# FCC PART 74 SUBPART H
# ISEDC RSS-210, ISSUE 11, JUNE 2024

TEST REPORT

For

## Lectrosonics, Inc.

581 Laser Rd. NE
Rio Rancho, NM 87124, USA

**FCC ID: DBZDSSMA**
**IC: 8024A-DSSMA**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | Digital Wireless Microphone Transmitter |

| | |
|---|---|
| **Prepared By:** | Arturo Reyes<br>RF Test Engineer |
| **Report Number:** | R2411181-74 |
| **Report Date:** | 2025-01-15 |
| **Reviewed By:** | Steven Lianto<br>EMC & RF Lead |

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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 | R2411181-74 | Original Report | 2024-01-15 |

# 1. General Description

## 1.1 Product Description for Equipment Under Test (EUT)

This test report has been compiled on behalf of *Lectrosonics, Inc.* and their product model: *DSSM-A1B1* (FCC ID: DBZDSSMA, IC: 8024A-DSSMA), which henceforth is referred to as the EUT. The EUT is a Digital Wireless Microphone Transmitter. The EUT operates in the frequency range: 470.100 – 607.950 MHz.

## 1.2 Mechanical Description of EUT

The EUT measures approximately: 6.6 cm (L) x 4.9 cm (W) x 1.7 cm (H), and weighs approximately 0.1 kg.

*The data gathered are from the typical production sample provided by the Lectrosonics, Inc. with serial number 103.*

## 1.3 Objective

The following test report was prepared on behalf of *Lectrosonics, Inc.* in accordance with Part 74, Subparts H of the Federal Communications Commission rules and RSS-210 Issue 11.

The objective was to determine compliance with Part 74 of the FCC Rules, and RSS-210 Issue 11, limits for RF output power, Operating Bandwidth & Emission Mask, Field strength at Spurious Emissions, and Frequency Stability.

## 1.4 Related Submittal(s)/Grant(s)

None

## 1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI/TIA-603-E-2016, FCC KDB 971168 D01 Power Meas License Digital Systems v03r01, KDB 206256 D01v02 and ETSI EN 300 422-1 v2.2.1 (2021-11) Wireless Microphones; Audio PMSE up to 3 GHz; Part 1: Audio PMSE Equipment up to 3 GHz; Harmonised Standard for access to radio spectrum.

All tests were performed at Bay Area Compliance Laboratories Corp.

## 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 Innovation, Science and Economic development 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 17025:20127 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***

- - 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 - ISEDC):
  - 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 (Infocomm Media Development Authority - IMDA):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IMDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IMDA MRA Recognition Scheme: 2011, Annex 2

- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.

- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

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

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

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

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

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

5 Other
- For Water Coolers (ver. 3.0)

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

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

# 2. EUT Test Configuration

## 2.1 Justification

The EUT was configured for testing according to ANSI/TIA-603-E-2016, ANSI C63.26-2015, KDB 971168 D01 v03r01, and ETSI EN 300 422-1 v2.2.1 (2021-11).

## 2.2 EUT Exercise Software

EUT configurations were managed via an integrated menu within the device. Options to change the frequency and power were displayed on the screen of the EUT.

| Mode | Channel | Frequency (MHz) | Power Setting |
|---|---|---|---|
| D2 | Low | 470.100 | 50mW |
| | Middle | 539.025 | |
| | High | 607.950 | |
| HDM | Low | 470.100 | 4mW |
| | Middle | 539.025 | |
| | High | 607.950 | |

## 2.3 Special Equipment

No special equipment was used during testing.

## 2.4 Equipment Modifications

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 |
|---|---|---|---|
| Lectrosonics, Inc. | Lithium Ion Battery Pack | LB-50 | - |

## 2.8 Interface Ports and Cables

None

# 3. Summary of Test Results

| FCC & ISEDC Rules | Descriptions of Test | Result (s) |
|---|---|---|
| FCC 2.1093<br>ISEDC RSS-102 | RF Exposure | Compliant[1] |
| FCC §74.861 (e)(1)(ii)<br>RSS-210 Section G.2 | RF Output Power | Compliant |
| FCC §2.1049<br>FCC §74.861 (e)(5,6,7)<br>RSS-210 Section G.2 & G.3<br>ETSI EN 300 422-1 (4.2.4.2.2) | Operating Bandwidth & Emission Mask | Compliant |
| FCC §74.861 (e)(7)(iv)<br>RSS-210 Section G.5<br>ETSI EN 300 422-1 (4.2.4.1.2) | Spurious Emissions at the Antenna Port | Compliant |
| FCC §74.861 (e)(7)(iv)<br>RSS-210 Section G.5<br>ETSI EN 300 422-1 (4.2.4.1.2) | Field Strength of Spurious Emissions | Compliant |
| FCC §2.1055<br>FCC §74.861 (e)(4)<br>RSS-210 Section G.2 & G.4 | Frequency Stability | Compliant |

Note[1]: Please refer to SAR test report for test results.

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

# 4. FCC §74.861 (e)(1)(ii) & RSS-210 Section G.2 – RF Output Power

## 4.1 Applicable Standards

According to FCC§74.861 (e):

For low power auxiliary stations operating in the 600 MHz duplex gap and the bands allocated for TV broadcasting, the following technical requirements apply:

1) The power may not exceed the following values.
   i. 54-72, 76-88, and 174-216 MHz bands: 50 mW EIRP
   ii. 470-608 MHz band: 250 mW conducted power
   iii. 653-657 MHz band: 20 mW EIRP

According to RSS-210 Section G.2:

The transmit power shall be measured in terms of average value over any period of continuous transmission. The frequency bands, e.i.r.p., authorized bandwidth and frequency stability limits for devices are provided in table G1 for wireless microphones and table G2 for WMAS.

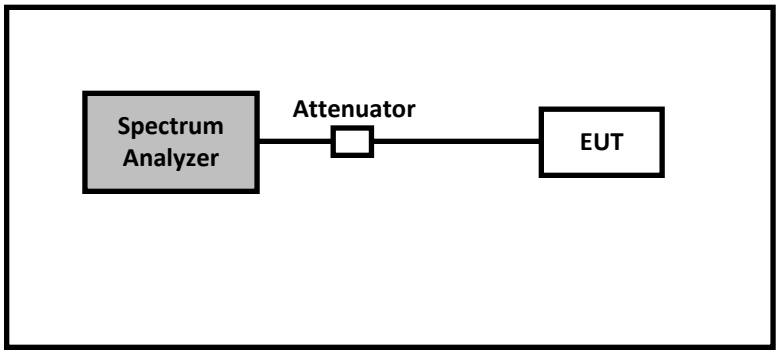
**Table G1: Specifications for wireless microphones**

| Frequency bands (MHz) | e.i.r.p. (mW) | Authorized bandwidth (kHz) | Frequency stability (± ppm) |
|---|---|---|---|
| 54-72<br>76-88<br>174-216 | ≤ 50 | ≤ 200 | ≤ 50 |
| 470-608 | ≤ 250 | ≤ 200 | ≤ 50 |
| 614-616<br>653-663 | ≤ 20 | ≤ 200 | ≤ 50 |

## 4.2 Test Procedure

Please refer to KDB 971168 D01 v03r01 Section 5.

## 4.3 Test Setup Block Diagram




## 4.4 Test Equipment List and Details

| BACL No. | Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Interval |
|---|---|---|---|---|---|---|
| 624 | Agilent | Spectrum Analyzer | E4446A | MY48250238 | 2024-06-14 | 1 year |
| - | - | 10dB Attenuator | - | - | Each time[1] | Each time[1] |
| - | - | RF Cable | - | - | Each time[1] | Each time[1] |

Note[1]: cable and attenuator 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".*

## 4.5 Test Environmental Conditions

| | |
|---|---|
| **Temperature:** | 17 ºC |
| **Relative Humidity:** | 51.3 % |
| **ATM Pressure:** | 101.5 kPa |

*The testing was performed by Arturo Reyes on 2024-12-04 at RF test site.*

## 4.6 Test Results

| Mode | Channel | Frequency (MHz) | Conducted Output Power (dBm) | Conducted Output Power (mW) | EIRP (dBm) | EIRP (mW) | Conducted and EIRP Limit (mW) | Result |
|---|---|---|---|---|---|---|---|---|
| D2 | Low | 470.100 | 16.13 | 41.02 | 18.28 | 67.30 | < 250 | Pass |
| | Middle | 539.025 | 16.32 | 42.85 | 18.47 | 70.31 | < 250 | Pass |
| | High | 607.950 | 16.14 | 41.11 | 18.29 | 67.45 | < 250 | Pass |
| HDM | Low | 470.100 | 6.08 | 4.06 | 8.23 | 6.65 | < 250 | Pass |
| | Middle | 539.025 | 6.15 | 4.12 | 8.3 | 6.76 | < 250 | Pass |
| | High | 607.950 | 6.23 | 4.20 | 8.38 | 6.89 | < 250 | Pass |

Note 1: EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)
Note 2: Antenna Gain declared by customer = 2.15 dBi

# 5. FCC §2.1049, FCC §74.861 (e)(5,6,7), RSS-210 Section G.2 & G.3 & ETSI EN 300 422-1 (4.2.4.2.2) – Occupied Bandwidth & Emission Mask

## 5.1 Applicable Standards

According to FCC §74.861 (e)(5):

The operating bandwidth shall not exceed 200 kilohertz, except that a wireless multichannel audio system must have an operating bandwidth not exceeding 6 megahertz in the TV bands or 4 megahertz in the 653-657 MHz band and must have a mode of operation in which it is capable of transmitting at least three audio channels per megahertz. For wireless multichannel audio systems operating in the TV bands, the 6 megahertz (or less) channel must fall entirely within a single TV channel (2-36) that is available for Part 74 LPAS use under § 74.802(b). The provisions of § 74.802(c) regarding frequency of operation within TV channels do not apply to wireless multichannel audio systems:

According to FCC §74.861 (e)(6):

The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

i. On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;
ii. On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;
iii. On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10log10 (mean output power in watts) dB.

According to FCC §74.861 (e)(7)(ii):

Emissions within the band from 2.5 × B below to 2.5 × B above the carrier frequency, where B is the channel bandwidth, shall comply with the emission mask in Figure 2 of section 4.2.4.2.2 of ETSI EN 300 422-1 V2.2.1 (2021-11) (incorporated by reference, see § 74.35).

According to RSS-210 Section G.2:

The transmit power shall be measured in terms of average value over any period of continuous transmission. The frequency bands, e.i.r.p., authorized bandwidth and frequency stability limits for devices are provided in table G1 for wireless microphones and table G2 for WMAS.

**Table G1: Specifications for wireless microphones**

| Frequency bands (MHz) | e.i.r.p. (mW) | Authorized bandwidth (kHz) | Frequency stability (± ppm) |
|---|---|---|---|
| 54-72<br>76-88<br>174-216 | ≤ 50 | ≤ 200 | ≤ 50 |
| 470-608 | ≤ 250 | ≤ 200 | ≤ 50 |
| 614-616<br>653-663 | ≤ 20 | ≤ 200 | ≤ 50 |

According to RSS-210 Section G.3:

The occupied bandwidth for wireless microphones shall not exceed the authorized bandwidth specified in tables G1 and G2, above.

WMAS shall have a bandwidth less than 6 megahertz and shall have a mode of operation capable of operating with at least three (3) audio channels per megahertz.

For WMAS operating in the TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz and 470-608 MHz), the 6 megahertz (or less) channel shall fall entirely within a single TV channel.

According to ETSI EN 300 422-1 V2.2.1 (2021-11) Section 4.2.4.2.2:

The following limits are applicable, where B is the Declared Channel Bandwidth.

The mean Power Density, measured with 1 kHz measurement bandwidth and RMS detector, of the transmitter unwanted emissions shall not exceed the limits of the masks provided in figure 1 for equipment employing analogue modulation and figure 2 for equipment employing digital modulation, but excluding WMAS.

The limits in figures 1 and 2 are relative to the transmitter RF output power according to clauses 4.2.1 and 5.4.1.

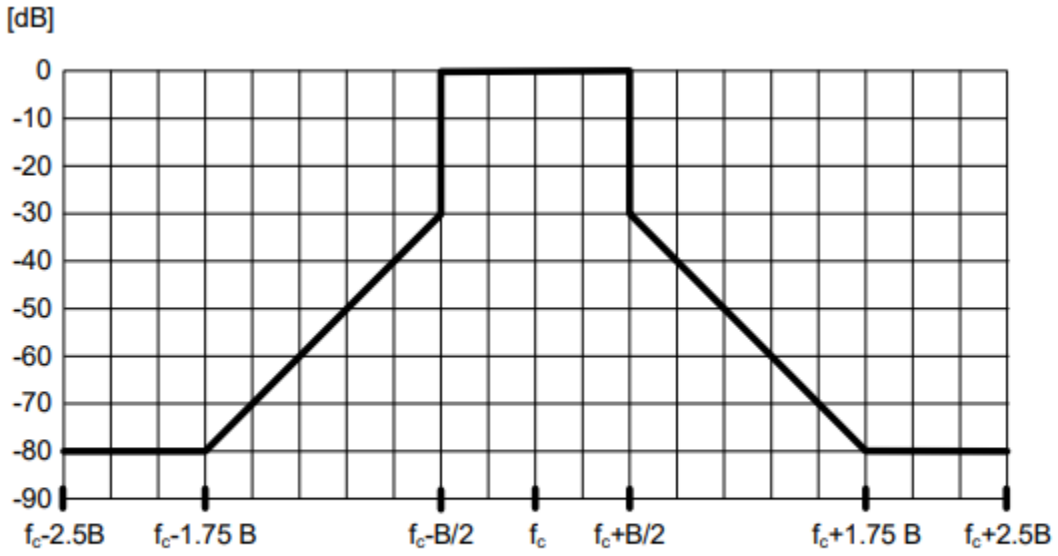


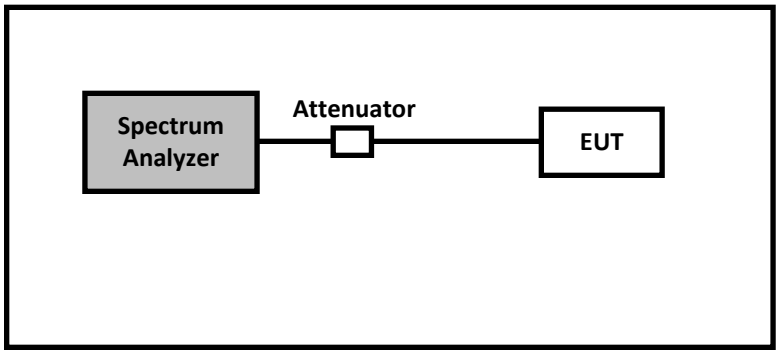

**Figure 2: Transmit spectral power mask for equipment employing digital modulation, except WMAS, RBW = 1 kHz**

## 5.2 Test Procedure

For OBW measurement, please refer to KDB 971168 D01 v03r01 Section 4.

For Emission mask measurement, please refer to ETSI EN 300 422-1 V2.2.1 (2021-11) Section 5.4.3.

## 5.3 Test Setup Block Diagram




## 5.4 Test Equipment List and Details

| BACL No. | Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Interval |
|---|---|---|---|---|---|---|
| 624 | Agilent | Spectrum Analyzer | E4446A | MY48250238 | 2024-06-14 | 1 year |
| 912 | Rohde & Schwarz | Signal Analyzer | FSV40 | 1321.3008k39 -101203-UW | 2024-07-25 | 1 year |
| - | - | 10dB Attenuator | - | - | Each time[1] | Each time[1] |
| - | - | RF Cable | - | - | Each time[1] | Each time[1] |

Note[1]: cable and attenuator 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".*

## 5.5 Test Environmental Conditions

| | |
|---|---|
| **Temperature:** | 17 to 19 ºC |
| **Relative Humidity:** | 47.2 to 51.7 % |
| **ATM Pressure:** | 101.2 to 101.7 kPa |

*The testing was performed by Arturo Reyes from 2024-12-04 to 2024-12-16 and 2025-01-15 at RF test site.*

## 5.6 Test Results

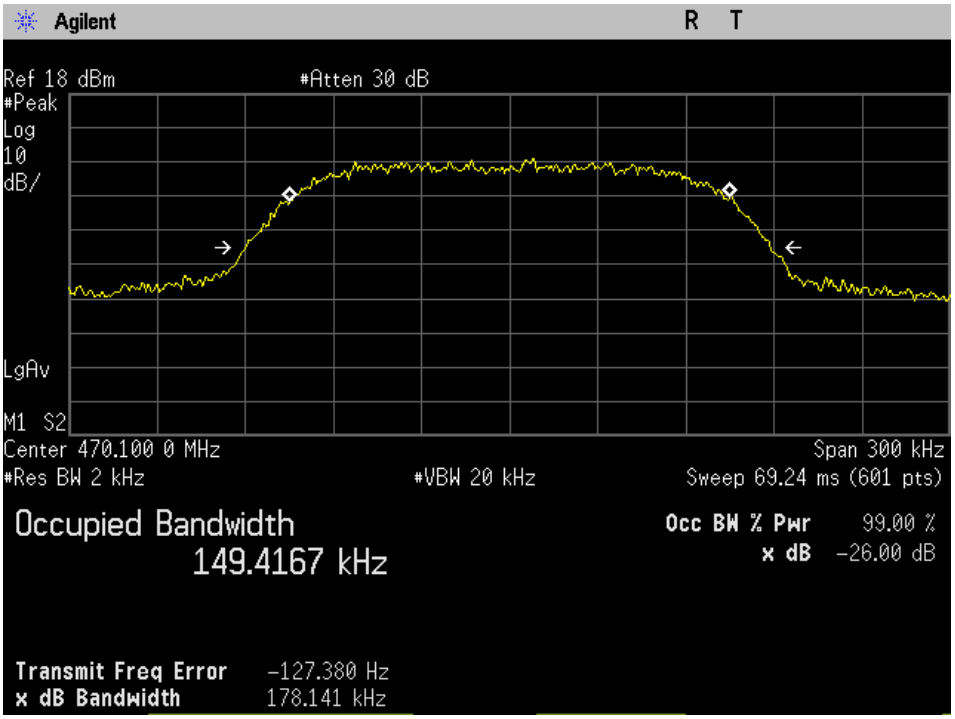
| Mode | Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 99% Occupied Bandwidth Limit (kHz) | Result |
|---|---|---|---|---|---|
| D2 | Low | 470.100 | 149.417 | < 200 | Pass |
| | Middle | 539.025 | 150.395 | < 200 | Pass |
| | High | 607.950 | 150.105 | < 200 | Pass |
| HDM | Low | 470.100 | 99.771 | < 200 | Pass |
| | Middle | 539.025 | 99.966 | < 200 | Pass |
| | High | 607.950 | 100.104 | < 200 | Pass |

Emission Mask Test Result: Pass

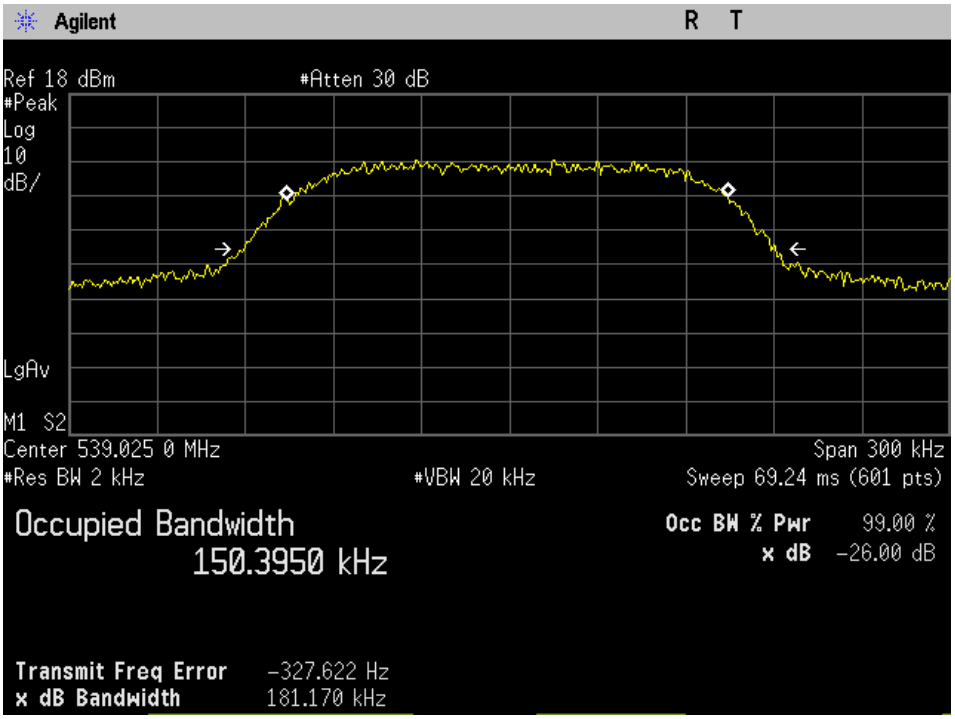
Please refer to Section 5.7 & 5.8 for detailed Occupied Bandwidth and Emission Mask plots, respectively.

## 5.7 Occupied Bandwidth Plots

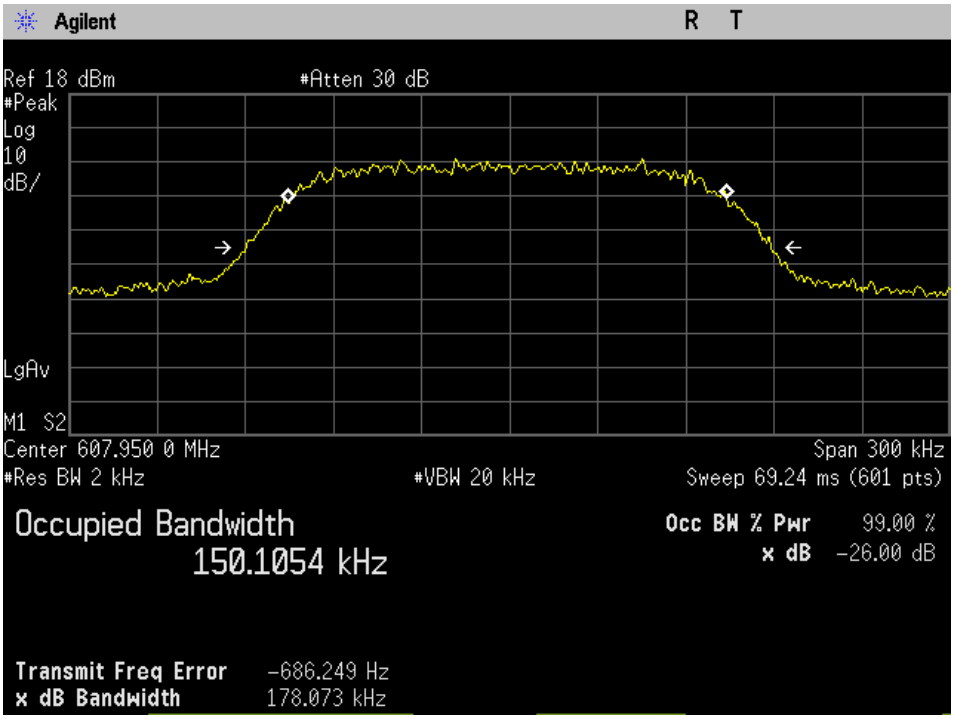
**D2 mode: 470.100 MHz, 99% OBW**



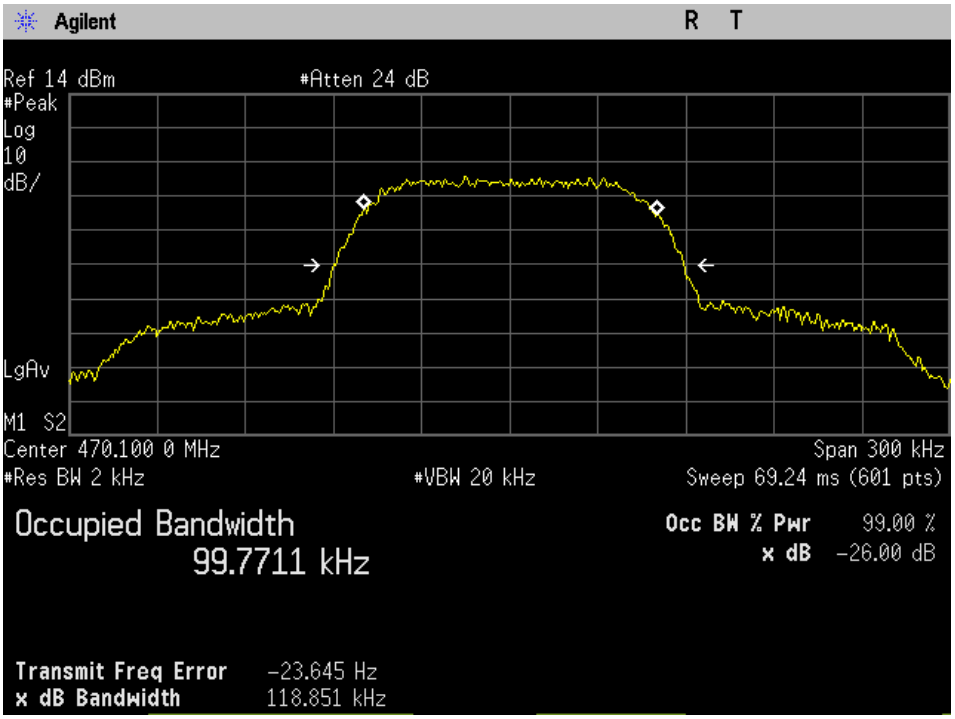

**D2 mode: 539.025 MHz, 99% OBW**



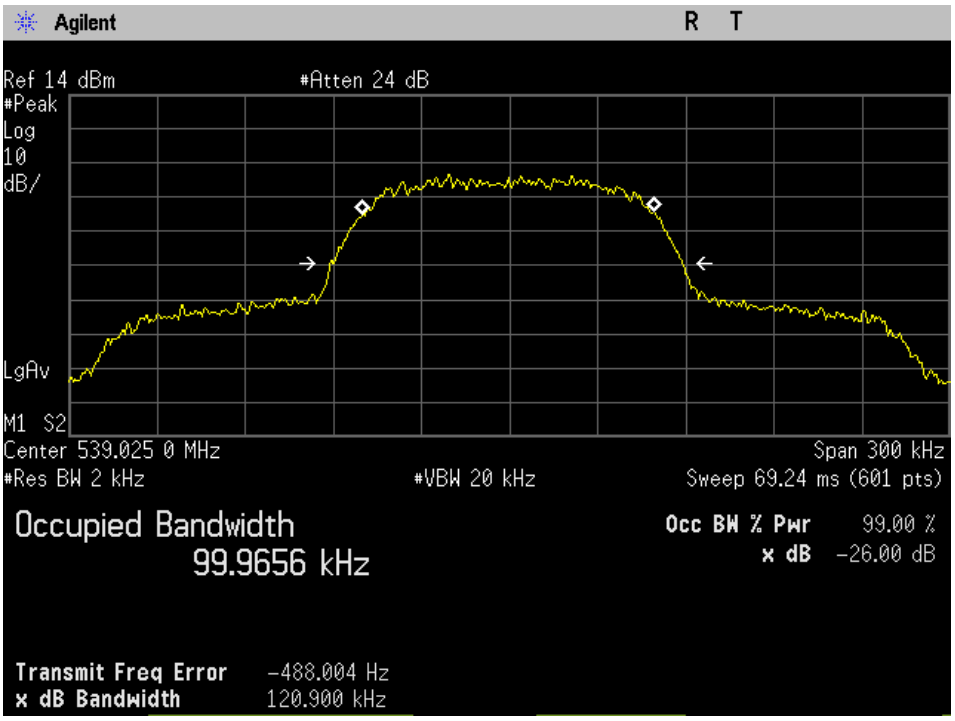
**D2 mode: 607.950 MHz, 99% OBW**



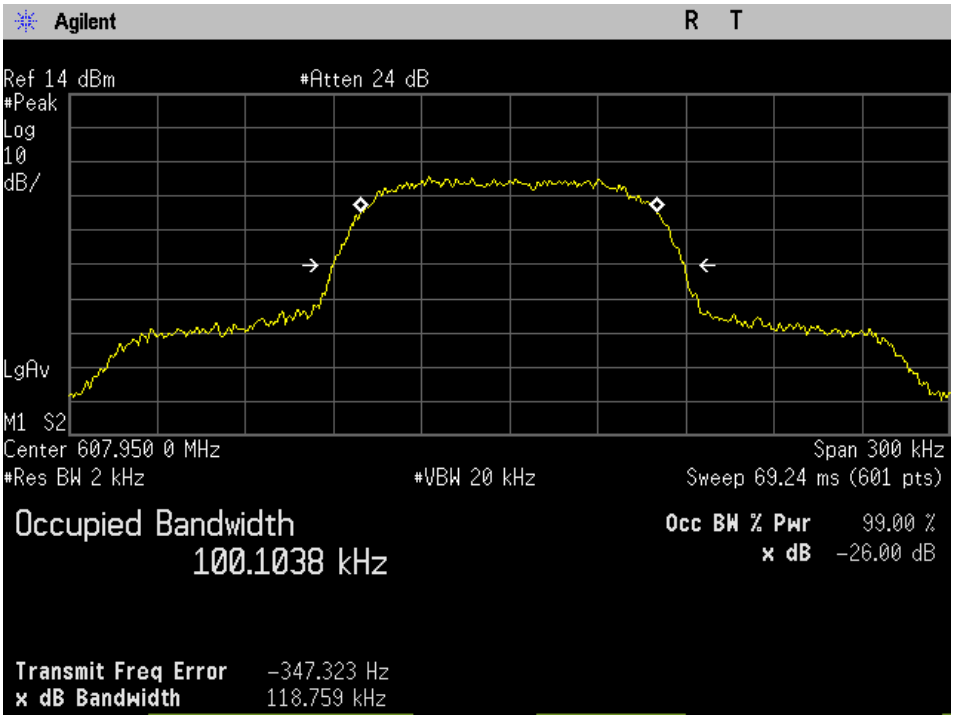

**HDM mode: 470.100 MHz, 99% OBW**



**HDM mode: 539.025 MHz, 99% OBW**

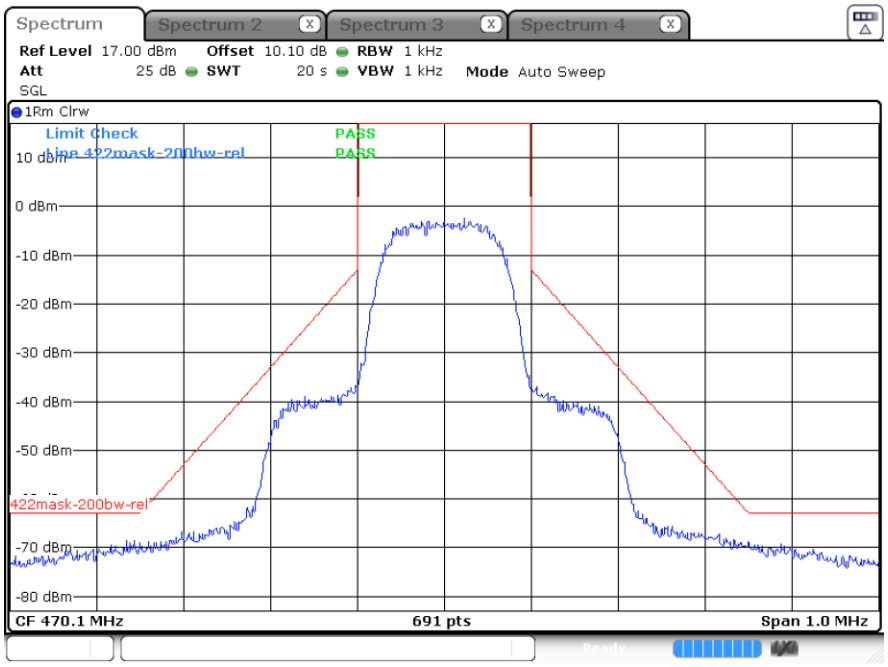



**HDM mode: 607.950 MHz, 99% OBW**



## 5.8 Emission Mask Plots

**D2 mode: 470.100 MHz, Emission Mask (1)**

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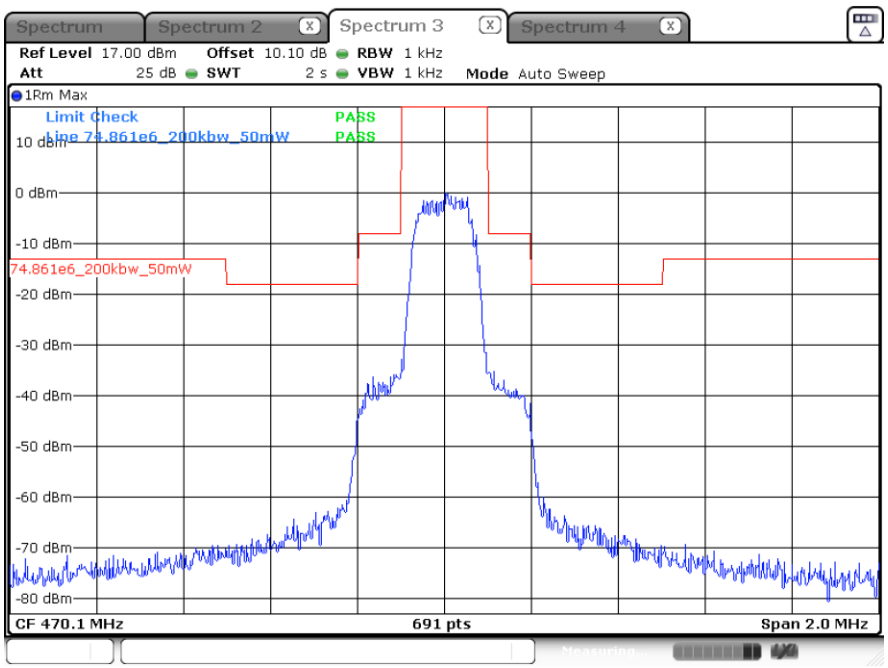
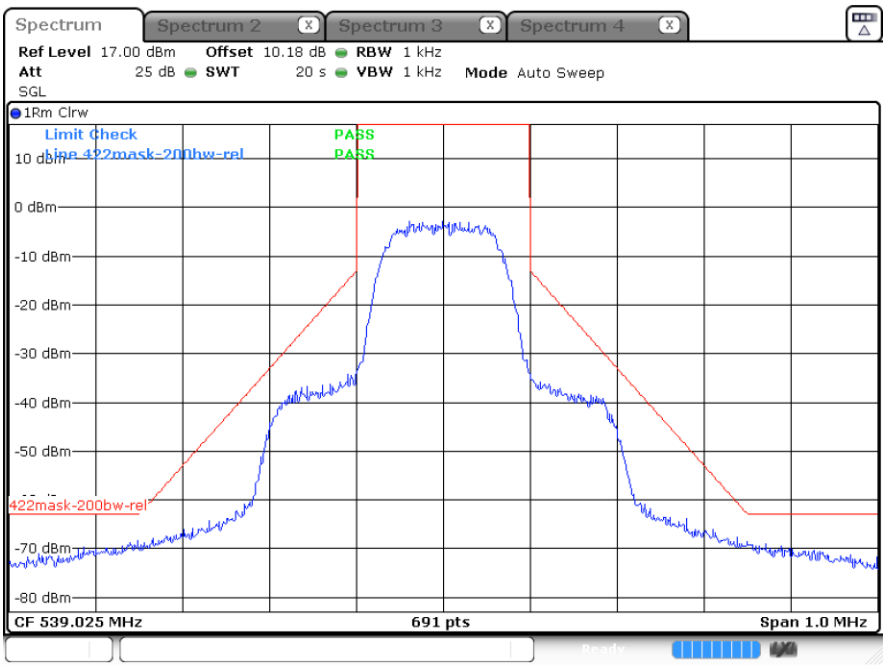
**D2 mode: 470.100 MHz, Emission Mask (2)**



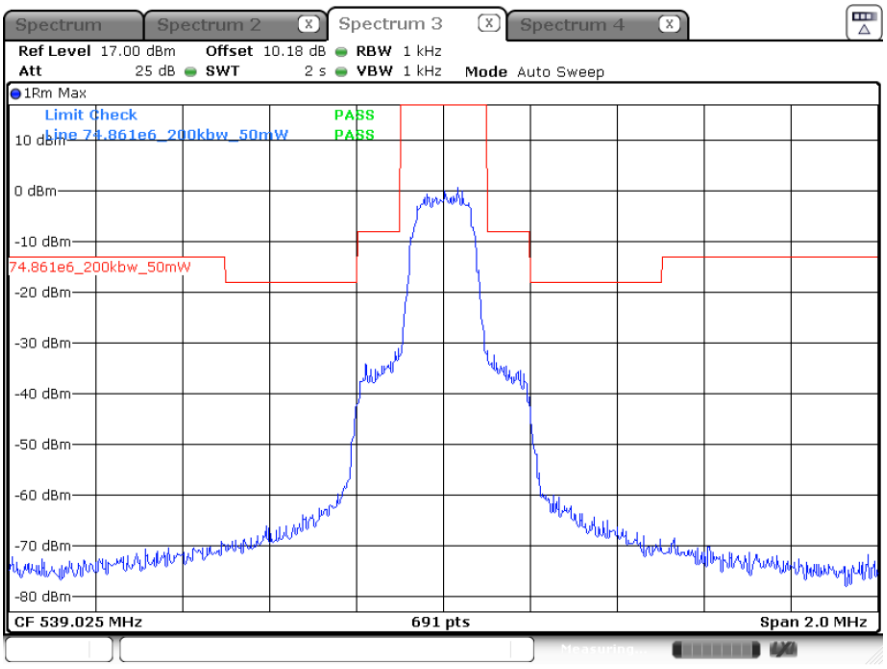

Date: 13.DEC.2024 21:09:25

**D2 mode: 539.025 MHz, Emission Mask (1)**



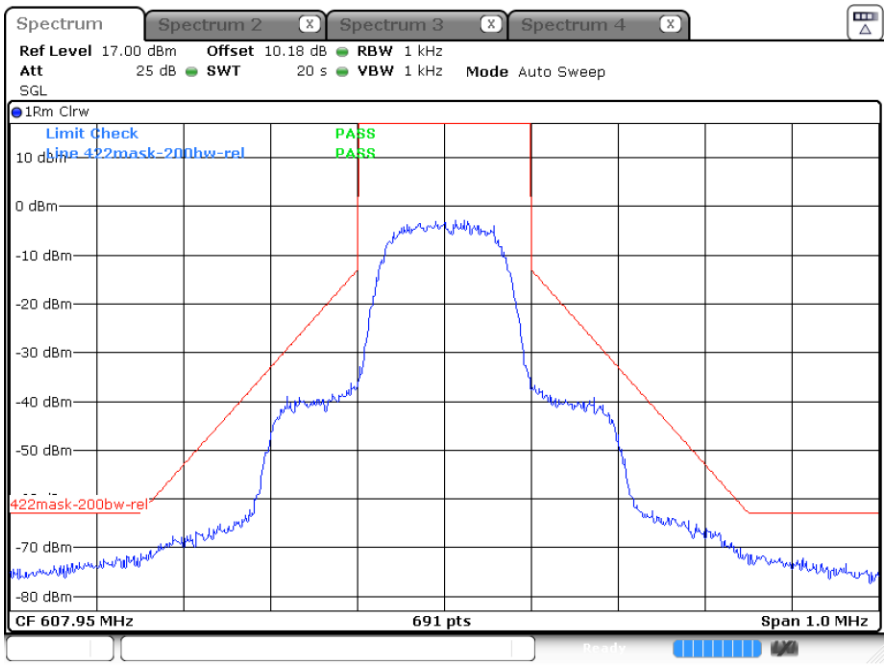

Date: 13.DEC.2024 21:12:48

**D2 mode: 539.025MHz, Emission Mask (2)**



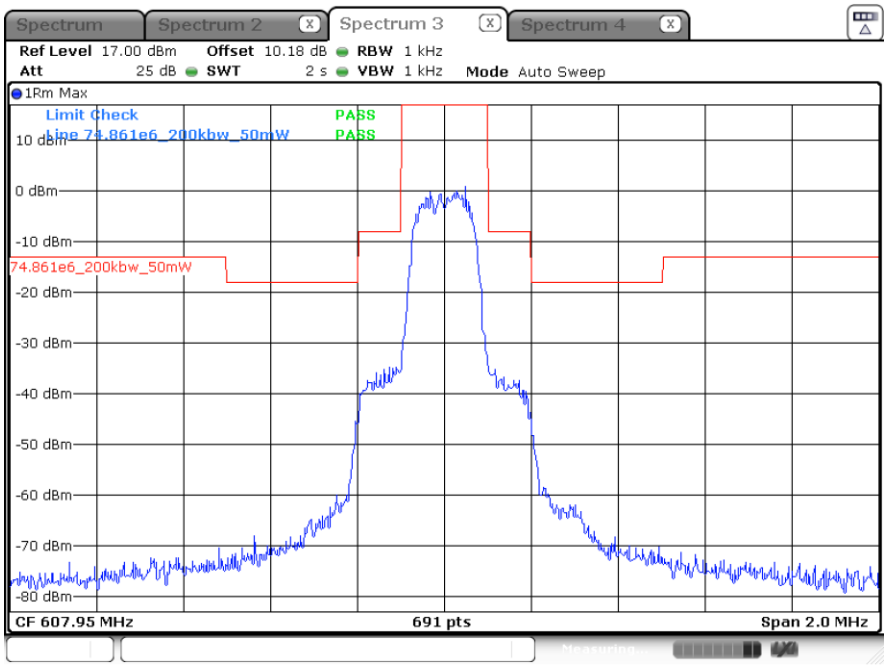

Date: 13.DEC.2024 21:13:55

## D2 mode: 607.950 MHz, Emission Mask (1)



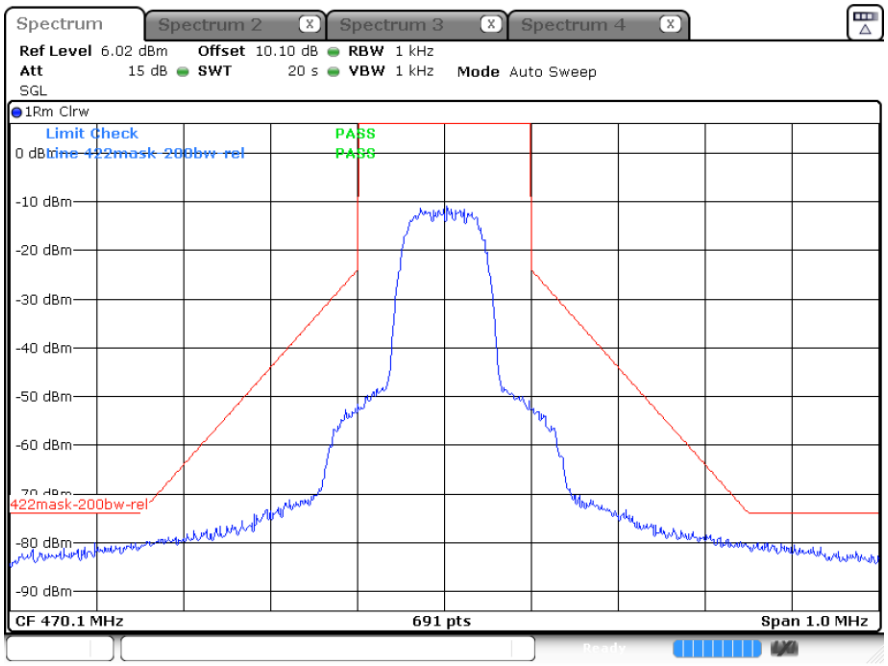

Date: 13.DEC.2024 21:21:38

## D2 mode: 607.950 MHz, Emission Mask (2)



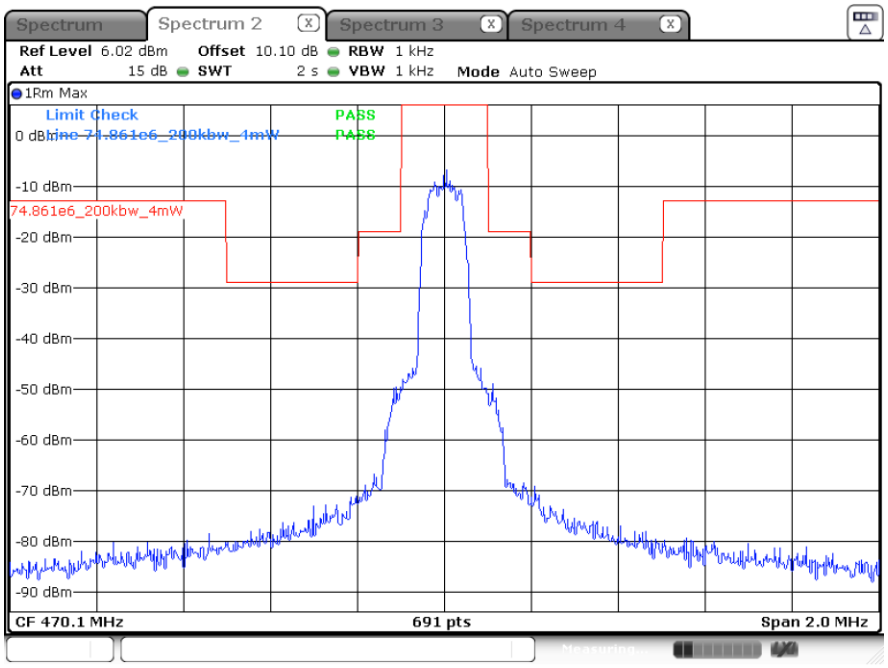

Date: 13.DEC.2024 21:20:49

**HDM mode: 470.100 MHz, Emission Mask (1)**



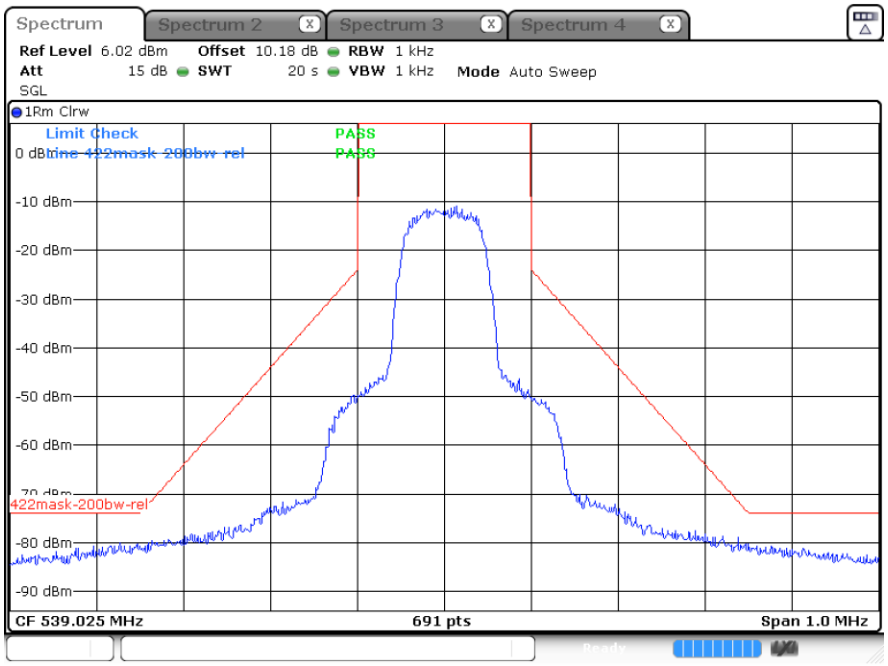

Date: 13.DEC.2024 21:08:37

**HDM mode: 470.100 MHz, Emission Mask (2)**



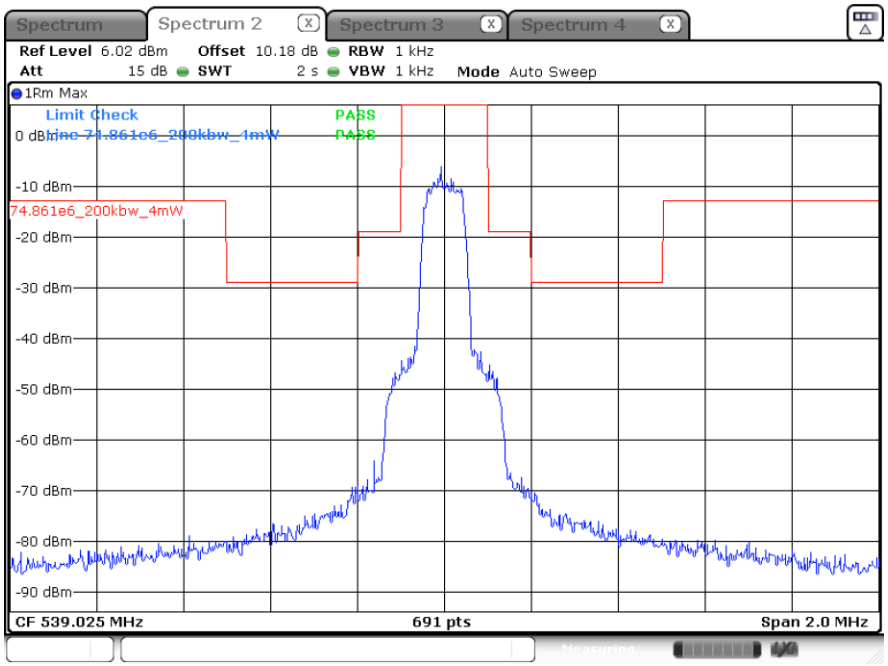

Date: 13.DEC.2024 21:09:02

**HDM mode: 539.025 MHz, Emission Mask (1)**



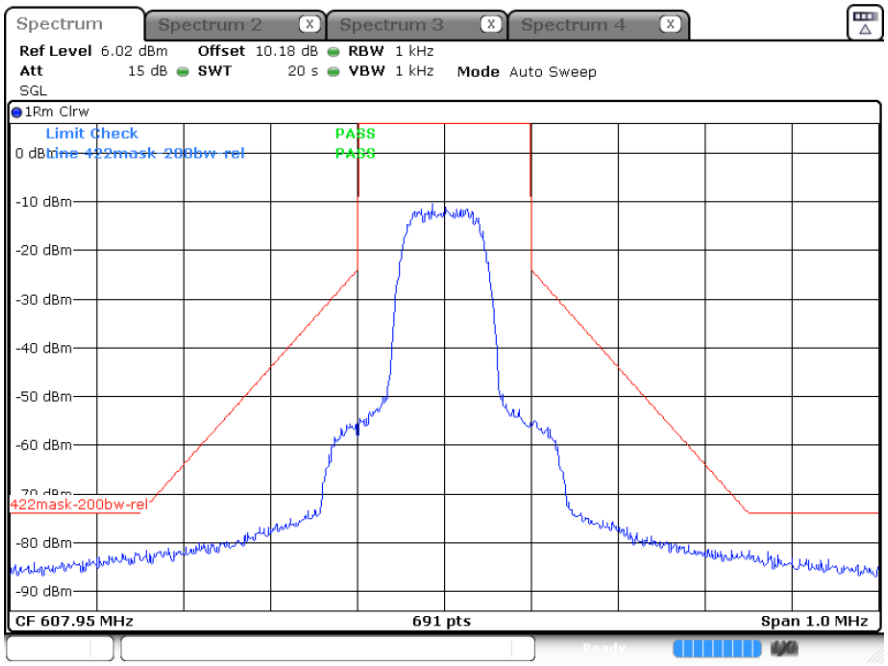

Date: 13.DEC.2024 21:16:17

**HDM mode: 539.025 MHz, Emission Mask (2)**



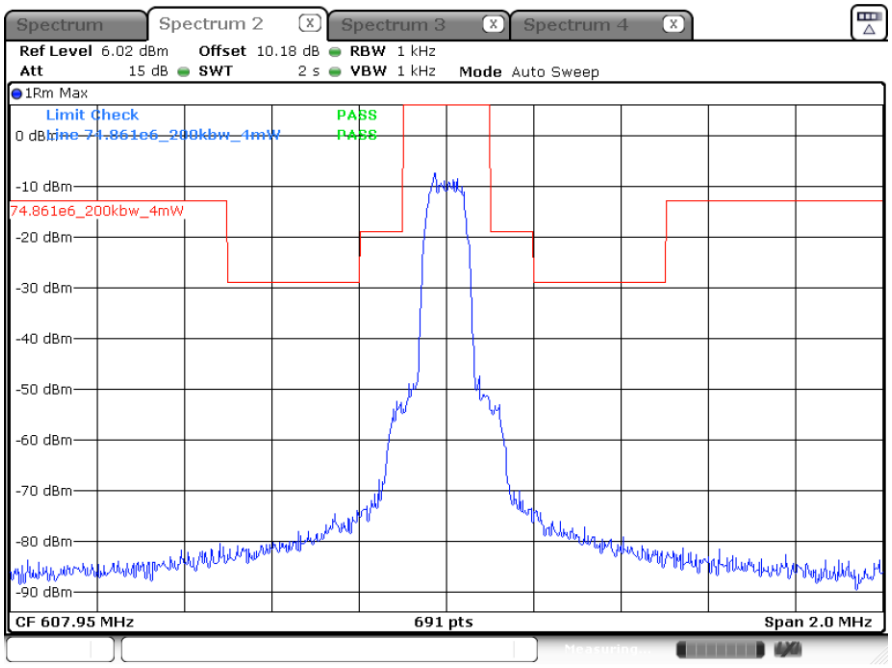

Date: 13.DEC.2024 21:15:34

**HDM mode: 607.950 MHz, Emission Mask (1)**




Date: 13.DEC.2024 21:18:35

**HDM mode: 607.950 MHz, Emission Mask (2)**




Date: 13.DEC.2024 21:19:24

# 6. FCC §74.861 (e)(7)(iv), RSS-210 Section G.5 & ETSI EN 300 422-1 (4.2.4.1.2) – Spurious Emissions at Antenna Port

## 6.1 Applicable Standards

According to FCC §74.861 (e)(7)(iv):

Emissions outside of the emission masks listed in paragraphs (e)(7)(i) through (e)(7)(iii) shall comply with the limits specified in section 4.2.4.1.2 of ETSI EN 300 422-1 V2.2.1 (2021-11) (incorporated by reference, see § 74.35).

According to RSS-210 Section G.5:

The transmitter unwanted emissions shall meet and be measured according to the requirements in sections 4.2.4.1.2 and 4.2.4.2.2 of ETSI EN 300 422-1.

According to ETSI EN 300 422-1 V2.2.1 (2021-11) Section 4.2.4.1.2:

The level of transmitter unwanted emissions in the spurious domain shall not exceed the limits given in table 4.

**Table 4: Transmitter unwanted emission limits (from ERC Recommendation 74-01 [2])**

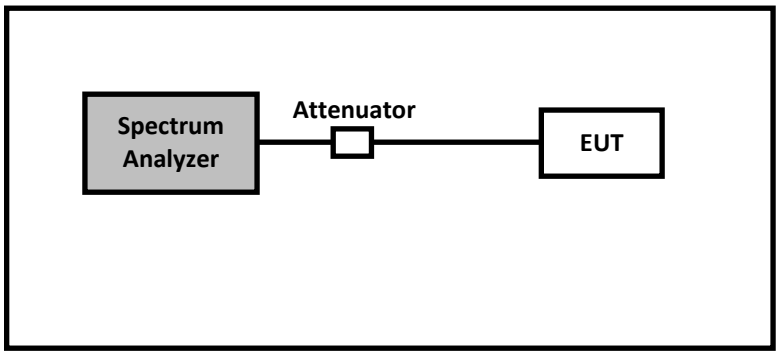
| Frequency range | Maximum power | RBW |
|---|---|---|
| 9 kHz - 150 kHz | -36 dBm | 1 kHz |
| 150 kHz - 30 MHz | -36 dBm | 10 kHz |
| 30 MHz - 1 GHz | -36 dBm | $F_c + 2,5\ B \le f \le f_c + 4\ B$: 1 kHz<br>$F_c + 4\ B < f \le f_c + 10\ B$: 10 kHz<br>$f > f_c + 10\ B$: 100 kHz<br>$f < f_c - 10\ B$: 100 kHz<br>$f_c - 10\ B \le f < f_c - 4\ B$: 10 kHz<br>$f_c - 4\ B \le f \le f_c - 2,5\ B$: 1 kHz |
| except: | | |
| 47 MHz - 74 MHz<br>87,5 MHz - 118 MHz | -54 dBm | 100 kHz |
| 174 MHz - 230 MHz<br>470 MHz - 862 MHz | -54 dBm | $F_c + 2,5\ B \le f \le f_c + 4\ B$: 1 kHz<br>$F_c + 4\ B < f \le f_c + 10\ B$: 10 kHz<br>$f > f_c + 10\ B$: 100 kHz<br>$f < f_c - 10\ B$: 100 kHz<br>$f_c - 10\ B \le f < f_c - 4\ B$: 10 kHz<br>$f_c - 4\ B \le f \le f_c - 2,5\ B$: 1 kHz |
| | | |
| 1 GHz < $f \le F_{upper}$ | -30 dBm | $F_c + 2,5\ B \le f \le f_c + 10\ B$: 30 kHz<br>$F_c + 10\ B < f \le f_c + 12\ B$: 300 kHz<br>$f > f_c + 12\ B$: 1 MHz<br>$f < f_c - 12\ B$: 1 MHz<br>$f_c - 12\ B \le f < f_c - 10\ B$: 300 kHz<br>$f_c - 10\ B \le f \le f_c - 2,5\ B$: 30 kHz |

with B being the Declared Channel Bandwidth.

## 6.2 Test Procedure

Please refer to KDB 971168 D01 v03r01 Section 6 and ETSI EN 300 422-1 V2.2.1 (2021-11) Section 5.4.4.

## 6.3 Test Setup Block Diagram




## 6.4 Test Equipment List and Details

| BACL No. | Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Interval |
|---|---|---|---|---|---|---|
| 912 | Rohde & Schwarz | Signal Analyzer | FSV40 | 1321.3008k39 -101203-UW | 2024-07-25 | 1 year |
| - | - | 10dB Attenuator | - | - | Each time[1] | Each time[1] |
| - | - | RF Cable | - | - | Each time[1] | Each time[1] |

Note[1]: cable and attenuator 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".*

## 6.5 Test Environmental Conditions

| | |
|---|---|
| **Temperature:** | 17 to 19 ºC |
| **Relative Humidity:** | 47.2 to 51.7 % |
| **ATM Pressure:** | 101.2 to 101.7 kPa |

*The testing was performed by Arturo Reyes from 2024-12-04 to 2024-12-16 at RF test site.*

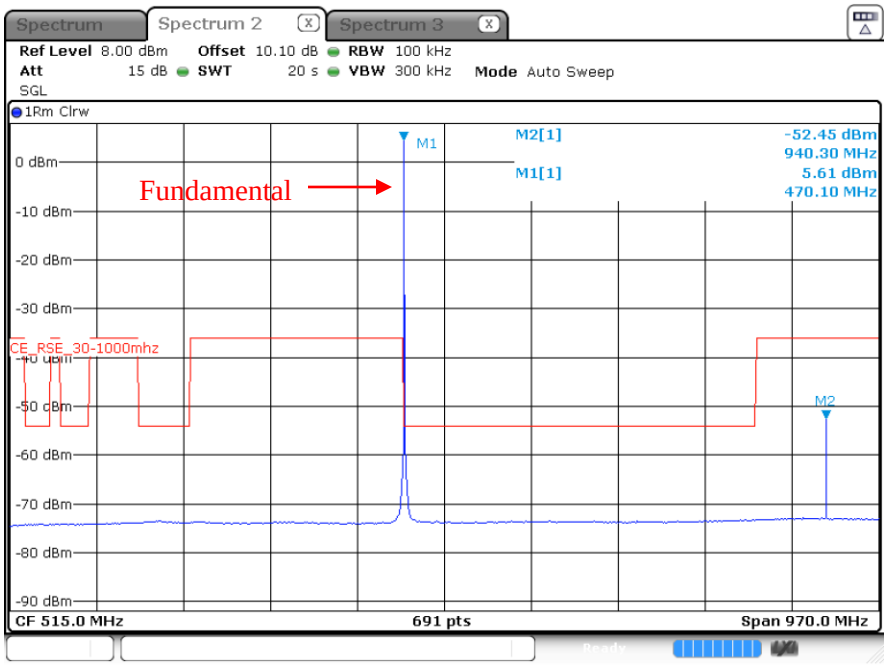
## 6.6 Test Results

Test Result: Pass

Please refer to Section 6.7 for detailed Spurious Emissions at Antenna Port plots.

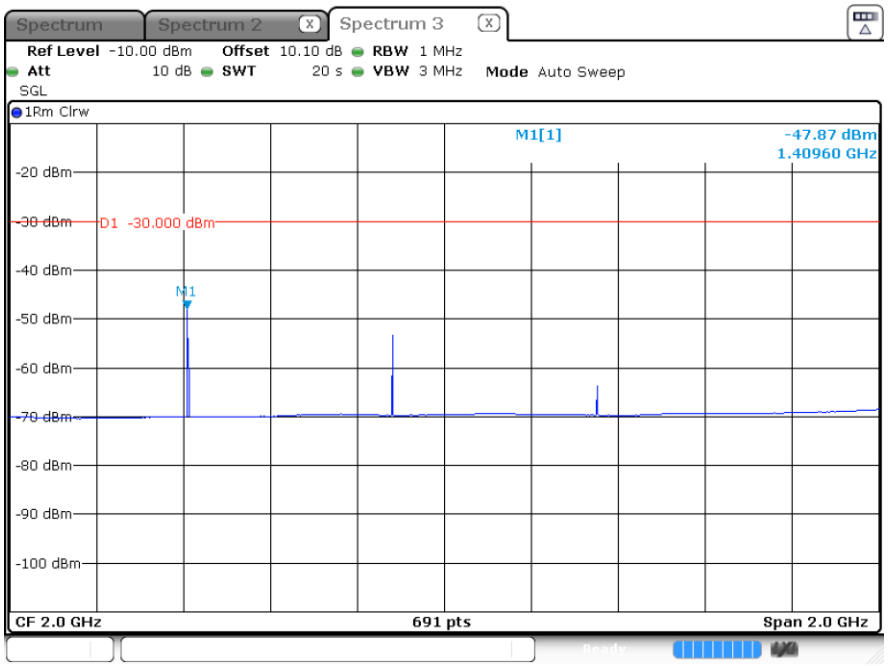
## 6.7 Spurious Emissions at Antenna Port Test Plots

**D2 mode: 470.100 MHz, 30-1000 MHz**



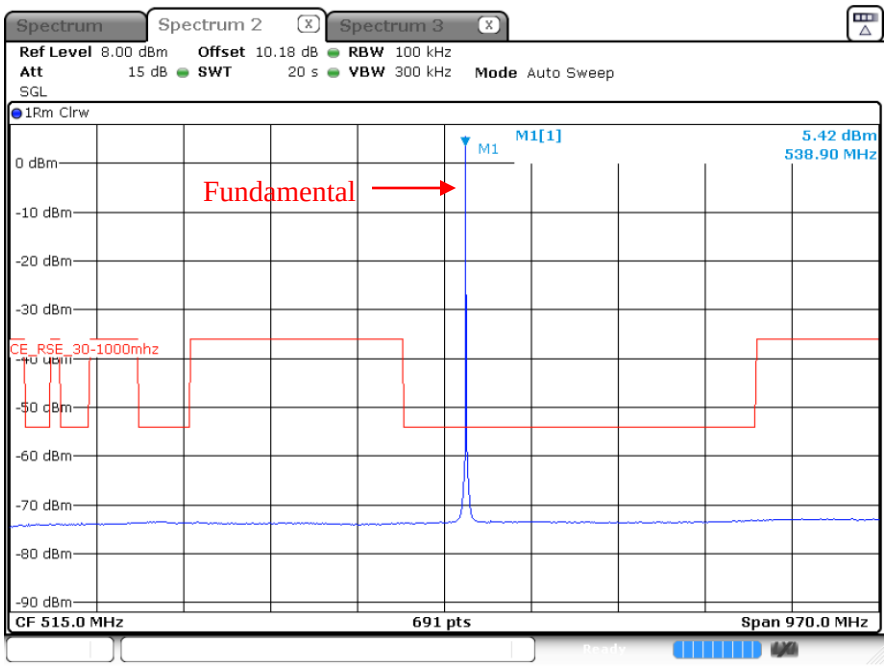

Date: 13.DEC.2024 21:34:49

**D2 mode: 470.100 MHz, Above 1 GHz**



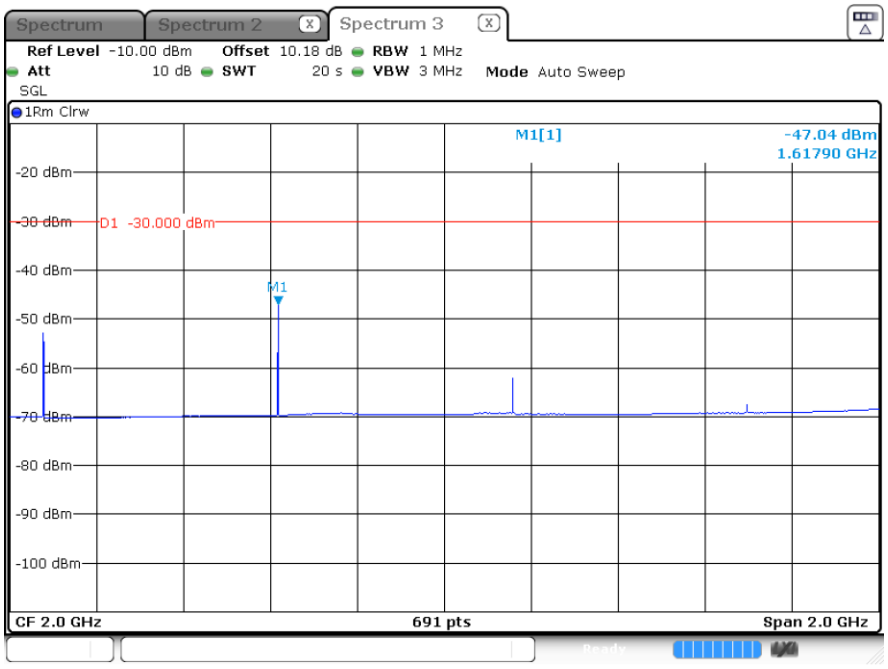

Date: 13.DEC.2024 21:35:45

**D2 mode: 539.025 MHz, 30-1000 MHz**



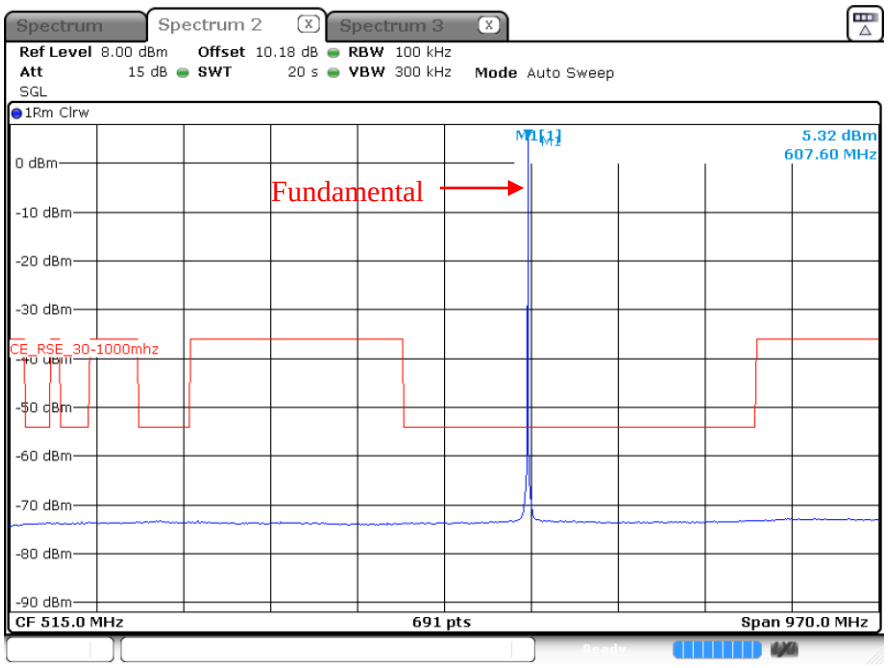

Date: 13.DEC.2024 21:53:21

**D2 mode: 539.025 MHz, Above 1 GHz**



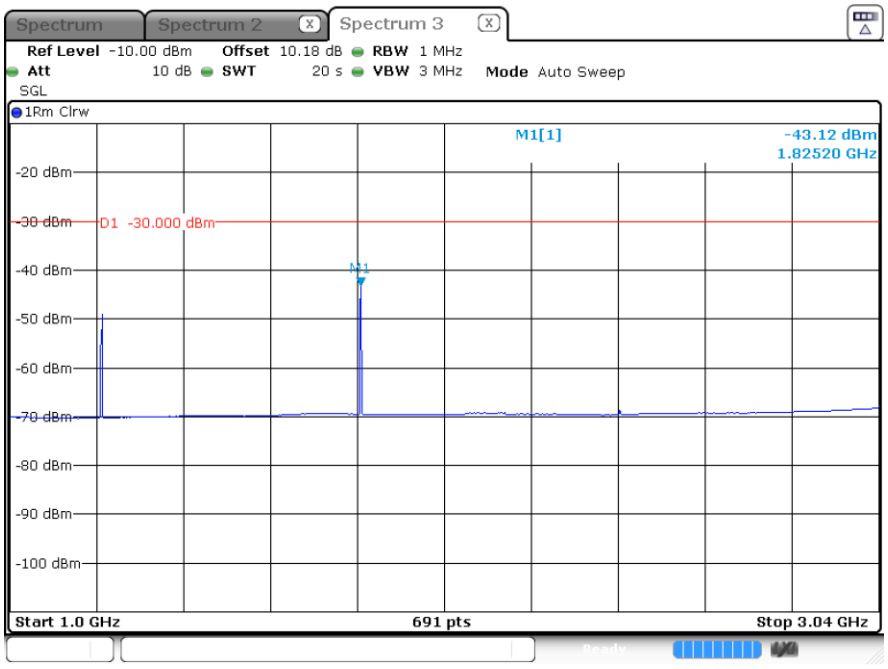

Date: 13.DEC.2024 21:54:19

**D2 mode: 607.950 MHz, 30-1000 MHz**



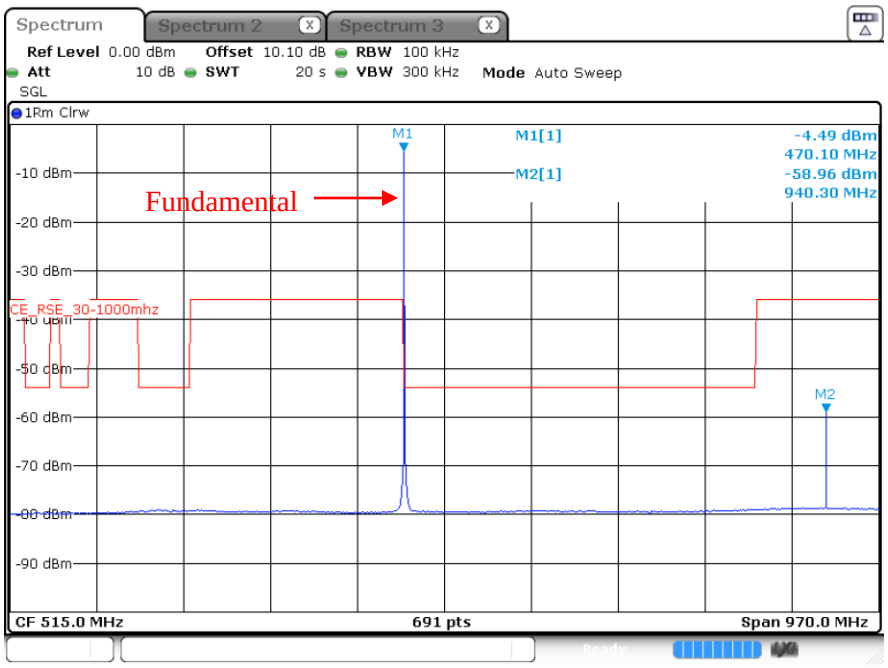

Date: 13.DEC.2024 22:06:40

**D2 mode: 607.950 MHz, Above 1 GHz**



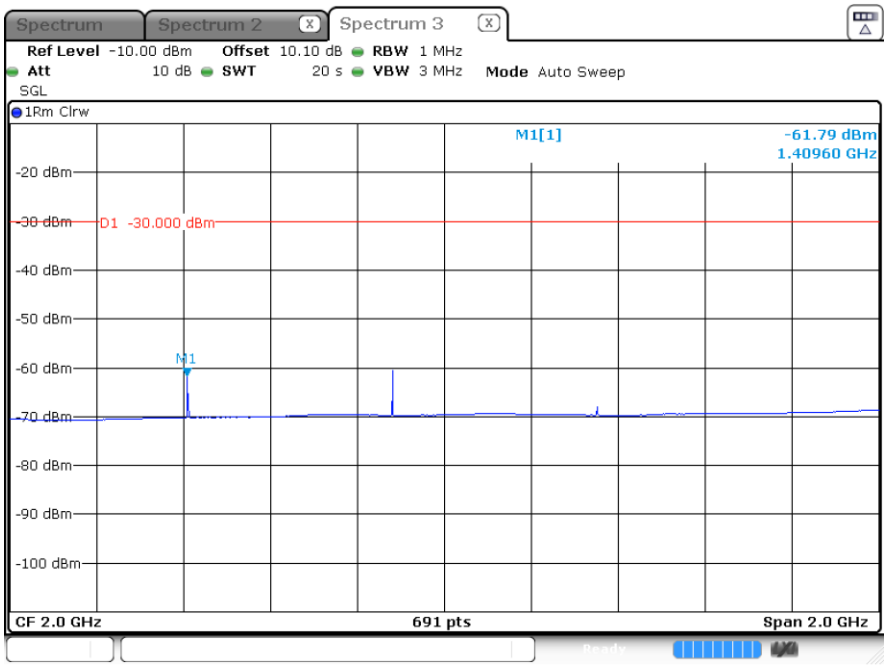

Date: 13.DEC.2024 22:10:00

**HDM mode: 470.100 MHz, 30-1000 MHz**



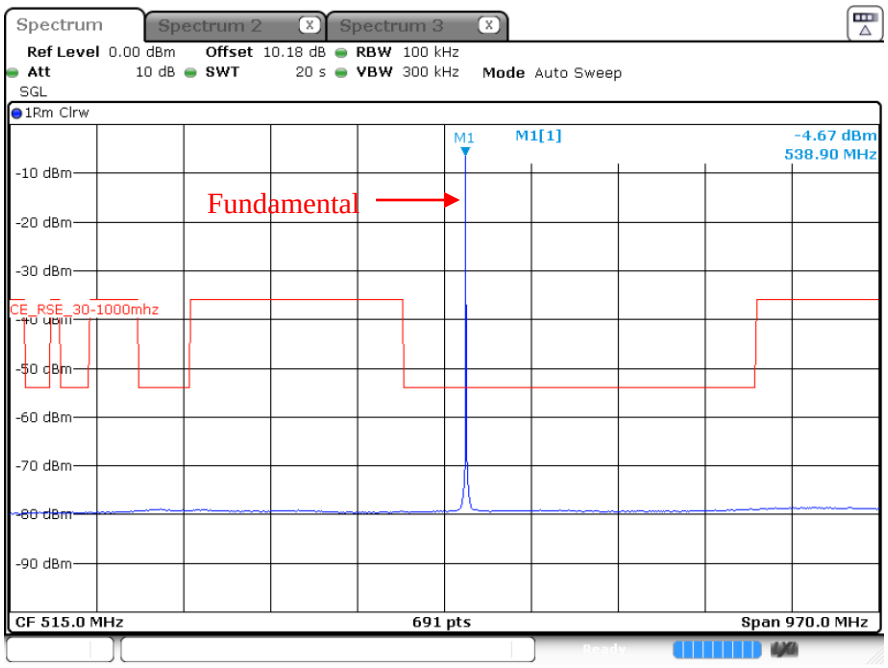

Date: 13.DEC.2024 21:40:23

**HDM mode: 470.100 MHz, Above 1 GHz**



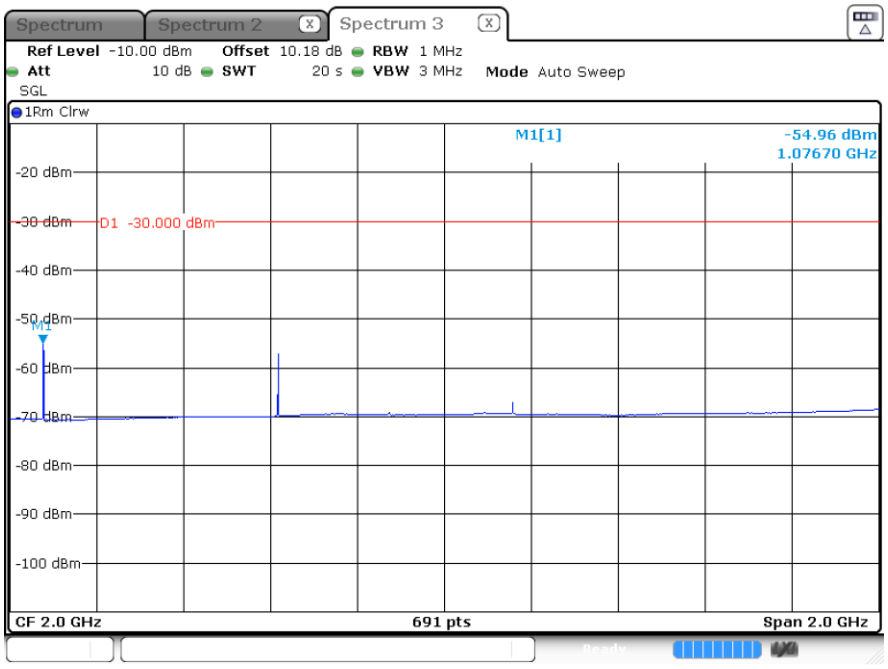

Date: 13.DEC.2024 21:36:46

**HDM mode: 539.025 MHz, 30-1000 MHz**



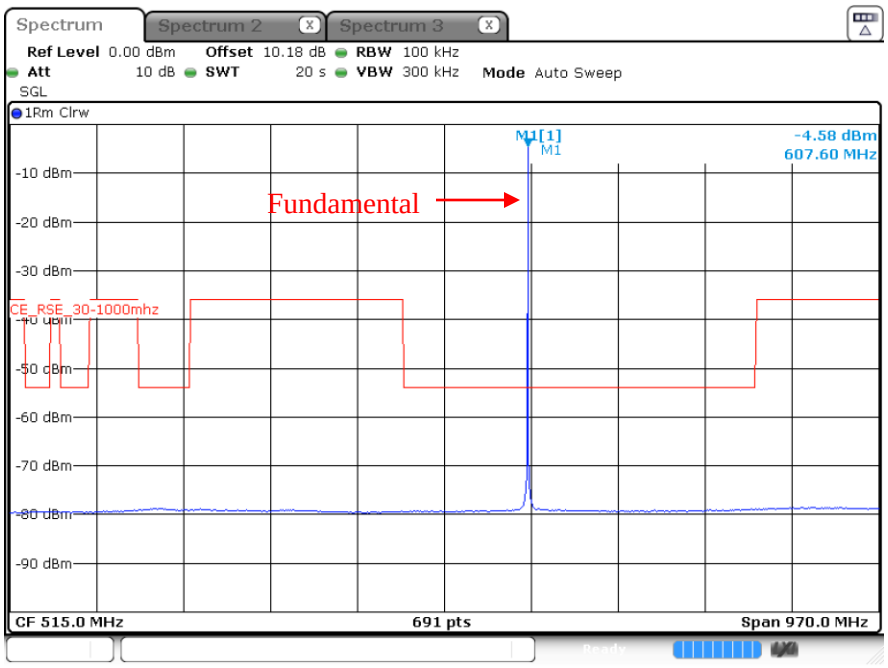

Date: 13.DEC.2024 21:52:14

**HDM mode: 539.025 MHz, Above 1 GHz**



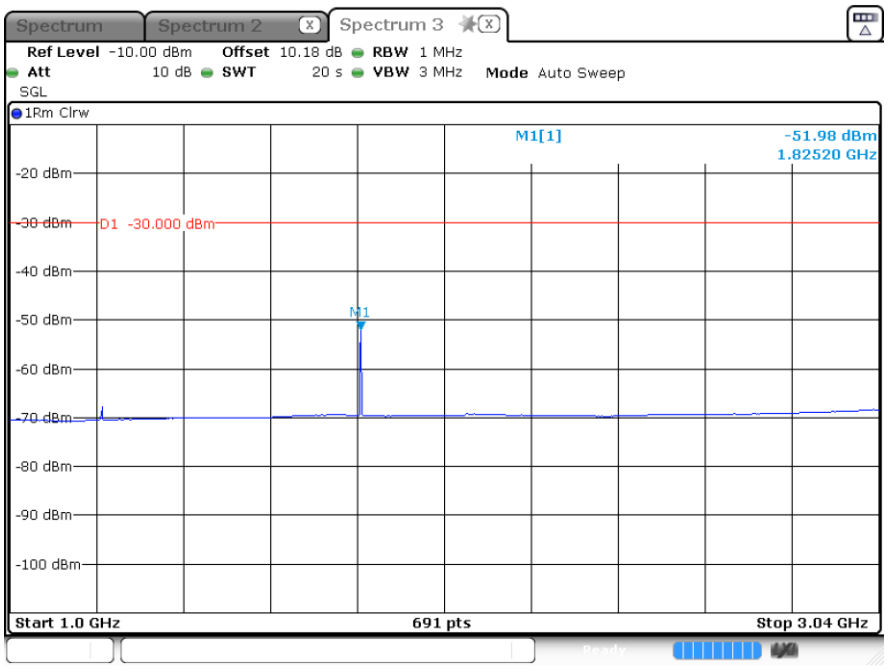

Date: 13.DEC.2024 21:50:19

**HDM mode: 607.950 MHz, 30-1000 MHz**




Date: 13.DEC.2024 22:07:47

**HDM mode: 607.950 MHz, Above 1 GHz**




Date: 13.DEC.2024 22:09:22

# 7. FCC §74.861 (e)(7)(iv), RSS-210 Section G.5 & ETSI EN 300 422-1 (4.2.4.1.2) – Field Strength of Spurious Radiation

## 7.1 Applicable Standards

According to FCC §74.861 (e)(7)(iv):

Emissions outside of the emission masks listed in paragraphs (e)(7)(i) through (e)(7)(iii) shall comply with the limits specified in section 4.2.4.1.2 of ETSI EN 300 422-1 V2.2.1 (2021-11) (incorporated by reference, see § 74.35).

According to RSS-210 Section G.5:

The transmitter unwanted emissions shall meet and be measured according to the requirements in sections 4.2.4.1.2 and 4.2.4.2.2 of ETSI EN 300 422-1.

According to ETSI EN 300 422-1 V2.2.1 (2021-11) Section 4.2.4.1.2:

The level of transmitter unwanted emissions in the spurious domain shall not exceed the limits given in table 4.

**Table 4: Transmitter unwanted emission limits (from ERC Recommendation 74-01 [2])**

| Frequency range | Maximum power | RBW |
|---|---|---|
| 9 kHz - 150 kHz | -36 dBm | 1 kHz |
| 150 kHz - 30 MHz | -36 dBm | 10 kHz |
| 30 MHz - 1 GHz | -36 dBm | $F_c + 2,5\ B \le f \le f_c + 4\ B$: 1 kHz<br>$F_c + 4\ B < f \le f_c + 10\ B$: 10 kHz<br>$f > f_c + 10\ B$: 100 kHz<br>$f < f_c - 10\ B$: 100 kHz<br>$f_c - 10\ B \le f < f_c - 4\ B$: 10 kHz<br>$f_c - 4\ B \le f \le f_c - 2,5\ B$: 1 kHz |
| except: | | |
| 47 MHz - 74 MHz<br>87,5 MHz - 118 MHz | -54 dBm | 100 kHz |
| 174 MHz - 230 MHz<br>470 MHz - 862 MHz | -54 dBm | $F_c + 2,5\ B \le f \le f_c + 4\ B$: 1 kHz<br>$F_c + 4\ B < f \le f_c + 10\ B$: 10 kHz<br>$f > f_c + 10\ B$: 100 kHz<br>$f < f_c - 10\ B$: 100 kHz<br>$f_c - 10\ B \le f < f_c - 4\ B$: 10 kHz<br>$f_c - 4\ B \le f \le f_c - 2,5\ B$: 1 kHz |
| | | |
| 1 GHz < $f \le F_{upper}$ | -30 dBm | $F_c + 2,5\ B \le f \le f_c + 10\ B$: 30 kHz<br>$F_c + 10\ B < f \le f_c + 12\ B$: 300 kHz<br>$f > f_c + 12\ B$: 1 MHz<br>$f < f_c - 12\ B$: 1 MHz<br>$f_c - 12\ B \le f < f_c - 10\ B$: 300 kHz<br>$f_c - 10\ B \le f \le f_c - 2,5\ B$: 30 kHz |

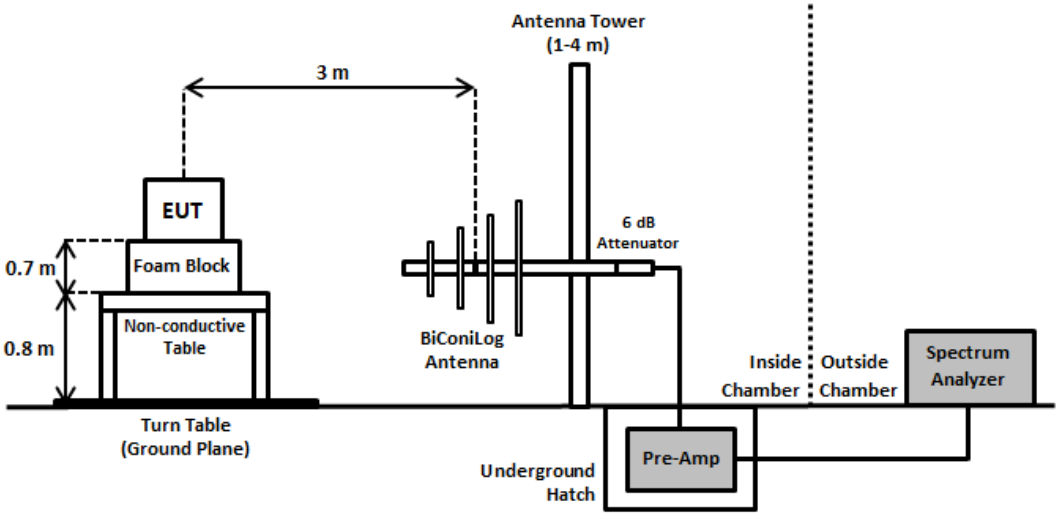
with B being the Declared Channel Bandwidth.

## 7.2 Test Procedure

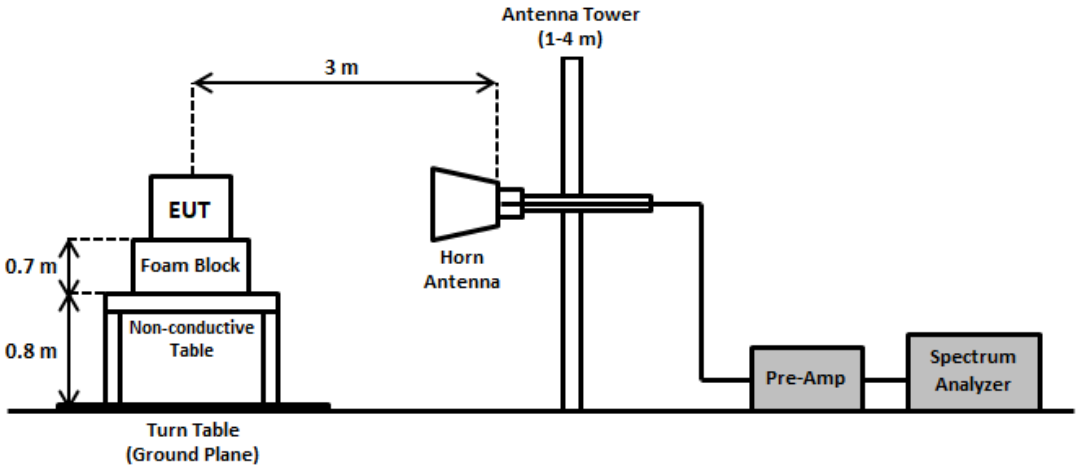
Please refer to KDB 971168 D01 v03r01 Section 7 and ETSI EN 300 422-1 V2.2.1 (2021-11) Section 5.4.4.

## 7.3 Test Setup Diagram

**Below 1 GHz**




**Above 1 GHz**



## 7.4 Test Equipment List and Details

| BACL No. | Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Interval |
|---|---|---|---|---|---|---|
| 1432 | Keysight Technologies | MXE EMI Receiver, Multi-touch | N9038B | MY60180008 | 2024-01-15 | 1 year |
| 316 | Sonoma Instruments | Preamplifier 10 kHz - 2.5 GHz | 317 | 260406 | 2024-08-30 | 6 months |
| 321 | Sunol Sciences | Biconilog Antenna | JB3 | A020106-2; 1504 | 2023-12-18 | 2 years |
| 1245 | - | Attenuator | PE7390-6 | 01182018A | 2023-12-18 | 2 years |
| 1248 | Pasternack | RG214 COAX Cable | PE3062 | NA | 2024-10-01 | 6 months |
| 1249 | Time Microwave | LMR-400 Cable Dc-3 GHz | AE13684 | 2k80612-5 6fts | 2024-04-09 | 1 year |
| 1359 | Pasternack | N 600in RF Cable | PE3496LF-600 | NA | 2024-07-26 | 6 months |
| 1246 | HEWLET PACKARD | RF Limiter | 11867A | 01734 | 2024-04-09 | 1 year |
| 568 | Com-Power | Dipole Antenna | AD-100 | 721033DB1, 721033DB2, 721033DB3, 721032DB4 | 2023-07-11 | 2 years |
| 1192 | ETS Lindgren | Horn Antenna | 3117 | 00218973 | 2024-10-23 | 2 years |
| 1449 | BACL | Preamplifier | BACL1313-A100M18G | 4052472 | 2024-08-19 | 6 months |
| 1295 | Carlisle Interconnected Technologies | 10m Coaxial Cable | UFB142A-1-3937-200200 | 64639890912-001 | 2024-10-16 | 6 months |
| 1397 | Mini Circuit | CBL ASSY 2.92MM PLUG TO PLUG 12" | FL086-12KM+ | QN2318110-2318 | 2024-08-16 | 6 months |
| 473 | EMCO | Horn Antenna | 3115 | 9511-4627 | 2024-11-26 | 2 years |
| 1130 | Aglient | MXG Analog Signal Generator | N5183A | MY50140453 | 2024-11-07 | 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".*

## 7.5 Test Environmental Conditions

| | |
|---|---|
| **Temperature:** | 22ºC |
| **Relative Humidity:** | 40% |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Arturo Reyes on 2024-12-18 in 5m Chamber 3.*

## 7.6 Test Results

**Note:** The data below are based on worst case mode (D2) when transmitting at maximum output power.

| Freq. (MHz) | S.A. Amp. (dBµV) | Table Azimuth (Degrees) | Test Antenna | | Substitution | | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (cm) | Polar (H/V) | Freq. (MHz) | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| **470.100 MHz** | | | | | | | | | | | |
| 51.91 | 35.75 | 360 | 150 | H | 51.91 | -82.98 | 0.70 | 0.83 | -83.11 | -54 | -29.11 |
| 50.24 | 36.62 | 360 | 150 | V | 50.24 | -80.72 | 1.20 | 0.83 | -80.35 | -54 | -26.35 |
| 1051.37 | 46.43 | 360 | 150 | H | 1051.37 | -67.32 | 5.78 | 1.35 | -62.89 | -30 | -32.89 |
| 1609.84 | 41.65 | 360 | 150 | V | 1609.84 | -72.12 | 5.78 | 1.35 | -67.69 | -30 | -37.69 |
| **539.025 MHz** | | | | | | | | | | | |
| 50.11 | 36.84 | 360 | 150 | H | 50.11 | -81.89 | 0.70 | 0.83 | -82.02 | -54 | -28.02 |
| 50.70 | 35.34 | 360 | 150 | V | 50.70 | -82.00 | 1.20 | 0.83 | -81.63 | -54 | -27.63 |
| 1052.80 | 47.04 | 360 | 150 | H | 1052.80 | -66.71 | 5.78 | 1.35 | -62.28 | -30 | -32.28 |
| 1116.76 | 42.12 | 360 | 150 | V | 1116.76 | -71.65 | 5.78 | 1.35 | -67.22 | -30 | -37.22 |
| **607.950 MHz** | | | | | | | | | | | |
| 51.15 | 38.05 | 360 | 150 | H | 51.15 | -80.68 | 0.7 | 0.83 | -80.81 | -54 | -26.81 |
| 50.49 | 38.31 | 360 | 150 | V | 50.49 | -79.03 | 1.2 | 0.83 | -78.66 | -54 | -24.66 |
| 1059.50 | 46.98 | 360 | 150 | H | 1059.50 | -66.77 | 5.78 | 1.35 | -62.34 | -30 | -32.34 |
| 1050.84 | 43.69 | 360 | 150 | V | 1050.84 | -70.08 | 5.78 | 1.35 | -65.65 | -30 | -35.65 |

# 8. FCC §2.1055, FCC §74.861 (e)(4), RSS-210 Section G.2 & G.3 – Frequency Stability

## 8.1 Applicable Standards

According to KDB 971168 D01 Section 9:

The frequency stability of the transmitter shall be measured while varying the ambient temperatures and supply voltages over the ranges specified in Section 2.1055. The specific frequency stability limits are provided in the relevant rules section(s).

According to FCC §74.861 (e)(4)::

The frequency tolerance of the transmitter shall be 0.005 percent.

According to RSS-210 Section G.2:

The transmit power shall be measured in terms of average value over any period of continuous transmission. The frequency bands, e.i.r.p., authorized bandwidth and frequency stability limits for devices are provided in table G1 for wireless microphones and table G2 for WMAS.

**Table G1: Specifications for wireless microphones**

| Frequency bands (MHz) | e.i.r.p. (mW) | Authorized bandwidth (kHz) | Frequency stability (± ppm) |
|---|---|---|---|
| 54-72<br>76-88<br>174-216 | ≤ 50 | ≤ 200 | ≤ 50 |
| 470-608 | ≤ 250 | ≤ 200 | ≤ 50 |
| 614-616<br>653-663 | ≤ 20 | ≤ 200 | ≤ 50 |

## 8.2 Test Procedure

According to FCC 2.1055:

a) The frequency stability shall be measured with variation of ambient temperature as follows:
   1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
   2) From −20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radio beacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.
   3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

c) The frequency stability shall be measured with variation of primary supply voltage as follows:
   1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
   2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
   3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

If an unmodulated carrier is not available, the measurement method shall be described in the test report.