FCC PART 15, SUBPART C
ISED RSS-247 ISSUE 4

TEST AND MEASUREMENT REPORT

For

Somewear Labs, Inc.

350 Brannan St., Ste 350
San Francisco, CA, 94107, USA

FCC ID: 2AQYN-SWL3
IC: 24246-SWL3

Report Type:	**Product Type:**
Original Report	Satellite Communication Device

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Report Number:	R2604272-DTS
Report Date:	2026-06-26
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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	R2604272-DTS	Original Report	2026-06-26

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report is prepared on behalf of *Somewear Labs, Inc.*, and their product model: SWL-3, FCC ID: 2AQYN-SWL3, IC: 24246-SWL3, the "EUT" as referred to in this report. The EUT is a Satellite Communication Device. The EUT has two LoRa radios (which operate in 914-918 MHz and 920-924MHz) and an Iridium 9603 radio that operates in 1616-1626.5MHz.

HVIN: SWL-3

1.2 Mechanical Description of EUT

The UUT measures approximately 11.2 cm (L) x 5.2 cm (W) x 2 cm (H) and weighs approximately less than 1 kg.

The data gathered was from a production sample provided by Somewear Labs, Inc. with S/N: F0124AQ10030.

1.3 Objective

This report was prepared on behalf of *Somewear Labs, Inc.*, in accordance with Part 2, Subpart J, and Part 15, Subpart C of the Federal Communication Commission's rules and ISEDC RSS-247.

The objective was to determine compliance with FCC Part 15.247 and RSS-247for Antenna Requirements, RF Exposure, AC Line Conducted Emissions, Conducted & Radiated Spurious Emissions, Emission Bandwidth, Output Power, Power Spectral Density, and 100 kHz Bandwidth of Band edges.

1.4 Related Submittal(s)/Grant(s)

FCC Part 25, RSS-170, Equipment Class: TNB with FCC ID: 2AQYN-SWL3, IC: 24246-SWL3.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, 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-0428.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2017 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2017 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/Wireless, RF Exposure, Safety, and Wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include, but are not limited to: Central Office Telecommunications Equipment [including NEBS – Network Equipment Building Systems], Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial Equipment, Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, Railway Equipment, Marine Equipment, and Energy Efficient Lighting. Additionally, BACL offers comprehensive test capabilities for both Unlicensed and Licensed Wireless and RF Devices, per the requirements of the FCC (USA), ISED Canada (Canada), the EU/EEA/EFTA Nations (per the ETSI Standards applicable under the Radio Equipment Directive), Singapore, MIC (Japan), South Korea, Vietnam, and Taiwan ROC.

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 (Innovation, Science and Economic Development 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 Equipment Technical Standards (BETS) in the Category I Equipment Standards List.
  - 7. RSS-HAC Radio Scope 6 Hearing Aid Compatibility and Volume Control
- For Singapore (Info-Comm Media Development Authority (IMDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2 IMDA Phase I
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2 IMDA Phase II
- For the Hong Kong Special Administrative Region & (Office of the Communications Authority-OFCA) – APEC Tel MRA- Phase I and Phase II:
  - 1 Radio Equipment, per KHCA 10XX-series Specifications; HKCA 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1010, 1015, 1016, 1019, 1020, 1022, 1026, 1033, 1034, 1035, 1036, 1037, 1039, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1052, 1053, 1054, 1056, 1057, 1061, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1080, 1081

2 GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications; HKCA 1218, 1223, 1224, 1225, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1277, 1281, 1282, 1283

3 Fixed Network Equipment, per HKCA 20XX-series Specifications; HKCA 2001, 2011, 2014, 2015, 2017, 2026, 2027, 2028, 2029, 2030, 2031

- 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 Appliances:
- for Clothes Washers (ver. 8.1)
- for Residential Dishwashers (ver. 6.0)
- for Residential Refrigerators and/or Freezers (ver. 5.0)

2 Commercial Food Service Equipment:
- for Commercial Dishwashers (ver. 3.0)
- for Commercial Ice Machines (ver. 3.0)

3 Data Center Equipment:
- for Large Network Equipment (ver. 1.1)

4 Electronics and Office Equipment:
- for Audio/Video Equipment (ver. 3.0)
- for Computers (ver. 8.0)
- for Data Center Storage (ver. 2.1)
- for Displays (ver. 8.0)
- for Enterprise Servers (ver. 4.0)
- for Imaging Equipment (ver. 3.1)
- for Set-top Boxes & Cable Boxes (ver. 5.1)
- for Small Network Equipment (ver. 1.0)
- for Telephony (ver. 3.0)
- for Televisions (ver. 9.0), Title 10 Chapter II CFR Part 430 Subpart B –Appendix BB, Title 10 Chapter II CFR Part 430 Subpart B –Appendix DD

3 Lighting and Fans
- for Decorative Light Strings (ver. 1.5)
- for Downlights (ver. 1.0)
- for Lamps (Light Bulbs)(ver. 2.1)
- for Luminaires (including sub-components) (ver. 2.2)
- for Residential Ceiling Fans (ver. 4.0)
- for Residential Ventilating Fans (ver. 4.1)

4 Other
- for Residential Ceiling Fans (ver. 4.0)
- for Electric Vehicle Supply Equipment (ver. 1.2)(Electric Vehicle Supply Equipment Final Test Method for DC-output EVSE Rev March 2021)
- for Water Coolers (ver. 3.0)
- for Smart Home Energy Management Systems (ver. 1.1)

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:***

1. For the USA (Federal Communications Commission), as a Telecommunications Certification Body (TCB):
   - All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
   - All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
   - All Telephone Terminal Equipment within FCC Scope C.

2. Canada (ISED Canada) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II:
   - Phase I Designation Letter
   - Phase II ISED Canada recognition as a Product Certification Body for unlicensed wireless devices, licensed radios, radars, etc.:

3. For Singapore (InfoComm Media Development Authority (IMDA)) APEC Tel MRA -Phase I & Phase II:
   - All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2 IMDA Phase I
   - All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2 IMDA Phase II

4. For the Hong Kong Special Administrative Region & (Office of the Communications Authority – OFCA) – APEC Tel MRA -Phase I & Phase II:
   - NIST Phase I Scope Recognition Letter from OFCA for BACL –US0057
   - OFCA Phase II Designation Letter

5. For Japan (Ministry of Communications):
   - NIST Japan Recognition
   - MIC Telecommunication Business Law (Terminal Equipment):
     1. All Scope A1 – Terminal Equipment for the Purpose of Calls;
     2. All Scope A2 – Other Terminal Equipment
   - Radio Law (Radio Equipment):
     1. All Scope B1 – Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
     2. All Scope B2 – Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
     3. All Scope B3 – Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law
   - Japan VCCI – Voluntary Control Council for Interference US-Japan Telecom Treaty (VCCI Side Letter)
     1. VCCI Certificate
   - Japan Registered Certification Body
     1. RCB Recognition Letter

6. European Union:
   - Radio Equipment Directive [RED] 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)

- EMC Directive [EMCD] 2014/30/EU US-EU EMC & Telecom MRA CAB (NB):

7. Australia ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I:
   - Phase I Designation Letter

8. Chinese Taipei (Republic of China – Taiwan):
   - NCC (National Communications Commission) APEC Tel MRA -Phase I

9. Republic of Korea (Ministry of Communications – Radio Research Laboratory) APEC Tel MRA - Phase I:
   - NIST Phase I Scope Update Notification Letter from Korea for BACL

10. Vietnam APEC Tel MRA -Phase I (page 13)
    - Vietnam (MIC) NIST Phase I Scope

11. Indonesia SDPPI (page 6)
    - Phase I Listing

12. Israel Phase I
    - NIST Phase I Scope Update Recognition Letter from Israel for BACL –US0057

13. UK Radio and EMC NIST Designation Letters
    - UK website: https://www.gov.uk/uk-market-conformity-assessment-bodies/bay-area-compliance-laboratories-corp-bacl

      1. Electromagnetic Compatibility Regulations (SI 2016/1091)
      https://assets.publishing.service.gov.uk/media/5fe1e344e90e07452fce4e5a/AB_1313_BACL_UK_EMC_Regs_NIST_Designation_Extended.pdf

      2. Radio Equipment Regulations 2017 (SI 2017/1206)
      https://assets.publishing.service.gov.uk/media/5fe1e351e90e074525bf7be6/AB_1313_BACL_UK_Radio_Regs_NIST_Designation_Extended.pdf

14. IFT Mexico Phase I
    - NIST Phase I New Recognition Letter from Mexico for BACL – US0057

15. Taiwan (BSMI) Phase 1 Designation Letter and designation form.
    - NIST Phase I Scope Update Designation Letter to BSMI for BACL – US0057
    - NIST Phase I Scope Update Designation Form to BSMI for BACL – US0057

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 and FCC KDB 558074 D01 DTS Meas Guidance v05r02.

2.2 EUT Exercise Software

The EUT has built-in test firmware.

Radio	Channel	Channel Frequency (MHz)	Power Setting
LoRa 1	Low	914	Default
	Middle	916	Default
	High	918	Default
LoRa 2	Low	920	Default
	Middle	922	Default
	High	924	Default
Iridium 9603	Low	1616	Default

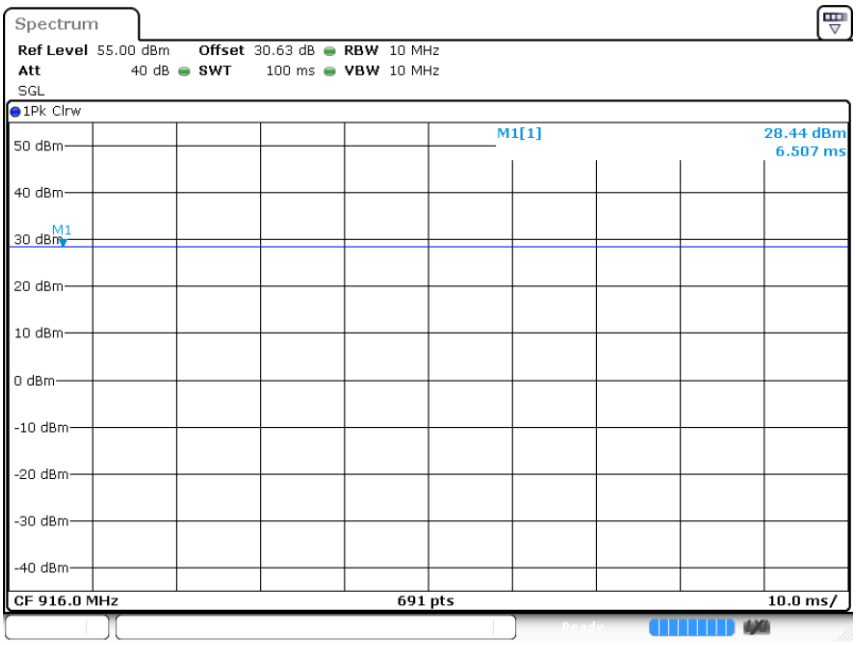
2.3 Duty Cycle Correction Factor

According to KDB 558074 D01 DTS Meas Guidance v05r02 section 6.0:

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be utilized to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data is being acquired (i.e., no transmitter off-time is to be considered).

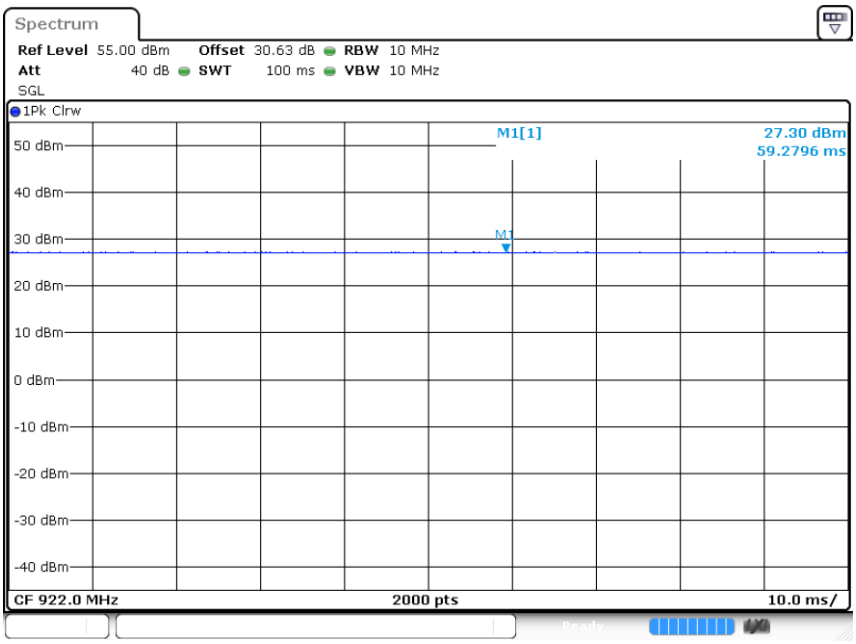
Radio frequency (MHz)	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
916	100	100	100	0
922	100	100	100	0

Duty Cycle = On Time (ms)/ Period (ms)
Duty Cycle Correction Factor (dB) = 10*log(1/Duty Cycle)



Project Number: R2604272; Tester Name: Arturo R.
Date: 25.JUN.2026 18:22:07

916MHz, Duty Cycle



Project Number: R2604272; Tester Name: Arturo R.
Date: 25.JUN.2026 18:54:57

922MHz, Duty Cycle

2.4 Equipment Modifications

No modifications were made to the EUT during testing

2.5 Remote Support Equipment

Manufacturer	Description	Model	Serial Number
Triad	Switching Mode Power Supply	824WSU120-2000	WSU120-2000

2.6 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude 5401	-

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
USB C to USB C	< 1	Laptop	EUT
12-pin power adapter	> 1	Switching Mode Power Supply	EUT

3 Summary of Test Results

Results reported relate only to the product tested.

FCC/IC Rules	Description of Test	Results
FCC §15.203 ISEDC RSS-Gen §6.8	Antenna Requirements	Compliant
FCC §2.1091, §15.247(i) ISEDC RSS-102	RF Exposure	Compliant
FCC §15.207 ISEDC RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
FCC §2.1053, §15.205, §15.209, §15.247(d) ISEDC RSS-247 §6.6 ISEDC RSS-Gen §8.9, §8.10	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) ISEDC RSS-247 §6.3.1 (a)	6 dB & 99% Emission Bandwidth	Compliant
FCC §15.247(b)(3) ISEDC RSS-247 §6.3.2	Output Power	Compliant
FCC §15.247(e) ISEDC RSS-247 §6.3.1 (b)	Power Spectral Density	Compliant
FCC §2.1051, §15.247(d) ISEDC RSS-247 §6.6	100 kHz Bandwidth of Frequency Band Edge	Compliant

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

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

4.1 Applicable Standards

According to FCC §15.203:

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

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

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

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

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

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

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

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

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

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

4.2 Antenna Description

External/Internal/ Integral	Frequency Range (MHz)	Antenna Type	Maximum Antenna Gain (dBi)
External	902 – 930	Omnidirectional Dipole	2.7
External	1616 – 1626	Omnidirectional Helical	2.8

Note: Antenna gain is information provided by customer.

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

5.1 Applicable Standards

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

According to FCC §2.1091, and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

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

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

According to ISED RSS-102 Issue 6:

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

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

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

5.2 MPE Prediction

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

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

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

5.3 RF exposure evaluation for FCC

LoRa 1 Worst Case: 918 MHz

Maximum output power at antenna input terminal (dBm):	28.30
Maximum output power at antenna input terminal (mW):	676.08
Prediction distance (cm):	22
Prediction frequency (MHz):	918
Maximum Directional Antenna Gain, typical (dBi):	2.7
Maximum Antenna Gain (numeric):	1.86
Power density of prediction frequency at 22.0 cm (mW/cm^2):	0.250
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.612

The device is compliant with the requirement FCC MPE limit for uncontrolled exposure. The maximum power density at the distance of 22 cm is 0.250 mW/cm^2. Limit is 0.612 mW/cm^2.

LoRa 2 Worst Case: 922 MHz

Maximum output power at antenna input terminal (dBm):	29.05
Maximum output power at antenna input terminal (mW):	647.14
Prediction distance (cm):	22
Prediction frequency (MHz):	922
Maximum Directional Antenna Gain, typical (dBi):	2.7
Maximum Antenna Gain (numeric):	1.86
Power density of prediction frequency at 22.0 cm (mW/cm^2):	0.239
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.615

The device is compliant with the requirement FCC MPE limit for uncontrolled exposure. The maximum power density at the distance of 22 cm is 0.239 mW/cm^2. Limit is 0.615 mW/cm^2.

Colocation at 22cm:

LoRa1 + LoRa2 + Iridium
0.250/0.612(41%)+0.239/0.615(39%)+0.043/1(4.3%) = 84.3% < 100%

Note: Iridium value is from original module certification (FCC ID: Q639603N) from report number 75926443 Report 10 Issue 2. Also note that this is considering new antenna gain.

5.4 RF exposure evaluation for IC

LoRa 1 Worst Case: 918 MHz

28.30dBm + 2.7dBi = 31 dBm < 1.387W (31.42dBm)

LoRa 2 Worst Case: 922 MHz

28.11dBm + 2.7dBi = 30.81 dBm < 1.387W (31.43dBm)

Iridium

After duty cycle correction (136mW)21.34dBm + 2.8dBi = 24.14 dBm < 2.04 (33.1dBm)

Therefore, radios are exempt from FRL exposure evaluation.

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

6.1 Applicable Standards

As per FCC §15.207 and ISEDC RSS-Gen Section 8.8: Conducted limits

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.
Note2: A linear average detector is required

6.2 Test Setup

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

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

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

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

6.4 Test Procedure

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

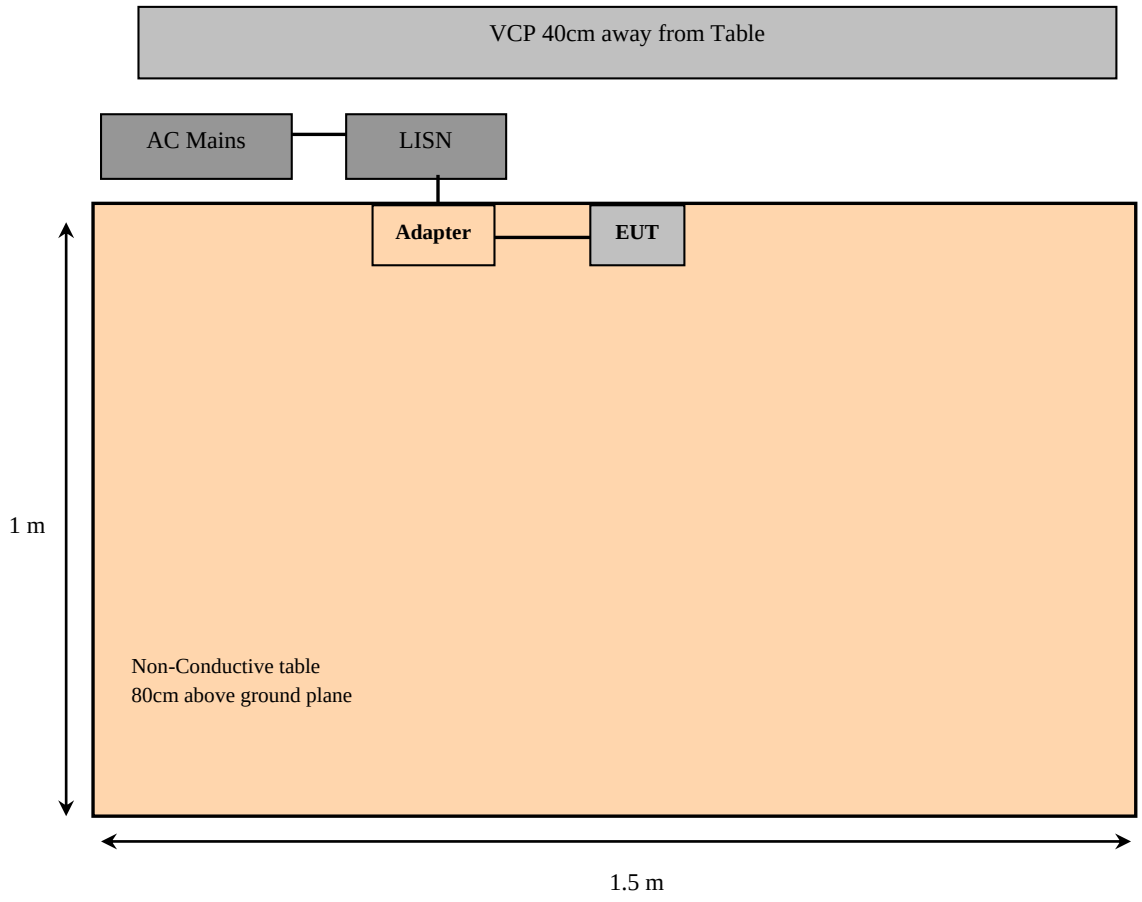
$$CA = Ai + CL + Atten$$

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

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

$$Margin = Corrected\ Amplitude - Limit$$

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
1615	Rohde & Schwarz	EMI Test Receiver	ESCI	101316	2026-04-06	1 year
681	Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101962	2026-03-19	6 months
725	Solar Electronics Company	High Pass Filter	Type 7930-100	7930150203	2026-03-19	6 months
1599	Pasternack	N-type RG58 Coax Cable, 5m	PE3441-500CM	W383627	2026-05-13	6 months
733	FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160130	2026-03-09	1 year

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 Environment Conditions

Temperature:	20 – 22ºC
Relative Humidity:	42 – 45%
ATM Pressure:	101.3 kPa

The testing was performed by Arturo Reyes on 2026-05-22 in Ground Plane

6.8 Summary of Test Results

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

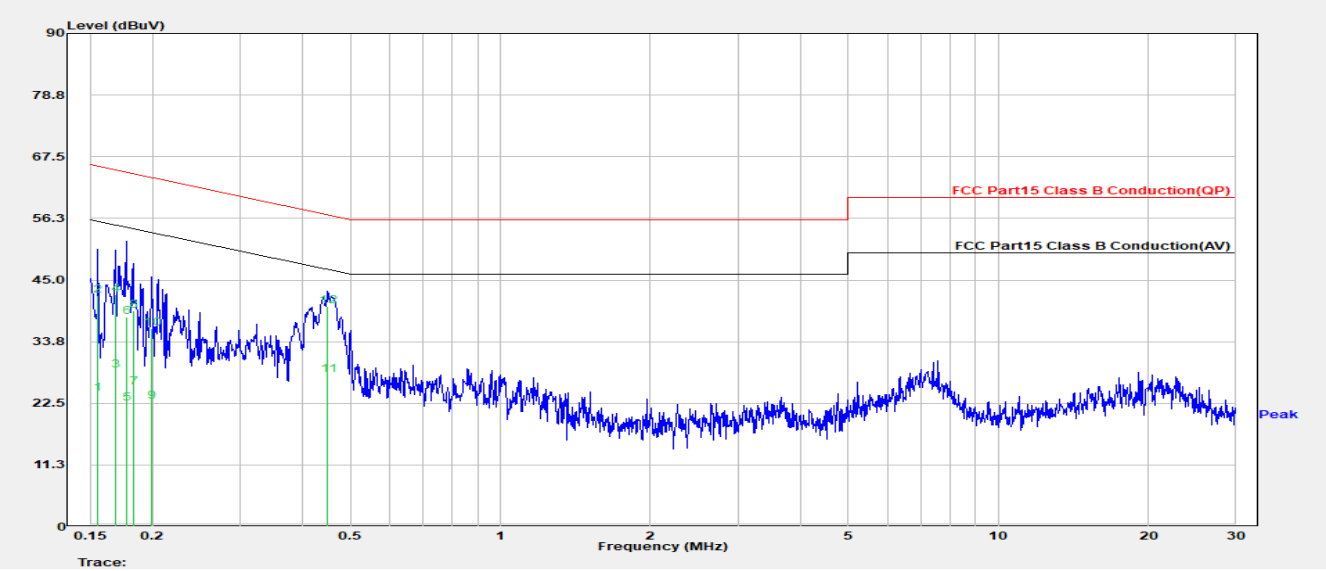
Worst Case – AC Line: 120V, 60Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Hot/Neutral)**	**Range (MHz)**
-16.73	0.450	Hot	0.15 to 30

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

6.9 Conducted Emissions Test Plots and Data

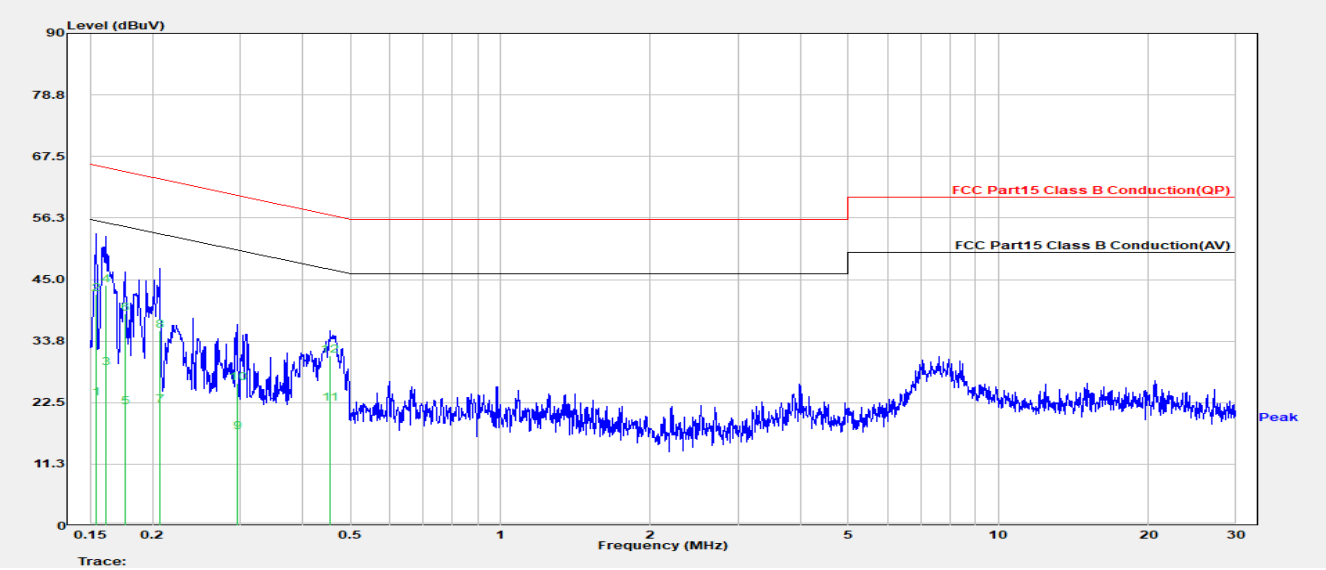
Worst Mode: Co-location: LoRa 1 (918 MHz), LoRa 2 (922 MHz) & Iridium 9603 (1616 MHz)

AC Line: 120V, 60Hz – Hot Conductor



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.155	10.88	13.36	24.24	55.71	-31.47	QP
0.155	28.78	13.36	42.14	65.71	-23.58	Ave
0.169	15.40	13.14	28.54	55.01	-26.47	QP
0.169	29.18	13.14	42.32	65.01	-22.69	Ave
0.177	9.39	13.02	22.41	54.61	-32.21	QP
0.177	25.21	13.02	38.22	64.61	-26.39	Ave
0.183	12.43	12.93	25.36	54.35	-28.99	QP
0.183	26.40	12.93	39.33	64.35	-25.02	Ave
0.200	10.10	12.68	22.78	53.62	-30.84	QP
0.200	23.37	12.68	36.06	63.62	-27.57	Ave
0.450	16.86	10.87	27.73	46.87	-19.14	QP
0.450	29.27	10.87	40.14	56.87	-16.73	Ave

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



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.154	9.88	13.36	23.24	55.76	-32.52	QP
0.154	28.95	13.36	42.31	65.76	-23.44	Ave
0.161	15.48	13.26	28.74	55.41	-26.66	QP
0.161	30.65	13.26	43.91	65.41	-21.50	Ave
0.176	8.63	13.03	21.66	54.66	-32.99	QP
0.176	25.70	13.03	38.73	64.66	-25.92	Ave
0.207	9.35	12.58	21.93	53.32	-31.39	QP
0.207	23.07	12.58	35.64	63.32	-27.67	Ave
0.296	5.84	11.33	17.17	50.35	-33.18	QP
0.296	14.75	11.33	26.08	60.35	-34.26	Ave
0.454	11.37	10.86	22.24	46.80	-24.56	QP
0.454	20.22	10.86	31.09	56.80	-25.71	Ave

7 FCC §15.1053, §15.205, §15.209, §15.247(d) & ISEDC RSS-Gen §8.9 & §8.10, ISEDC RSS-247 §6.6 – Spurious Radiated Emissions

7.1 Applicable Standards

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

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

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

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

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

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

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

As per ISEDC RSS-247 §6.6,

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum device, digitally modulated device, or hybrid system is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power – based on either an RF conducted or a radiated measurement – provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 6.3.2, the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

As per ISEDC RSS-Gen §8.9,

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

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

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

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

Frequency	Field Strength (micro volts/meter)	Measurement Distance (meters)
9 – 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 – 1705 kHz	63.7/F (F in kHz)	30
1.705 – 30 MHz	0.08	30

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

As per ISEDC RSS-Gen §8.10(c),

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

Table 7 – Restricted frequency bands[Note 1]

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

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

7.2 Test Setup

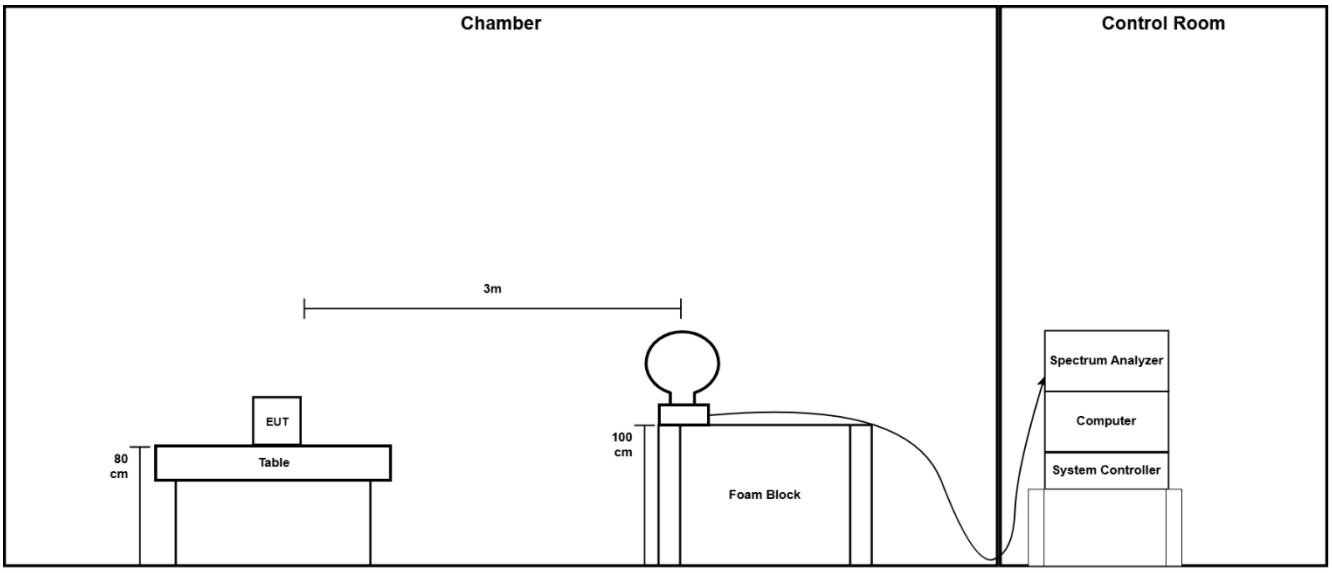
The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10. The specification used was the FCC 15 Subpart C and ISEDC RSS-247 limits.

The spacing between the peripherals was 10 centimeters.

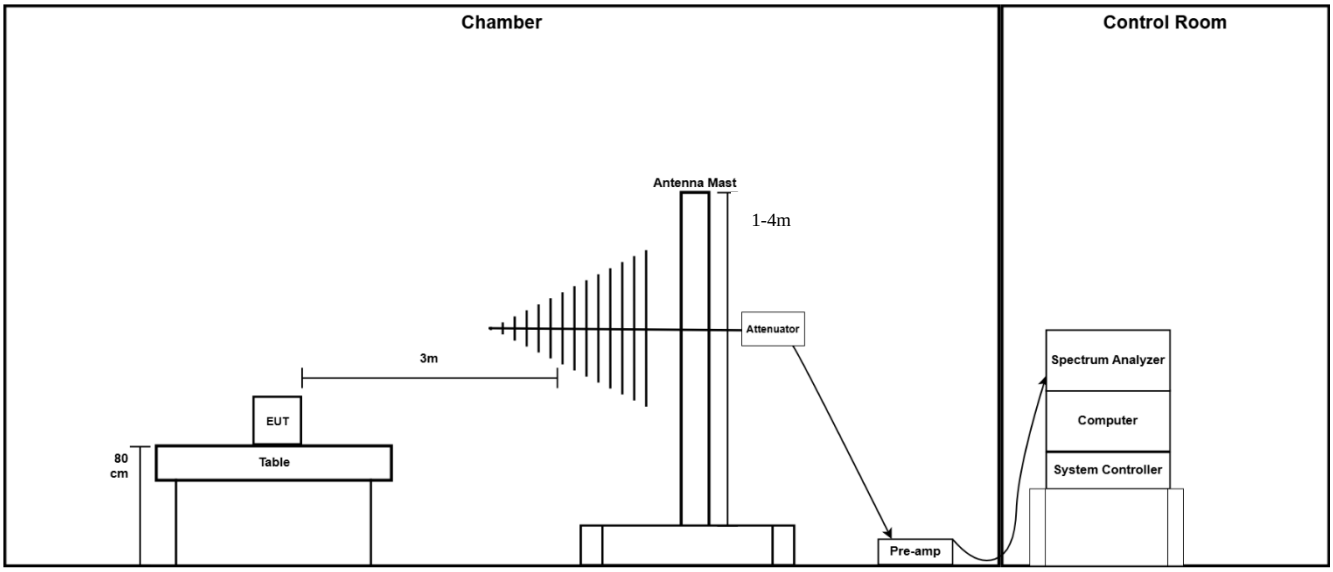
External I/O cables were draped along the edge of the test table and bundle when necessary.

7.3 Block Diagram

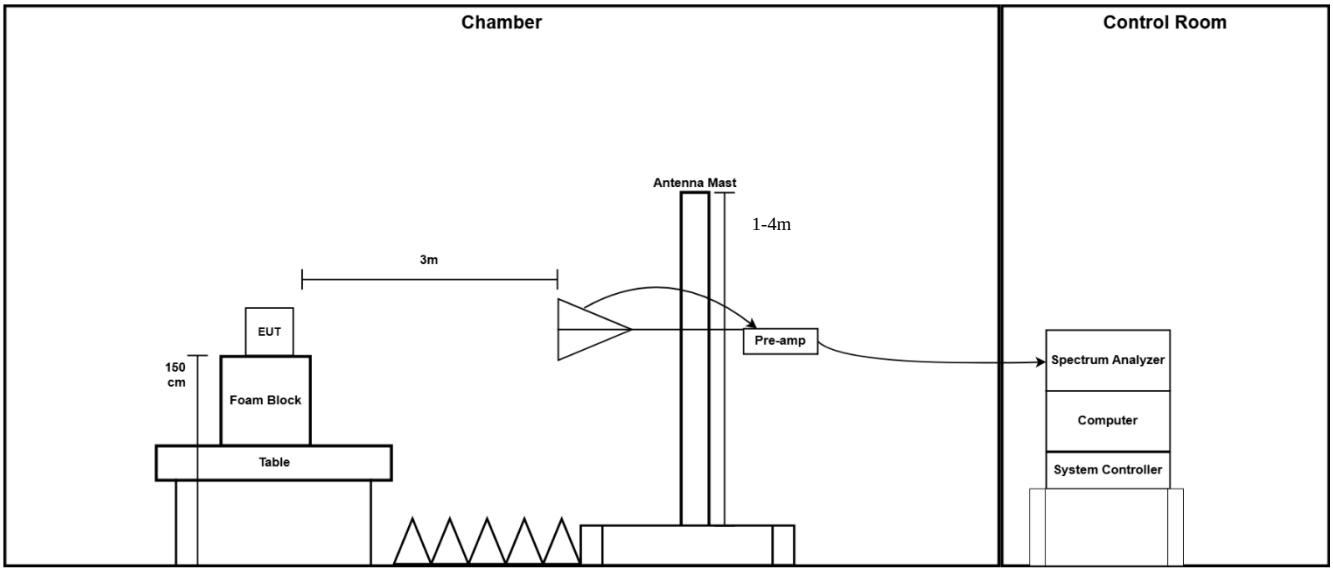
9 kHz to 30 MHz:



30 MHz to 1 GHz:



Above 1 GHz:



7.4 Test Procedure

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

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

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

The spectrum analyzer or receiver is set as:

9kHz to 150kHz:

RBW = 200 Hz / VBW = 1 kHz / Sweep = Auto

150kHz to 30MHz:

RBW = 9 kHz / VBW = 30 kHz / Sweep = Auto

30MHz to 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

7.5 Corrected Amplitude & Margin Calculation

For emissions below 1 GHz and for above 1GHz scans.

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 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

7.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
327	Sunol Sciences	Controller, System	SC110V	122303-1	N/R	N/R
1075	Sunol Sciences	Boresight Antenna Tower	TLT3	050119-7	N/R	N/R
1388	Sunol Sciences	Flush Mount Turntable	FM	112005-2	N/R	N/R
1432	Keysight Technologies	MXE EMI Receiver, Multi-touch	N9038B	MY60180008	2026-01-22	1 year
393	Com-Power	Loop Antenna, Active	AL-130	17043	2025-05-06	2 years
321	Sunol Sciences	Biconilog Antenna	JB3	A020106-2	2025-12-16	2 years
1245	Pasternack	Attenuator	PE7390-6	01182018A	2025-12-16	2 years
1627	Global Engineering Services Corp	N-type 15m coax cable	XH500A-N/J-N/J-15M-A	BACL01627A	2026-04-24	6 months
316	Sonoma Instruments	Preamplifier	317	260406	2025-11-12	7 months
1248	Pasternack	RG214 COAX Cable	PE3062	BACL01248A	2026-04-06	6 months
1246	Hewlet Packard	RF Limiter	11867A	01734	2026-03-05	6 months
1517	Micro-Tronics	Notch Filter 902 - 928 MHz	BRC50722	G038	2026-03-06	1 year
1192	ETS Lindgren	Horn Antenna	3117	00218973	2024-10-23	2 years
1546	Megaphase	SMA coax cable	TM26-S1S3-12	20869602001	2026-02-27	6 months
1449	BACL	Preamplifier	BACL-1313-A100M18G	4052472	2026-02-17	6 months
1232	Micro-Tronics	High Pass Filter	HPM20242	001	2026-04-06	1 year
1526	Micro-Tronics	High Pass Filter	HPM50110	G185	2026-03-19	1 year
1295	CarlisleIT	10m Coaxial Cable	UFB142A-1-3937-200200	64639890912-001	2026-04-14	6 months

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

7.7 Test Environmental Conditions

Temperature:	20 – 24 ºC
Relative Humidity:	40 – 45 %
ATM Pressure:	102.3 kPa

The testing was performed by Arturo Reyes on 2026-05-08 and 2026-05-20 in 5m chamber 3.

7.8 Summary of Test Results

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

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization**	**Transmitting Channel**
-2.47	885.78156	Vertical	Co-location: LoRa 1 (918 MHz), LoRa 2 (922 MHz) & Iridium 9603 (1616 MHz)

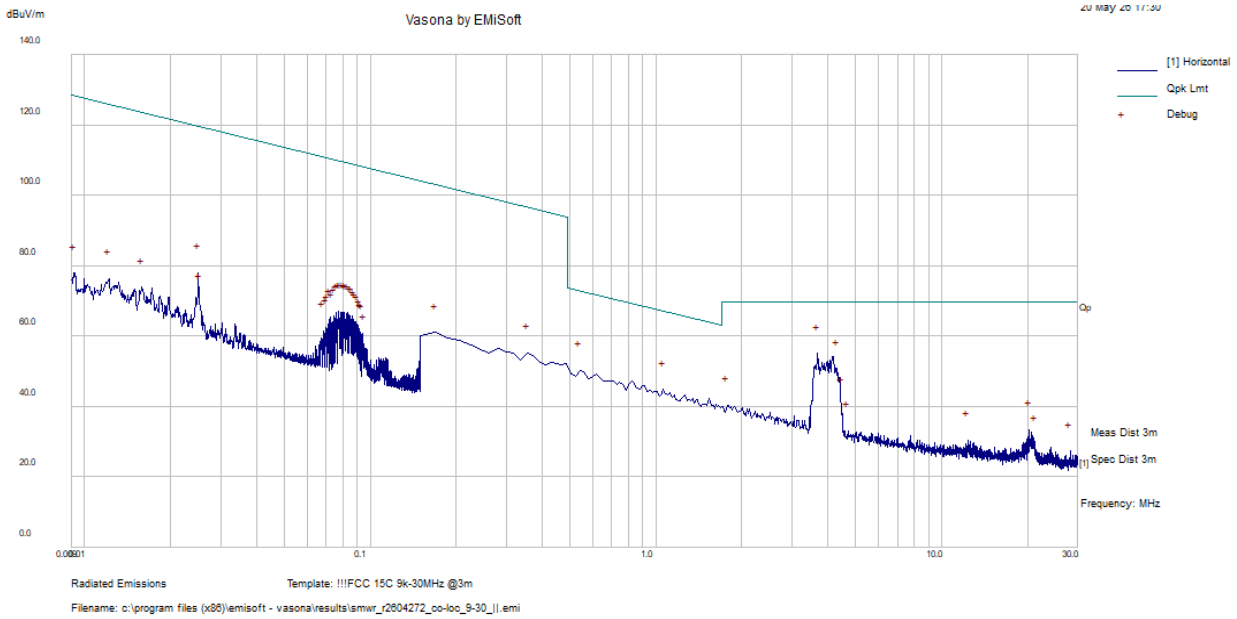
Please refer to the following table and plots for specific test result details.

7.9 Radiated Emissions Test Results

1. *Pre-scan was performed in order to determine worst-case orientation of device with respect to measurement antenna in the X/Y/Z axis. Plots/data shown represent measurements made in worst-case orientation.*
2. *Worst case colocation scans considered below.*

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

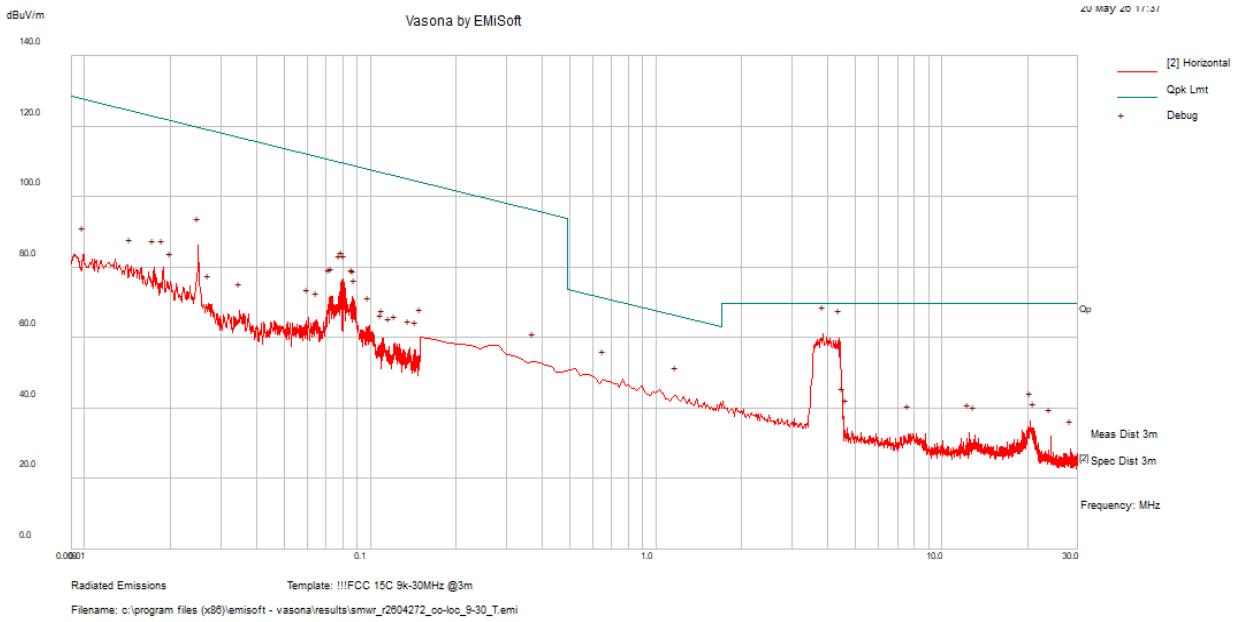
Co-location: LoRa 1 (918 MHz), LoRa 2 (922 MHz) & Iridium 9603 (1616 MHz); Parallel Orientation



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
3.676031	44.72	10.33	55.05	100	360	69.54	-14.49	Peak

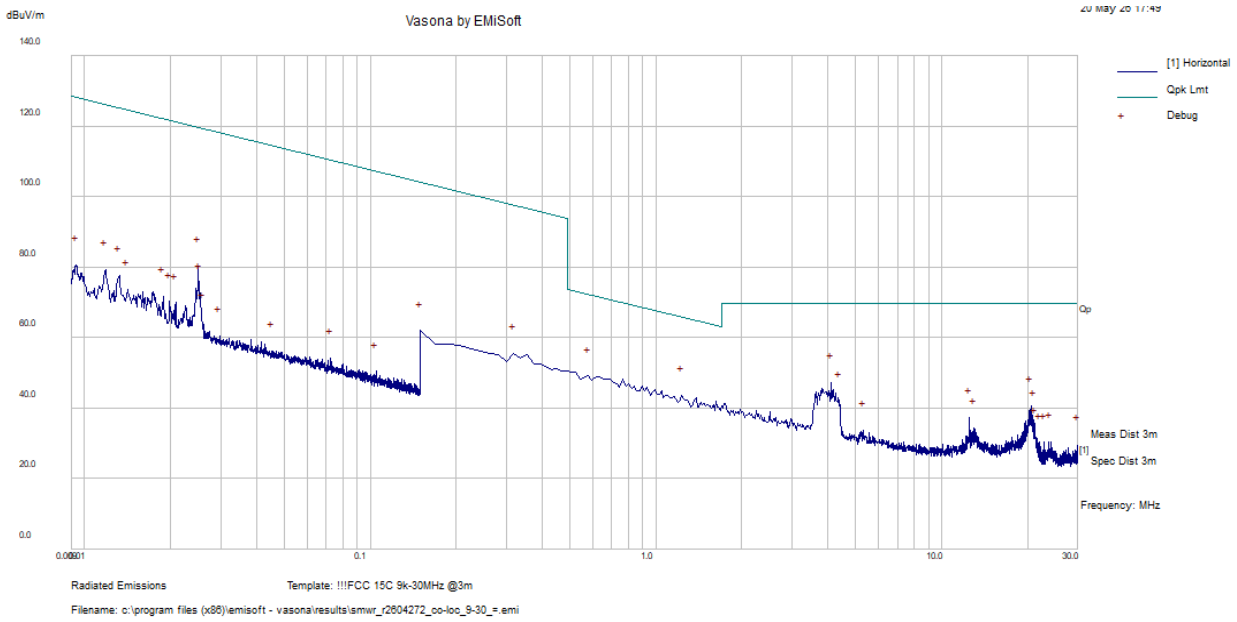
Note: The plot above shows that there were no emissions above the Quasi-Peak Limit at 9 kHz to 30 MHz frequency range. Peak measurement compared against Quasi-Peak limit.

Co-location: Co-location: LoRa 1 (918 MHz), LoRa 2 (922 MHz) & Iridium 9603 (1616 MHz); Perpendicular Orientation



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
3.843938	50.69	10.33	61.02	100	360	69.54	-8.52	Peak

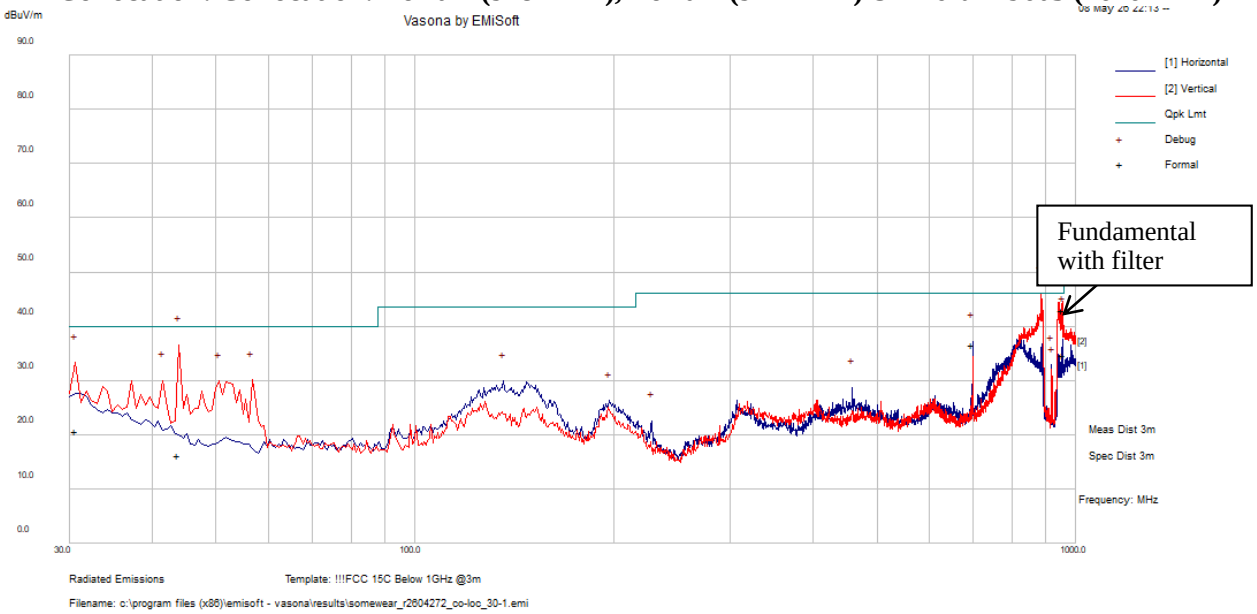
Co-location: Co-location: LoRa 1 (918 MHz), LoRa 2 (922 MHz) & Iridium 9603 (1616 MHz); Ground Parallel Orientation



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
4.105125	37.06	10.3	47.36	100	360	69.54	-22.18	Peak

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

Co-location: Co-location: LoRa 1 (918 MHz), LoRa 2 (922 MHz) & Iridium 9603 (1616 MHz)



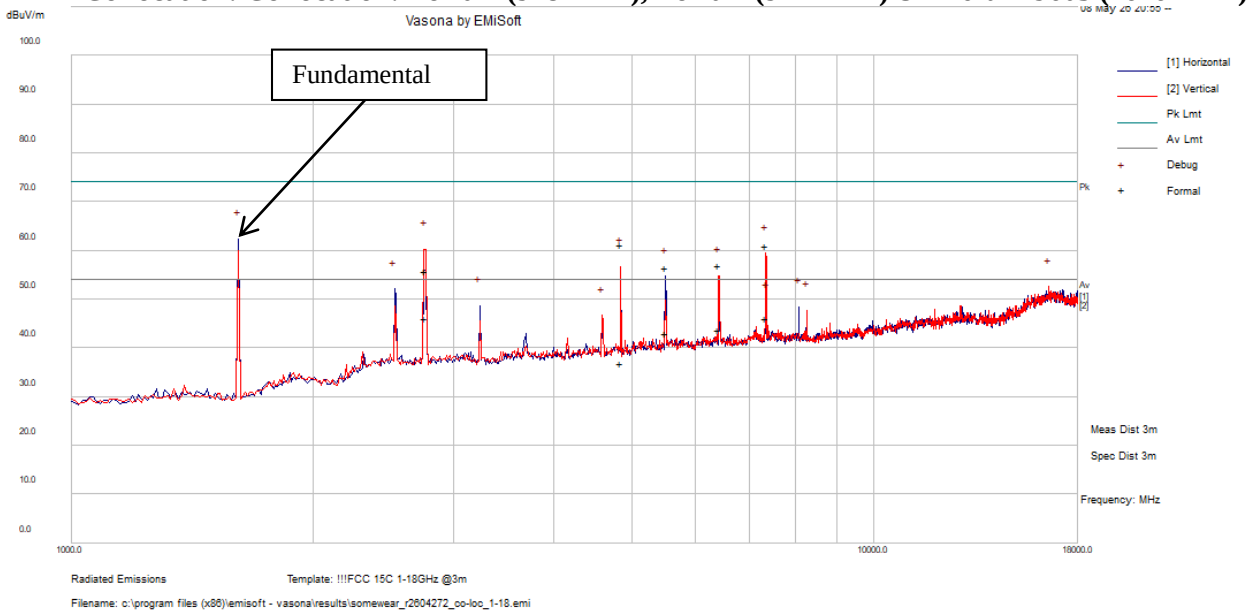
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
885.78156	55.61	-12.08	43.53	101	V	262	46	-2.47	QP
953.8325	54.49	-11.57	42.92	153	V	239	46	-3.08	QP
43.860625	37.91	-21.7	16.21	102	V	333	40	-23.79	QP
957.54875	46.28	-11.53	34.75	120	V	102	46	-11.25	QP
30.679688	32.46	-11.72	20.74	270	V	210	40	-19.26	QP
698.14719	49.94	-13.46	36.48	159	H	131	46	-9.52	QP

FCC/IC Limits for 1 GHz to 18 GHz			
Applicability	**(dBm)**	**(uV/m at 3meters)**	**(dBuV/m at 3meters)**
Restricted Band Average Limit	-	500	54[2]
Restricted Band Peak Limit[1]	-	-	74

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

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

Co-location: Co-location: LoRa 1 (918 MHz), LoRa 2 (922 MHz) & Iridium 9603 (1616 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)	Comment
2765.295	57.82	-1.99	55.83	298	V	281	74	-18.17	Peak
7343.5025	55.6	5.33	60.93	120	V	174	74	-13.07	Peak
4848.0425	60.24	1.05	61.29	271	V	25	74	-12.71	Peak
6420.335	53.1	3.93	57.03	126	V	143	74	-16.97	Peak
5506.81	53.85	2.66	56.51	102	H	213	74	-17.49	Peak
2765.295	48.04	-1.99	46.05	298	V	281	54	-7.95	Ave
7343.5025	40.64	5.33	45.97	120	V	174	54	-8.03	Ave
4848.0425	35.78	1.05	36.83	271	V	25	54	-17.17	Ave
6420.335	39.85	3.93	43.78	126	V	143	54	-10.22	Ave
5506.81	40.42	2.66	43.08	102	H	213	54	-10.92	Ave

8 FCC §15.247(a) (2) & ISEDC RSS-247 §6.3.1 (a) - Emission Bandwidth

8.1 Applicable Standards

According to FCC §15.247(a) (2) and ISEDC RSS-247 §6.3.1(a): the minimum 6 dB bandwidth shall be 500 kHz.

8.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Measure Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8: DTS bandwidth.

As per ANSI C63.10 Clause 11.8: DTS bandwidth

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW $\geqslant 3 \times$ RBW, and peak detector with maximum hold) is implemented by the instrumentation function.
When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geqslant$6 dB.

As per the ANSI 63.10 Clause 6.9.3: Occupied Bandwidth

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

a. The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 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 VBW shall be approximately three times the 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. Step a) through step c) might require iteration to adjust within the specified range.

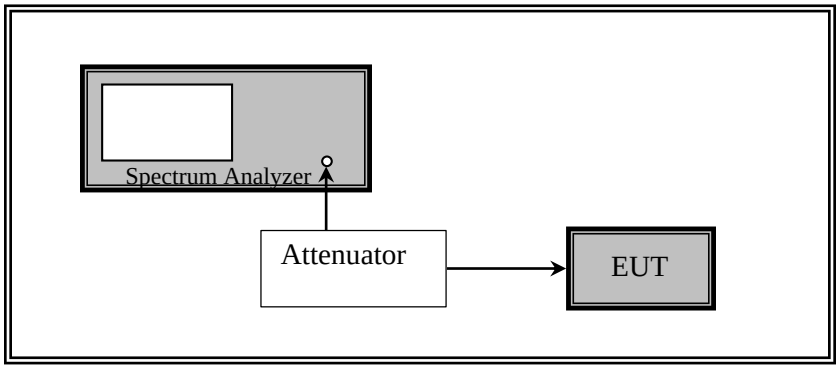
e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f. Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g. If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h. 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).

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
921	Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2025-08-04	1 year
1585	-	SMA 24in RF cable	ST18/SMAm/SMAm/24	245210	2026-03-19	6 months
1540	-	Attenuator, SMA	MCL BW-S20W5	-	2025-12-18	1 year
1603	-	Attenuator, SMA	MCL BW-S10W5+	-	2025-12-18	1 year

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:	19 – 21 ºC
Relative Humidity:	42 – 46%
ATM Pressure:	101.7 kPa

The testing was performed by Arturo Reyes on 2026-05-07 and 2026-06-25 at RF test site.

8.6 Test Results

Radio	Channel	Frequency (MHz)	6 dB OBW (kHz)	99% OBW (kHz)	6 dB OBW Limit (kHz)	Result
LoRa 1	Low	914	630	516	≥ 500	Pass
	Middle	916	624	512	≥ 500	Pass
	High	918	632	514	≥ 500	Pass
LoRa 2	Low	920	580	506	≥ 500	Pass
	Middle	922	584	514	≥ 500	Pass
	High	924	592	510	≥ 500	Pass

Please refer to ANNEX A for detailed test results.

9 FCC §15.247(b) (3) & ISEDC RSS-247 §6.3.2 - Output Power

9.1 Applicable Standards

According to FCC §15.247(b) (3): For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to RSS-247 §6.3.2:
For DTS operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1W, and the e.i.r.p. shall not exceed 4 W.
For DTS operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W, and the e.i.r.p. shall not exceed 4 W, except as provided in section 6.5 a) and b).
As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.

9.2 Measurement Procedure

The measurements are based on ANSI C63.10, Section 11.9.1.1

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

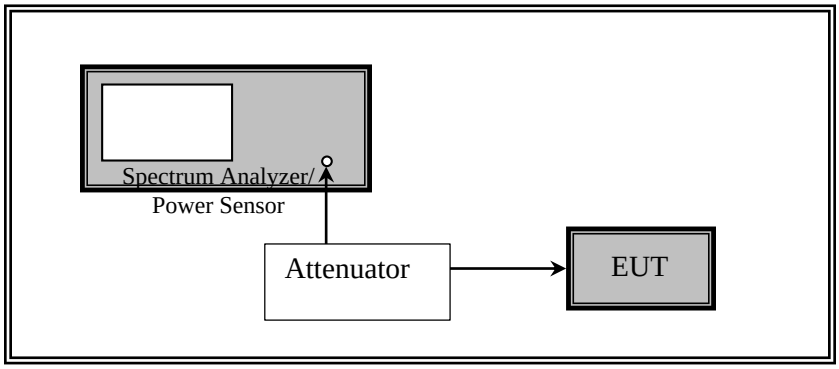
The measurements are based on ANSI C63.10, Section 11.9.2.3.1

Method AVGPM is a measurement using an RF average power meter, as follows:

a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent (see Figure 24) if all of the conditions listed below are satisfied:
1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
d) Correct the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle.

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
921	Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2025-08-04	1 year
697	ETS-LINDGREN	USB RF Power Sensor	7002-006	00160097	2026-03-12	1 year
1585	-	SMA 24in RF cable	ST18/SMAm/SMAm/24	245210	2026-03-19	6 months
1540	-	Attenuator, SMA	MCL BW-S20W5	-	2025-12-18	1 year
1603	-	Attenuator, SMA	MCL BW-S10W5+	-	2025-12-18	1 year

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:	19 – 21 ºC
Relative Humidity:	42 – 46%
ATM Pressure:	101.7 kPa

The testing was performed by Arturo Reyes on 2026-05-07 and 2026-06-25 at RF test site.

9.6 Test Results

Peak Power:

Radio	Channel	Frequency (MHz)	Antenna Gain (dBi)	Conducted Output Power (dBm)	Output Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
LoRa 1	Low	914	2.7	29.13	< 30	31.83	< 36	Pass
	Middle	916	2.7	29.17	< 30	31.87	< 36	Pass
	High	918	2.7	29.18	< 30	31.88	< 36	Pass
LoRa 2	Low	920	2.7	29.01	< 30	31.71	< 36	Pass
	Middle	922	2.7	29.05	< 30	31.75	< 36	Pass
	High	924	2.7	29.00	< 30	31.70	< 36	Pass

Note: EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)

Average Power:

Radio	Channel	Frequency (MHz)	Antenna Gain (dBi)	Conducted Output Power (dBm)	Output Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
LoRa 1	Low	914	2.7	27.92	< 30	30.62	< 36	Pass
	Middle	916	2.7	27.93	< 30	30.63	< 36	Pass
	High	918	2.7	28.30	< 30	31.00	< 36	Pass
LoRa 2	Low	920	2.7	27.82	< 30	30.52	< 36	Pass
	Middle	922	2.7	28.11	< 30	30.54	< 36	Pass
	High	924	2.7	27.99	< 30	30.81	< 36	Pass

Note: EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)

Please refer to ANNEX B for detailed test results.

10 FCC §15.247(e) & ISEDC RSS-247 §6.3.1 (b) - Power Spectral Density

10.1 Applicable Standards

According to ECFR §15.247(e) and RSS-247 §6.3.1 (b), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

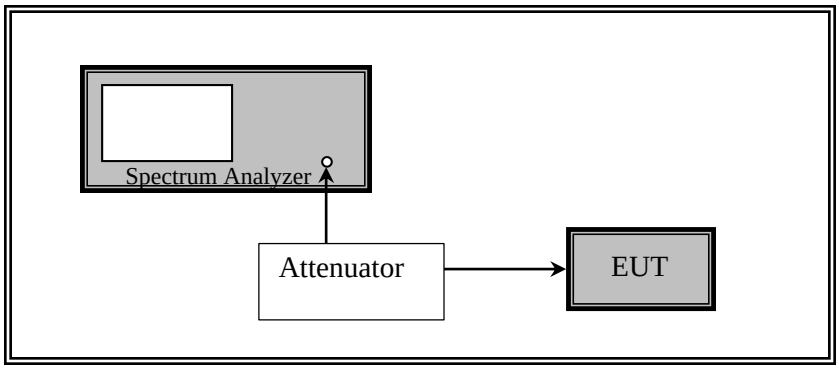
10.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8.4: Maximum power spectral density level in the fundamental emission.

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = rms
f) Trace = Power Averaging

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
921	Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2025-08-04	1 year
1585	-	SMA 24in RF cable	ST18/SMAm/SMAm/24	245210	2026-03-19	6 months
1540	-	Attenuator, SMA	MCL BW-S20W5	-	2025-12-18	1 year
1603	-	Attenuator, SMA	MCL BW-S10W5+	-	2025-12-18	1 year

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:	19 – 21 ºC
Relative Humidity:	42 – 46%
ATM Pressure:	101.7 kPa

The testing was performed by Arturo Reyes on 2026-05-22 at RF test site.

10.6 Test Results

Radio	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
LoRa 1	Low	914	7.91	< 8	Pass
	Middle	916	7.92	< 8	Pass
	High	918	7.91	< 8	Pass
LoRa 2	Low	920	7.89	< 8	Pass
	Middle	922	7.92	< 8	Pass
	High	924	7.99	< 8	Pass

Please refer to ANNEX C for detailed test results.

11 FCC §15.247(d) & ISEDC RSS-247 §6.6 - 100 kHz Bandwidth of Spurious Emissions

11.1 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).

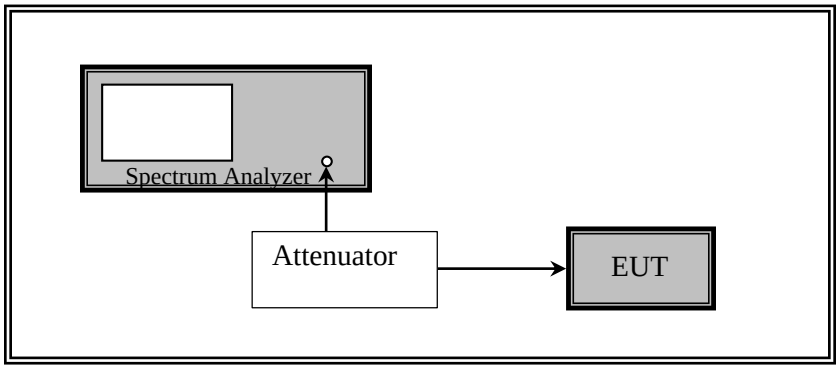
According to ISEDC RSS-247 §6.6:In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

11.2 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

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
921	Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2025-08-04	1 year
1585	-	SMA 24in RF cable	ST18/SMAm/SMAm/24	245210	2026-03-19	6 months
1540	-	Attenuator, SMA	MCL BW-S20W5	-	2025-12-18	1 year
1603	-	Attenuator, SMA	MCL BW-S10W5+	-	2025-12-18	1 year

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:	19 – 21 ºC
Relative Humidity:	42 – 46%
ATM Pressure:	101.7 kPa

The testing was performed by Arturo Reyes on 2026-05-07 at RF test site.

11.6 Test Results

Please refer to ANNEX D for detailed test results.

Test Result: Pass

12 Annex F (Normative) - Test Setup Photographs

Please refer to the attachment.

13 Annex G (Normative) - EUT External Photographs

Please refer to the attachment.

14 Annex H (Normative) - EUT Internal Photographs

Please refer to the attachment.

15 Annex I (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

--- END OF REPORT ---