandwidth specifications are to be used.

Radiated Emissions at or below 960 MHz

Frequency (MHz)	Field Strength (Microvolts/m)	Measurement Distance (Metres)	E.i.r.p. (dBmW)
0.009-0.490	2,400/F (F in kHz)	300	10 log (17.28 / F^2) (F in kHz)
0.490-1.705	24,000/F (F in kHz)	30	10 log (17.28 / F^2) (F in kHz)
1.705-30	30	30	-45.7
30-88	100	3	-55.2
88-216	150	3	-51.7
216-960	200	3	-49.2

According to FCC §15.519(c): (c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3

According to ISED RSS-220 §5.3.1(d): Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

Frequency	EIRP
960-1610 MHz	-75.3 dBm
1.61-4.75 GHz	-70.0 dBm
4.75-10.6 GHz	-41.3 dBm
Above 10.6 GHz	-61.3 dBm

According to FCC §15.519(c): (d) In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

According to ISED RSS-220 §5.3.1(e): In addition to the limits specified in paragraph (d) of this section, radiated emissions shall not exceed the following average limits when measured using a resolution bandwidth greater than or equal to 1 kHz. The measurements shall demonstrate compliance with the stated limits at whatever resolution bandwidth is used.

Frequency	e.i.r.p. in a Resolution Bandwidth of no less than 1 kHz
1164-1240 MHz	-85.3 dBm
1559-1610 MHz	-85.3 dBm

8.2 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 F and ISED RSS-220 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.

8.3 Measurement Procedure

The EUT host, and all support equipment power cords were connected to the AC floor outlet.

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

For radiated testing the EUT was set 1 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 960 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 960 MHz:

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

Above 960 MHz:

The measurements were based on ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices section 10.3: Radiated measurement procedure above 960 MHz.

8.4 Corrected Amplitude and Margin Calculation

For emissions below 1 GHz,

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

CA = S.A. Reading + Correction Factor

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

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

Correction Factor = AF + CL + Atten – Ga

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:

$$CA = Ai + AF + CL + Atten - Ga$$

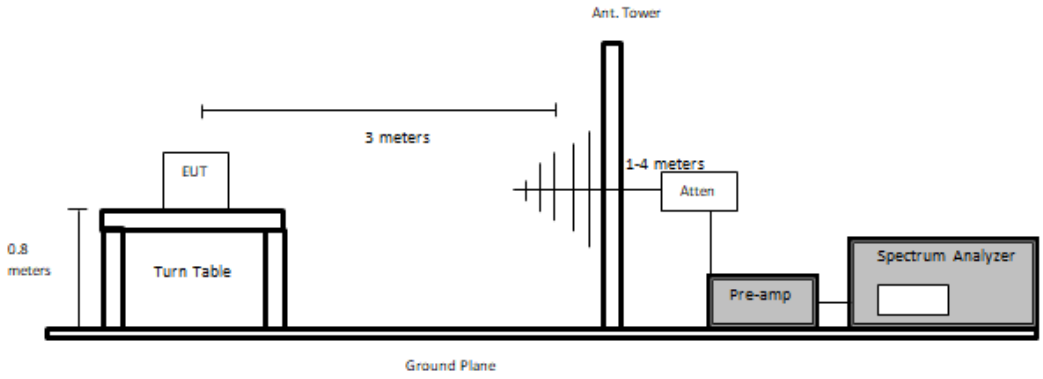
For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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:

$$Margin = Corrected\ Amplitude - Limit$$

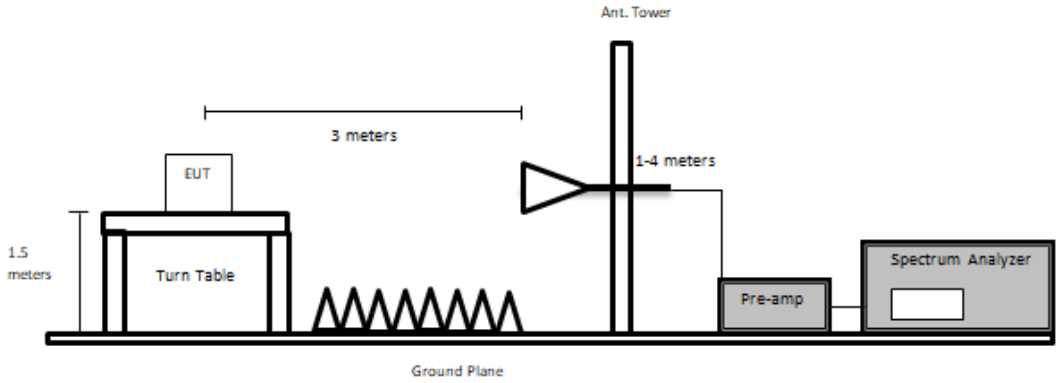
8.5 Test Setup Block Diagram

Below 1GHz:

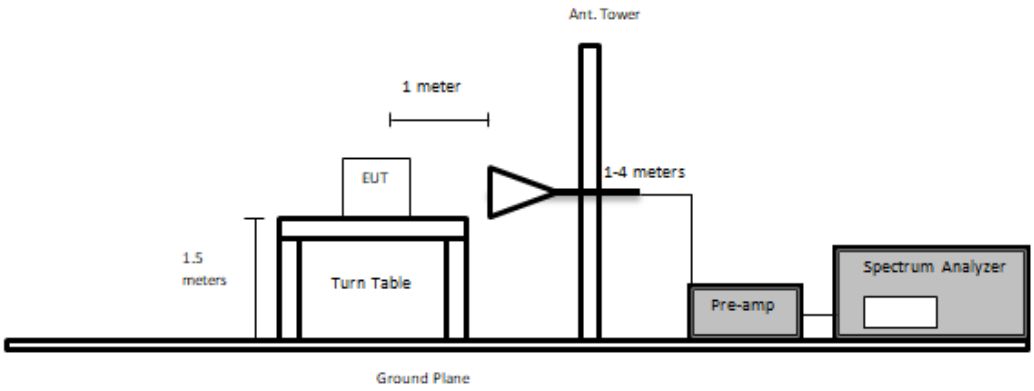


Above 1GHz:

At 3 meters:



At 1 meter:


Ant. Tower
1 meter
EUT
1-4 meters
1.5
meters
Turn Table
Spectrum Analyzer
Pre-amp
Ground Plane

8.6 Test Equipment List and Details

Asset #	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
124	Rhode & Schwarz	EMI Test Receiver	ESCI	100044	2023-06-16	1 year
424	Agilent	Spectrum Analyzer	E4440A	US453 03156	2022-12-19	1 year
655	Rhode & Schwarz	Signal Analyzer	FSQ26	200749	2023-06-06	1 year
912	Rhode & Schwarz	Signal Analyzer	FSV40	1321.30 08k39-101203 -UW	2023-06-02	1 year
327	Sunol Sciences Corp	System Controller	SC110V	122303 -1	N/R	N/A
316	Sonoma Instruments	Preamplifier	317	260406	2023-04-12	6 months
658	HP/Agilent	Preamplifier	8449B OPT HO2	3008A0 1103	2023-06-13	1 year
827	AH Systems	Preamplifier	PAM 1840 VH	170	2023-05-17	1 year
1186	Pasternack	Coaxial Cable, RG214	PE3062-1050CM	N/A	2023-04-14	6 months
1247	Uti flex	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	2k8061 2-5 6fts	2023-04-14	6 months
1295	Carlisle	10m Ultra Low Loss Coaxial Cable	UFB142A-1-3937-200200	646398 90912-001	2023-05-04	6 months
1346	RFMW	2.92mm 10ft RF cable	KMSE-160SAW-240.0-KSME	N/A	2023-06-23	6 months
1354	RFMW	2.92mm 10ft RF Cable DC to 40 GHz	P1CA-29M29M-F150-120	N/A	2023-02-24	1 year
91	Wisewave	Horn Antenna	ARH-4223-02	10555-02	2022-03-08	2 years
230	Wisewave	Horn Antenna	ARH-2823-02	10555-02	2022-03-08	2 years
321	Sunol Sciences	Biconilog Antenna	JB3	A02010 6-2; 1504	2021-11-22	2 years
784	ETS Lindgren	Horn Antenna w/built-in Preamplifier	3117 PA	203557	2022-08-25	2 years
1192	ETS Lindgren	Horn Antenna	3117	002189 73	2022-09-29	2 years
1245	-	6dB Attenuator	PE7390-6	011820 18A	2021-11-22	2 years
1246	HP	RF Limiter	11867A	01734	2023-04-13	1 year
-	-	RF cable	-	-	Each time[1]	N/A
-	Vasona	Test software	V6.0 build 11	104002 13	N/R	N/R

Note[1]: cables 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".*

8.7 Test Environmental Conditions

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

The testing was performed by Arturo Reyes from 2023-08-01 and 2023-08-18 and 2023-08-28 in 5 meter chamber 3.

8.8 Test Results below 960 MHz

Note: Please refer to section 7.9 for evaluation together with accompanying radios collocating.

8.9 Test Results above 960 MHz

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

Average Radiated Spurious Emissions: 960 MHz-26.5 GHz

Note: Measurement was performed at 1m distance. The stricter IC limit was used to demonstrate compliance.
Note: In radiated measurement screenshots from 960MHz to 26.5GHz, shown emissions account for equipment factors to show corrected values compared to applicable limits.
Note: Worst case polarization was used during testing.
Note: According to ANSI C63.10 Section 10.3.9, measured field strength in dBµV/m was converted to EIRP in dBm to compare with the limit. The equation below was used,

EIRP (dBm) = E (dBµV/m @3m)-95.3

Note: Distance correction factor was calculated which is added to the field strength at 1 meter to field strength at 3 meters.

Distance Correction Factor = 20×log(1m / 3m) = -9.54 dB

Field Strength(@3m) = Field Strength(@1m) + Distance Correction Factor

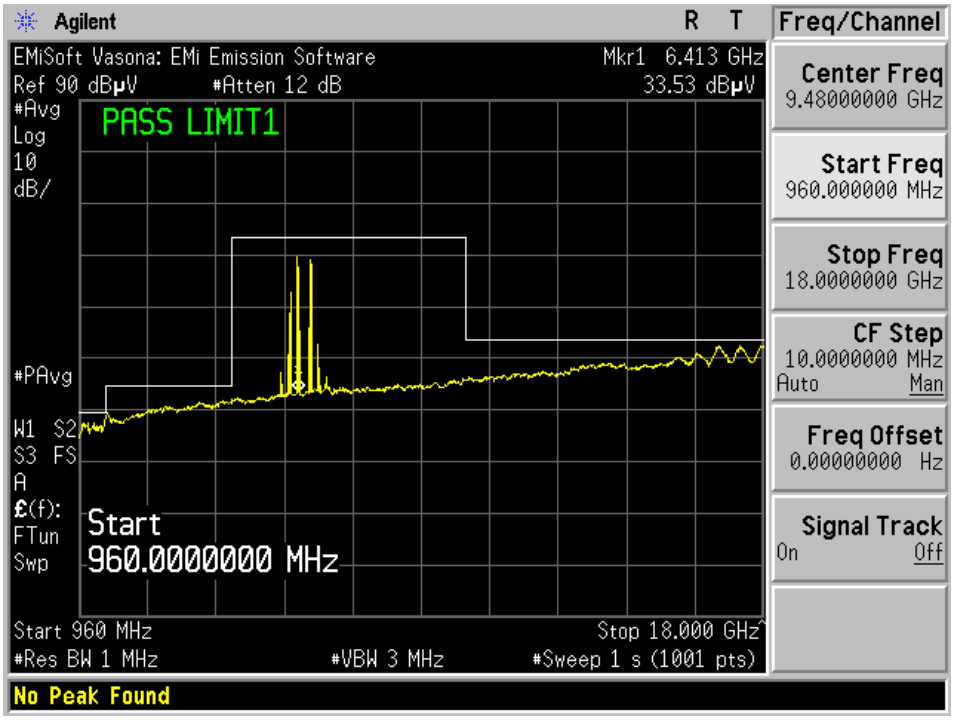
Channel 5 (6489.6 MHz)

Mode	Measured Emission Frequency (GHz)	Antenna Pol (H/V)	Field Strength (dBµV/m @1m)	Corrected Average Field Strength (dBµV/m @3m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
BPRF	25.6024	V	37.51	27.97	-67.332	-61.3	-6.032
HPRF	25.0346	V	37.49	27.95	-67.352	-61.3	-6.052

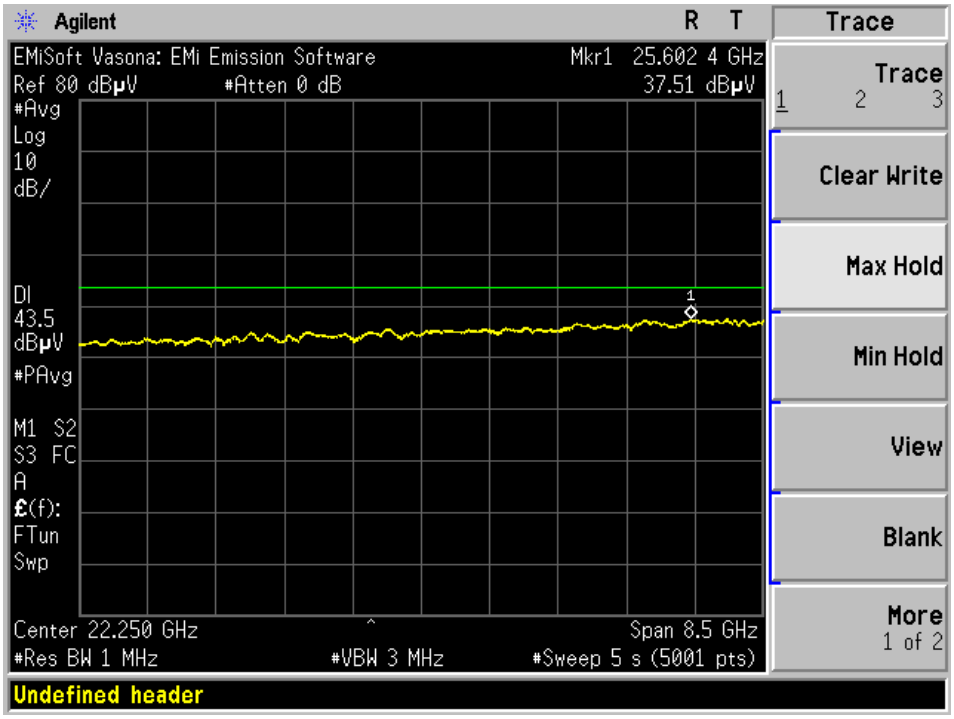
Please refer to the following plots.

Mode: BPRF

1 GHz-18 GHz

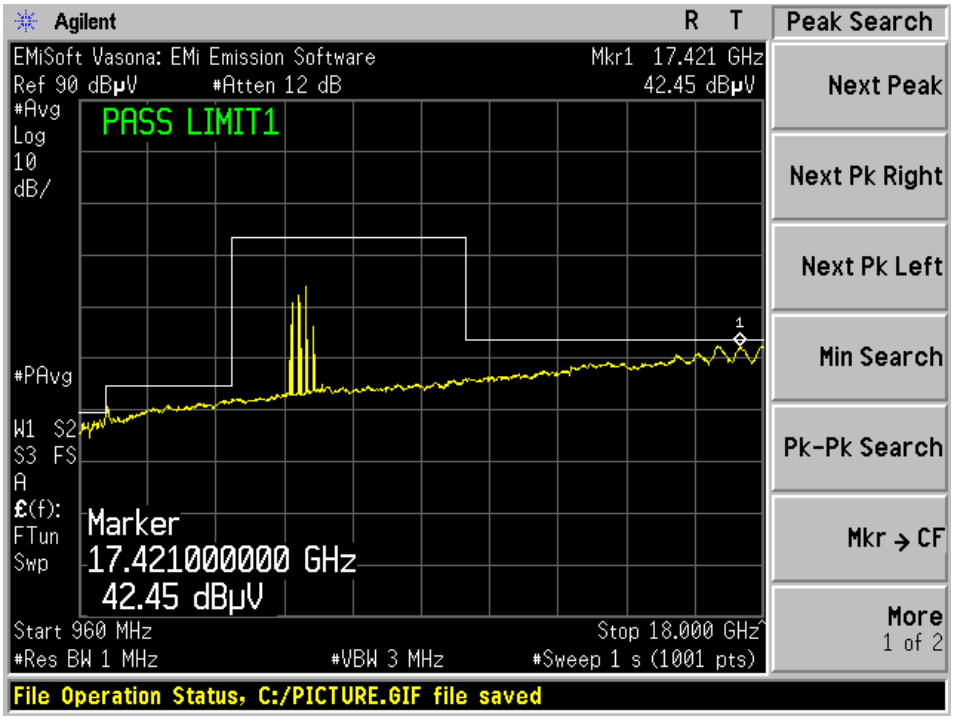


18 GHz-26.5 GHz

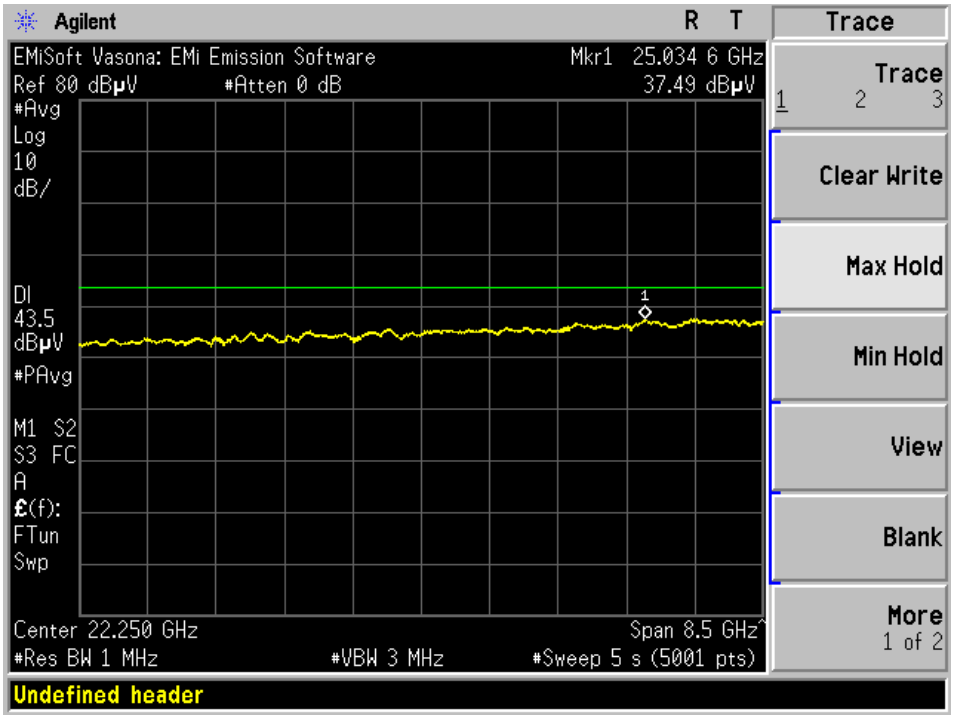


Mode: HPRF

1 GHz-18 GHz



18 GHz-26.5GHz



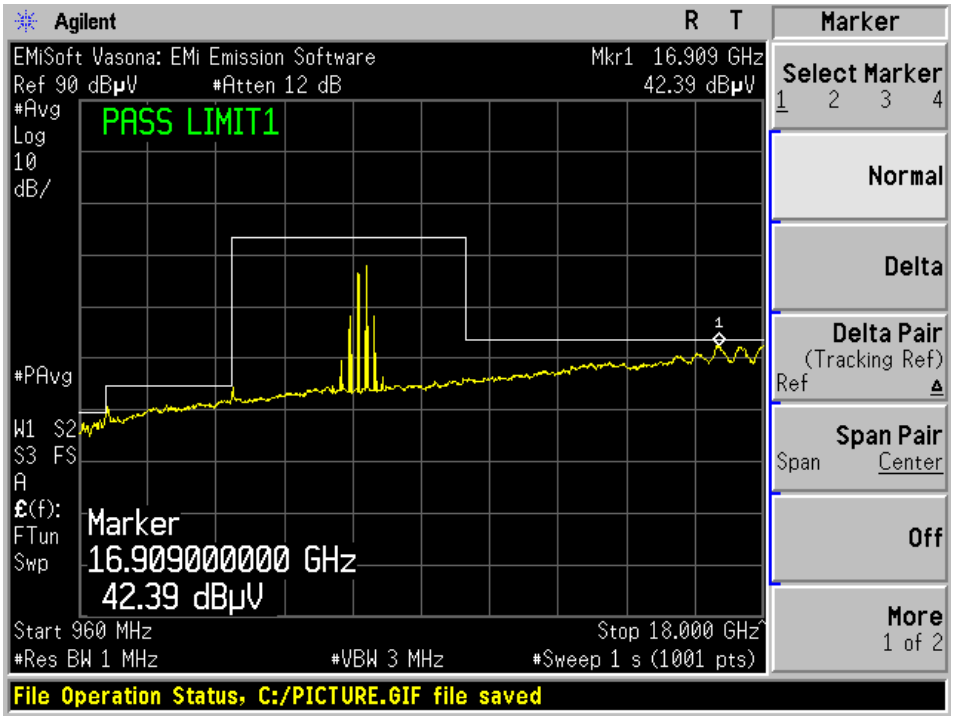
Channel 9 (7987.2 MHz)

Mode	Measured Emission Frequency (GHz)	Antenna Pol (H/V)	Field Strength (dBµV/m @1m)	Corrected Average Field Strength (dBµV/m @3m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
BPRF	25.6058	V	37.58	28.04	-67.262	-61.3	-5.962
HPRF	26.5	V	37.95	28.41	-66.892	-61.3	-5.592

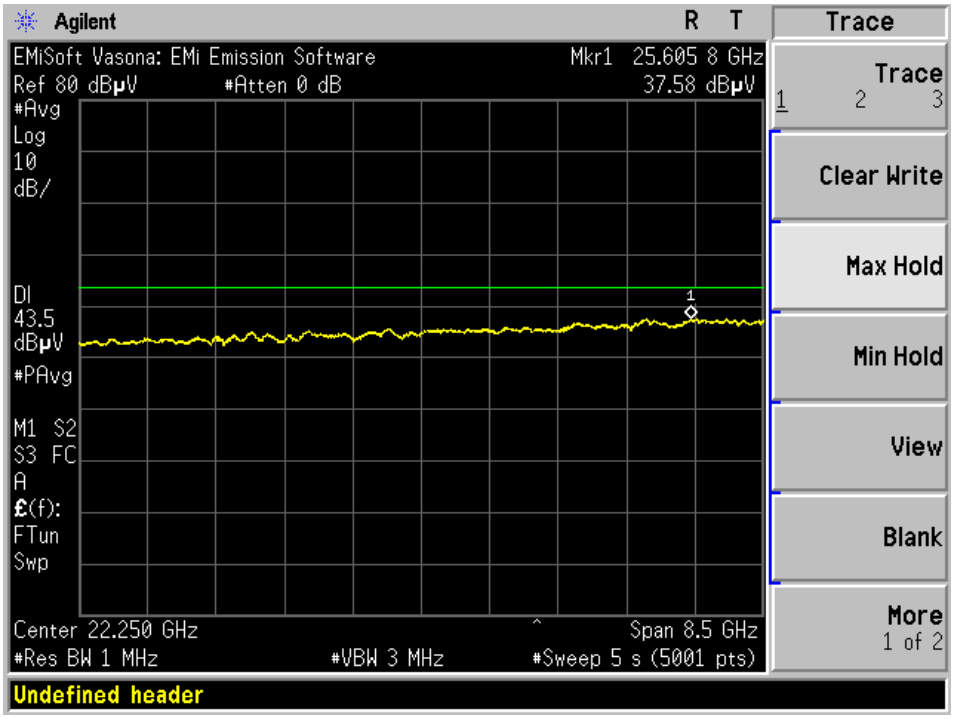
Please refer to the following plots.

Mode: BPRF

1 GHz-18 GHz

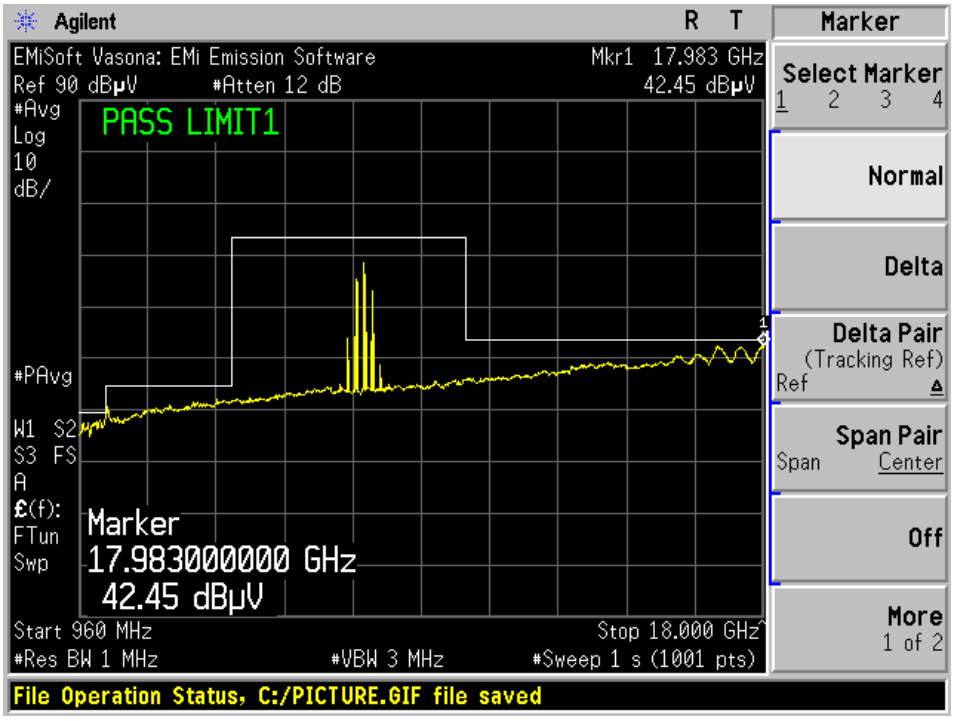


18 GHz-26.5 GHz

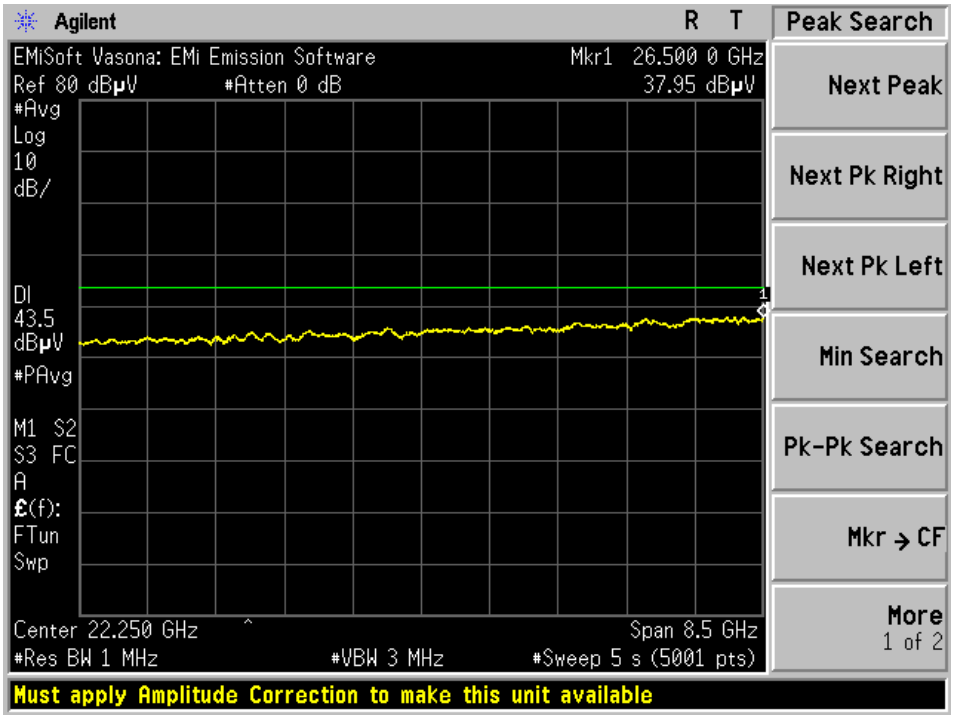


Mode: HPRF

1 GHz-18 GHz



18 GHz-26.5 GHz



Average Radiated Spurious Emissions: 26.5-40 GHz

Note: Measurement was performed at 1m distance. The stricter IC limit was used to demonstrate compliance.
Note: Worst case polarization was used during testing.
Note: In radiated measurement screenshots from 26.5 GHz to 40 GHz, shown emissions do not account for equipment factors. In this case, highest emission was chosen and corrected value was calculated given equipment factors in order to compare to limit.
Note: According to ANSI C63.10 Section 10.3.9, measured field strength in dBµV/m was converted to EIRP in dBm to compare with the limit. The equation below was used,

EIRP (dBm) = E (dBµV/m @3m)-95.3

Note: Distance correction factor was calculated which is added to the field strength at 1 meter to field strength at 3 meters.

Distance Correction Factor = 20×log(1m / 3m) = -9.54 dB

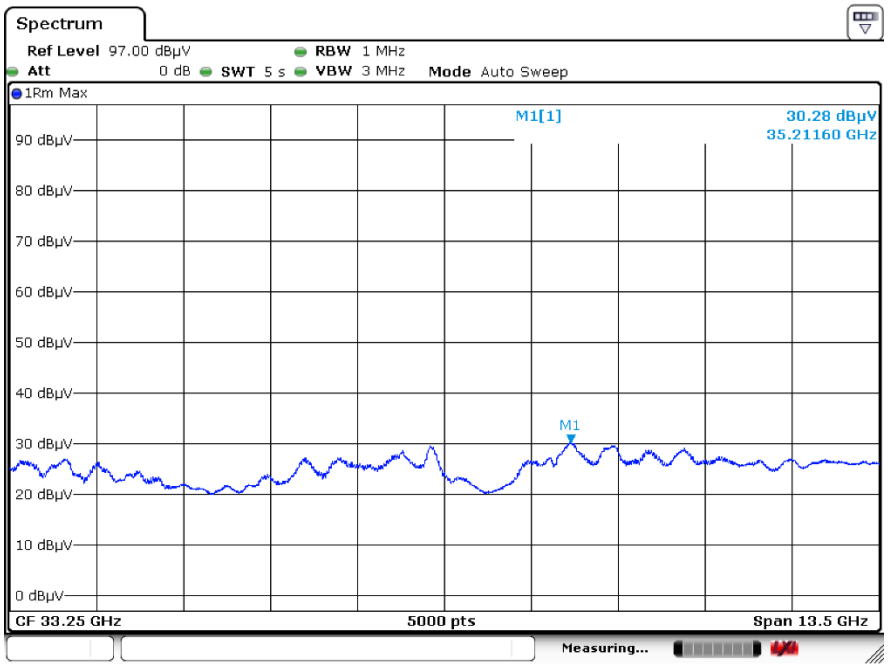
Field Strength (@3m) = Field Strength (@1m) + Distance Correction Factor

Channel 5 (6489.6 MHz)

Mode	Measured Emission Frequency (GHz)	PSA Reading (dBµV)	Ant. Pol (H/V)	Ant. Factor (dB)	Cable Loss (dB)	Pre Amp Gain (dB)	Field Strength (dBµV/m @1m)	Corrected Average Field Strength (dBµV/m @3m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
BPRF	35.2116	30.28	V	38.904	7.225	36.684	39.725	30.183	-65.117	-61.3	-3.817
HPRF	35.2170	30.33	V	38.904	7.225	36.684	39.775	30.233	-65.067	-61.3	-3.767

Mode: BPRF

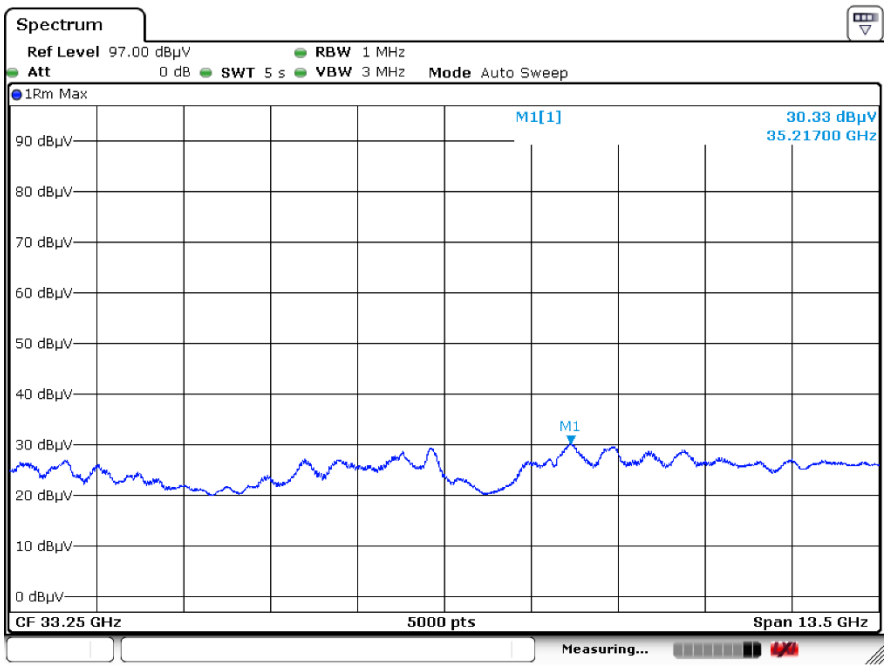
26.5-40 GHz



Date: 28.AUG.2023 16:30:15

Mode: HPRF

26.5-40 GHz



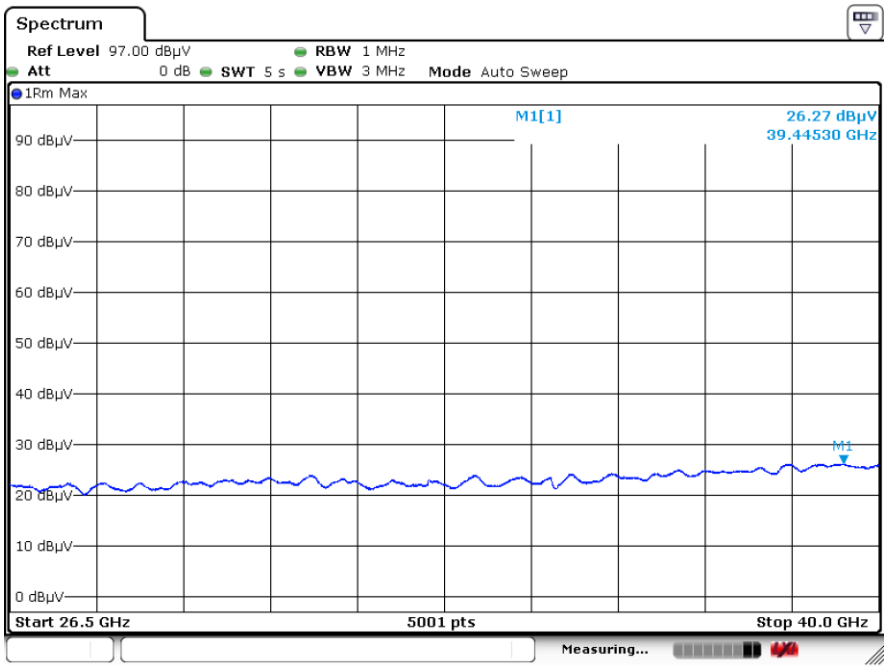
Date: 28.AUG.2023 16:36:08

Channel 9 (7987.2 MHz) BPRF

Mode	Measured Emission Frequency (GHz)	PSA Reading (dBµV)	Ant. Pol (H/V)	Ant. Factor (dB)	Cable Loss (dB)	Pre Amp Gain (dB)	Field Strength (dBµV/m @1m)	Corrected Average Field Strength (dBµV/m @3m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
BPRF	35.2035	30.27	V	38.904	7.225	36.684	39.715	30.173	-65.127	-61.3	-3.827
HPRF	35.2251	30.26	V	38.904	7.225	36.684	39.705	30.163	-65.137	-61.3	-3.837

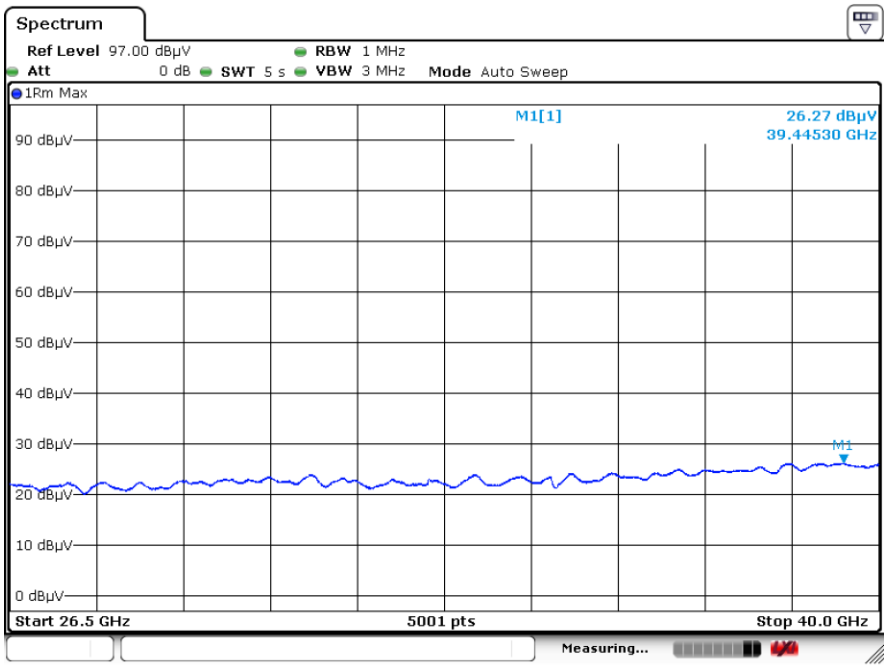
Mode: BPRF

26.5-40 GHz



Mode: HPRF

26.5-40 GHz



Additional Radiated Average Spurious Emissions with RBW of 1 kHz

Note: In radiated measurement screenshots from 1164 MHz to 1240 MHz and 1559 MHz to 1610 MHz, shown emissions account for equipment factors to show corrected values compared to applicable limits.
Note: Worst case polarization was used during testing.
Note: According to ANSI C63.10 Section 10.3.9, measured field strength in dBµV/m was converted to EIRP in dBm to compare with the limit. The equation below was used,

EIRP (dBm) = E (dBµV/m @3m)-95.3

Note: Distance correction factor was calculated which is added to the field strength at 1 meter to field strength at 3 meters.

Distance Correction Factor = 20×log(1m / 3m) = -9.54 dB

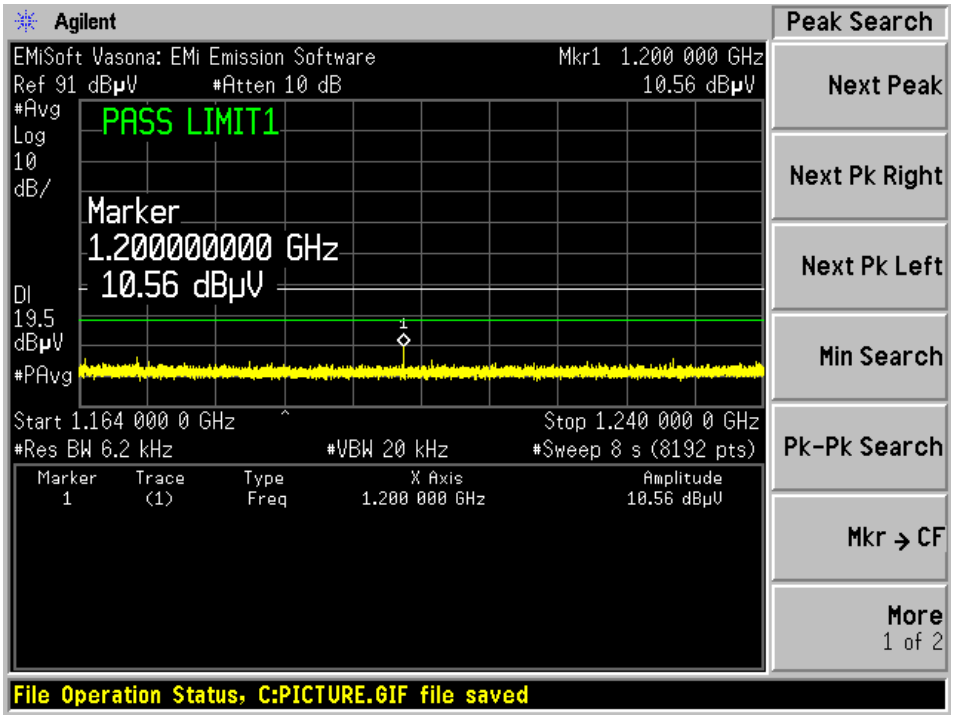
Field Strength (@3m) = Field Strength (@1m) +Distance Correction Factor

Worst Mode: BPRF

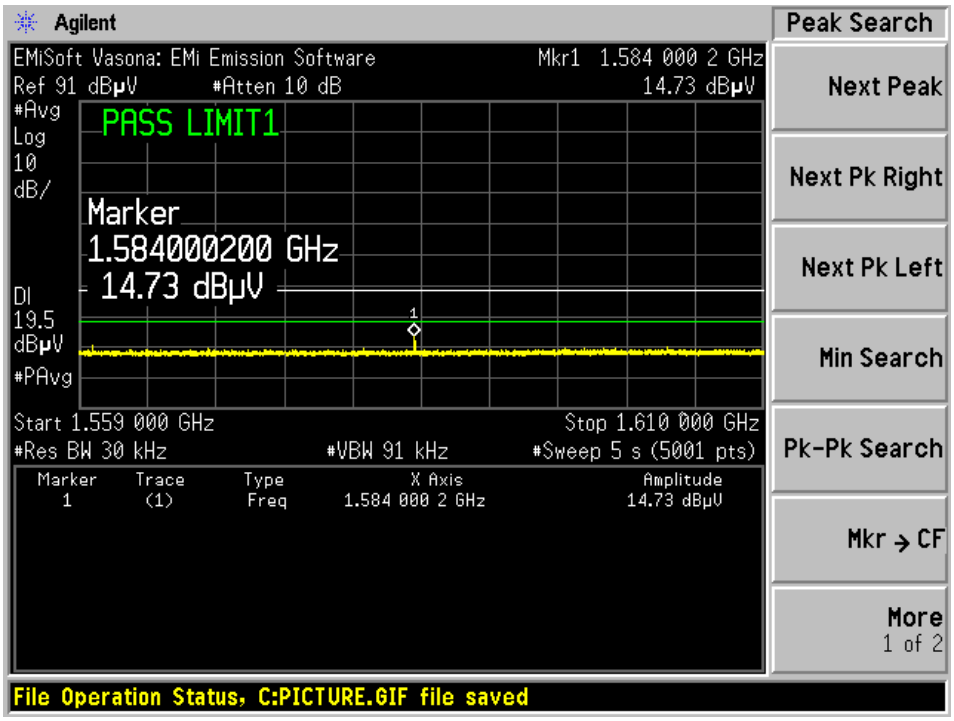
Channel	Mode	Frequency Range (MHz)	Antenna Pol. (H/V)	Highest Emission Frequency (MHz)	Highest Emission (dBuV/m @1 meter)	Corrected Value (dBuV/m @3 meters)	EIRP (dBm)	Limit (dBm)	Margin (dB)
5	BPRF	1164-1240	V	1200	10.56	1.02	-94.28	-85.3	-8.98
5	BPRF	1559-1610	V	1584	14.73	5.19	-90.11	-85.3	-4.81
9	BPRF	1164-1240	V	1200	10.02	0.48	-94.82	-85.3	-9.52
9	BPRF	1559-1610	V	1584	15.54	6	-89.3	-85.3	-4

Channel 5, Mode: BPRF

1164 MHz-1240 MHz

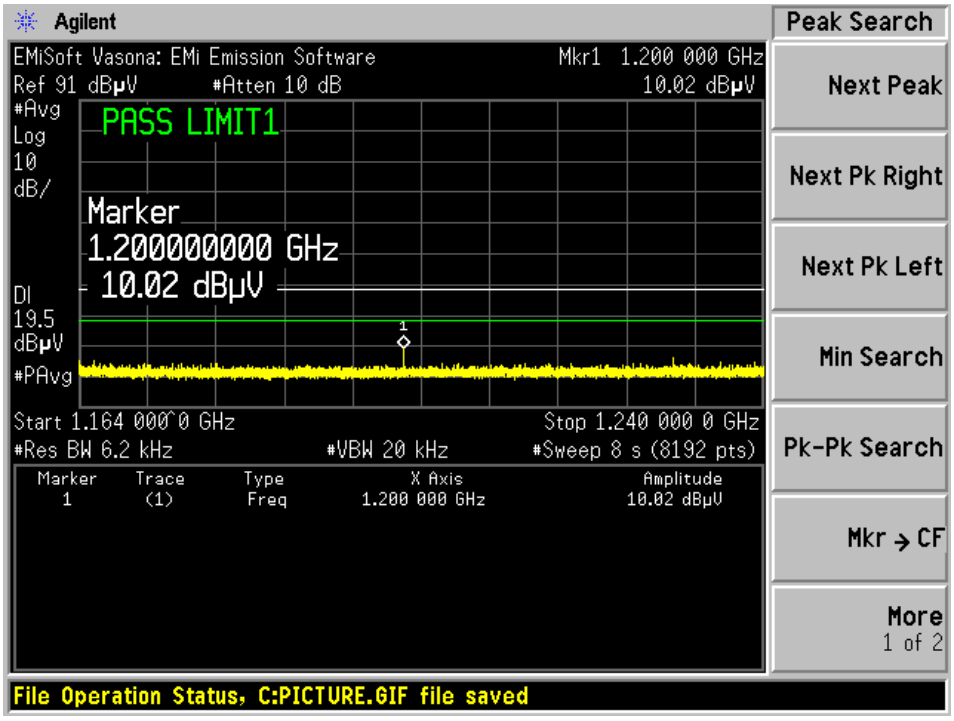


1559 MHz-1610 MHz

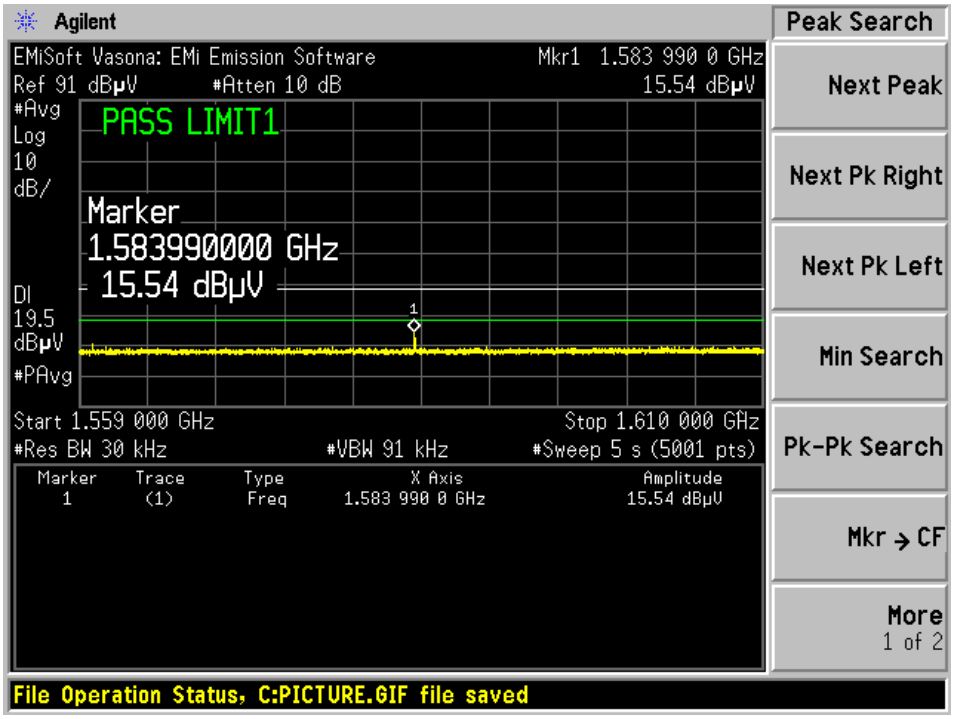


Channel 9, Mode: BPRF

1164 MHz-1240 MHz



1559 MHz-1610 MHz



9 FCC §15.519(e), §15.521(e) & ISED RSS-220 §5.3.1(g) - Peak Fundamental Emission

9.1 Applicable Standards

According to FCC §15.519(e): There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521.

According to FCC §15.521(e): The frequency at which the highest radiated emission occurs, f_M, must be contained within the UWB bandwidth.

According to ISED RSS-220 §5.3.1(g): The peak level of the transmissions shall not exceed the peak equivalent of the average limit contained within any 50 MHz bandwidth, as defined in section 4 of the Annex

According to ISED RSS-220 Annex 4(c): Peak measurements shall be made in addition to average measurements. Transmissions shall not exceed 0 dBm e.i.r.p. in any 50 MHz bandwidth when the average limit is -41.3 dBm/MHz.

According to FCC §15.521(g): When a peak measurement is required, it is acceptable to use a resolution bandwidth other than the 50 MHz specified in this subpart. This resolution bandwidth shall not be lower than 1 MHz or greater than 50 MHz, and the measurement shall be centered on the frequency at which the highest radiated emission occurs, f_M. If a resolution bandwidth other than 50 MHz is employed, the peak EIRP limit shall be 20 log (RBW/50) dBm where RBW is the resolution bandwidth in megahertz that is employed. This may be converted to a peak field strength level at 3 meters using E(dBuV/m) = P(dBm EIRP) + 95.3. If RBW is greater than 3 MHz, the application for certification filed with the Commission must contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

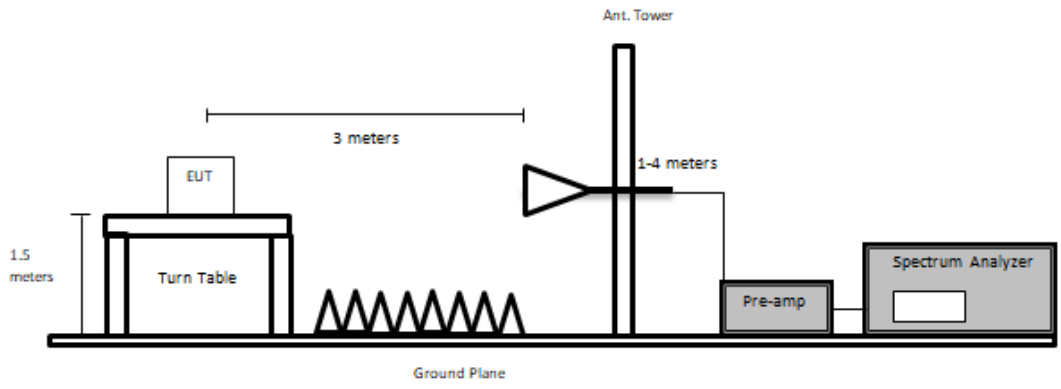
9.2 Measurement Procedure

The measurements were based on ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices section 10.3: Radiated measurement procedure above 960MHz.

9.3 Test Setup Block Diagram

Above 1GHz:

At 3 meters:



9.4 Test Equipment List and Details

Asset #	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
655	Rohde & Schwarz	Spectrum Analyzer	FSQ26	200749	2022-02-07	2 years
327	Sunol Sciences Corp	System Controller	SC110V	122303-1	N/R	N/A
1192	ETS Lindgren	Horn Antenna	3117	00218973	2022-09-29	2 years
658	HP/Agilent	Preamplifier	8449B OPT HO2	3008A01103	2023-06-13	1 year
-	-	RF cable	-	-	Each time[1]	N/A
1295	Carlisle	10m Ultra Low Loss Coaxial Cable	UFB142A-1-3937-200200	64639890912-001	2023-05-04	6 months

Note[1]: cables 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".*

9.5 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

The testing was performed by Arturo Reyes and Shankar Pangeni on 2023-08-18 to 2023-08-19 in 5 meter chamber 3.

9.6 Test Results

Measurements were taken at 3 meters.

Channel Number	Channel Frequency (MHz)	Mode	PSA Reading (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Pre Amp Gain (dB)	Corrected Field Strength (dBµV/m @3m)	Limit[1] (dBµV/m @3m)	Margin (dB)
5	6489.6	BPRF	71.28	36.404	8.725	36.5488	79.86	81.32	-1.46
		HPRF	71.40	36.404	8.725	36.5488	79.98	81.32	-1.34
9	7987.2	BPRF	68.42	36.02	9.776	36.5743	77.64	81.32	-3.68
		HPRF	68.20	36.02	9.776	36.5743	77.42	81.32	-3.90

Note[1]: Radiated Peak limit determined using a 10 MHz measurement BW. (i.e. 20*log(10/50)= -13.98 dB), then adding 95.3 dB for field strength at 3 meters as instructed to in FCC §15.521(g)
Note: For reference, highest power in dBm = 79.98dBuV/m @ 3m (10MHz RBW) + 13.98dB - 95.3dB = -1.34 dBm. This test power is similar with original certification.

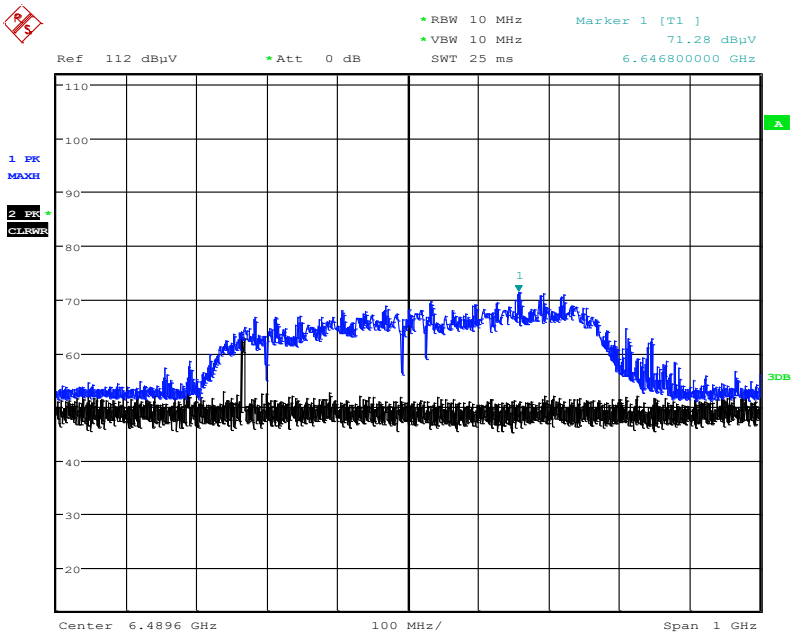
Channel Number	Channel Frequency (MHz)	Mode	f_M (MHz)	Range of UWB BW[2] (MHz)	Result
5	6489.6	BPRF	6646.26667	6294.6-6836.2667	Pass
		HPRF	6726.26667	6220.113-2787.4205	Pass
9	7987.2	BPRF	7987.2	7730.79-8237.2	Pass
		HPRF	7987.2	7717.969-8246.8154	Pass

Note[2]: please refer to Section 9.6 of this report for the UWB bandwidth measurement result.

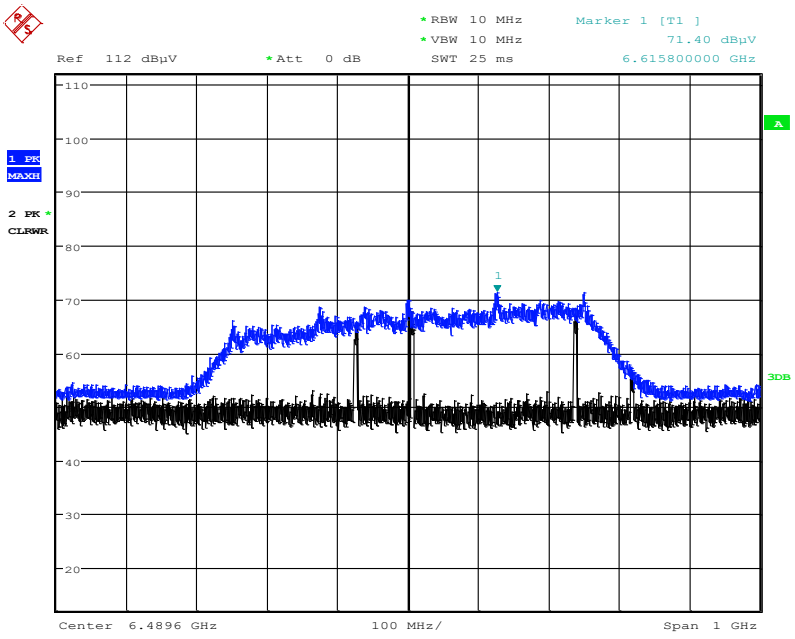
Please refer to the following plots.

Channel 5 (6489.6 MHz), Fundamental Peak Measurements

Mode BPRF

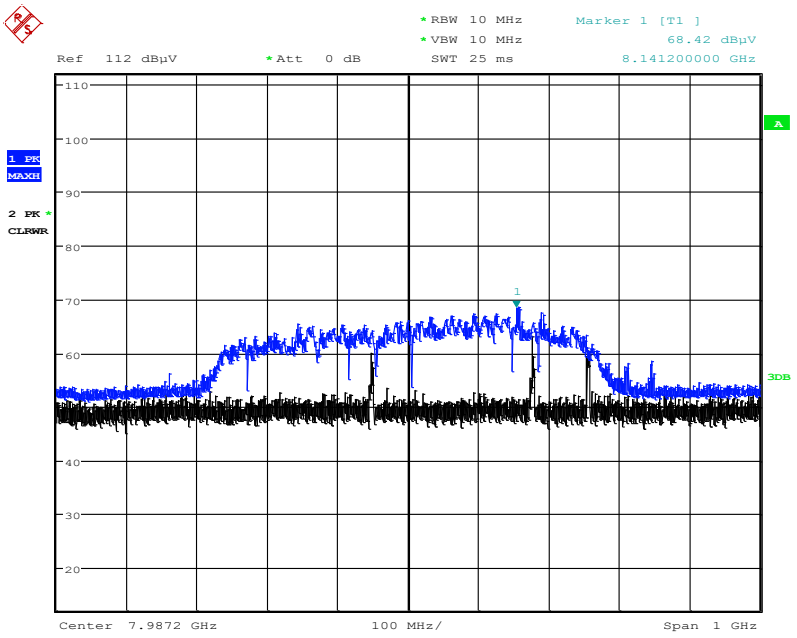


Mode HPRF

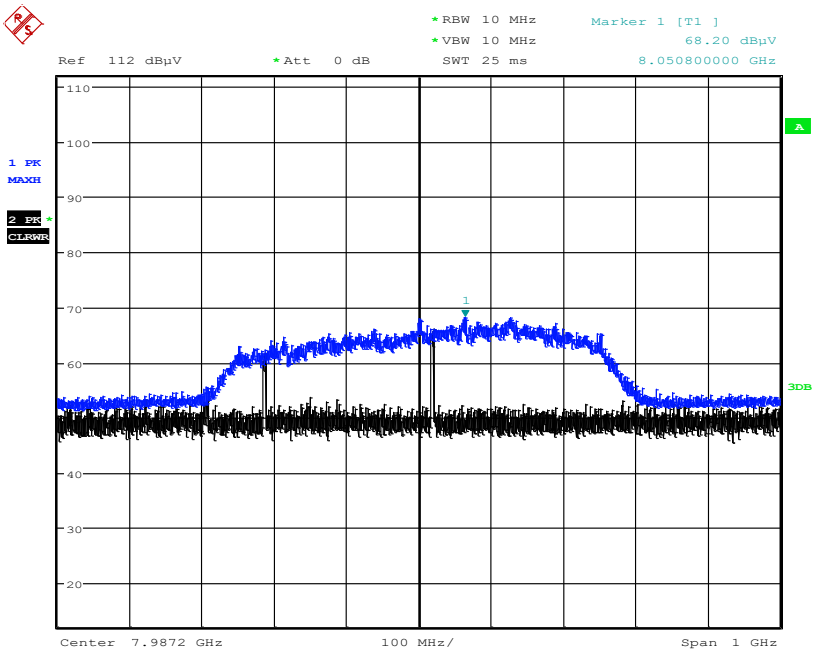


Channel 9 (7987.2 MHz), Fundamental Peak Measurements

Mode BPRF



Mode HPRF



10 Annex A (Normative) - Test Setup Photographs

Please refer to the attachment.

11 Annex B (Normative) - EUT External Photographs

Please refer to the attachment.

12 Annex C (Normative) - EUT Internal Photographs

Please refer to the attachment.

13 Annex D (Normative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets A2LA *R222 - Specific Requirements EPA ENERGY STAR Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 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

--- END OF REPORT ---