FCC PART 15, SUBPART C

TEST REPORT

For

Neuspera Medical, Inc.

51 Daggett Dr.
San Jose, CA 95134, USA

FCC ID: 2BMNE-WT-002

Report Type: Original Report	**Product Type:** Neurostimulator Powering Device
Prepared By:	Arturo Reyes RF Test Engineer
Report Number:	R2408161-247
Report Date:	2025-04-24
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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	R2408161-247	Original Report	2025-04-24

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report is prepared on behalf of *Neuspera Medical, Inc.*, and their product with FCC ID: 2BMNE-WT-002, the "EUT" as referred to in this report. The EUT is a wireless power and communication device to neurostimulation device.

FCC ID	2BMNE-WT-002
Radio Type	900 MHz transmitter
Operating Frequency	902-912 MHz
Modulation	ASK
Channel Spacing	<200 kHz
Antenna Gain	2.36 dBi

1.2 Mechanical Description of EUT

The UUT measures approximately 8.0 cm (L) x 8.0 cm (W) x 1.5 cm (H) and weighs approximately 0.1 kg.

The data gathered was from a production sample provided by Neuspera Medical, Inc. with S/N: 004119

1.3 Objective

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

The objective is to determine compliance with FCC Part 15.247 and ISEDC RSS-247 for Antenna Requirement, RF Exposure, Radiated & Conducted Spurious Emissions, Emission Bandwidth, Maximum Output Power, Peak Power Spectral Density, and 100 kHz Spurious Emissions.

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

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

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

1.6 Measurement Uncertainty

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

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

1.7 Test Facility Registrations

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

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

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

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-428.

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

2 System Test Configuration

2.1 Justification

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

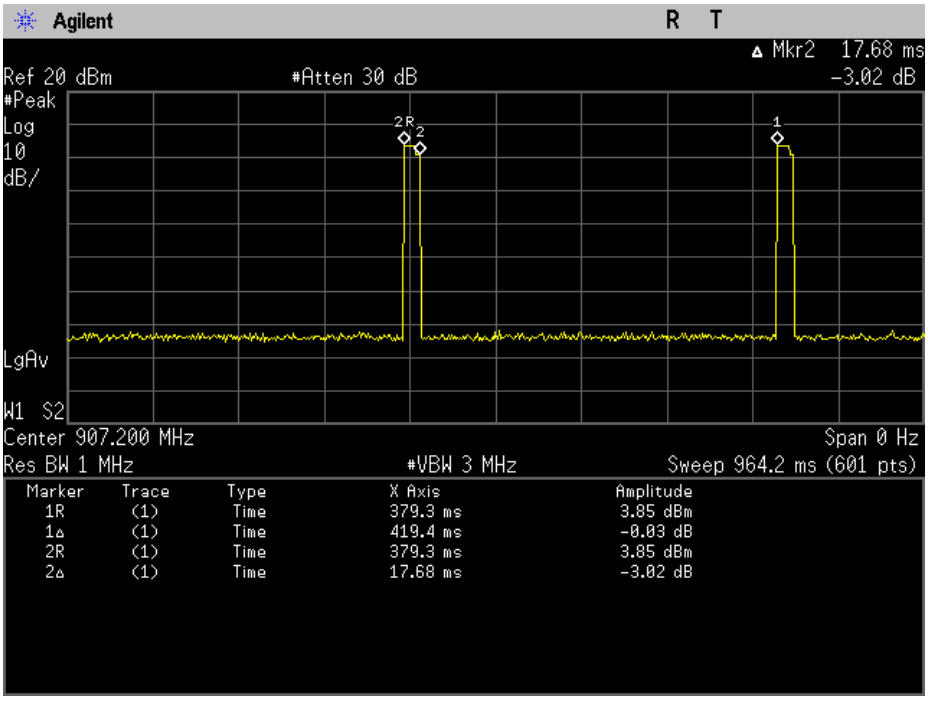
The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The exercising software used during testing was configured by Neuspera Medical, Inc. The software is compliant with the standard requirements being tested against.

Radio	Modulation	Channel	Frequency (MHz)	Power Setting
900 MHz Transmitter	ASK	Low	902.2	Default
		Middle	907.2	Default
		High	912	Default

2.3 Duty Cycle



On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
17.68	419.4	4.22	27.49

2.4 Equipment Modification

No modifications were made to the EUT during testing.

2.5 Local Support Equipment

None.

2.6 Remote Support Equipment

None.

2.7 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Zeus	Lithium Ion Polymer Battery	PCLP705048-1S1P	-

2.8 Interface Ports and Cabling

None.

3 Summary of Test Results

FCC Rules	Description of Test	Results
FCC §15.203	Antenna Requirements	Compliant
FCC §2.1093, §15.247(i)	RF Exposure	Compliant
FCC §15.207	AC Line Conducted Emissions	N/A[1]
FCC §2.1053, §15.35(b), §15.205, §15.209, §15.247(d)	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(1)(i)	Emission Bandwidth	Compliant
FCC §15.247(b)(2)	Maximum Output Power	Compliant
FCC §15.247(a)(1)	Channel Separation	Compliant
FCC §15.247(a)(1)(i)	Number of Hopping Channels	Compliant
FCC §15.247(a)(1)(i)	Dwell Time	Compliant
FCC §2.1051, §15.247 (d)	Spurious Emissions at Antenna Terminal (dBc)	Compliant
FCC §2.1051, §15.247(d)	100 kHz Bandwidth of Frequency Band Edges	Compliant

Note 1: Device is battery powered and not functional while in charging mode.

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– 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.

4.2 Antenna Description

External/Internal/ Integral	Antenna Type	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
Internal	Ceramic SMT	902-912	2.36

NOTE: antenna is not removable

5 FCC §15.247(i) §2.1093 - RF Exposure

5.1 Applicable Standards

Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition(s), listed below, is (are) satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.28 The minimum test separation distance defined in 4.1 f) is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander. To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified, typically in the SAR measurement or SAR analysis report, by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting are required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops and tablets, etc.[29]

a) For 100 MHz to 6 GHz and test separation distances $\leqslant$ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following: [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] $\cdot$ [$\sqrt{}$ f(GHz)] $\leqslant$ 3.0 for 1-g SAR, and $\leqslant$ 7.5 for 10-g extremity SAR,[30] where

   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation31
   - The result is rounded to one decimal place for comparison
   - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

   The test exclusions are applicable only when the minimum test separation distance is $\leqslant$ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

5.2 Test Exclusion Result

Radio	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Test Distance (mm)	Max SAR Level Reported for 1-g (W/kg)	FCC Limit 1-g SAR Limit (W/kg)
900 MHz[1]	912	2.36	-	-	-	6.5	1.43	1.6
Radio	**Frequency (MHz)**	**Antenna Gain (dBi)**	**Maximum Power (dBm)**	**Maximum Power (mW)**		**Test Distance (mm)**	**Power Threshold (mW)**	
BLE[2]	2440	1.0	-3.87	0.41		6.5	≤ 4.53	

Note 1: SAR results were used in lieu of Maximum Output Power, please refer to R2408161-SAR Report

Note 2: BLE data was referenced from Centre of Testing Service, report number CGZ3161014-01896-EFI, FCC ID: 2AA9B05. Note that Power used instead of ERP since Power is greater in this case.

Note 3: BLE was evaluated per 1.1307(b)(3)(i)(B).

The below formula is for considering the total co-located output power

$$\frac{Test\ Exclusion\ Threshold}{Limit} + \frac{Test\ Exclusion\ Threshold}{Limit} \leq 1.0$$

Thus,

$$\frac{1.43}{1.6} + \frac{0.41}{4.53} = 0.984$$

The combined ratios of the 900 MHz and BLE emissions is 0.985, therefore, the radios meet exclusion considerations.

6 FCC §15.35(b), §15.205, §15.209, §15.247(d) – Spurious Radiated Emissions

6.1 Applicable Standards

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

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

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

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

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

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

As per FCC §15.247 (d),

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

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 limits.

The spacing between the peripherals was 10 centimeters.

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

6.3 Test Procedure

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

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

The spectrum analyzer or receiver was set as:

Below 1000 MHz:

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

Above 1000 MHz:

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

6.4 Corrected Amplitude and Margin Calculation

For emissions below 1 GHz,

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

CA = S.A. Reading + Correction Factor

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

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

Correction Factor = AF + CL + Atten – Ga

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

Margin = Corrected Amplitude – Limit

For emission above 1 GHz,

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

CA = Ai + AF + CL + Atten – Ga

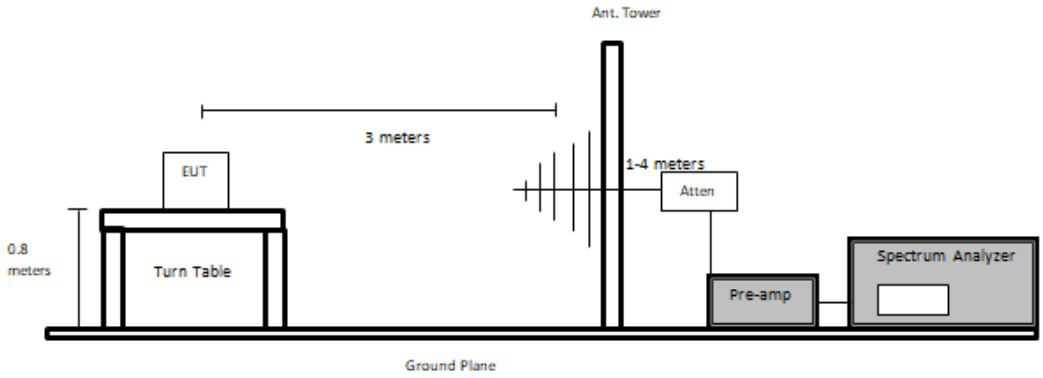
For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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

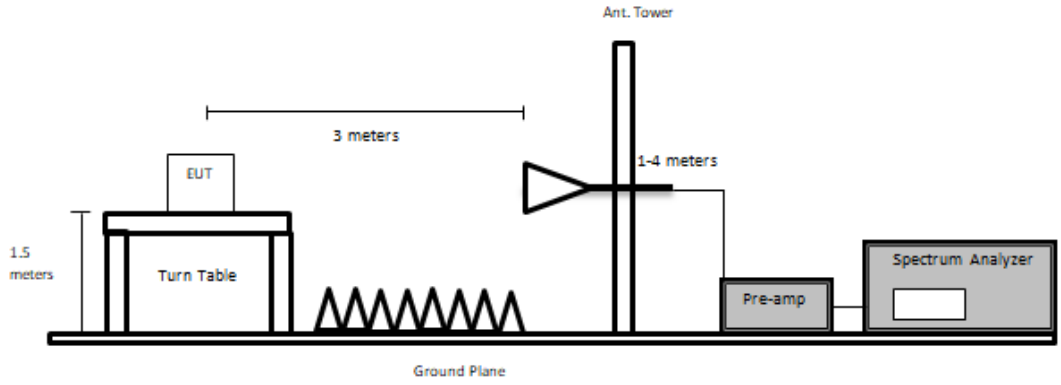
Margin = Corrected Amplitude – Limit

6.5 Test Setup Block Diagram

30 MHz to 1 GHz



1 GHz to 26.5 GHz



6.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
310	Rohde & Schwarz	EMI test receiver	ESCI 1166.5950.03	100338	2024-05-29	1 year
316	Sonoma Instruments	Preamplifier 10 kHz - 2.5 GHz	317	260406	2024-02-27	1 year
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2; 1504	2023-12-18	2 years
1245	-	6dB Attenuator	PE7390-6	01182018A	2023-12-18	2 years
1246	Hewlet Packard	RF Limiter	11867A	01734	2024-04-09	1 year
1248	Pasternack	RG214 COAX Cable	PE3062	-	2024-04-04	6 months
1249	Time microwave	LMR-400 Cable Dc-3 GHz	AE13684	2k80612-5 6fts	2024-04-09	6 months
1356	Pasternack	N 28ft RF Cable	RG213	062421	2024-07-02	6 months
-	Micro-Tronics	902-928 MHz Band Notch Filter	BRC50722	G038	Each Time[1]	Each Time[1]
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2024-06-14	1 year
1449	BACL	Preamplifier	BACL1313-A100M18G	4052472	2024-08-19	6 months
1451	BACL	Preamplifier	BACL-1313-A1840	4052432	2024-08-16	6 months
91	Wisewave	Horn Antenna	ARH-4223-02	10555-02	2024-03-14	2 years
1192	ETS Lindgren	Horn Antenna	3117	00218973	2022-09-29	2 years
672	Micro-Tronics	2.4-2.6 GHz Notch Filter	BRM50701	160	2024-03-06	1 year
1232	Micro-Tronics	>1GHz High-pass Filter	HPM20242	001	2024-04-11	1 year
1355	Megaphase	2.92mm 236in RF Cable DC to 40GHz	GC12-K1K1-236-H	1 GVT4 20554701 001	2024-02-27	1 year
1394	Mini Circuit	CBL ASSY 2.92MM PLUG TO PLUG 12"	FL086-12KM+	QN2318110-2318	2024-08-16	6 months
1397	Mini Circuit	CBL ASSY 2.92MM PLUG TO PLUG 12"	FL086-12KM+	QN2318110-2318	2024-08-16	6 months
327	Sunol Sciences	System Controller	SC110V	122303-1	N/A	N/A
1075	Sunol Sciences	Boresight Tower	TLT3	050119-7	N/A	N/A
1388	Sunol Sciences	Flush Mount Turntable	FM	112005-2	N/A	N/A

Note[1]: 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:	21-24ºC
Relative Humidity:	30-45%
ATM Pressure:	108.6 kPa

The testing was performed by Arturo Reyes from 2024-08-27 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 standards' radiated emissions limits, and had the worst margin of:

Worst Case – Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Configuration**
-5.72	8119.77	Vertical	902.2 MHz

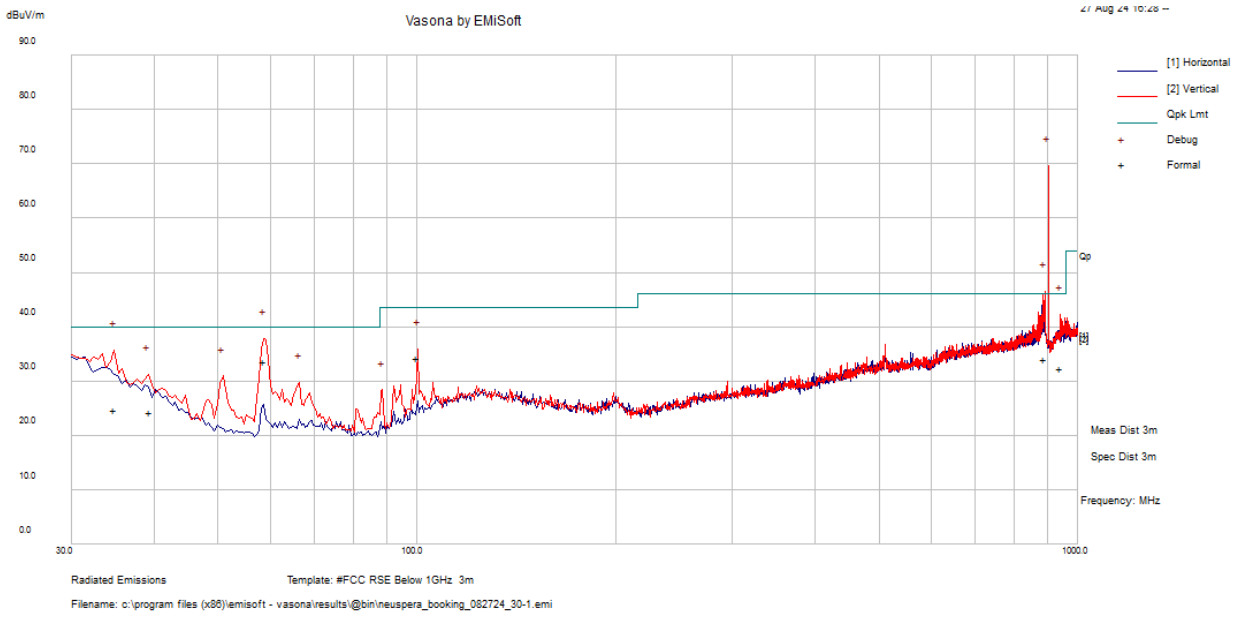
Please refer to the tables and plots in the next section for detailed test results.

6.9 Radiated Emissions Test Results

Note 1: The EUT is not transmitting at below 30 MHz, thus 9 kHz to 30 MHz was not evaluated for Spurious Emissions.
Note 2: The EUT was evaluated in X, Y and Z orientations in order to determine the worst-case position for testing. This position can be seen in the test setup photos document.

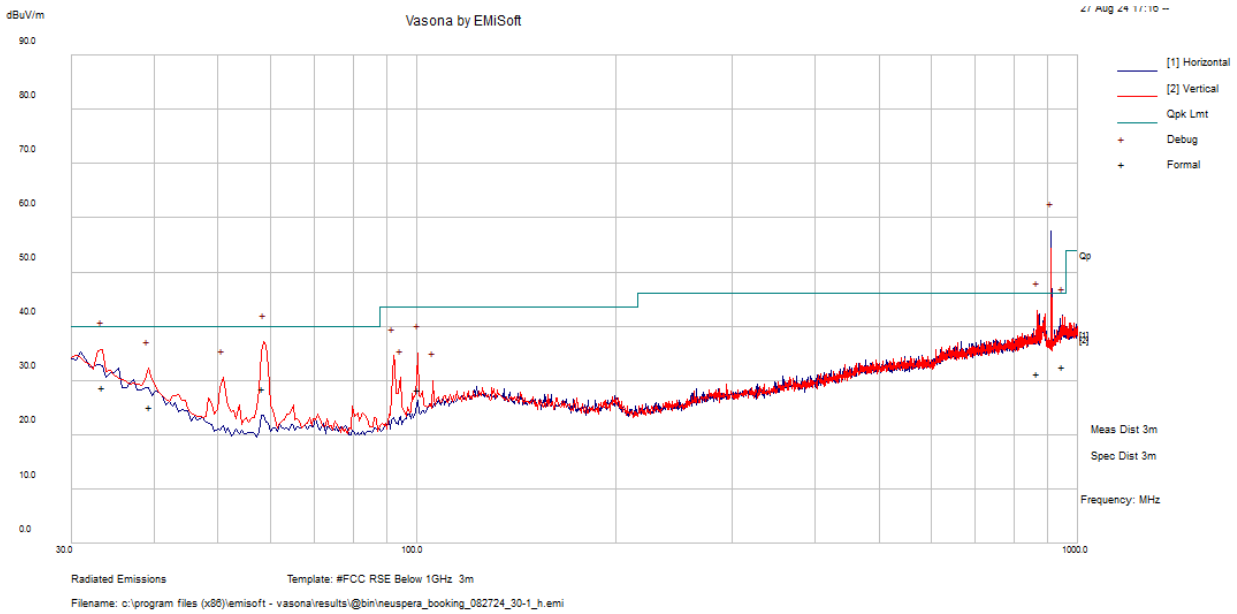
1) 30 MHz – 1 GHz, Measured at 3 meters

Low Channel: 902.2 MHz



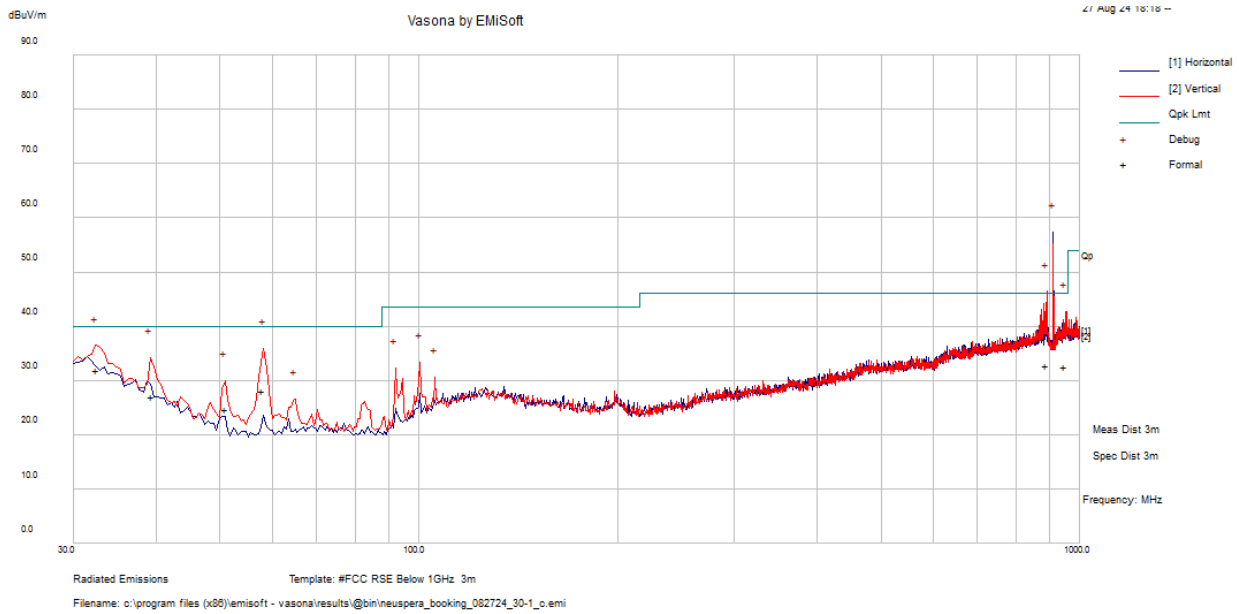
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
891.36925	29.79	4.18	33.97	261	V	119	46	-12.03	QP
58.64125	47.54	-13.84	33.7	104	V	105	40	-6.3	QP
941.9875	27.63	4.72	32.35	188	V	195	46	-13.65	QP
34.8605	28.84	-4.15	24.69	286	V	88	40	-15.31	QP
100.2485	44.2	-9.99	34.21	107	V	282	43.5	-9.29	QP
39.46025	31.64	-7.32	24.32	277	V	105	40	-15.68	QP

High Channel: 912 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
58.5555	42.31	-13.85	28.46	163	V	306	40	-11.54	QP
868.378	27.24	4.14	31.38	145	V	344	46	-14.62	QP
948.4585	27.68	4.82	32.5	272	H	61	46	-13.5	QP
33.482	32.05	-3.33	28.72	170	V	50	40	-11.28	QP
39.4325	32.31	-7.3	25.01	174	V	334	40	-14.99	QP
100.25625	38.38	-9.98	28.4	116	V	59	43.5	-15.1	QP

Colocation: BLE (2440 MHz) + Transmitter (912 MHz)



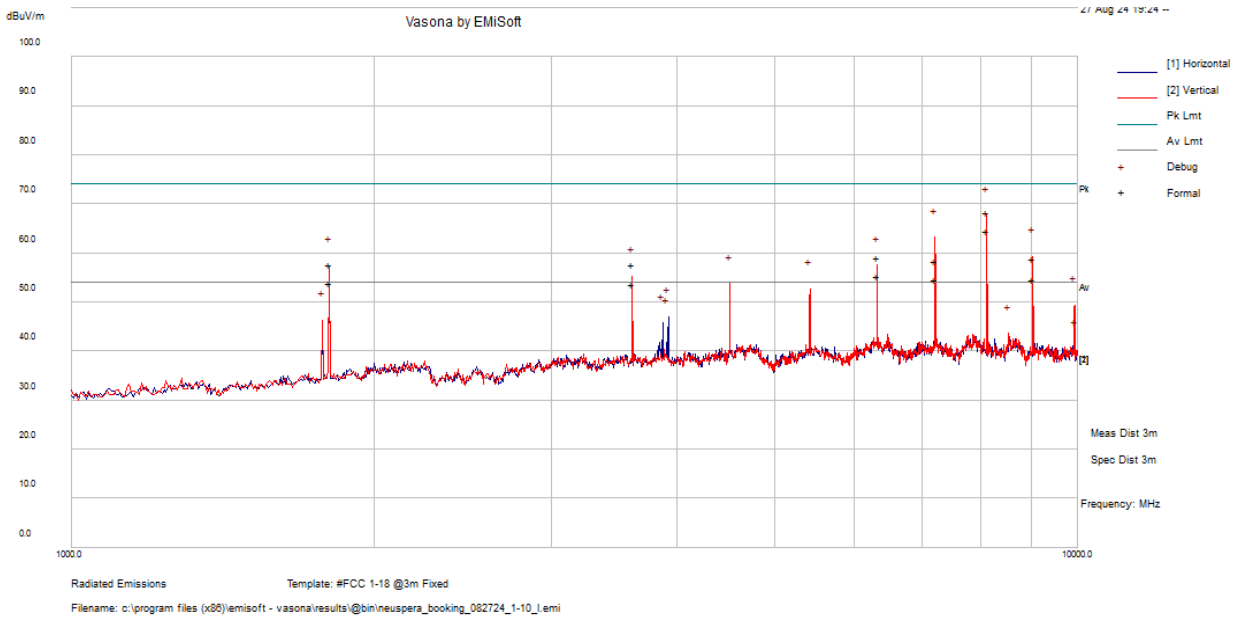
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
891.311	28.53	4.18	32.71	232	V	291	46	-13.29	QP
950.70425	27.74	4.85	32.59	151	V	57	46	-13.41	QP
32.5175	34.55	-2.71	31.84	101	V	38	40	-8.16	QP
58.08825	42.04	-13.88	28.16	113	V	98	40	-11.84	QP
39.42975	34.37	-7.3	27.07	232	V	130	40	-12.93	QP
50.92925	38.4	-13.69	24.71	114	V	147	40	-15.29	QP

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

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

2) 1 GHz – 10/18 GHz, Measured at 3 meters

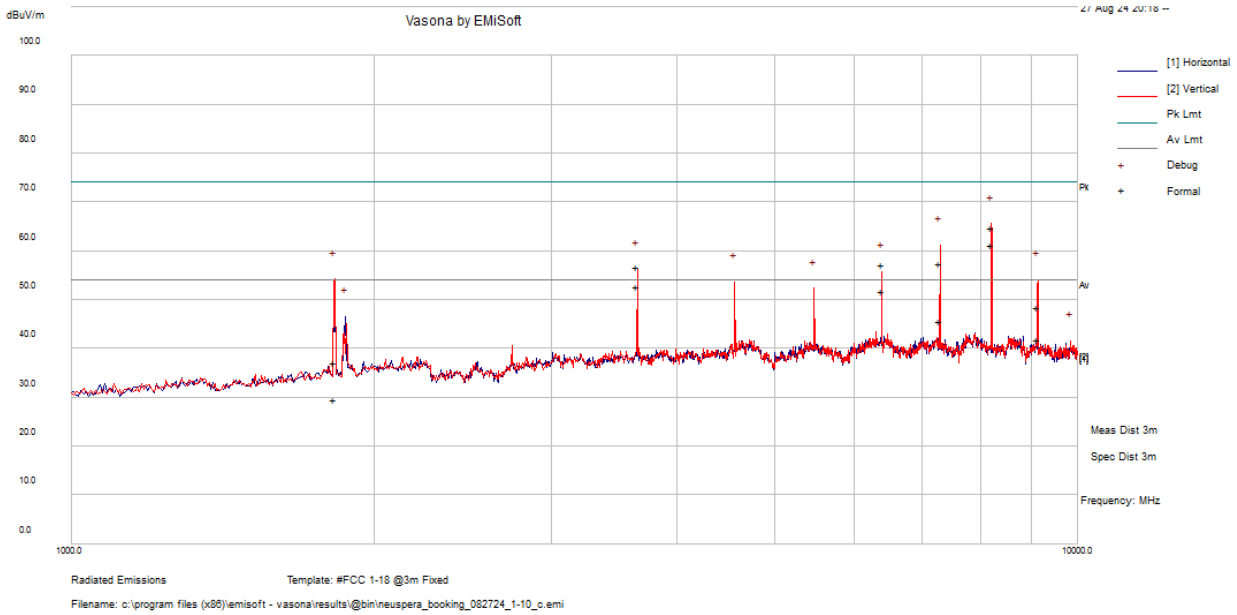
Low Channel: 902.2 MHz



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
8119.77	70.8	-2.52	68.28	104	V	40	74	-5.72	Peak
7217.6	61.36	-2.89	58.47	117	V	272	74	-15.53	Peak
9021.985	60.56	-1.75	58.81	219	V	216	74	-15.19	Peak
6315.3625	61.98	-2.95	59.03	112	V	129	74	-14.97	Peak
1804.3725	67.02	-9.34	57.68	204	V	244	74	-16.32	Peak
3608.7375	63.24	-5.56	57.68	263	V	272	74	-16.32	Peak
8119.77	43.31	-2.52	40.79	104	V	40	54	-13.21	Avg
7217.6	33.87	-2.89	30.98	117	V	272	54	-23.02	Avg
9021.985	33.07	-1.75	31.32	219	V	216	54	-22.68	Avg
6315.3625	34.49	-2.95	31.54	112	V	129	54	-22.46	Avg
1804.3725	39.53	-9.34	30.19	204	V	244	54	-23.81	Avg
3608.7375	35.75	-5.56	30.19	263	V	272	54	-23.81	Avg

Note: Average Corrected Amplitude measurements consider a Duty Cycle Correction Factor of 27.49 dB to be subtracted, refer to Section 2.3 for more details.

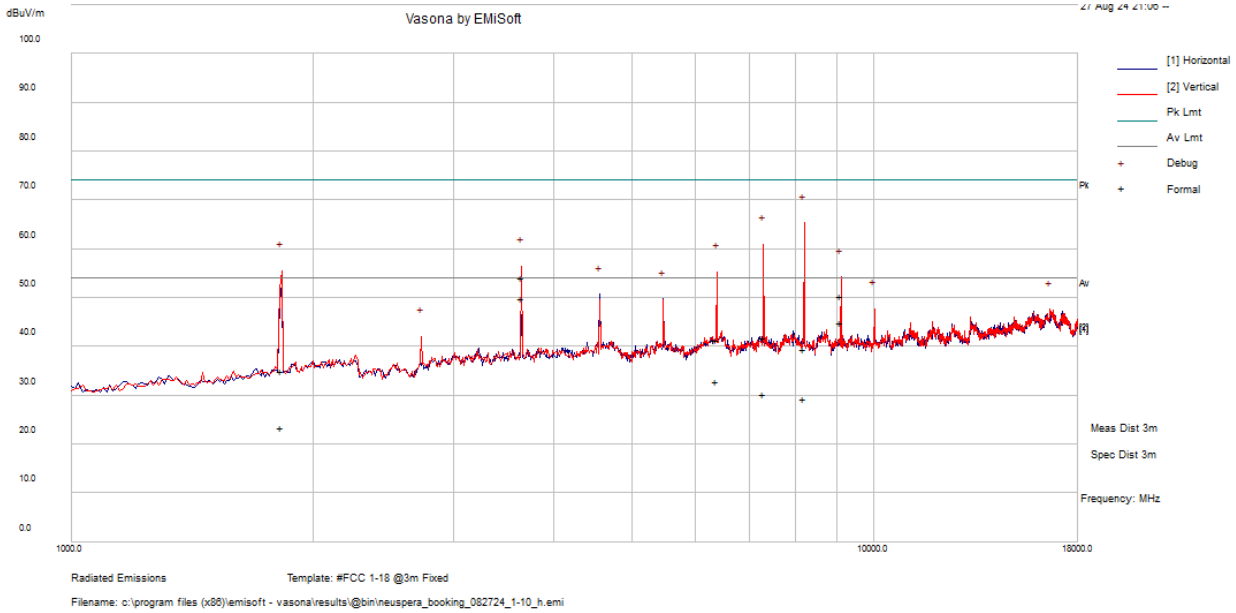
High Channel: 912 MHz



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
8207.625	67.1	-2.34	64.76	166	V	276	74	-9.24	Peak
7295.955	60.36	-2.93	57.43	217	V	327	74	-16.57	Peak
3647.9525	62.5	-5.89	56.61	153	V	263	74	-17.39	Peak
6384.145	59.9	-2.63	57.27	118	V	315	74	-16.73	Peak
1824.915	46.07	-9.05	37.02	278	V	146	74	-36.98	Peak
9120.5775	49.74	-1.29	48.45	202	V	85	74	-25.55	Peak
8207.625	39.61	-2.34	37.27	166	V	276	54	-16.73	Avg
7295.955	32.87	-2.93	29.94	217	V	327	54	-24.06	Avg
3647.953	35.01	-5.89	29.12	153	V	263	54	-24.88	Avg
6384.145	32.41	-2.63	29.78	118	V	315	54	-24.22	Avg
1824.915	18.58	-9.05	9.53	278	V	146	54	-44.47	Avg
9120.578	22.25	-1.29	20.96	202	V	85	54	-33.04	Avg

Note: Average Corrected Amplitude measurements consider a Duty Cycle Correction Factor of 27.49 dB to be subtracted, refer to Section 2.3 for more details.

Colocation: BLE (2440 MHz) + Transmitter (912 MHz)

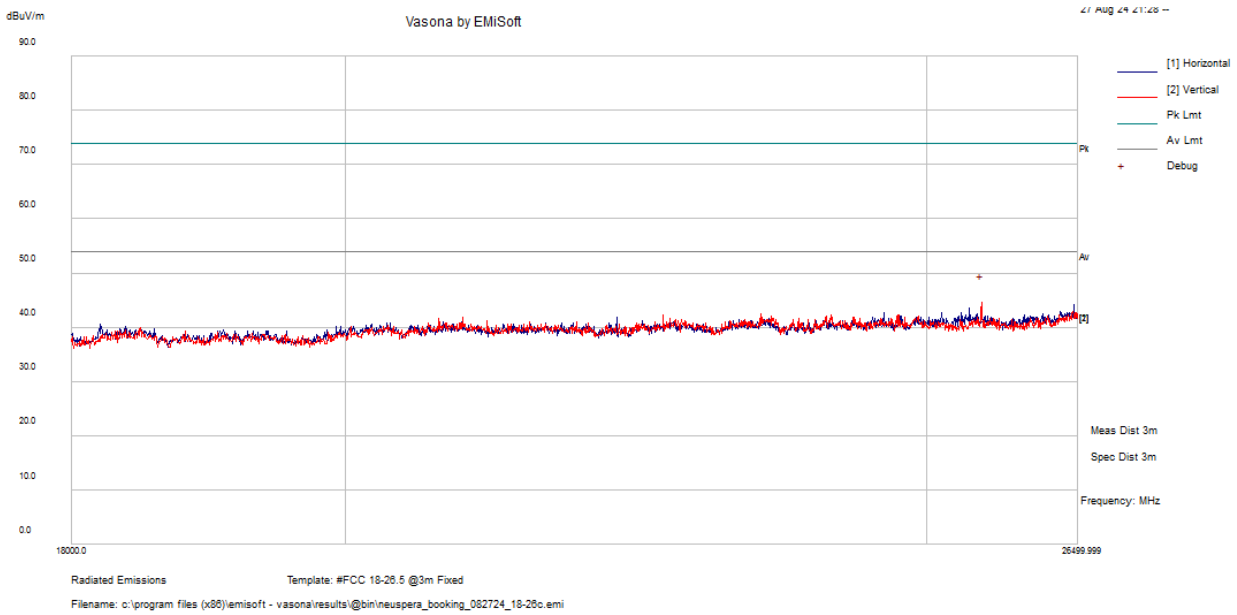


Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
8205.3325	41.91	-2.35	39.56	258	V	341	74	-34.44	Peak
7301.7275	44.72	-2.94	41.78	175	V	111	74	-32.22	Peak
3647.6175	59.98	-5.89	54.09	293	V	237	74	-19.91	Peak
1829.3875	43.98	-9.03	34.95	223	V	233	74	-39.05	Peak
6384.9025	44.08	-2.63	41.45	202	V	126	74	-32.55	Peak
9119.43	51.69	-1.29	50.4	273	V	76	74	-23.6	Peak
8205.3325	31.77	-2.35	5.70	258	V	341	54	-48.30	Avg
7301.7275	33.12	-2.94	6.46	175	V	111	54	-47.54	Avg
3647.6175	55.71	-5.89	26.10	293	V	237	54	-27.90	Avg
1829.3875	32.49	-9.03	-0.26	223	V	233	54	-54.26	Avg
6384.9025	35.44	-2.63	9.09	202	V	126	54	-44.91	Avg
9119.43	46.25	-1.29	21.24	273	V	76	54	-32.76	Avg

Note: Average Corrected Amplitude measurements consider a Duty Cycle Correction Factor of 27.49 dB to be subtracted, refer to Section 2.3 for more details.

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

Colocation: BLE (2440 MHz) + Transmitter (912 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
25538.437	53.5	-8.95	44.55	100	V	360	54	-9.45	Peak

Note: Peak measurement is compared to the Average Limit to show compliance.
Note: The plot above shows that there were no emissions above the noise floor at 18-26.5GHz frequency range.

7 FCC §15.247(a)(1)(i) – Emission Bandwidth

7.1 Applicable Standards

According to FCC §15.247(a)(1)(i): For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

7.2 Measurement Procedure

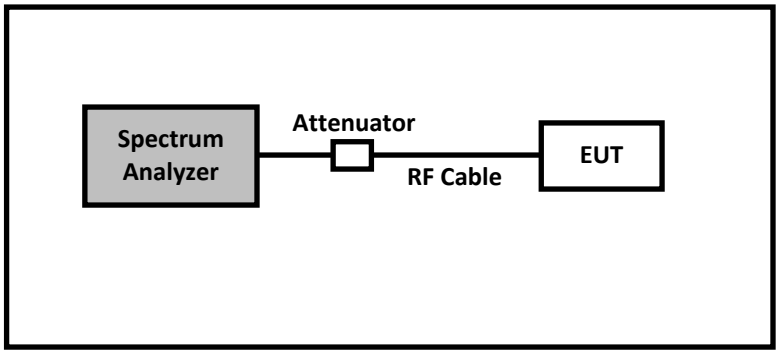
As per ANSI C63.10 Clause 6.9.2: Occupied bandwidth—relative measurement procedure

The occupied bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). Typical ratios, expressed in dB, are −6 dB, −20 dB, and −26 dB, corresponding to 6 dB BW, 20 dB BW, and 26 dB BW, respectively. In this subclause, the ratio is designated by "−xx dB." The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements might specify a specific maximum or minimum value for the "−xx dB" bandwidth; other requirements might specify that the "−xx dB" bandwidth be entirely contained within the authorized or designated frequency band.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
f) Set detection mode to peak and trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

7.3 Test Setup Block Diagram



7.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2024-06-14	1 year
-	-	RF Cable	-	-	Each Time[1]	Each Time[1]
-	-	xdB Attenuator	-	-	Each Time[1]	Each Time[1]

Note[1]: 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".*

7.5 Test Environmental Conditions

Temperature:	20 - 25ºC
Relative Humidity:	40 - 45%
ATM Pressure:	108.1 kPa

The testing was performed by Libass Thiaw from 2024-08-23 and 2025-04-23 at RF test site.

7.6 Test Results

Channel	Frequency (MHz)	20 dB OBW (kHz)				20 dB OBW Limit (kHz)	Result
		Port 1	Port 2	Port 3	Port 4		
ASK							
Low	902.2	83.713	83.826	83.067	83.351	< 250	Pass
Middle	907.2	83.515	83.548	83.105	82.937	< 250	Pass
High	912	83.708	81.806	83.823	83.709	< 250	Pass

Please refer to Annex A for detailed Emissions Bandwidth test results.

8 FCC §15.247(a)(1) – Channel Separation

8.1 Applicable Standards

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

8.2 Measurement Procedure

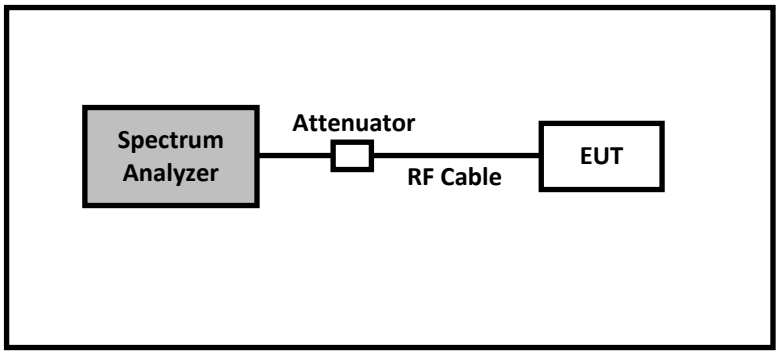
According to ANSI C63.10-2013 section 7.8.2 – Carrier frequency separation:

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a. Span: Wide enough to capture the peaks of two adjacent channels.
b. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c. Video (or average) bandwidth (VBW) ≥ RBW.
d. Sweep: Auto.
e. Detector function: Peak.
f. Trace: Max hold.
g. Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

8.3 Test Setup Block Diagram



8.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2024-06-14	1 year
-	-	RF Cable	-	-	Each Time[1]	Each Time[1]
-	-	xdB Attenuator	-	-	Each Time[1]	Each Time[1]

Note[1]: 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".*

8.5 Test Environmental Conditions

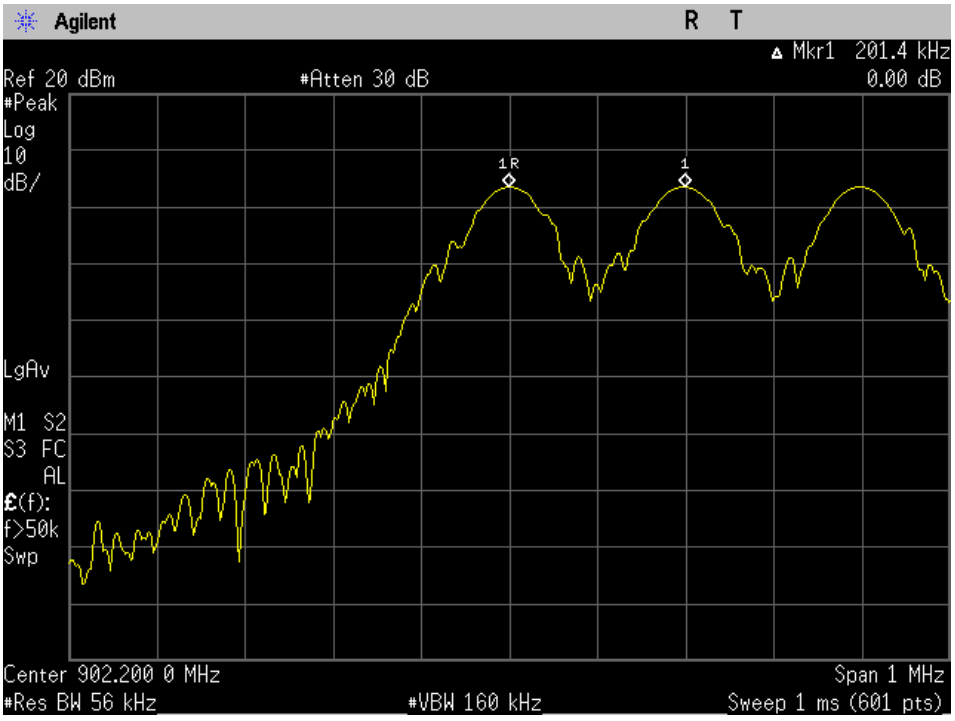
Temperature:	20 - 25ºC
Relative Humidity:	40 - 45%
ATM Pressure:	108.1 kPa

The testing was performed by Libass Thiaw from 2024-08-23 at RF test site.

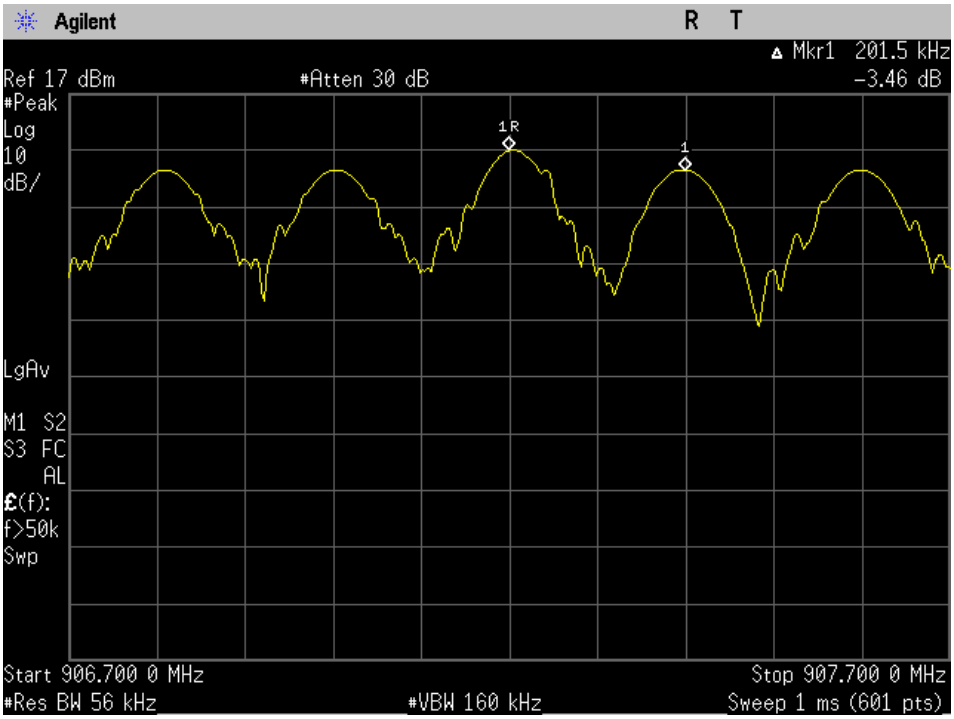
8.6 Test Results

Channel	Frequency (MHz)	Channel Separation (kHz)	Limit > 20 dB OBW (kHz)
ASK			
Low	902.2	201.4	83.713
Middle	907.2	201.5	83.515
High	912	203.8	83.708

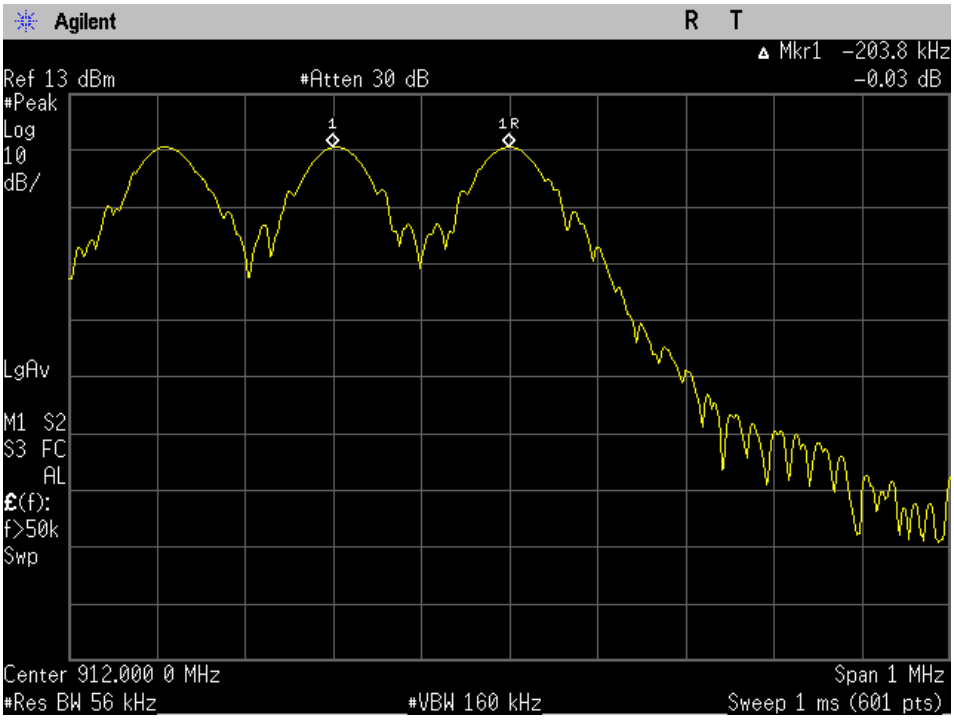
Low Channel Separation



Middle Channel Separation



High Channel Separation



9 FCC §15.247(a)(1)(i) – Number of Hopping Channels

9.1 Applicable Standards

According to FCC §15.247(a)(1)(i): For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

9.2 Measurement Procedure

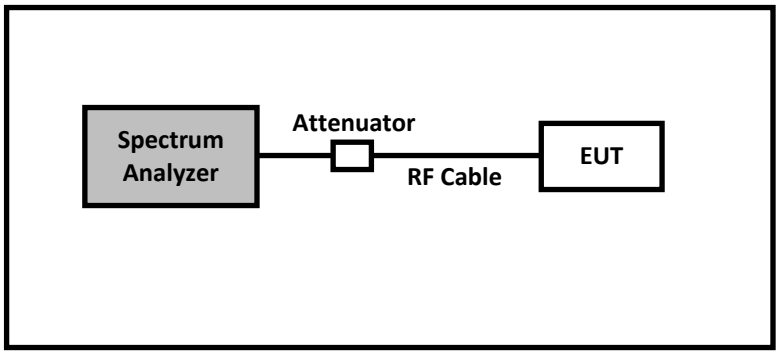
According to ANSI C63.10-2013 section 7.8.3 – Number of hopping frequencies:

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c. VBW ≥ RBW.
d. Sweep: Auto.
e. Detector function: Peak.
f. Trace: Max hold.
g. Allow the trace to stabilize.

It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

9.3 Test Setup Block Diagram



9.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2024-06-14	1 year
-	-	RF Cable	-	-	Each Time[1]	Each Time[1]
-	-	xdB Attenuator	-	-	Each Time[1]	Each Time[1]

Note[1]: 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".*

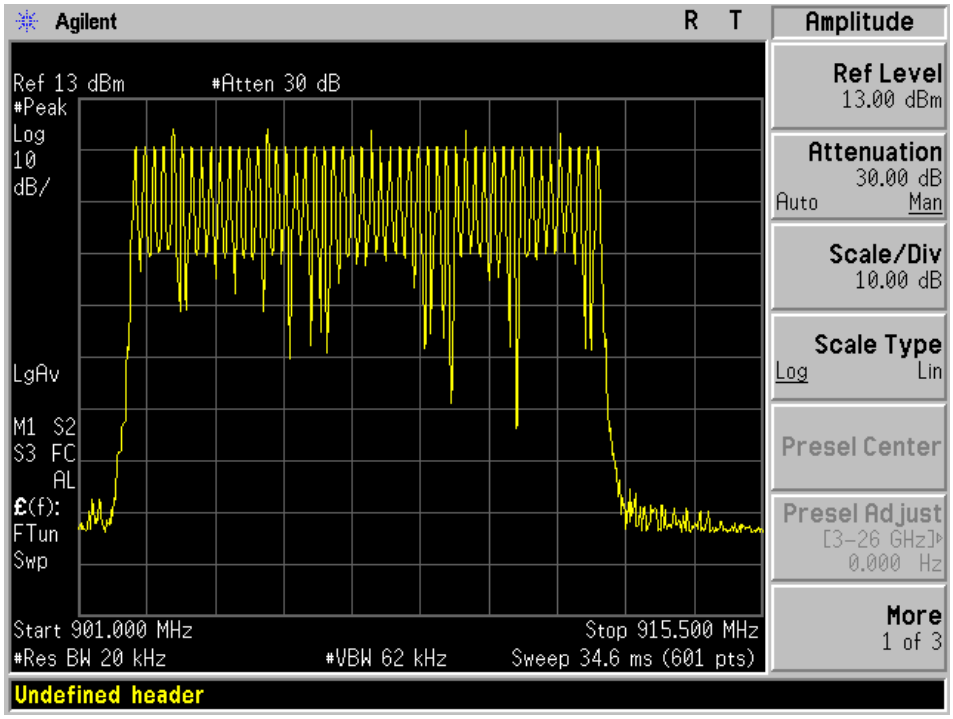
9.5 Test Environmental Conditions

Temperature:	20 - 25ºC
Relative Humidity:	40 - 45%
ATM Pressure:	108.1 kPa

The testing was performed by Libass Thiaw from 2024-08-23 at RF test site.

9.6 Test Results

Number of Hopping Channels



Number of Hopping Channels	Limit
50	≥ 50

10 FCC §15.247(a)(1)(i) – Dwell Time

10.1 Applicable Standards

According to FCC §15.247(a)(1)(i): For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

10.2 Measurement Procedure

According to ANSI C6.10-2013 section 7.8.4 Time of occupancy (dwell time)

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a. Span: Zero span, centered on a hopping channel.
b. RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
c. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d. Detector function: Peak.
e. Trace: Max hold.

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

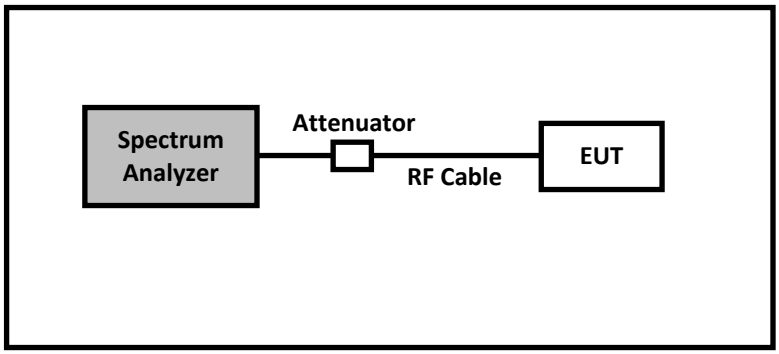
Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) =
(number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.

The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

10.3 Test Setup Block Diagram



10.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2024-06-14	1 year
-	-	RF Cable	-	-	Each Time[1]	Each Time[1]
-	-	xdB Attenuator	-	-	Each Time[1]	Each Time[1]

Note[1]: 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".*

10.5 Test Environmental Conditions

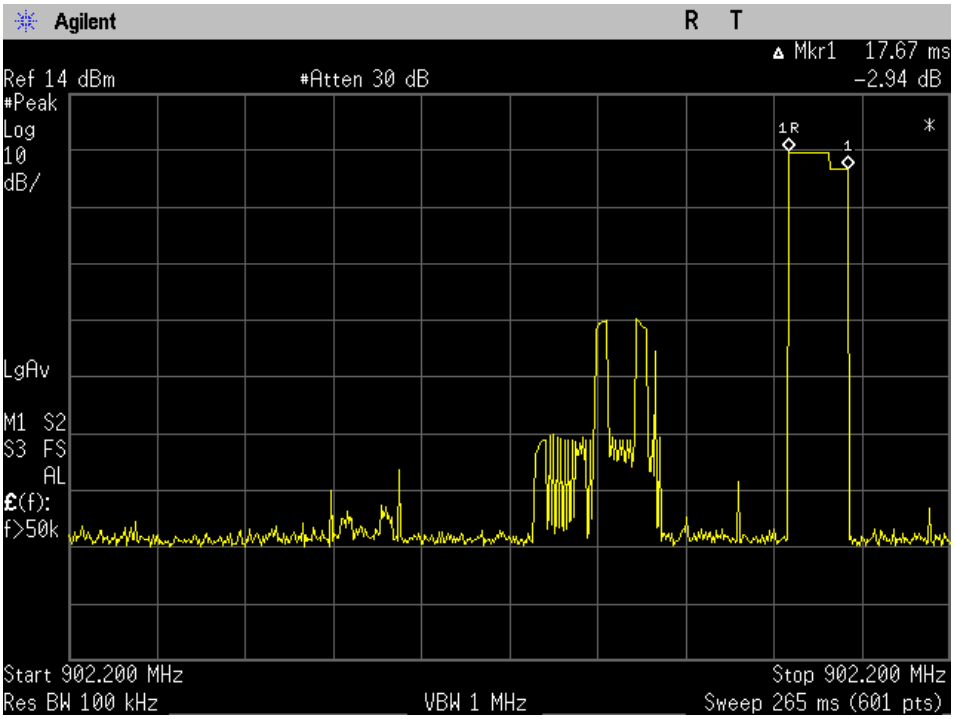
Temperature:	20 - 25ºC
Relative Humidity:	40 - 45%
ATM Pressure:	108.1 kPa

The testing was performed by Libass Thiaw from 2024-08-23 at RF test site.

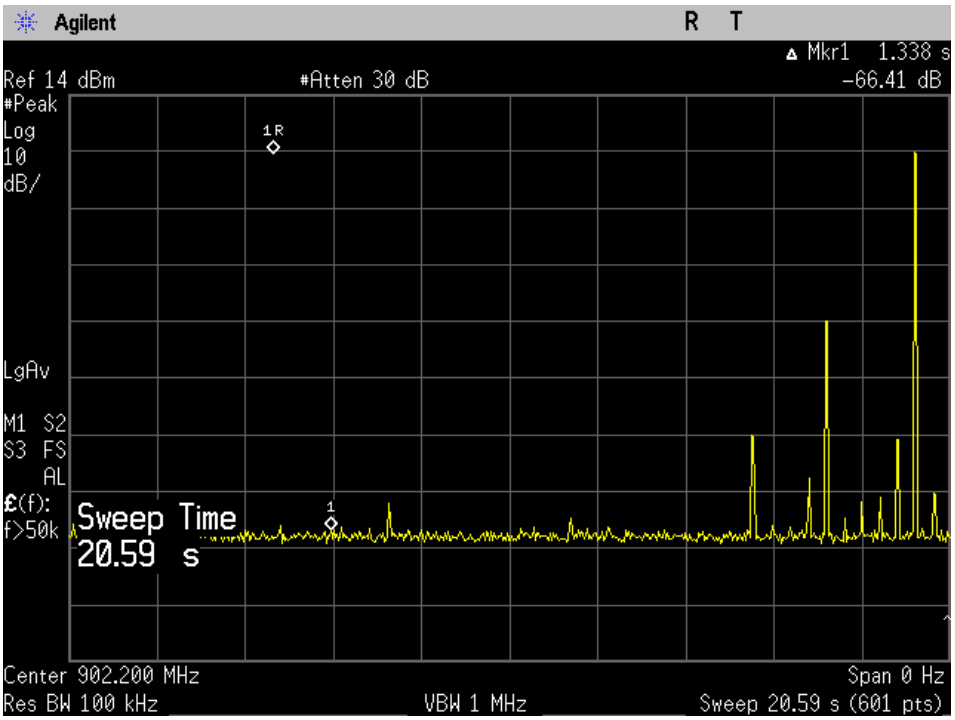
10.6 Test Results

Channel	Pulse Width (ms)	Dwell Time (Sec.)	Limit (Sec.)	Result
Low	17.67	0.01767	0.4	Pass

Note: one pulse observed per observation period of 20seconds. Lower amplitude emissions are adjacent channels.



Number of Hops within 20 seconds



11 FCC §15.247(b)(2)– Maximum Output Power

11.1 Applicable Standards

According to FCC §15.247(b)(2): For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

11.2 Measurement Procedure

The measurements are based on ANSI C63.10-2013, Section 7.8.5

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:
1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.

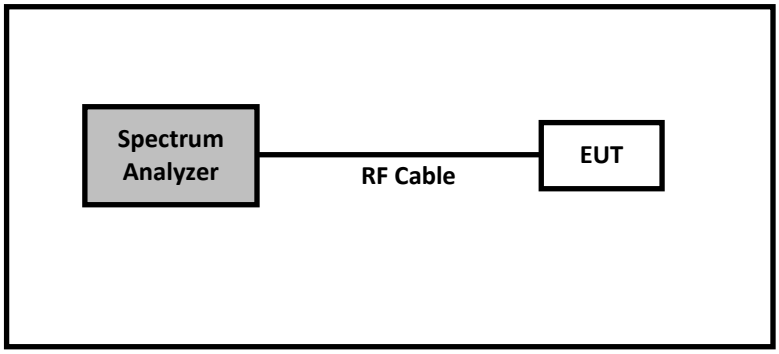
b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

e) A plot of the test results and setup description shall be included in the test report

11.3 Test Setup Block Diagram



11.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2024-06-14	1 year
-	-	RF Cable	-	-	Each Time[1]	Each Time[1]
-	-	xdB Attenuator	-	-	Each Time[1]	Each Time[1]

Note[1]: 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".*

11.5 Test Environmental Conditions

Temperature:	21-24ºC
Relative Humidity:	30-45%
ATM Pressure:	108.6 kPa

The testing was performed by Libass Thiaw from 2024-08-23 and 2025-04-23 at RF test site.

11.6 Test Results

Channel	Frequency (MHz)	Antenna Gain (dBi)	Peak Conducted Output Power (dBm)					Conducted Output Power Limit (dBm)	Result
			Port 1	Port 2	Port 3	Port 4	Total		
Low	902.2	2.36	23.59	23.78	23.87	23.89	29.80	< 30	Pass
Middle	907.2	2.36	23.91	23.82	23.89	23.92	29.91	< 30	Pass
High	912	2.36	23.62	23.84	23.91	23.92	29.84	< 30	Pass

*Note 1: Conducted Output Power Limit [dBm] = 10*log(Power[mW]/1mW) = 10*log(1000mW/1mW) = 30 dBm*

Please refer to Annex B for detailed Maximum Output Power test results.

12 FCC §15.247(d) – 100 kHz Spurious Emissions at Antenna Terminals (dBc)

12.1 Applicable Standards

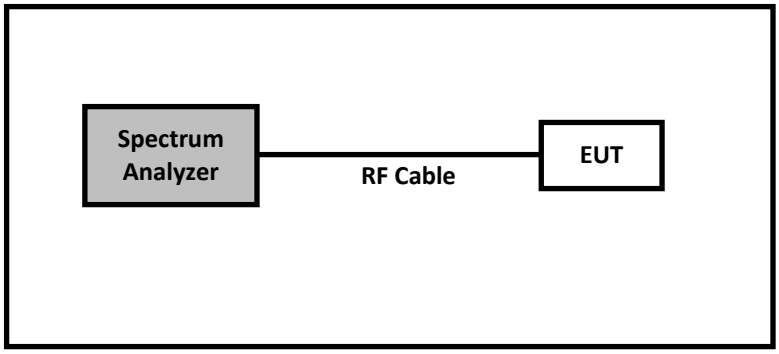
According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

12.2 Measurement Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW = 100 kHz
VBW = 300 kHz
Sweep = coupled
Detector function = peak
Trace = max hold

12.3 Test Setup Block Diagram



12.4 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2024-06-14	1 year
-	-	RF Cable	-	-	Each Time[1]	Each Time[1]
-	-	xdB Attenuator	-	-	Each Time[1]	Each Time[1]

Note[1]: 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".*

12.5 Test Environmental Conditions

Temperature:	21-24ºC
Relative Humidity:	30-45%
ATM Pressure:	108.6 kPa

The testing was performed by Libass Thiaw from 2024-08-23 and 2025-04-23 at RF test site.

12.6 Test Results

Please refer to Annex C for detailed 100 kHz Spurious Emissions at Antenna Terminals (dBc) test results.

Result: Pass

13 Annex A – Emission Bandwidth

Please refer to the attachment.

14 Annex B – Maximum Output Power

Please refer to the attachment.

15 Annex C – 100 kHz Spurious Emissions at Antenna Terminal (dBc)

Please refer to the attachment.

16 Appendix A (Normative) – EUT Test Setup Photographs

Please refer to the attachment.

17 Appendix B (Normative) – EUT External Photographs

Please refer to the attachment.

18 Appendix C (Normative) – EUT Internal Photographs

Please refer to the attachment.

19 Appendix D (Normative) – A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

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

Presented this 13th day of September 2024.

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

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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

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

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