**Test report issued under the responsibility of:**
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006
Canadian CAB Identifier: FR0003

# RADIO TEST REPORT

**FCC 47 CFR PART 15: 2023**
**RSS-247_Issue 2, February 2017**
**RSS-Gen Issue 4, November 2014**
**ANSI C 63.4:2014**
**ANSI C 63.10: 2013**

| | |
|---|---|
| **Company** .....: | **ENLESS WIRELESS** |
| Address.....: | 45 TER AVENUE DE VERDUN<br>33520 BRUGES<br>FRANCE |
| **Test item description**. .....: | **LoRa temperature & humidity wireless transmitter** |
| Trade Mark. .....: | ENLESS WIRELESS |
| Manufacturer.....: | ENLESS WIRELESS |
| Model/Type reference.....: | 600121402 / TX T&H AMB 600-121 |
| FCC ID.....: | 2BEZP600121 |
| IC. .....: | 32107-600121 |
| Ratings.....: | 3.6 Vdc to 3.8 Vdc |
| **Testing Laboratory** .....: | **EMITECH MONTPELLIER laboratory** |
| Address.....: | 145 rue de Massacan<br>34740 VENDARGUES<br>FRANCE |
| **Report Reference No**.....: | **RR-EVE-23B292-2A** |
| Test procedure. .....: | FCC IC Certification |
| Diffusion.....: | Mr PETIT |
| Applicant's name. .....: | ENLESS WIRELESS |
| Date of issue.....: | July 5, 2024 |
| Total number of pages.....: | 50 |
| Revision.....: | 0 |
| Compiled by.....: | Morgan PATEY |
| Approved by (+ signature). .....: | Olivier HEYER (Deputy Laboratory Manager) |

*Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above. This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.*

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**REVISION HISTORY:**

| Revision | Date | Modified pages | Modifications |
|---|---|---|---|
| 0 | July 5, 2024 | / | Creation |

# 1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **LoRa temperature & humidity wireless transmitter 600121402 / TX T&H AMB 600-121** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

**TESTING PROCEDURE AND TESTING LOCATION:**

| | |
|---|---|
| **Testing Location** ..... : | EMITECH MONTPELLIER laboratory |
| Address. ..... : | 145 rue de Massacan<br>34740 VENDARGUES<br>FRANCE |
| Test procedure. ..... : | FCC IC Certification |
| Tested by ..... : | Morgan PATEY |
| Test supervisor ..... : | None |
| Date of receipt of test item ..... : | N/A |
| Date (s) of performance of tests ..... : | From January the 5th to the 10th of 2024 |

**APPLICANT'S GENERAL INFORMATIONS:**

| | |
|---|---|
| **Company name** ..... : | ENLESS WIRELESS |
| Company address. ..... : | 45 TER AVENUE DE VERDUN<br>33520 BRUGES<br>FRANCE |
| Person(s) present during the tests. ..... : | No representative for company attended the tests. |
| Responsible. ..... : | Mr PETIT |

**GENERAL REMARKS:**

**The information in italics is declared by the manufacturer and is under his responsibility**
**The test results presented in this report relate only to the object tested.**
**The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.
Throughout this report the decimal separator is point.

**POSSIBLE TEST CASE VERDICTS:**

| | |
|---|---|
| Test case does not apply to the test object.: | N/A |
| Test case not performed..... : | N/P |
| Test object does meet the requirement..... : | P (Pass) |
| Test object does not meet the requirement. ..... : | F (Fail) |

**DEFINITIONS AND ABBREVIATIONS:**

| | | | | | |
|---|---|---|---|---|---|
| E.U.T. | Equipment Under Test | AE | Ancillary Equipment | Pk | Peak detector |
| RBW | Resolution BandWidth | VBW | Video BandWidth | QP | Quasi-peak detector |
| FSOATS | Free Space Open Area Test Site | FAR | Full Anechoic Room | Av | Average detector |
| VP | Vertical Polarization | HP | Horizontal Polarization | RMS | Root Mean Square |
| RF | Radio Frequency | N.T.R | Nothing To Report | N/C | Not Communicated |
| SAC | Semi Anechoic Chamber | | | | |

## 2. REFERENCE DOCUMENT(S)

| NORMATIVE REFERENCES: |
|---|
| The following referenced documents are necessary for the application of the present test report.<br><br>**FCC 47 CFR Part 15: October 2023**<br>Code of federal regulations – Title 47 telecommunication - Part 15 - Radio frequency devices<br><br>**FCC 47 CFR Part 15.247**<br>Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.<br><br>**RSS-247_Issue 3: August 2023**<br>Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence Exempt Local Area Network (LE-LAN) Devices<br><br>**RSS-Gen Issue 5: April 2018 / AMD1: 2019 / AMD2: 2021**<br>General Requirements for Compliance of Radio Apparatus<br><br>**ANSI C 63.10: 2013**<br>American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices<br><br>Although the product standard uses obsolete technical standards, the latest versions of standards achievable by the laboratory will be used for testing. |
| **INFORMATIVE REFERENCES:** |
| The following referenced documents are not necessary for the application of the present test report but they assist the user with regard to a particular subject area. |

# 3. EQUIPMENT TECHNICAL DESCRIPTION

## 3.1. Test Conditions

| | |
|---|---|
| Test item description. ..... : | LoRa temperature & humidity wireless transmitter |
| Model/Type reference..... : | 600121402 / TX T&H AMB 600-121 |
| Trade Mark. ..... : | ENLESS WIRELESS |
| Serial number (S/N)..... : | Not communicated |
| Part number (P/N). ..... : | Not communicated |
| Software version..... : | *Not communicated* |
| Firmware version..... : | *Not communicated* |
| Type of sample..... : | Standard equipment |
| Function(s)..... : | Not communicated |
| Manufacturer name. ..... : | ENLESS WIRELESS |
| Address. ..... : | 45 TER AVENUE DE VERDUN<br>33520 BRUGES<br>FRANCE |

**General product information:**

N/A

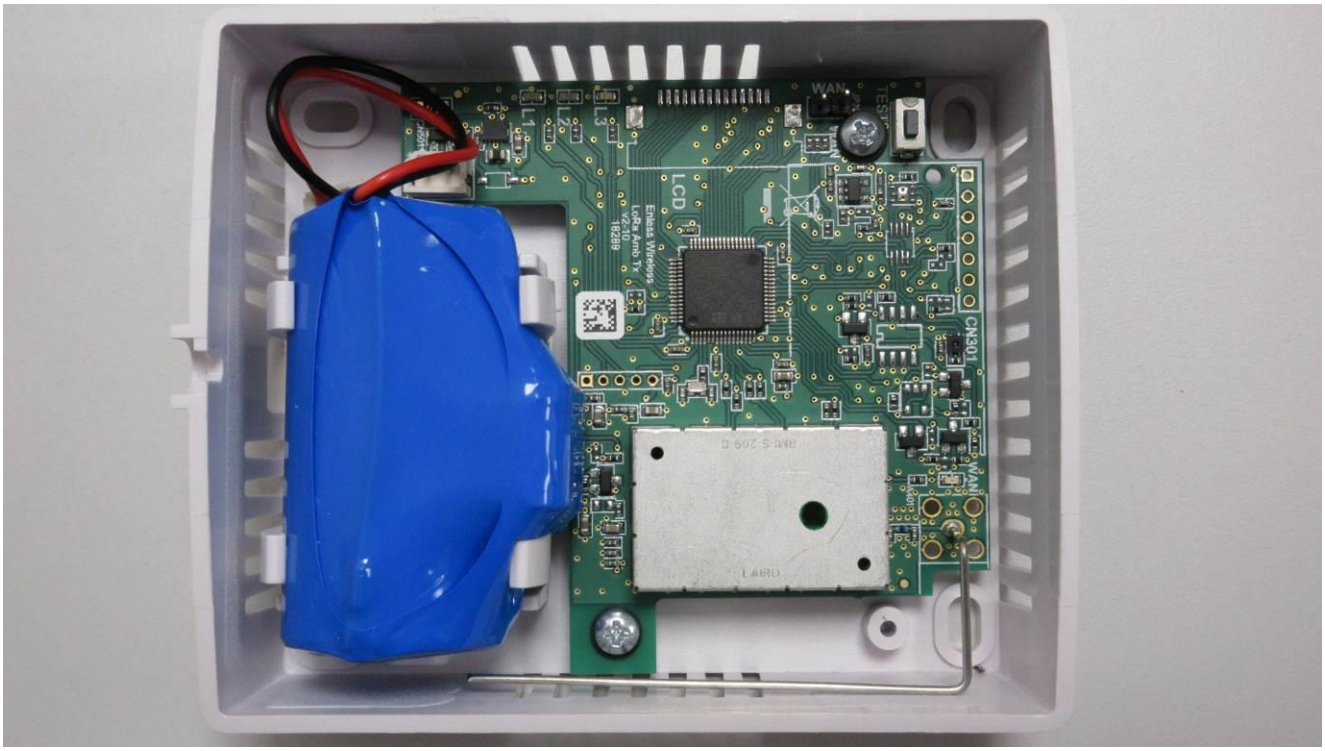
## 3.2. E.U.T. Marking plate

## 3.3. E.U.T. General view

## 3.4. E.U.T. Front view

## 3.5. E.U.T. Back view

## 3.6. E.U.T. Internal view & Electronic board



## 3.7. E.U.T. Mechanical and Electrical Design

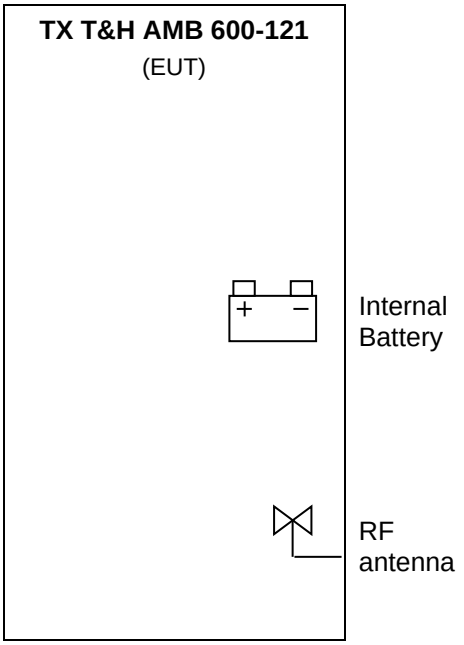
Power supply. ..... : *3.6 VDC*
Power supply range. ..... : *3.6 Vdc to 3.8 Vdc*
Power type. ..... : *Battery powered*
Power (W). ..... : *Not communicated*
Nominal current (A). ..... : *Not communicated*
Dimensions (L x W x H) (m). ..... : *0.100 x 0.080 x 0.035*
Weight (kg). ..... : *0.130*
Temperature range (°C). ..... : *-25 to +55*
Ground bounding strap. ..... : *No*

**Comments:**

*N/A*

.

## 3.8. E.U.T. Input/Output ports



| PORT | NAME | TYPE | LENGTH | CABLE TYPE | COMMENTS |
|---|---|---|---|---|---|
| 0 | Main frame | N/E | N/A | Plastic | N/A |
| 1 | Internal Battery | DC | N/A | N/A | 3.6 Vdc |
| 2 | RF antenna | RF | N/A | N/A | 915 MHz |

AC/DC ..... : AC/DC Converter port
AC ..... : Alternative current port
DC ..... : Direct current port
I/O ..... : Input or Output port
TP ..... : Telecommunication port
RF ..... : Radio frequency port
N/E ..... : Non Electrical port

## 3.9. EUT Radio Specifications

| a) GENERAL INFORMATIONS | |
|---|---|
| According to manufacturer's declarations : | |
| EUT type..... : | *Transceiver* |
| Technology ..... : | *LoRa* |
| Environmental profile..... : | *Data transmissions* |
| Temperature range..... : | *-25°C to +55°C* |
| Antenna type ..... : | *Internal* |
| Antenna Gain..... : | *Not communicated* |
| **Comments:** | |
| *N/A* | |

| b) TRANSMITTER PARAMETERS (TX) | |
|---|---|
| Frequency bands..... : | *902 MHz to 928 MHz* |
| RF Power..... : | *25 mw* |
| Number of channels / Separation..... : | 8 for DSSS/1.6MHz<br>64 for FHSS/200kHz (Refer to test report RR-EVE-23B292-1A) |
| Modulation type ..... : | *LoRa* |
| Tested frequency..... : | *903.0 MHz (Low channel)*<br>*907.8 MHz (Mid channel)*<br>*914.2 MHz (High channel)* |

| c) RECEIVER PARAMETERS (RX) | |
|---|---|
| Frequency bands..... : | *902 MHz to 928 MHz* |
| Bandwidth..... : | *Not communicated* |

## 4. RESULT SUMMARY

| TEST DESIGNATION | SEVERITY | VERDICT | COMMENTS |
|---|---|---|---|
| GENERAL | | | |
| Labeling requirements | | N/P | 15.19 / See certification documents |
| Information to user | | N/P | 15.21 / See certification documents |
| Home-built devices | | N/A | 15.23 |
| Kits | | N/A | 15.25 |
| Special Accessories | | N/P | 15.27 / See certification documents |
| Inspection by the Commission | | N/A | 15.29 |
| Measurement standards | | PASS | 15.31 |
| Test procedure for CPU boards and computer power supplies | | N/A | 15.32 |
| Frequency range of radiated measurements | | PASS | 15.33 |
| Measurement detector functions and bandwidths | | PASS | 15.35 |
| Transition provisions for compliance with the rules | | N/P | 15.37 / See certification documents |
| UNINTENTIONAL RADIATORS | | | |
| Equipment authorization | | | |
| - Verification | | N/A | 15.101 |
| - Declaration of Conformity | | N/A | |
| CPU boards and power supplies used in personal computers | | N/A | |
| Exempted device | | N/A | 15.102 |
| Information to the user | | N/P | 15.103 |
| Conducted limits | | N/A | 15.105 / See certification documents |
| Radiated emission limits | Class B | PASS | 15.107 / Battery powered equipment |
| Antenna power conduction limits for receivers | | N/A | 15.109 |
| Power line carrier systems | | N/A | 15.111 |
| TV interface devices, including cable system terminal devices | | N/A | 15.113 |
| TV broadcast receivers | | N/A | 15.115 |
| Cable ready consumer electronics equipment | | N/A | 15.117 |
| Program blocking technology requirements for TV receivers | | N/A | 15.118 |
| Scanning receivers and frequency converters used with scanning receivers | | N/A | 15.120 |
| Labeling of digital cable ready products | | N/A | 15.121 |
| INTENTIONAL RADIATORS | | | |

| TEST DESIGNATION | SEVERITY | VERDICT | COMMENTS |
|---|---|---|---|
| **Equipment authorization requirement** | | **PASS** | **15.201 / Transmitter part is subject to Certification procedure** |
| **Certified operating frequency range** | | **N/A** | **15.202** |
| **Antenna requirement** | | **PASS** | **15.203 / Dedicated integral antenna** |
| **External radio frequency power amplifiers and antenna modifications** | | **N/A** | **15.204** |
| **Restricted bands of operation** | | **PASS** | **15.205** |
| **Conducted limits** | | **N/A** | **15.207 / Battery powered equipment** |
| **Radiated emission limits; general requirements** | **Class B** | **PASS** | **15.209** |
| **Tunnel radio systems** | | **N/A** | **15.211** |
| **Modular transmitters** | | **N/A** | **15.212** |
| **Cable locating equipment** | | **N/A** | **15.213** |
| **Cordless telephones** | | **N/A** | **15.214** |
| **Additional provisions to the general radiated emission limits** | | **PASS** | **15.215** |
| **Operation within the band 902-928MHz, 2400-2483.5MHz and 5725-5850MHz** | | | **15.247** |
| - **Frequency hopping and digitally modulated** | | - | **a)** |
| - Frequency hopping system | | **N/A** | **a) (1) Refer to test report RR-EVE-23B292-1A** |
| - Digital modulation system | | **PASS** | **a) (2)** |
| - **Maximum peak conducted output power** | | **-** | **b)** |
| - For hopping system in the 2400-2483.5 MHz and 5725-5850 MHz bands | | **N/A** | **b) (1)** |
| - For hopping system in the 902-928MHz band | | **N/A** | **b) (2) Refer to test report RR-EVE-23B292-1A** |
| - For system using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands | | **PASS** | **b) (3)** |
| - **Operation with directional antenna gains > 6 dBi** | | **N/A** | **c)** |
| - **Out-of-band emissions** | | **PASS** | **d)** |
| - **Power spectral density conducted** | | **PASS** | **e)** |
| - **Hybrid system** | | **N/A** | **f)** |
| - **Frequency hopping additional requirements** | | **N/A** | **g)** |
| - **Frequency hopping intelligence** | | **N/A** | **h)** |
| - **RF exposure compliance** | | **PASS** | **i)** |

Sample subject to the test complies with the requirements of the reference document(s) listed in §2 of this test report and, where applicable, with deviation(s) specified in this document.

To declare, or not, the compliance with the specifications, it was not explicitly taken account of uncertainty associated with the results.

Opinion(s) and interpretation(s): N/A

## 5. MEASUREMENT UNCERTAINTY

| PARAMETER | MAXIMAL EMITECH UNCERTAINTY | MINIMAL STANDARD UNCERTAINTY |
|---|---|---|
| Radio frequency | ± 1 x $10^{-7}$ | ±1 x $10^{-7}$ |
| RF power, conducted | | |
| RF power | ± 0.8dB | ± 1 dB |
| Power spectral density | ± 2.3dB | ± 3 dB |
| Occuped bandwidth | | |
| RF power | ± 3.8 % | ± 5 % |
| Conducted emission (spurious) | | |
| f ≤ 1 GHz | ± 0.8 dB | ± 3 dB |
| 1 GHz - 12.75 GHz | ± 1.6 dB | |
| Radiated emission (ERP / EIRP) | | |
| f ≤ 62.5 MHz | ± 5.7 dB | ± 6 dB |
| 62.5 MHz - 1 GHz | ± 5.8 dB | ± 6 dB |
| 1 GHz - 18 GHz | ± 5.6 dB | ± 6 dB |
| 18 GHz – 40 GHz | ± 5.6 dB | ± 6 dB |
| Radiated emission (magnetic field) | | |
| 9kHz – 30MHz | ± 3.4 dB | ± 6 dB |
| Supply voltages | ± 3 % | ± 3 % |
| Temperature | ± 1 °C | ± 1°C |
| Humidity | ± 5 % | ± 5 % |
| Time / Duty cycle | ± 4.4 % | ± 5 % |
| Conducted emission (FCC) | | |
| (Artificial Mains Network) 150kHz – 30MHz | ± 3.4 dB | ± 3.4 dB |
| Radiated emission (electric field for FCC standard) | | |
| 9kHz – 30MHz | ± 2.7 dB | / |
| 30MHz – 1GHz | ± 5.0 dB | / |
| 1GHz – 18GHz | ± 5.3 dB | / |
| 18GHz – 40GHz | ± 6.1 dB | / |
| 40GHz – 140GHz | ± 5.7 dB | / |

For the calculation of expanded uncertainty, the confidence interval is 95 % (k=2).

# 6. TEST CONDITIONS AND RESULTS

## 6.1. Radiated emission limits

| | |
|---|---|
| **Reference standard:** | FCC 47 CFR Part 15.247; 15.209; 15.205<br>RSS-247; RSS-Gen |
| **Test method:** | ANSI C63.10: 2013 |
| **Test description: :** For f <30MHz, EUT is set on an insulating support at 80cmcm above the ground reference plane.<br>Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter in a semi-anechoic chamber. The EUT was rotated 360°in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°).<br>Final measurements (quasi-peak) were then performed in a 10-meter Open Area Test Site that complies to CISPR 16 in the same measurement conditions.<br>For f > 30MHz, EUT is set on an insulating support at 80cm above the ground reference plane (150cm for f >1GHz).<br>Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities.<br>Final measurements (quasi-peak or average) were then performed in a semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. The EUT was rotated 360° about its azimuth and adjusting the receive antenna height from 1 to 4 m.<br>All frequencies were investigated, where applicable.<br>For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded. | |

| TESTED CONFIGURATION | PARAMETER | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| Radiated measurement / 9 kHz to 30 MHz / 0° | 9kHz-30MHz | 15.209 | EMI4988 | **PASS** |
| Radiated measurement / 9 kHz to 30 MHz / 45° | 9kHz-30MHz | 15.209 | EMI4989 | **PASS** |
| Radiated measurement / 9 kHz to 30 MHz / 90° | 9kHz-30MHz | 15.209 | EMI4990 | **PASS** |
| Radiated measurement / 30 MHz to 1 GHz / All channels | 30MHz-1GHz | 15.209 | EMI4857 | **PASS** |
| Radiated measurement / 1 GHz to 12.75 GHz / Low channel | 1GHz-12.75GHz | 15.209 | EMI4869 | **PASS** |
| Radiated measurement / 1 GHz to 12.75 GHz / Mid channel | 1GHz-12.75GHz | 15.209 | EMI4870 | **PASS** |
| Radiated measurement / 1 GHz to 12.75 GHz / High channel | 1GHz-12.75GHz | 15.209 | EMI4871 | **PASS** |

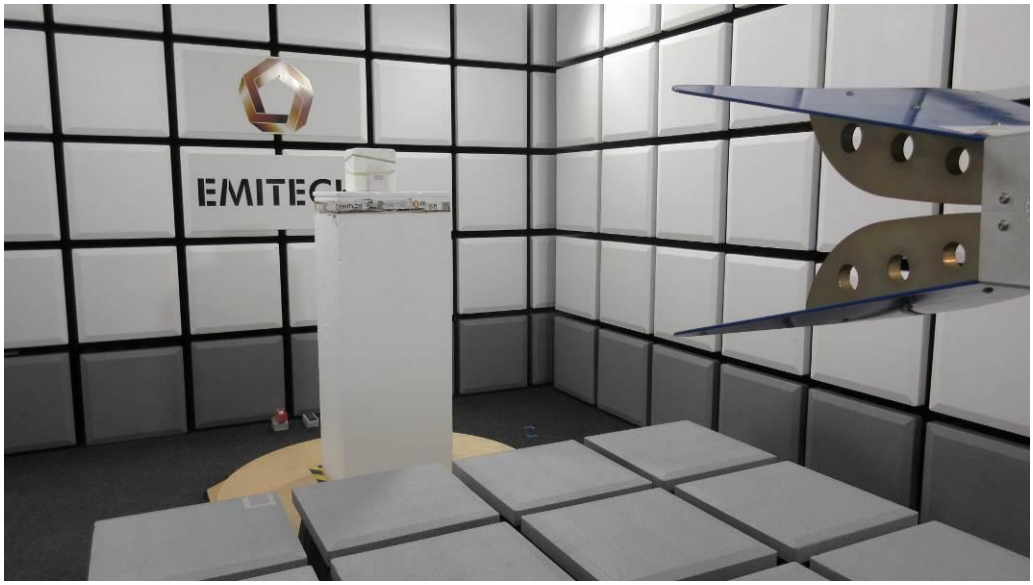
| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | *See Graph(s)* |
| Relative Humidity | 20 to 75 % | *See Graph(s)* |
| Atmospheric pressure | N/A | *See Graph(s)* |
| **Test method deviation:** N/A | | |
| Supplementary information: From 9 kHz to 30MHz: limit indicated on the curves is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.<br>From 30MHz to 1GHz Quasi peak limit provided is the limit given in §15.209.<br>Above 1GHz average limit in restricted bands §15.205 is 54dBµV/m. Otherwise, the limit is 20dB under carrier emission level at 3m without averaging. | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | Rohde & Schwarz | HFH2-Z2 | 5825 | 16/08/2022 | 16/10/2024 |
| Antenna | ETS lindgren | 3142E | 14523 | 27/01/2022 | 27/03/2025 |
| Antenna | AARONIA | Powerlog 70180 | 15306 | 04/01/2023 | 04/03/2026 |
| Cable | / | N-1m | 3625 | 02/05/2023 | 02/07/2025 |
| Cable | Techniwave | N-3.5m | 18353 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-4m | 18355 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-1.5m | 18341 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-1.5m | 18342 | 25/01/2022 | 25/03/2024 |
| Cable | SUCOFLEX | N-3m | 14378 | 17/08/2023 | 17/10/2025 |
| Cable | SUCOFLEX | N-6,5m | 14380 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-8m | 18349 | 17/08/2023 | 17/10/2025 |
| Filter | Micro-Tronics | HPM18865 | 12843 | 24/08/2021 | 24/10/2024 |
| Preamplifier | IMPULSE | CA118-546ACN | 9169 | 15/06/2023 | 15/08/2024 |
| Receiver | Rohde & Schwarz | ESW26 | 17791 | 08/02/2023 | 08/04/2024 |
| Receiver | Rohde & Schwarz | FSW43 | 14830 | 10/08/2022 | 10/10/2024 |
| Shielded enclosure | COMTEST | FAR-3m | 18014 | 17/08/2021 | 17/10/2024 |
| Shielded enclosure | COMTEST | SAC 3m | 14494 | 08/08/2023 | 08/10/2026 |
| Software | Nexio | BAT EMC | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/06/2022 | 07/08/2024 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/09/2023 | 25/11/2025 |

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

| TEST SETUP PHOTO(S) - EUT POSITION |
|---|
| |

| TEST SETUP PHOTO(S) - 30 MHZ TO 1 GHZ |
|---|
| |

| TEST SETUP PHOTO(S) - 1 GHZ TO 12.75 GHZ |
| --- |
|  |

| RADIATED EMISSION LIMITS – TABULATED RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 0° | | | | | | EMI4988 | |
| FREQUENCY (MHZ) | PEAK LEVEL (dBµA/m) | AVERAGE LEVEL (dBµA/m) | AVERAGE LIMIT (dBµA/m) | AVERAGE MARGIN (dB) | QPEAK LEVEL (dBµA/m) | QPEAK LIMIT (dBµA/m) | QPEAK MARGIN (dB) |
| N/A | N/A | N/A | N/A | N/A | N/P | N/A | N/A |
| COMMENT: | No spurious emissions were detected. | | | | | | |

| RADIATED EMISSION LIMITS – TABULATED RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 45° | | | | | | EMI4989 | |
| FREQUENCY (MHZ) | PEAK LEVEL (dBµA/m) | AVERAGE LEVEL (dBµA/m) | AVERAGE LIMIT (dBµA/m) | AVERAGE MARGIN (dB) | QPEAK LEVEL (dBµA/m) | QPEAK LIMIT (dBµA/m) | QPEAK MARGIN (dB) |
| N/A | N/A | N/A | N/A | N/A | N/P | N/A | N/A |
| COMMENT: | No spurious emissions were detected. | | | | | | |

| RADIATED EMISSION LIMITS – TABULATED RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 90° | | | | | | EMI4990 | |
| FREQUENCY (MHZ) | PEAK LEVEL (dBµA/m) | AVERAGE LEVEL (dBµA/m) | AVERAGE LIMIT (dBµA/m) | AVERAGE MARGIN (dB) | QPEAK LEVEL (dBµA/m) | QPEAK LIMIT (dBµA/m) | QPEAK MARGIN (dB) |
| N/A | N/A | N/A | N/A | N/A | N/P | N/A | N/A |
| COMMENT: | No spurious emissions were detected. | | | | | | |

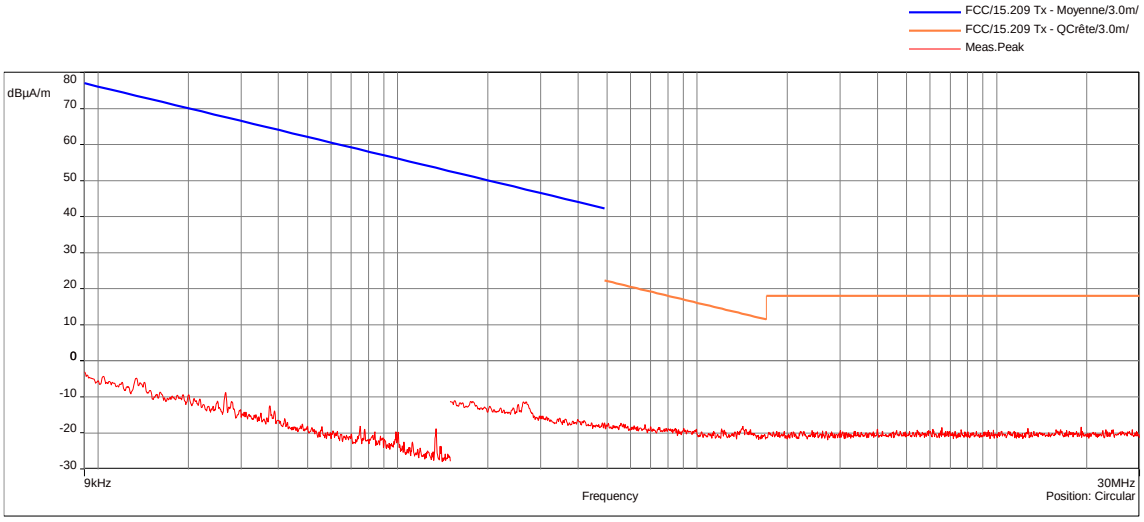
| RADIATED EMISSION LIMITS – TABULATED RESULTS | | | | | |
|---|---|---|---|---|---|
| RADIATED MEASUREMENT / 30 MHZ TO 1 GHZ / ALL CHANNELS | | | | | EMI4857 |
| FREQUENCY (MHZ) | POLARIZATION | PEAK LEVEL (dBµV/m) | QPEAK LEVEL (dBµV/m) | QPEAK LIMIT (dBµV/m) | MARGIN (dB) |
| 657.42 | Vertical | 31.63 | N/P | 46 | -14.37 |
| 796.29 | Vertical | 38.81 | N/P | 46 | -7.19 |
| 805.73 | Vertical | 39.98 | N/P | 46 | -6.02 |
| 823.26 | Vertical | 36.82 | N/P | 46 | -9.18 |
| 833.12 | Vertical | 34.81 | N/P | 46 | -11.19 |
| 871.15 | Vertical | 34.44 | N/P | 46 | -11.56 |
| 936.85 | Vertical | 36.00 | N/P | 46 | -10.00 |
| 946.16 | Vertical | 36.08 | N/P | 46 | -9.92 |
| 544.02 | Horizontal | 31.16 | N/P | 46 | -14.84 |
| 794.91 | Horizontal | 46.66 | 40.25 | 46 | -5.75 |
| 802.95 | Horizontal | 50.92 | 45.24 | 46 | -0.76 |
| 807.35 | Horizontal | 50.95 | 45.80 | 46 | -0.20 |
| 815.40 | Horizontal | 46.25 | 42.16 | 46 | -3.84 |
| 875.90 | Horizontal | 37.67 | N/P | 46 | -8.33 |
| 882.08 | Horizontal | 37.79 | N/P | 46 | -8.21 |
| 934.85 | Horizontal | 37.67 | N/P | 46 | -8.33 |
| 946.42 | Horizontal | 37.61 | N/P | 46 | -8.39 |
| COMMENT: | When margin between peak measurements and Qpeak limit(s) is > 6dB, no Qpeak measurements were performed. | | | | |

| RADIATED EMISSION LIMITS – TABULATED RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / LOW CHANNEL | | | | | | EMI4869 | |
| FREQUENCY (MHZ) | POLARIZATION | PEAK LEVEL (dBµV/m) | PEAK LIMIT (dBµV/m) | PEAK MARGIN (dB) | AVERAGE LEVEL (dBµV/m) | AVERAGE LIMIT (dBµV/m) | AVERAGE MARGIN (dB) |
| 1002.35 | Vertical | 47.91 | 74 | -26.08 | N/P | 54 | -6.08 |
| 1806.08 | Vertical | 52.12 | 88* | -35.88 | N/A | N/A | N/A |
| 5418.14 | Vertical | 44.82 | 74 | -29.18 | N/P | 54 | -9.18 |
| 9030.61 | Vertical | 52.59 | 74 | -21.41 | 44.55 | 54 | -1.41 |
| 1010.18 | Horizontal | 52.71 | 74 | -21.29 | 43.20 | 54 | -10.80 |
| 1805.69 | Horizontal | 49.78 | 88* | -38.22 | N/A | N/A | N/A |
| 5418.15 | Horizontal | 46.08 | 74 | -27.92 | N/P | 54 | -7.92 |
| 8811.66 | Horizontal | 48.75 | 88* | -39.25 | N/A | N/A | N/A |
| 9030.22 | Horizontal | 52.17 | 74 | -21.83 | 42.81 | 54 | -11.19 |
| COMMENT: | When margin between peak measurements and average limit is > 6dB, no average measurements were performed.<br>* According to the paragraph (d) §15.247, outside restricted bands the limit is 20 dBc under carrier emission level at 3m without averaging:<br>In this case 108 dBµV/m – 20 dB = 88 dBµV/m | | | | | | |

| RADIATED EMISSION LIMITS – TABULATED RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / MID CHANNEL | | | | | | EMI4870 | |
| FREQUENCY (MHZ) | POLARIZATION | PEAK LEVEL (dBµV/m) | PEAK LIMIT (dBµV/m) | PEAK MARGIN (dB) | AVERAGE LEVEL (dBµV/m) | AVERAGE LIMIT (dBµV/m) | AVERAGE MARGIN (dB) |
| 1011.36 | Vertical | 47.94 | 74 | -26.06 | N/P | 54 | -6.06 |
| 1815.48 | Vertical | 52.06 | 88* | -35.94 | N/P | N/A | N/A |
| 5446.74 | Vertical | 46.35 | 74 | -47.65 | N/P | 54 | -7.65 |
| 6933.16 | Vertical | 46.45 | 88* | -41.55 | N/A | N/A | N/A |
| 9080.35 | Vertical | 53.59 | 74 | -20.41 | 44.14 | 54 | -9.86 |
| 1012.93 | Horizontal | 52.57 | 74 | -21.43 | 42.17 | 54 | -11.83 |
| 1815.48 | Horizontal | 49.38 | 88* | -38.62 | N/A | N/A | N/A |
| 5445.95 | Horizontal | 45.93 | 74 | -28.07 | N/P | 54 | -8.07 |
| 9076.44 | Horizontal | 51.24 | 74 | -22.76 | 42.29 | 54 | -11.71 |
| COMMENT: | When margin between peak measurements and average limit is > 6dB, no average measurements were performed.<br>* According to the paragraph (d) §15.247, outside restricted bands the limit is 20 dBc under carrier emission level at 3m without averaging:<br>In this case 108 dBµV/m – 20 dB = 88 dBµV/m | | | | | | |

| RADIATED EMISSION LIMITS – TABULATED RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / HIGH CHANNEL | | | | | | EMI4871 | |
| FREQUENCY (MHz) | POLARIZATION | PEAK LEVEL (dBµV/m) | PEAK LIMIT (dBµV/m) | PEAK MARGIN (dB) | AVERAGE LEVEL (dBµV/m) | AVERAGE LIMIT (dBµV/m) | AVERAGE MARGIN (dB) |
| 1021.15 | Vertical | 46.10 | 74 | -27.89 | N/P | 54 | -7.89 |
| 1828.40 | Vertical | 52.19 | 88* | -35.81 | N/A | N/A | N/A |
| 5486.29 | Vertical | 46.66 | 88* | -41.34 | N/A | N/A | N/A |
| 8229.62 | Vertical | 47.97 | 74 | -26.03 | N/P | 54 | -6.03 |
| 9141.45 | Vertical | 50.23 | 74 | -23.77 | 41.89 | 54 | -12.11 |
| 1023.50 | Horizontal | 55.51 | 74 | -18.49 | 42.64 | 54 | -11.36 |
| 1827.62 | Horizontal | 48.91 | 88* | -39.09 | N/A | N/A | N/A |
| 5484.34 | Horizontal | 45.96 | 88* | -42.04 | N/A | N/A | N/A |
| 9139.50 | Horizontal | 48.75 | 74 | -25.25 | N/P | 54 | -5.25 |
| COMMENT: | When margin between peak measurements and average limit is > 6dB, no average measurements were performed.<br>* According to the paragraph (d) §15.247, outside restricted bands the limit is 20 dBc under carrier emission level at 3m without averaging:<br>In this case 108 dBµV/m – 20 dB = 88 dBµV/m | | | | | | |

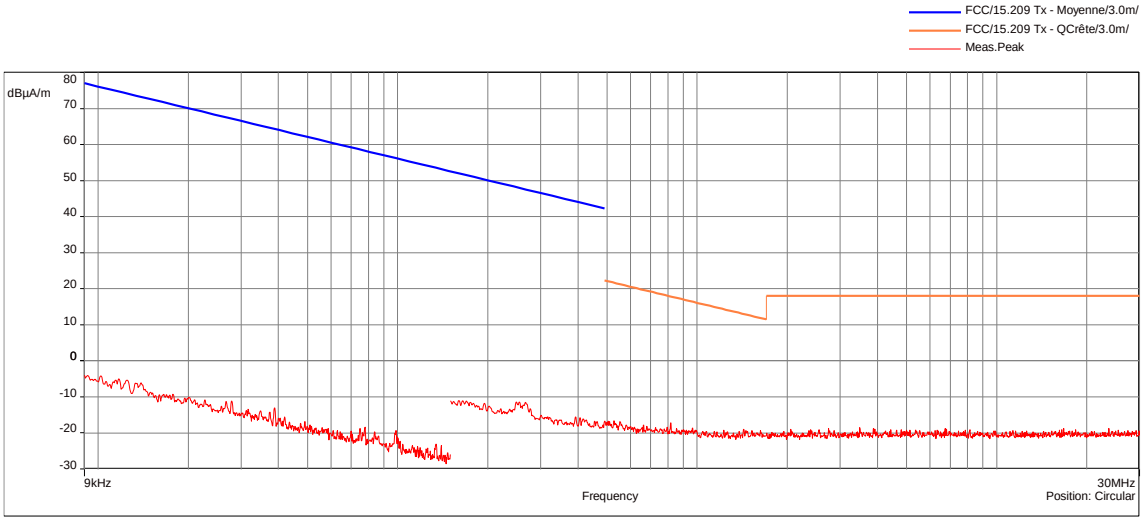
| RADIATED EMISSION LIMITS - GRAPH | | | |
|---|---|---|---|
| RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 0° | | EMI4988 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.2 |
| **Test Date:** | 10/01/2024 | **H (%):** | 32.1 |
| **Test Operator:** | MPA | **P (hPa):** | 1020 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>No spurious emissions were detected. | | | |

EUT modification(s): N/A

| RADIATED EMISSION LIMITS - GRAPH | | | |
|---|---|---|---|
| RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 45° | | EMI4989 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.2 |
| **Test Date:** | 10/01/2024 | **H (%):** | 32.1 |
| **Test Operator:** | MPA | **P (hPa):** | 1020 |

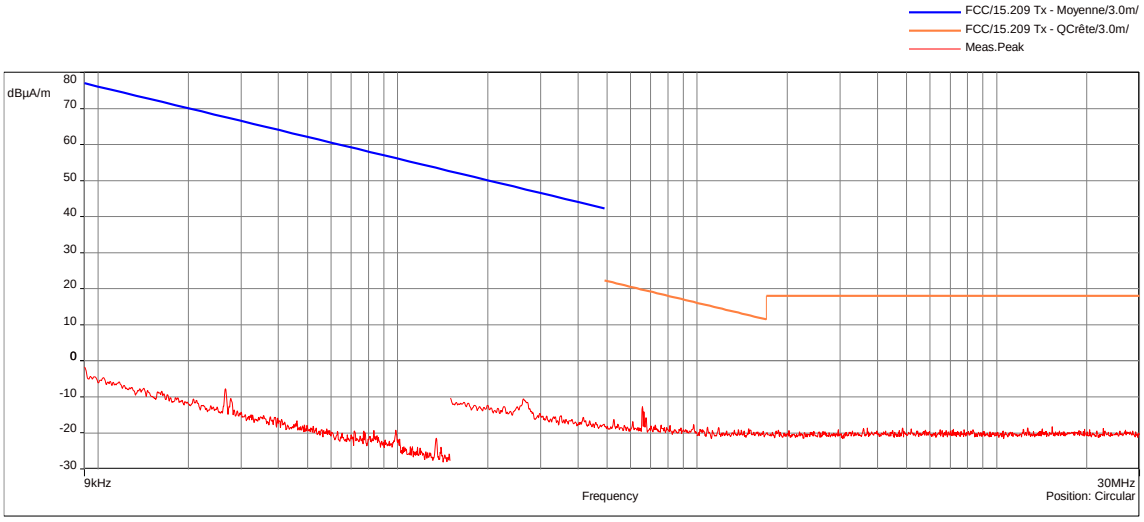



| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>No spurious emissions were detected. |

EUT modification(s): N/A

| RADIATED EMISSION LIMITS - GRAPH | | | |
|---|---|---|---|
| RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 90° | | EMI4990 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.2 |
| **Test Date:** | 10/01/2024 | **H (%):** | 32.1 |
| **Test Operator:** | MPA | **P (hPa):** | 1020 |

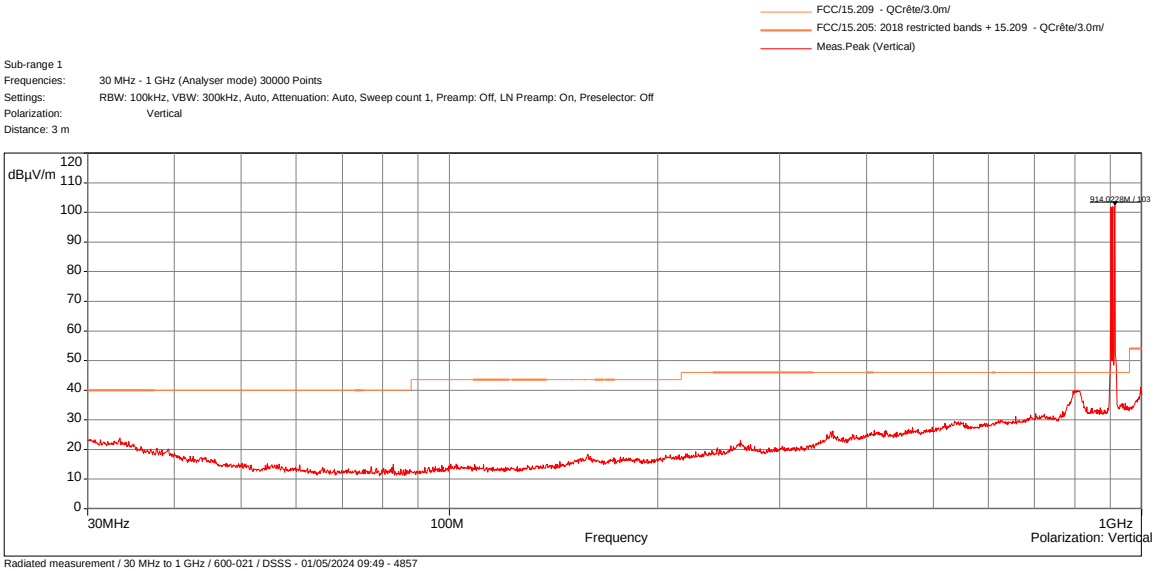


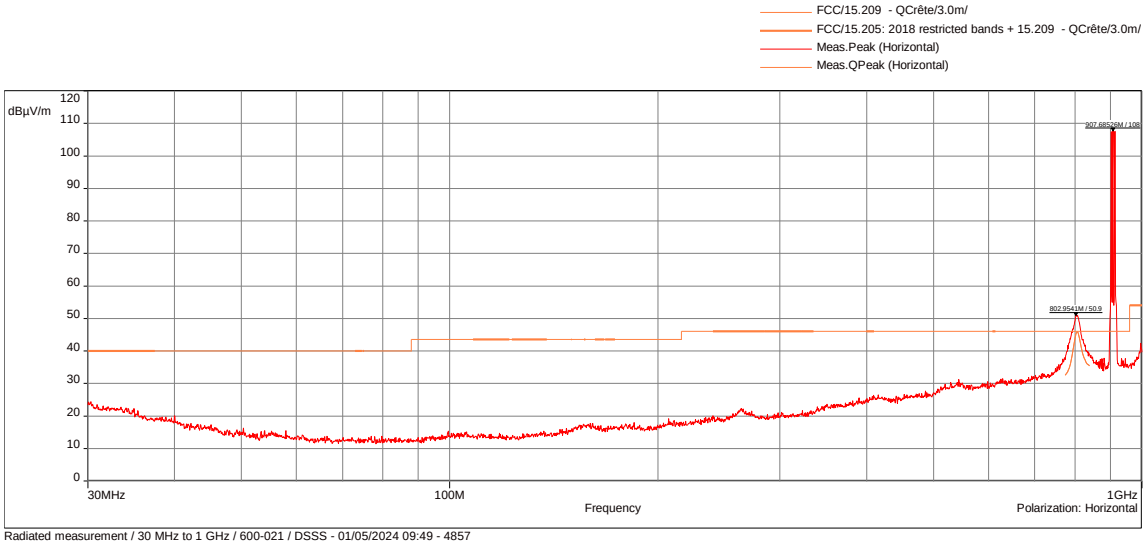

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>No spurious emissions were detected. |

EUT modification(s): N/A

| RADIATED EMISSION LIMITS - GRAPH | | | |
|---|---|---|---|
| RADIATED MEASUREMENT / 30 MHZ TO 1 GHZ / ALL CHANNELS | | EMI4857 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.7 |
| **Test Date:** | 05/01/2024 | **H (%):** | 43.5 |
| **Test Operator:** | MPA | **P (hPa):** | 1004 |

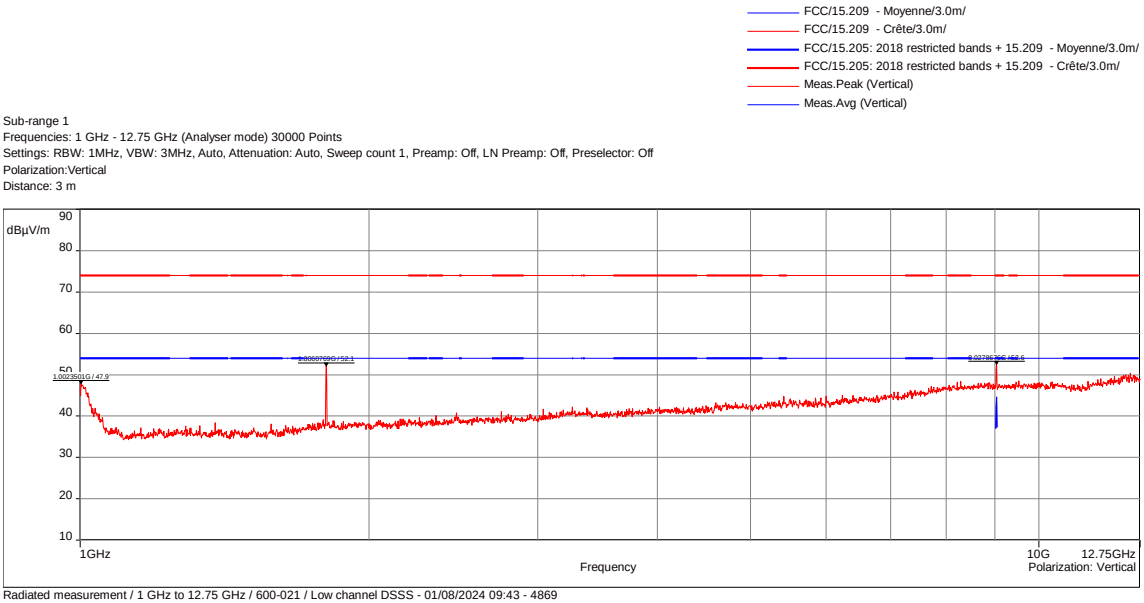


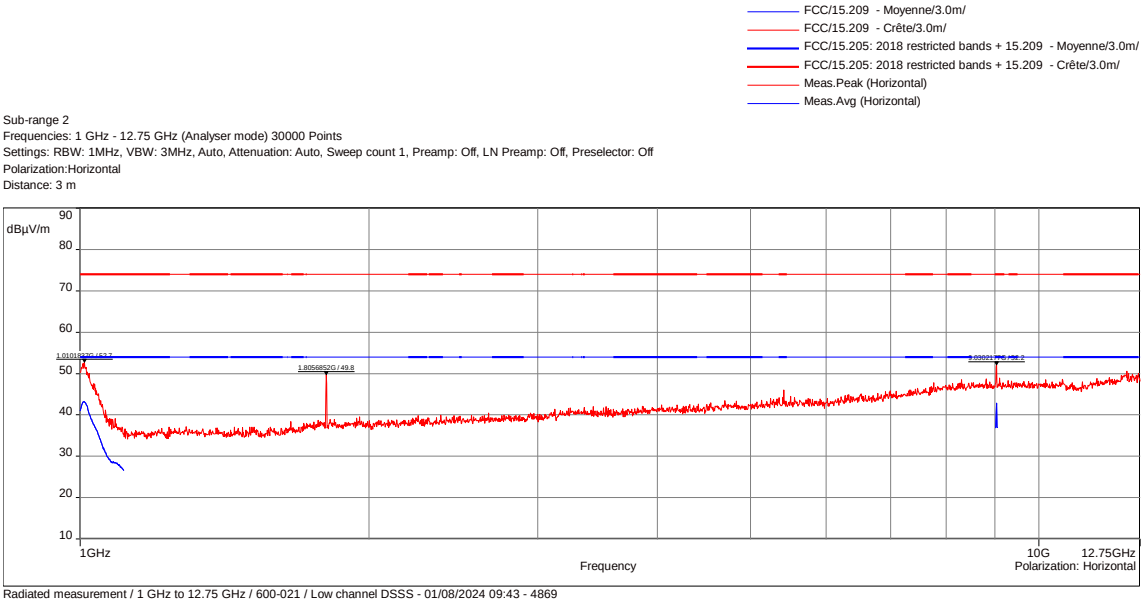

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 30MHz-1GHz | 100kHz | 300kHz | Peak |
| Horizontal | 30MHz-1GHz | 100kHz | 300kHz | Peak |
| Horizontal | 775MHz-840MHz | 120kHz | 360kHz | QPeak |
| **Configuration:** | N/A | | | |
| **Comments:** | Frequencies from 903MHz to 914.2MHz are the main carrier frequencies of the EUT's radio signals. | | | |

*EUT modification(s): N/A*

| RADIATED EMISSION LIMITS - GRAPH | | | |
|---|---|---|---|
| RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / LOW CHANNEL | | EMI4869 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 08/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1014 |




Radiated measurement / 1 GHz to 12.75 GHz / 600-021 / Low channel DSSS - 01/08/2024 09:43 - 4869



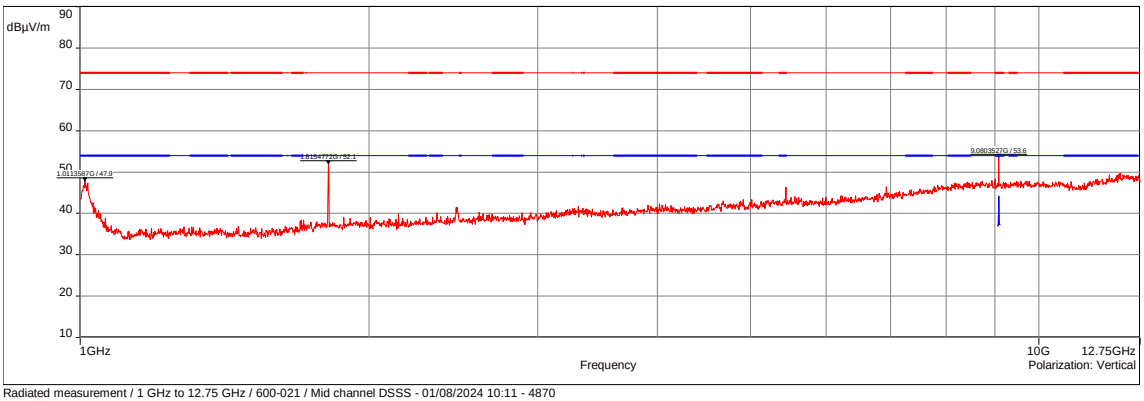

Radiated measurement / 1 GHz to 12.75 GHz / 600-021 / Low channel DSSS - 01/08/2024 09:43 - 4869

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 1GHz-12.75GHz | 1MHz | 3MHz | Peak / Average |
| Horizontal | 1GHz-12.75GHz | 1MHz | 3MHz | Peak / Average |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| RADIATED EMISSION LIMITS - GRAPH | | | |
|---|---|---|---|
| RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / MID CHANNEL | | EMI4870 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 08/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1014 |

FCC/15.209 - Moyenne/3.0m/
FCC/15.209 - Crête/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Moyenne/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Crête/3.0m/
Meas.Peak (Vertical)
Meas.Avg (Vertical)

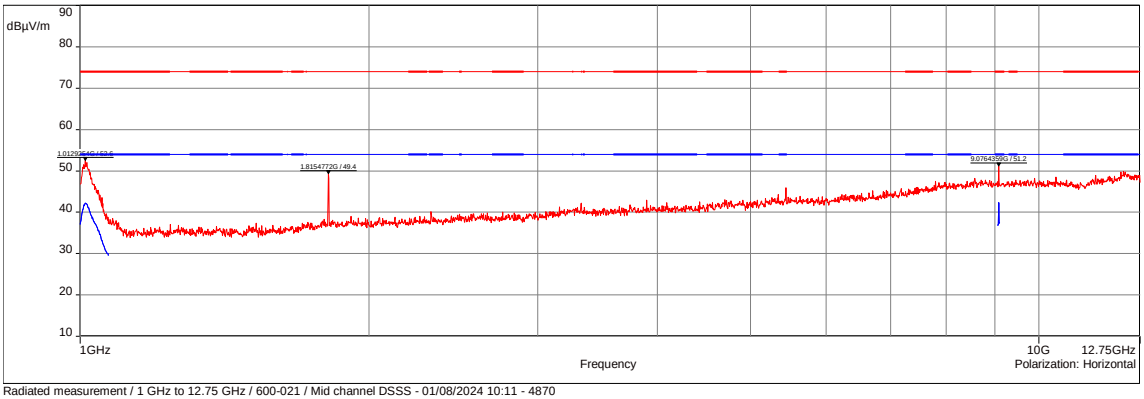
Sub-range 1
Frequencies: 1 GHz - 12.75 GHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m




Radiated measurement / 1 GHz to 12.75 GHz / 600-021 / Mid channel DSSS - 01/08/2024 10:11 - 4870

FCC/15.209 - Moyenne/3.0m/
FCC/15.209 - Crête/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Moyenne/3.0m/
FCC/15.205: 2018 restricted bands + 15.209 - Crête/3.0m/
Meas.Peak (Horizontal)
Meas.Avg (Horizontal)

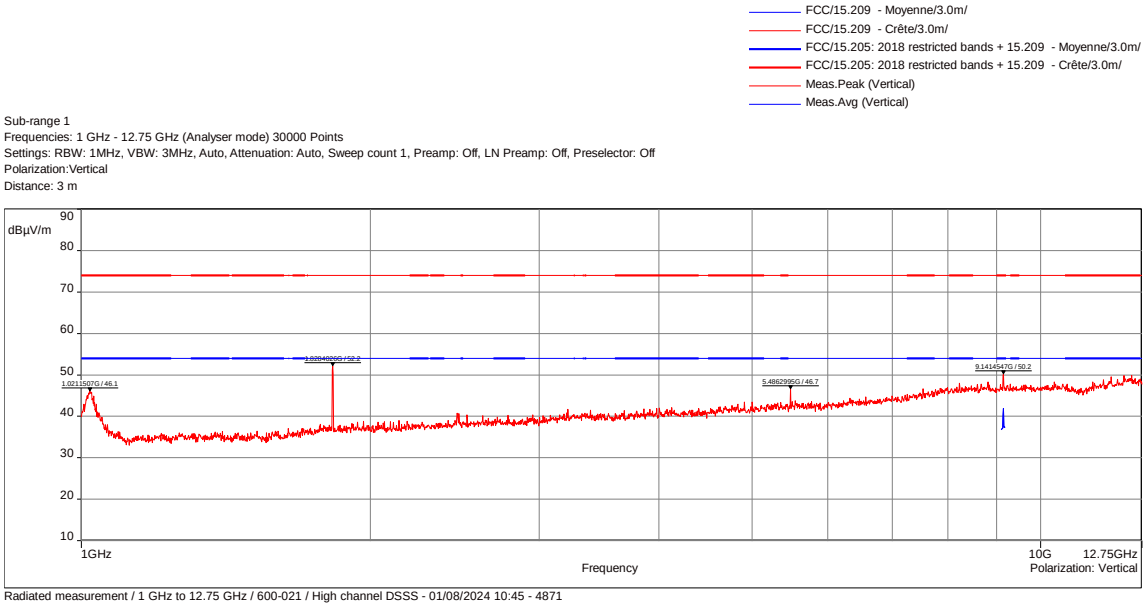
Sub-range 2
Frequencies: 1 GHz - 12.75 GHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Horizontal
Distance: 3 m



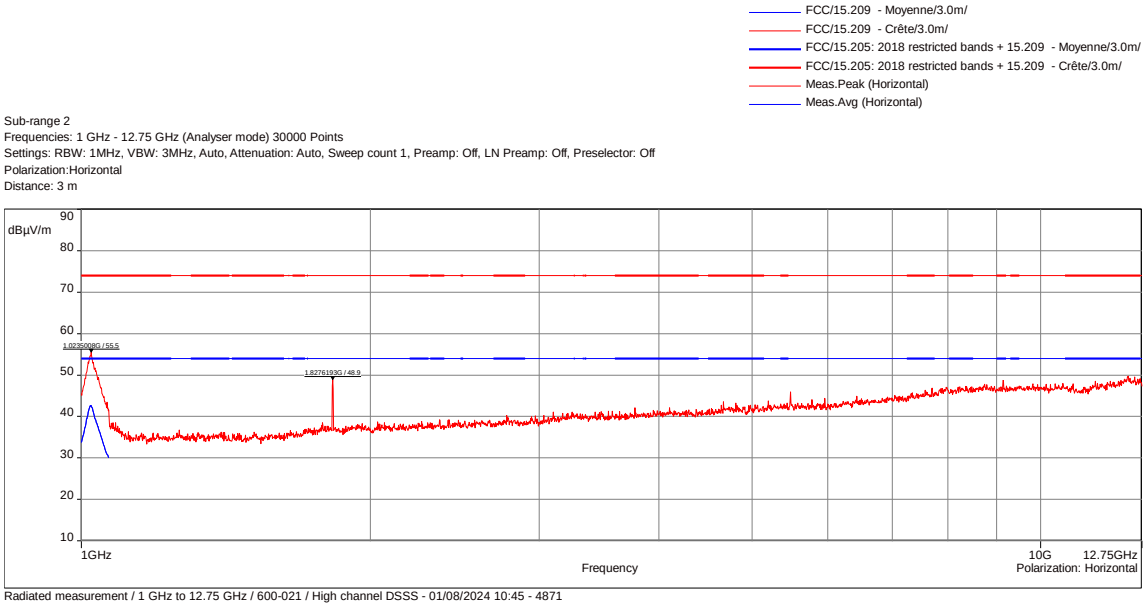

Radiated measurement / 1 GHz to 12.75 GHz / 600-021 / Mid channel DSSS - 01/08/2024 10:11 - 4870

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 1GHz-12.75GHz | 1MHz | 3MHz | Peak / Average |
| Horizontal | 1GHz-12.75GHz | 1MHz | 3MHz | Peak / Average |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| RADIATED EMISSION LIMITS - GRAPH | | | |
|---|---|---|---|
| RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / HIGH CHANNEL | | EMI4871 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 08/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1014 |




Radiated measurement / 1 GHz to 12.75 GHz / 600-021 / High channel DSSS - 01/08/2024 10:45 - 4871




Radiated measurement / 1 GHz to 12.75 GHz / 600-021 / High channel DSSS - 01/08/2024 10:45 - 4871

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 1GHz-12.75GHz | 1MHz | 3MHz | Peak / Average |
| Horizontal | 1GHz-12.75GHz | 1MHz | 3MHz | Peak / Average |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |

*EUT modification(s): N/A*

## 6.2. 6dB bandwidth

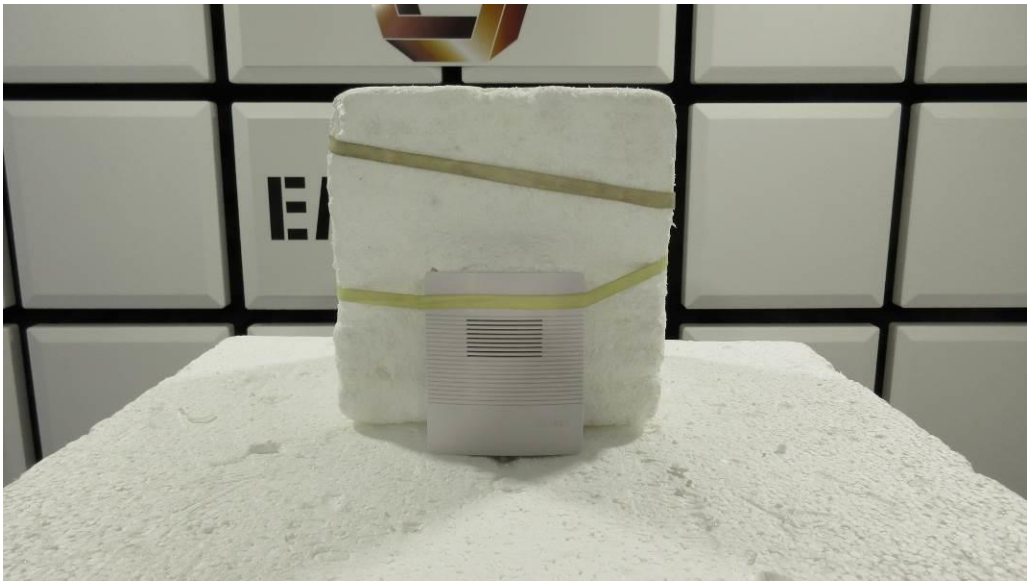
| | |
|---|---|
| **Reference standard:** | FCC 47 CFR Part 15.247<br>RSS 247 |
| **Test method:** | ANSI C63.10: 2013 |
| **Test description:** (2)<br>Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. | |

| TESTED PARAMETER | RESULT | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| 6 dB Bandwidth / low channel | 515.53 kHz | ≥ 500 kHz | EMI5236 | **PASS** |
| 6 dB Bandwidth / Mid channel | 515.53 kHz | ≥ 500 kHz | EMI5237 | **PASS** |
| 6 dB Bandwidth / High channel | 513.37 kHz | ≥ 500 kHz | EMI5990 | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | *See Graph(es)* |
| Relative Humidity | 20 to 75 % | *See Graph(es)* |
| Atmospheric pressure | N/A | *See Graph(es)* |
| **TEST METHOD DEVIATION:** N/A | | |
| Supplementary information: N/A | | |

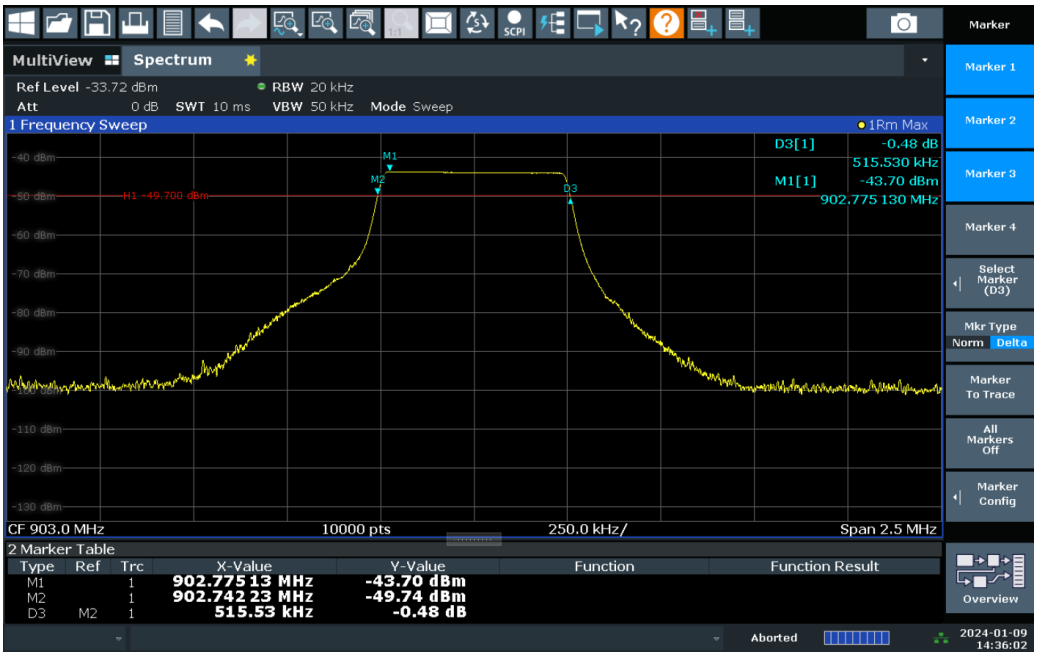
| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | ETS lindgren | 3143B | 17930 | 12/08/2021 | 12/10/2024 |
| Cable | / | N-1m | 3625 | 02/05/2023 | 02/07/2025 |
| Cable | Techniwave | N-3.5m | 18353 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-4m | 18355 | 17/08/2023 | 17/10/2025 |
| Receiver | Rohde & Schwarz | FSW43 | 14830 | 10/08/2022 | 10/10/2024 |
| Shielded enclosure | COMTEST | FAR-3m | 18014 | 17/08/2021 | 17/10/2024 |
| Software | Nexio | BAT EMC | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/06/2022 | 07/08/2024 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/09/2023 | 25/11/2025 |

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

| TEST SETUP PHOTO(S) - EUT POSITION |
| --- |
|  |

| TEST SETUP PHOTO(S) |
| --- |
| |

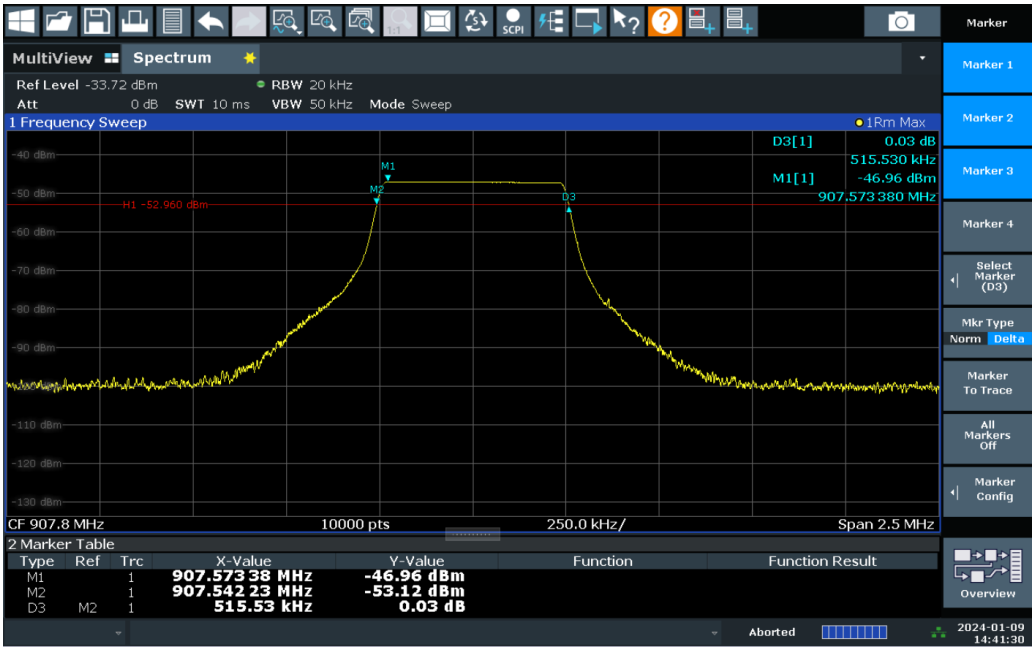
| 6dB BANDWIDTH - GRAPH | | | |
|---|---|---|---|
| 6dB BANDWIDTH / LOW CHANNEL | | EMI5236 | |
| **EUT mode:** | Tx mode | **T (°C):** | 17.5 |
| **Test Date:** | 09/01/2024 | **H (%):** | 43.8 |
| **Test Operator:** | MPA | **P (hPa):** | 1008 |




| | |
|---|---|
| **Results:** | The 6dB bandwidth for Low channel is 513.53 |

*EUT modification(s): N/A*

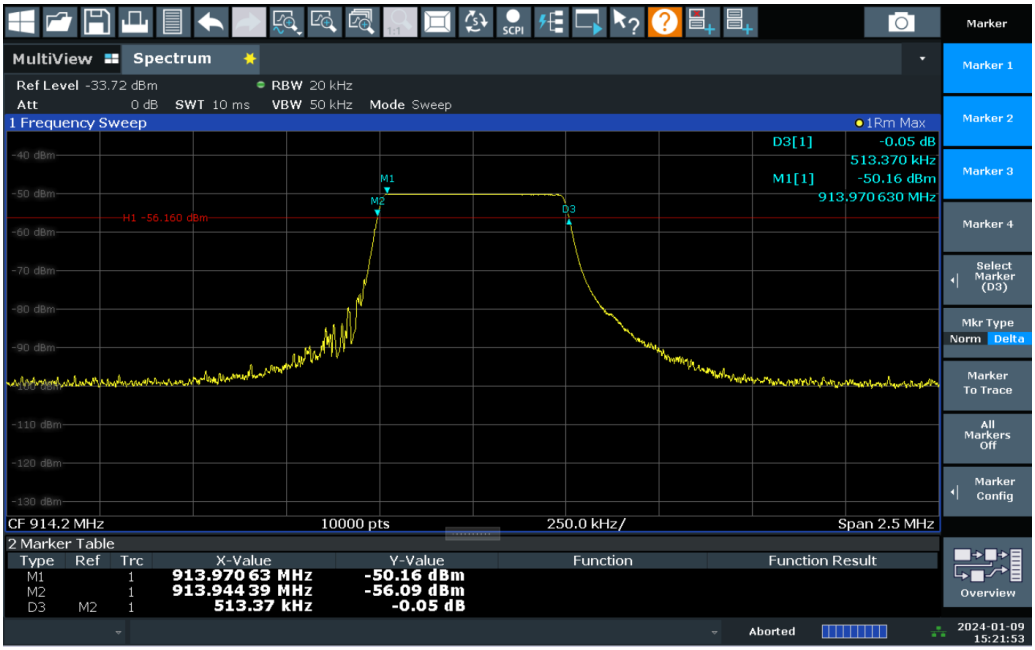
| 6dB BANDWIDTH - GRAPH | | | |
|---|---|---|---|
| 6dB BANDWIDTH / MID CHANNEL | | EMI5237 | |
| **EUT mode:** | Tx mode | **T (°C):** | 17.5 |
| **Test Date:** | 09/01/2024 | **H (%):** | 43.8 |
| **Test Operator:** | MPA | **P (hPa):** | 1008 |




| | |
|---|---|
| **Results:** | The 6dB bandwidth for Mid channel is 515.53 |

*EUT modification(s): N/A*

| 6dB BANDWIDTH - GRAPH | | | |
|---|---|---|---|
| 6dB BANDWIDTH / HIGH CHANNEL | | EMI5990 | |
| **EUT mode:** | Tx mode | **T (°C):** | 17.5 |
| **Test Date:** | 09/01/2024 | **H (%):** | 43.8 |
| **Test Operator:** | MPA | **P (hPa):** | 1008 |




| | |
|---|---|
| **Results:** | The 6dB bandwidth for High channel is 513.37 kHz. |

*EUT modification(s): N/A*

## 6.3. Equivalent isotropic radiated power

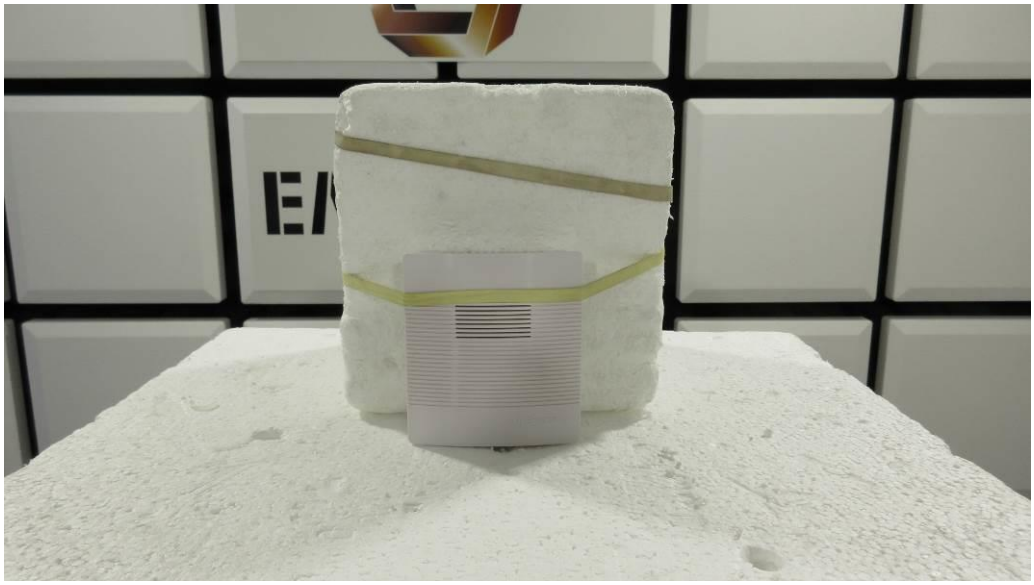
| | |
|---|---|
| **Reference standard:** | FCC 47 CFR Part 15.247<br>RSS 247 |
| **Test method:** | ANSI C63.10: 2013 |
| **Test description:** b) (3)<br>For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.<br>Only the highest levels are recorded. The measurement is performed in radiated mode because the product antenna is a simple wire type antenna. The results are directly compared to the radiated limits (conducted limits + 6dB). | |

| TESTED CONFIGURATION | RESULTS | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| RF output power (EIRP) / Low channel | 8.71 dBm | 4W (36 dBm) | EMI4866 | **PASS** |
| RF output power (EIRP) / Mid channel | 9.36 dBm | 4W (36 dBm) | EMI4867 | **PASS** |
| RF output power (EIRP) / High channel | 9.32 dBm | 4W (36 dBm) | EMI4868 | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | *See Graph(es)* |
| Relative Humidity | 20 to 75 % | *See Graph(es)* |
| Atmospheric pressure | N/A | *See Graph(es)* |
| **TEST METHOD DEVIATION:** N/A | | |
| Supplementary information: Measurements are performed in radiated. | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | ETS lindgren | 3143B | 17930 | 12/08/2021 | 12/10/2024 |
| Attenuator | EMITECH | SUB.V4-H | 18112 | 10/03/2023 | 10/05/2024 |
| Attenuator | EMITECH | SUB.V4-V | 18111 | 10/03/2023 | 10/05/2024 |
| Cable | / | N-1m | 3625 | 02/05/2023 | 02/07/2025 |
| Cable | Techniwave | N-3.5m | 18353 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-4m | 18355 | 17/08/2023 | 17/10/2025 |
| Receiver | Rohde & Schwarz | FSW43 | 14830 | 10/08/2022 | 10/10/2024 |
| Shielded enclosure | COMTEST | FAR-3m | 18014 | 17/08/2021 | 17/10/2024 |
| Software | Nexio | BAT EMC | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/06/2022 | 07/08/2024 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/09/2023 | 25/11/2025 |

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

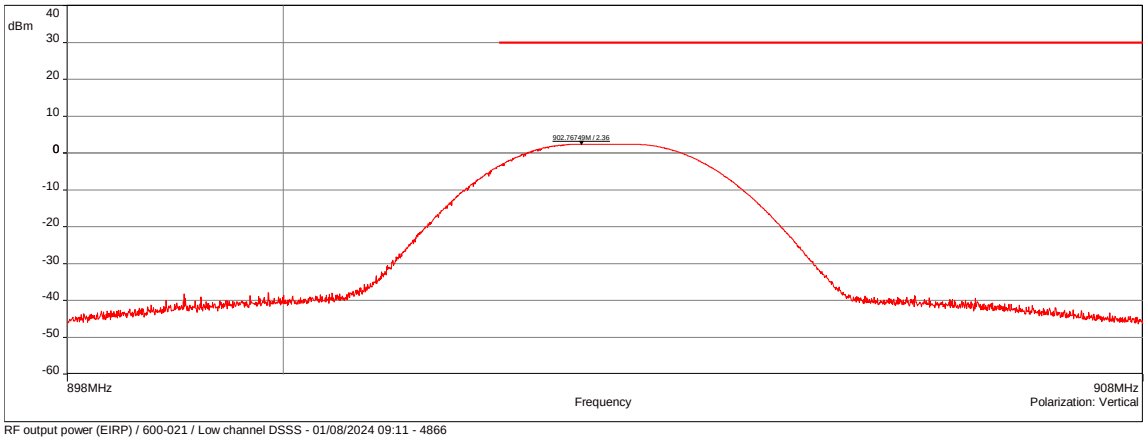
| TEST SETUP PHOTO(S) – EUT POSITION |
| --- |
|  |

| TEST SETUP PHOTO(S) |
| --- |
| |

| MAXIMUM PEAK POWER - GRAPH | | | |
|---|---|---|---|
| RF OUTPUT POWER (EIRP) / LOW CHANNEL | | EMI4866 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 08/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1013 |

FCC/15.247 : 2017 F0 1W - Crête/3.0m/
Meas.Peak (Vertical)

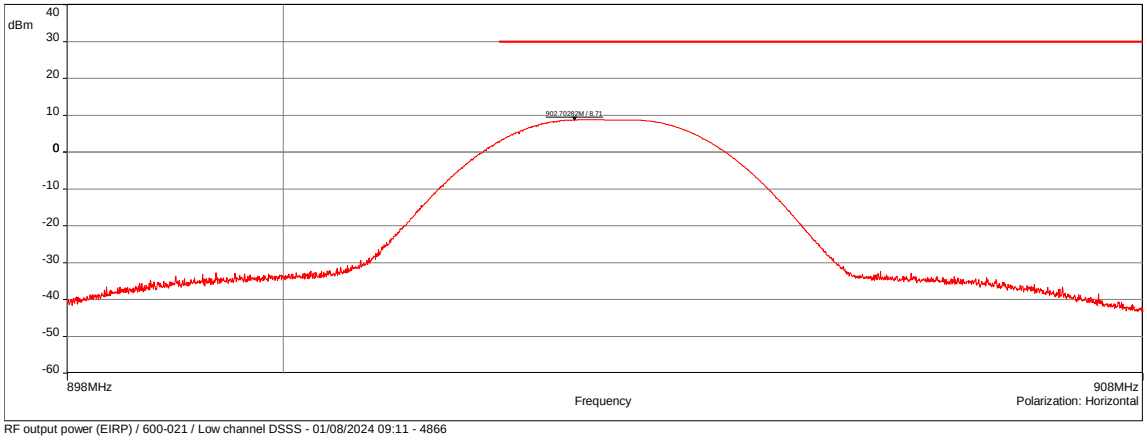
Sub-range 1
Frequencies: 898 MHz - 908 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m




RF output power (EIRP) / 600-021 / Low channel DSSS - 01/08/2024 09:11 - 4866

FCC/15.247 : 2017 F0 1W - Crête/3.0m/
Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 898 MHz - 908 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Horizontal
Distance: 3 m




RF output power (EIRP) / 600-021 / Low channel DSSS - 01/08/2024 09:11 - 4866

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 898MHz-908MHz | 1MHz | 3MHz | Peak |
| Horizontal | 898MHz-908MHz | 1MHz | 3MHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |

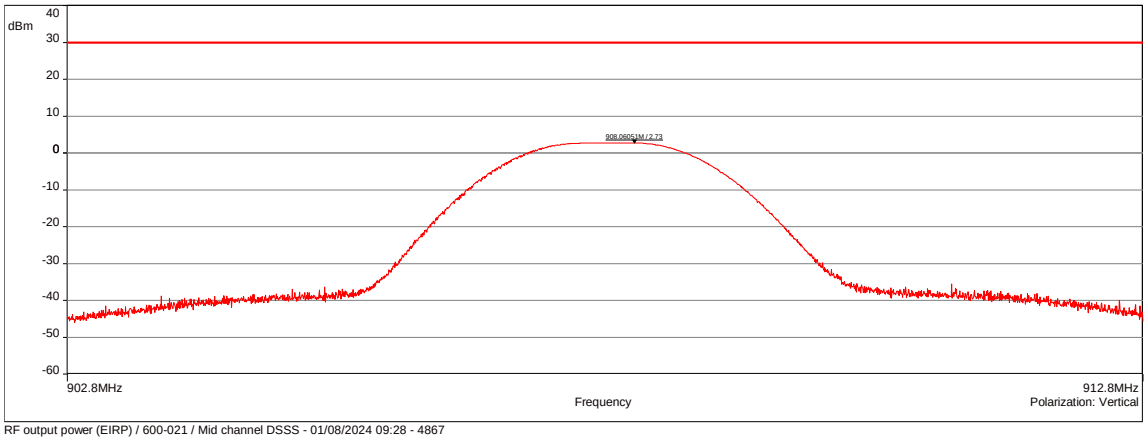
*EUT modification(s): N/A*

| FREQUENCY (MHZ) | POLARIZATION | LEVEL (DBM) | LIMIT (DBM) |
|---|---|---|---|
| 903.0 | Vertical | 2.36 | 36 |
| 903.0 | Horizontal | 8.71 | 36 |

| MAXIMUM PEAK POWER - GRAPH | | | |
|---|---|---|---|
| RF OUTPUT POWER (EIRP) / MID CHANNEL | | EMI4867 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 08/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1013 |

FCC/15.247 : 2017 F0 1W - Crête/3.0m/
Meas.Peak (Vertical)

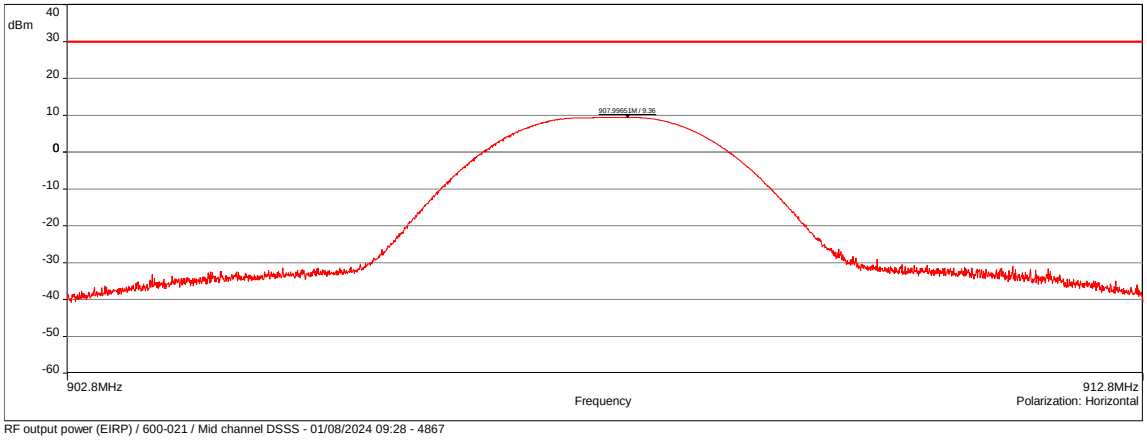
Sub-range 1
Frequencies: 902.8 MHz - 912.8 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m




RF output power (EIRP) / 600-021 / Mid channel DSSS - 01/08/2024 09:28 - 4867

FCC/15.247 : 2017 F0 1W - Crête/3.0m/
Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 902.8 MHz - 912.8 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Horizontal
Distance: 3 m




RF output power (EIRP) / 600-021 / Mid channel DSSS - 01/08/2024 09:28 - 4867

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 902.8MHz-912.8MHz | 1MHz | 3MHz | Peak |
| Horizontal | 902.8MHz-912.8MHz | 1MHz | 3MHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |

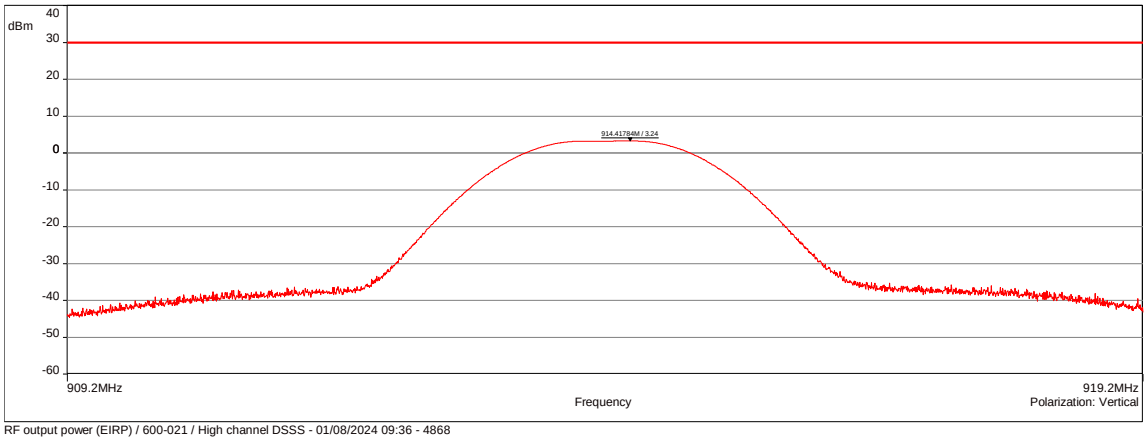
*EUT modification(s): N/A*

| FREQUENCY (MHZ) | POLARIZATION | LEVEL (DBM) | LIMIT (DBM) |
|---|---|---|---|
| 907.8 | Vertical | 2.73 | 36 |
| 907.8 | Horizontal | 9.36 | 36 |

| MAXIMUM PEAK POWER - GRAPH | | | |
|---|---|---|---|
| RF OUTPUT POWER (EIRP) / HIGH CHANNEL | | EMI4868 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 08/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1013 |

FCC/15.247 : 2017 F0 1W - Crête/3.0m/
Meas.Peak (Vertical)

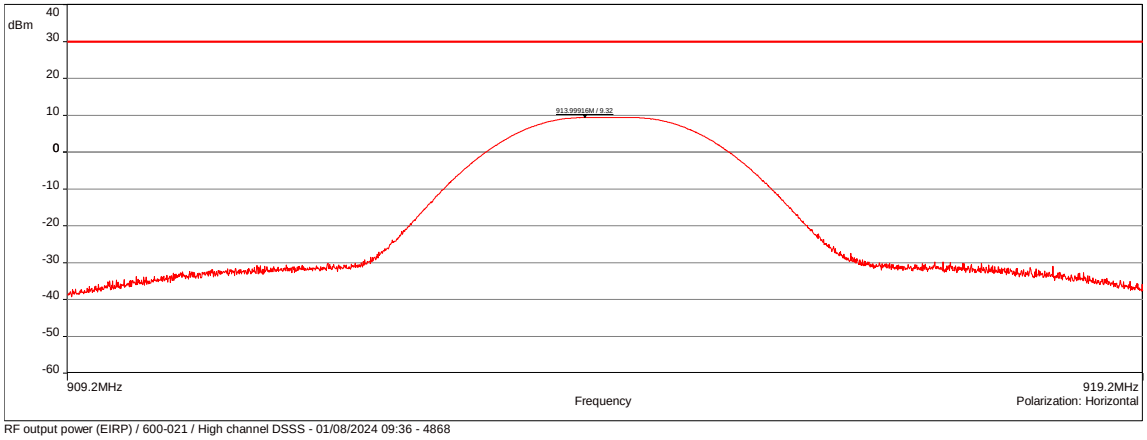
Sub-range 1
Frequencies: 909.2 MHz - 919.2 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m




RF output power (EIRP) / 600-021 / High channel DSSS - 01/08/2024 09:36 - 4868

FCC/15.247 : 2017 F0 1W - Crête/3.0m/
Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 909.2 MHz - 919.2 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Horizontal
Distance: 3 m




RF output power (EIRP) / 600-021 / High channel DSSS - 01/08/2024 09:36 - 4868

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 909.2MHz-919.2MHz | 1MHz | 3MHz | Peak |
| Horizontal | 909.2MHz-919.2MHz | 1MHz | 3MHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |

*EUT modification(s): N/A*

| FREQUENCY (MHZ) | POLARIZATION | LEVEL (DBM) | LIMIT (DBM) |
|---|---|---|---|
| 914.2 | Vertical | 3.24 | 36 |
| 914.2 | Horizontal | 9.32 | 36 |

## 6.4. Band-edge compliance

| | |
|---|---|
| **Reference standard:** | FCC 47 CFR Part 15.247<br>RSS 247 |
| **Test method:** | ANSI C63.10: 2013 |

**Test description:** d)

In any 100 kHz bandwidth outside the frequency band in which the 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

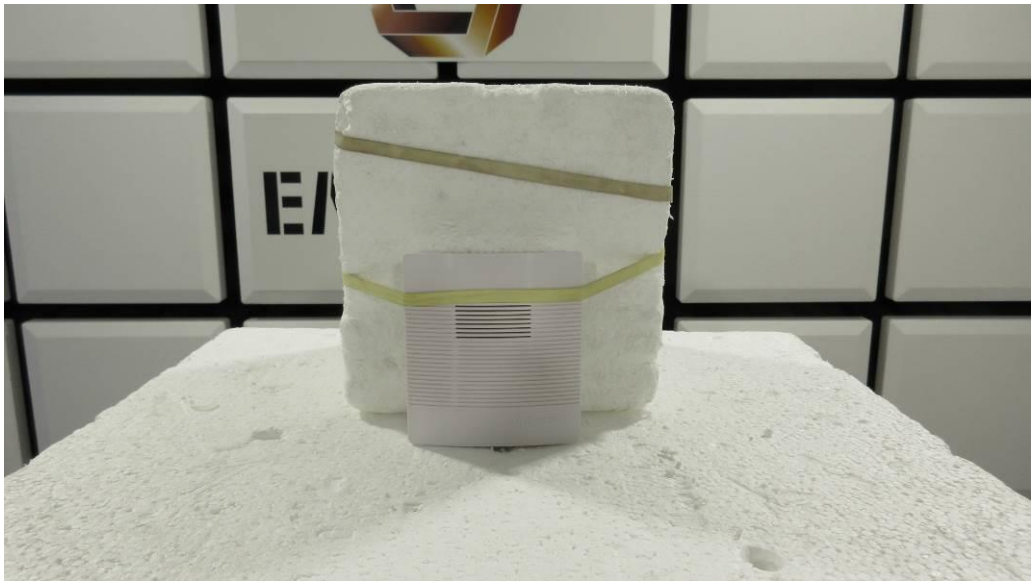
Only the highest levels are recorded.

| TESTED CONFIGURATION | PARAMETER | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| Band edge / All channels | 876MHz-954MHz | 20 dBc<br>§15.209 | EMI4857 | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | *See Graph(es)* |
| Relative Humidity | 20 to 75 % | *See Graph(es)* |
| Atmospheric pressure | N/A | *See Graph(es)* |
| **Test method deviation:** N/A | | |
| Supplementary information: N/A | | |

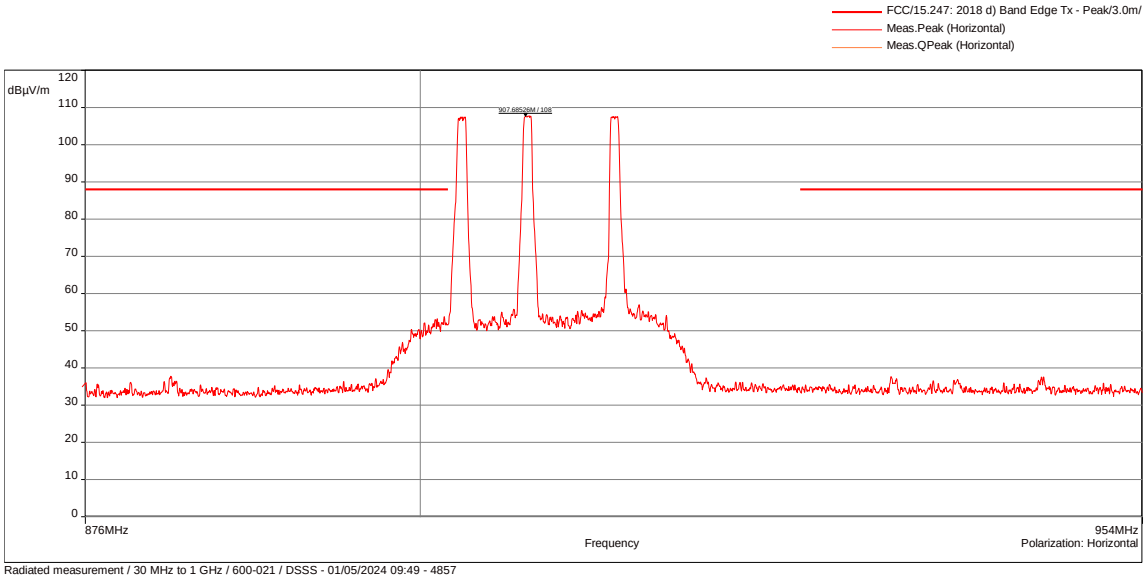
| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | ETS lindgren | 3142E | 14523 | 27/01/2022 | 27/03/2025 |
| Cable | Techniwave | N-8m | 18349 | 17/08/2023 | 17/10/2025 |
| Cable | SUCOFLEX | N-6,5m | 14380 | 17/08/2023 | 17/10/2025 |
| Cable | SUCOFLEX | N-3m | 14378 | 17/08/2023 | 17/10/2025 |
| Receiver | Rohde & Schwarz | ESW26 | 17791 | 08/02/2023 | 08/04/2024 |
| Shielded enclosure | COMTEST | SAC 3m | 14494 | 08/08/2023 | 08/10/2026 |
| Software | Nexio | BAT EMC | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/06/2022 | 07/08/2024 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/09/2023 | 25/11/2025 |

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

| TEST SETUP PHOTO(S) – EUT POSITION |
| --- |
|  |

| TEST SETUP PHOTO(S) |
| --- |
| |

| BAND-EDGE COMPLIANCE - GRAPH | | | |
|---|---|---|---|
| BAND EDGE / ALL CHANNELS | | EMI4857 | |
| **EUT mode:** | Tx mode | **T (°C):** | 17.5 |
| **Test Date:** | 05/01/2024 | **H (%):** | 43.8 |
| **Test Operator:** | MPA | **P (hPa):** | 1008 |




Radiated measurement / 30 MHz to 1 GHz / 600-021 / DSSS - 01/05/2024 09:49 - 4857

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Horizontal | 876MHz-954MHz | 100kHz | 300kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | No out of band emissions detected. | | | |

EUT modification(s): N/A

## 6.5. Power Spectral Density

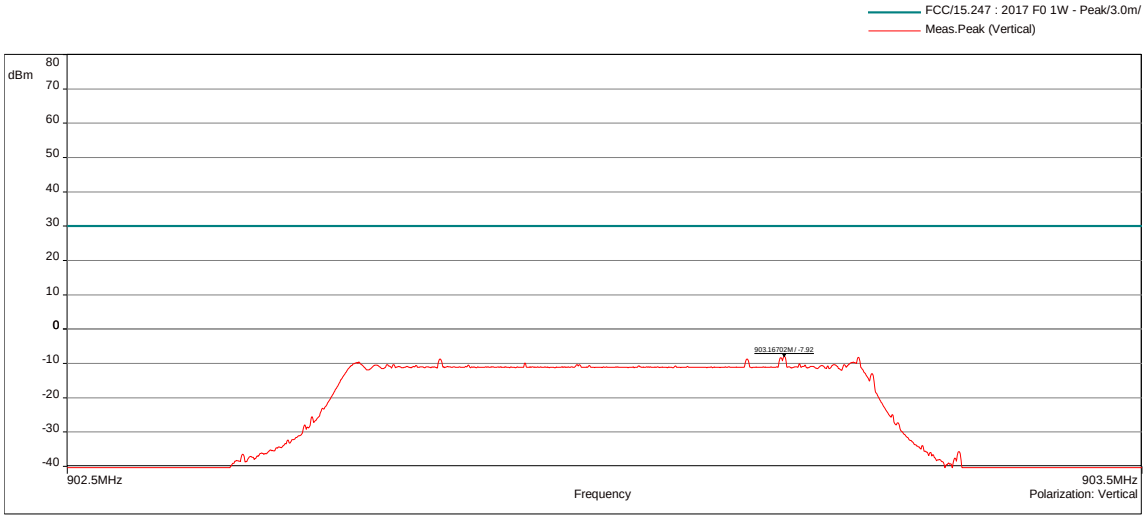
| | |
|---|---|
| **Reference standard:** | FCC 47 CFR Part 15.247<br>RSS 247 |
| **Test method:** | ANSI C63.10: 2013 |
| **Test description:** e)<br>For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.<br>Only the highest levels are recorded. | |

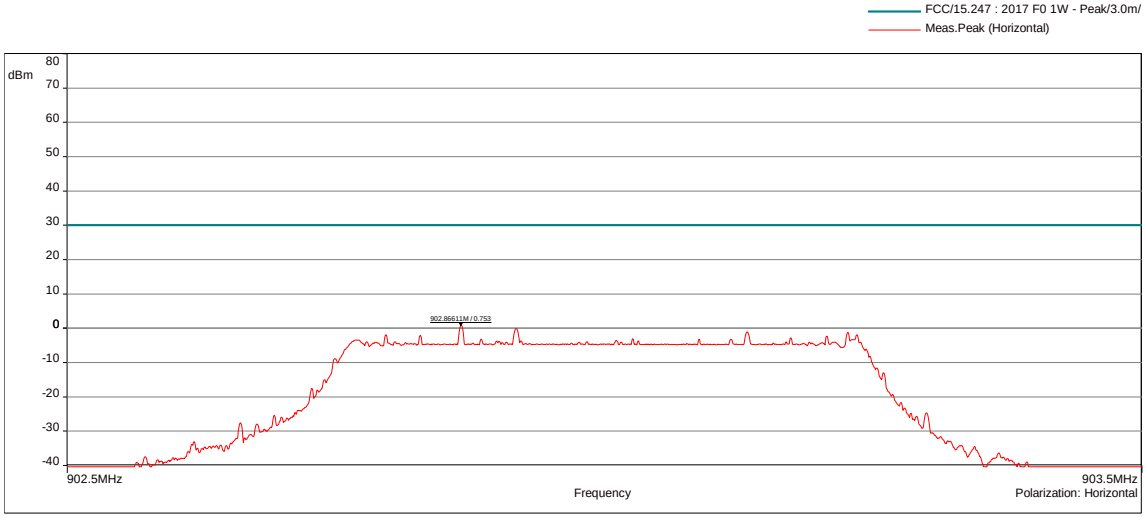
| TESTED CONFIGURATION | RESULT | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| PSD / Low channel | 902.5MHz-903.5MHz | 8dBm /3kHz | EMI5238 | **PASS** |
| PSD / Mid channel | 907.3MHz-908.3MHz | 8dBm/3kHz | EMI5239 | **PASS** |
| PSD / High channel | 913.7MHz-914.7MHz | 8dBm/3kHz | EMI5240 | **PASS** |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | ETS lindgren | 3143B | 17930 | 12/08/2021 | 12/10/2024 |
| Attenuator | EMITECH | SUB.V4-H | 18112 | 10/03/2023 | 10/05/2024 |
| Attenuator | EMITECH | SUB.V4-V | 18111 | 10/03/2023 | 10/05/2024 |
| Cable | / | N-1m | 3625 | 02/05/2023 | 02/07/2025 |
| Cable | Techniwave | N-3.5m | 18353 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-4m | 18355 | 17/08/2023 | 17/10/2025 |
| Receiver | Rohde & Schwarz | FSW43 | 14830 | 10/08/2022 | 10/10/2024 |
| Shielded enclosure | COMTEST | FAR-3m | 18014 | 17/08/2021 | 17/10/2024 |
| Software | Nexio | BAT EMC | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/06/2022 | 07/08/2024 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/09/2023 | 25/11/2025 |

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

| POWER SPECTRAL DENSITY - GRAPH | | | |
|---|---|---|---|
| PSD / LOW CHANNEL | | EMI5238 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 09/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1013 |



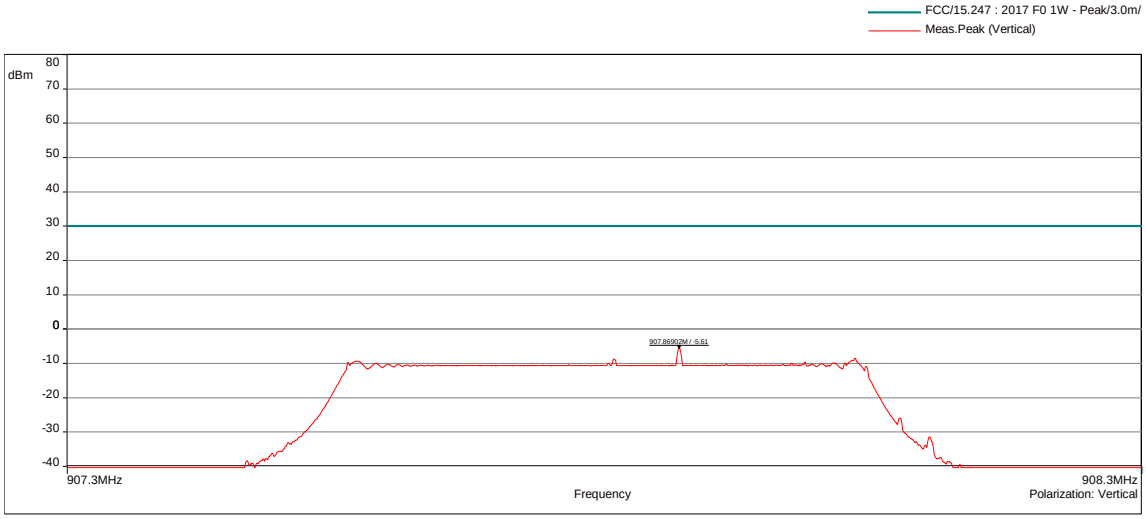



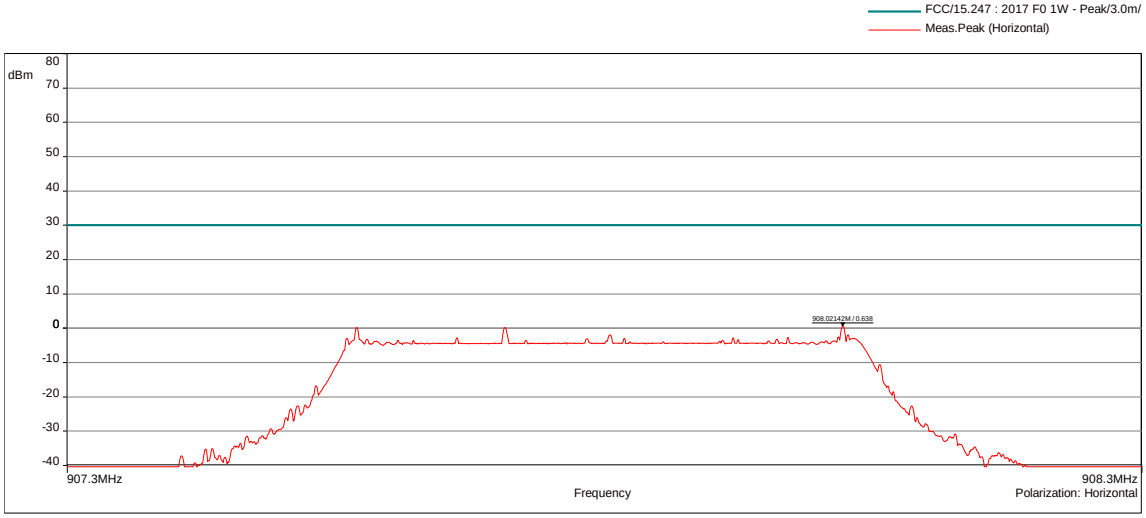

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 902.5MHz-903.5MHz | 3kHz | 10kHz | Peak |
| Horizontal | 902.5MHz-903.5MHz | 3kHz | 10kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |

EUT modification(s): N/A

| FREQUENCY (MHz) | POLARIZATION | LEVEL (dBm/3kHz) | LIMIT (dBm/3kHz) |
|---|---|---|---|
| 903 | Vertical | -7.92 | 8 |
| 903 | Horizontal | 0.75 | 8 |

| POWER SPECTRAL DENSITY - GRAPH | | | |
|---|---|---|---|
| PSD / MID CHANNEL | | EMI5239 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 09/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1013 |



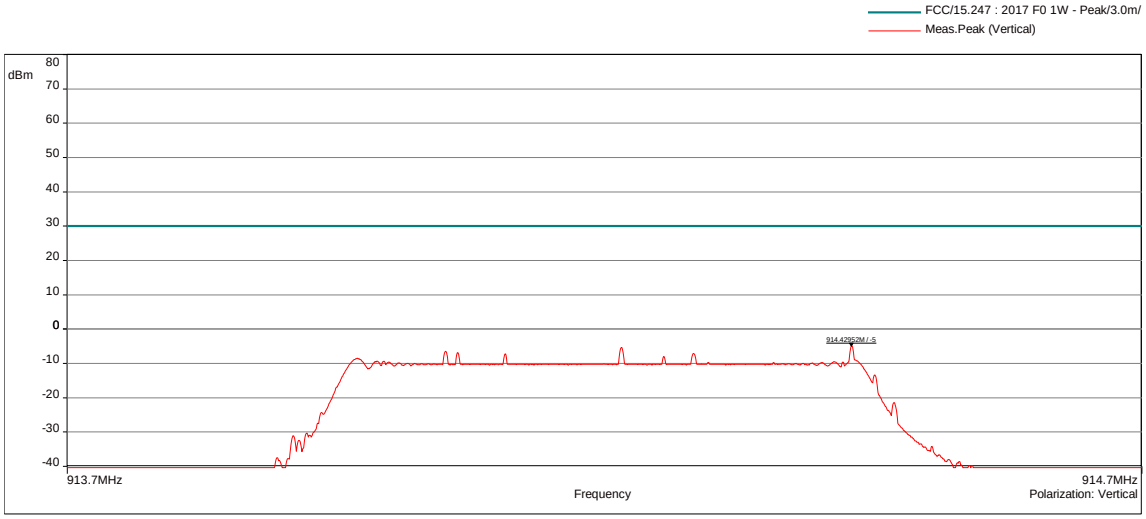



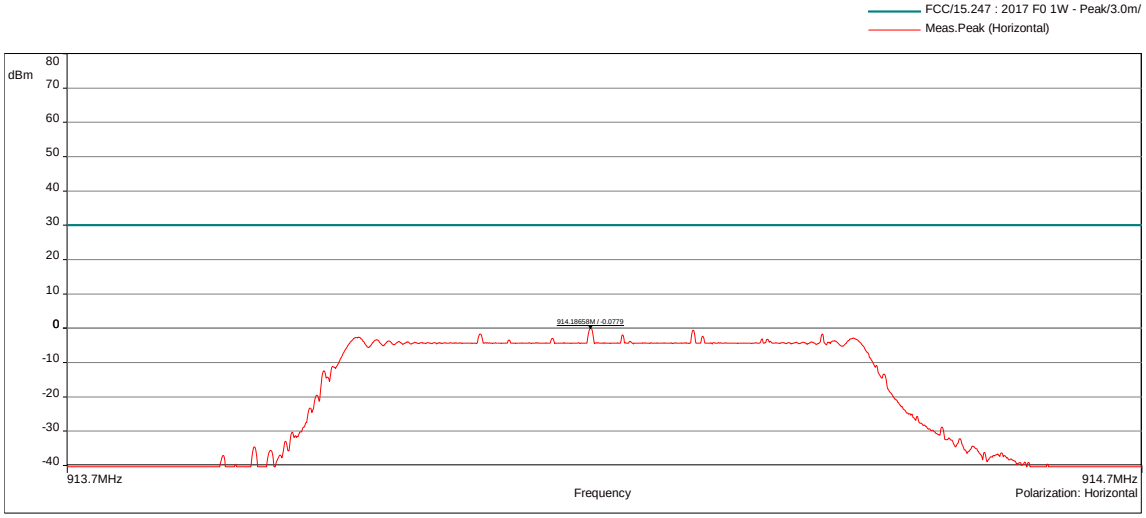

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 907.3MHz-908.3MHz | 3kHz | 10kHz | Peak |
| Horizontal | 907.3MHz-908.3MHz | 3kHz | 10kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |

EUT modification(s): N/A

| FREQUENCY (MHz) | POLARIZATION | LEVEL (dBm/3kHz | LIMIT (dBm/3kHz) |
|---|---|---|---|
| 907.8 | Vertical | -5.61 | 8 |
| 907.8 | Horizontal | 0.64 | 8 |

| POWER SPECTRAL DENSITY - GRAPH | | | |
|---|---|---|---|
| PSD / HIGH CHANNEL | | EMI5240 | |
| **EUT mode:** | Tx mode | **T (°C):** | 20.3 |
| **Test Date:** | 09/01/2024 | **H (%):** | 33.0 |
| **Test Operator:** | MPA | **P (hPa):** | 1013 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 913.7MHz-914.7MHz | 3kHz | 10kHz | Peak |
| Horizontal | 913.7MHz-914.7MHz | 3kHz | 10kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | N/A | | | |
| EUT modification(s): N/A | | | | |

| FREQUENCY (MHZ) | POLARIZATION | LEVEL (dBm/3kHz) | LIMIT (dBm/3kHz) |
|---|---|---|---|
| 914.2 | Vertical | -5.00 | 8 |
| 914.2 | Horizontal | -0.08 | 8 |

## 6.6. Measurement of frequency stability

| | |
|---|---|
| **Reference standard:** | FCC 47 CFR Part 15.215<br>RSS-Gen |
| **Test method:** | ANSI C63.10: 2013 |
| **General test setup:** The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.<br>EUT is set inside the climatic enclosure. | |

| TEST CASE | EUT MODE | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| Low channel | Tx mode | Within 902MHz to 928MHz | EMI6410 | **PASS** |
| Mid channel | Tx mode | | EMI6411 | **PASS** |
| High channel | Tx mode | | EMI6412 | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | 21.2 °C |
| Relative Humidity | 20 to 75 % | 39.5 % |
| Atmospheric pressure | N/A | 1014 hPa |
| **Test method deviation:** N/A | | |
| Supplementary information: N/A | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | EMITECH | 3.5 cm | 4653 | | |
| Cable | C&C | N-3m | 14332 | 28/04/2023 | 28/06/2025 |
| Climatic enclosure | CLIMATS | EXCAL 7714-HA | 14261 | 21/10/2022 | 21/12/2024 |
| Multimeter | Agilent Technologies | U1252A | 6138 | 29/06/2023 | 29/08/2024 |
| Power supply | TTI | PL303QMD | 8496 | | |
| Receiver | Rohde & Schwarz | FPL1007 | 17908 | 03/11/2022 | 03/01/2025 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/09/2023 | 25/11/2025 |
| Thermohygrometer | Testo | 608-H1 | 7562 | 28/08/2023 | 28/10/2025 |
| Thermometer contactless | GHM Greisinger | GMH 3710 | 12968 | 28/02/2023 | 28/04/2025 |

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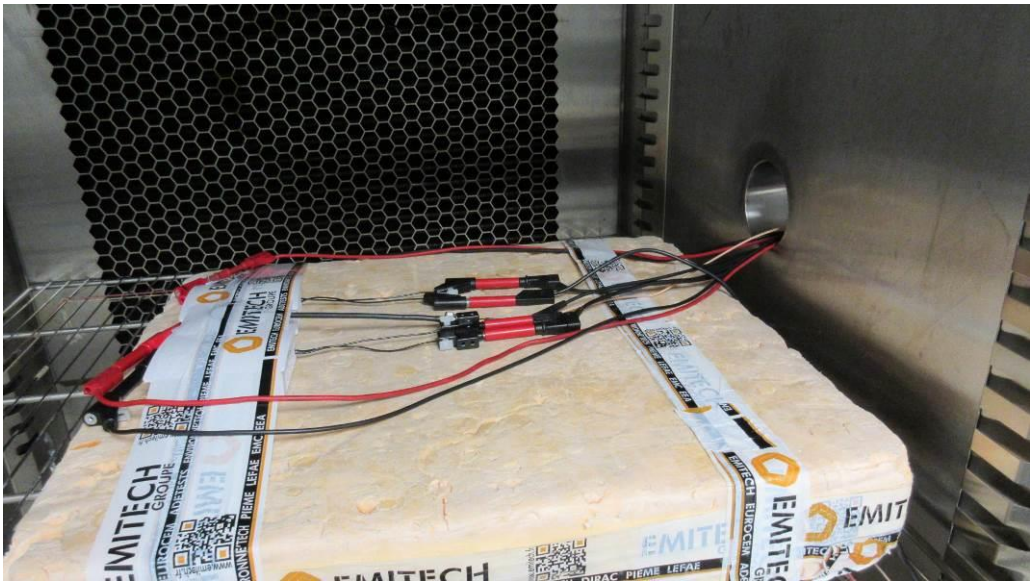
| TEST SETUP PHOTO(S) |
|---|
|  |

| MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS | | | | | |
|---|---|---|---|---|---|
| LOW CHANNEL | | | | | EMI6410 |
| **Test case** | **Temperature (°C)** | **Power supply (Vdc)** | **Frequency (MHz)** | **Frequency error (kHz)** | **Limit** |
| Normal conditions | +25 | 3.7 | 903.001127 | - | Within 902MHz to 928MHz |
| Extrem voltage conditions | +25 | 3.6 | 903.001053 | -0.074 | |
| | | 3.8 | 903.000975 | -0.152 | |
| Extrem temperature conditions | -25 | 3.7 | 903.003528 | -2.401 | |
| | +55 | | 903.003067 | -1.940 | |

| MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS | | | | | |
|---|---|---|---|---|---|
| MID CHANNEL | | | | | EMI6411 |
| **Test case** | **Temperature (°C)** | **Power supply (Vdc)** | **Frequency (MHz)** | **Frequency error (kHz)** | **Limit** |
| Normal conditions | +25 | 3.7 | 907.800737 | - | Within 902MHz to 928MHz |
| Extrem voltage conditions | +25 | 3.6 | 907.800738 | +0.001 | |
| | | 3.8 | 907.800492 | -0.245 | |
| Extrem temperature conditions | -25 | 3.7 | 907.801985 | +1.248 | |
| | +55 | | 907.801909 | +1.172 | |

| MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS | | | | | |
|---|---|---|---|---|---|
| HIGH CHANNEL | | | | | EMI6412 |
| **Test case** | **Temperature (°C)** | **Power supply (Vdc)** | **Frequency (MHz)** | **Frequency error (kHz)** | **Limit** |
| Normal conditions | +25 | 3.7 | 914.200419 | - | Within 902MHz to 928MHz |
| Extrem voltage conditions | +25 | 3.6 | 914.200151 | -0.268 | |
| | | 3.8 | 914.200426 | +0.007 | |
| Extrem temperature conditions | -25 | 3.7 | 914.200769 | +0.350 | |
| | +55 | | 914.199910 | -0.509 | |

## 6.7. Occupied Bandwidth

| | |
|---|---|
| **Reference standard:** | RSS-Gen |
| **Test method:** | ANSI C63.10: 2013 |
| **Test description:** The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β, which, in cases of symmetrical spectra, splits up into β/2 on each side of the spectrum. Unless otherwise specified, β/2 is taken as 0,5 %.<br>The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions. | |

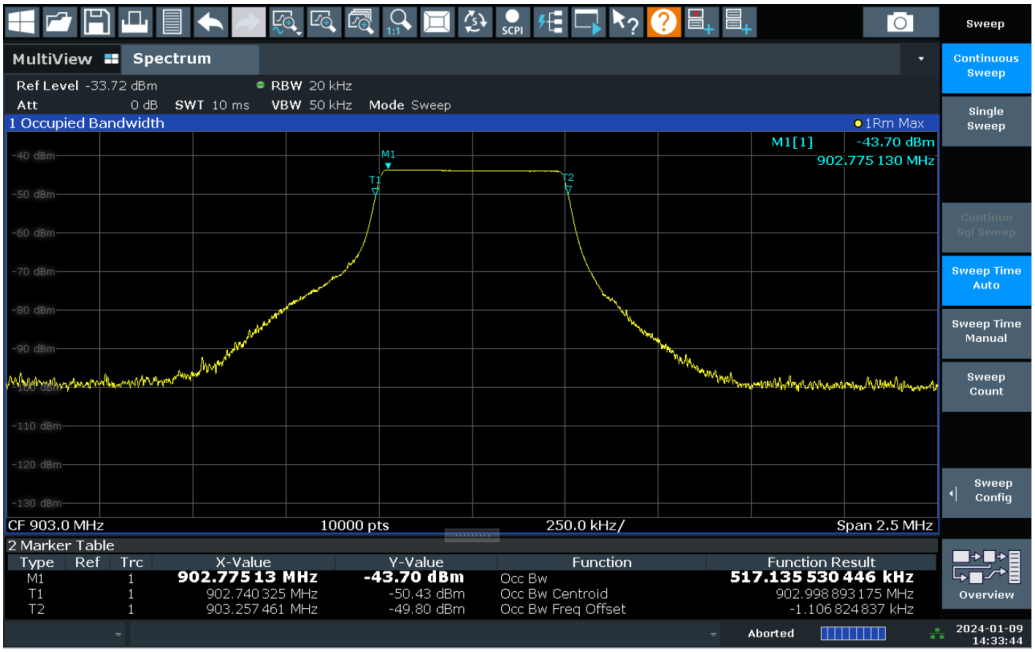
| TESTED CABLE | FREQUENCY | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| 99% Bandwidth / Low channel | 903.0 MHz | Within the 902MHz-928MHz band | EMI4470 | **PASS** |
| 99% Bandwidth / Mid channel | 907.8 MHz | Within the 902MHz-928MHz band | EMI4471 | **PASS** |
| 99% Bandwidth / High channel | 914.2 MHz | Within the 902MHz-928MHz band | EMI4472 | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | 17.5 °C |
| Relative Humidity | 20 to 75 % | 43.8 % |
| Atmospheric pressure | N/A | 1008 hPa |
| **Test method deviation:** N/A | | |
| Supplementary information: N/A | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | ETS lindgren | 3143B | 17930 | 12/08/2021 | 12/10/2024 |
| Cable | / | N-1m | 3625 | 02/05/2023 | 02/07/2025 |
| Cable | Techniwave | N-3.5m | 18353 | 17/08/2023 | 17/10/2025 |
| Cable | Techniwave | N-4m | 18355 | 17/08/2023 | 17/10/2025 |
| Receiver | Rohde & Schwarz | FSW43 | 14830 | 10/08/2022 | 10/10/2024 |
| Shielded enclosure | COMTEST | FAR-3m | 18014 | 17/08/2021 | 17/10/2024 |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/06/2022 | 07/08/2024 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/09/2023 | 25/11/2025 |

Blank cells = Permanent validity

| OCCUPIED BANDWIDTH - GRAPH | |
|---|---|
| 99% BANDWIDTH / LOW CHANNEL | EMI4470 |
| **EUT mode:** | Tx mode |
| **Test Date:** | 09/01/2024 |
| **Test Operator:** | MPA |

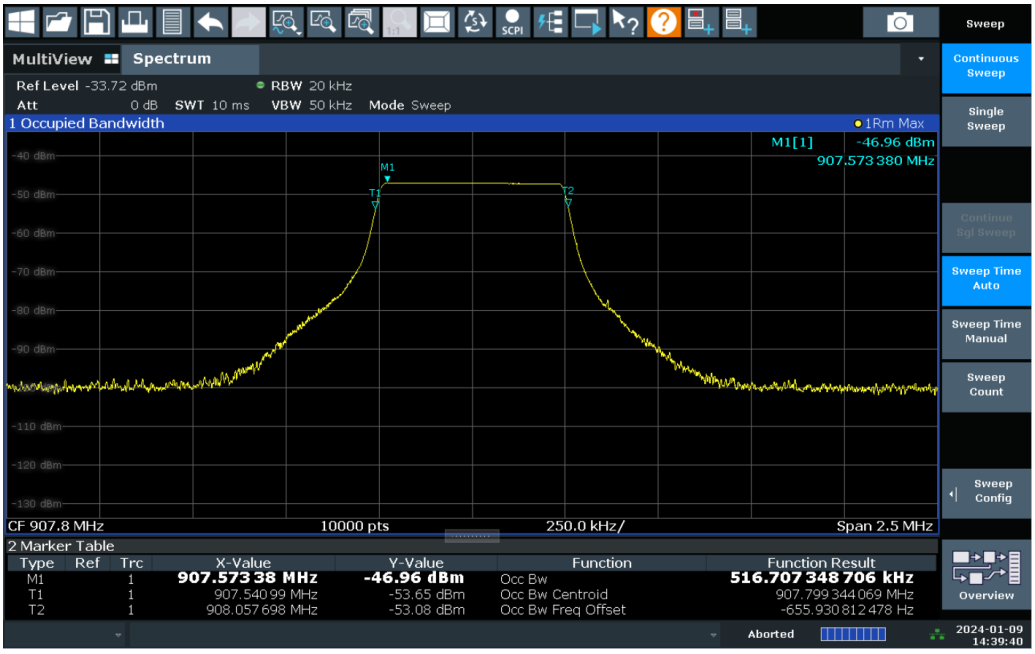



EUT modification(s): N/A

| | |
|---|---|
| **Results:** | The system has an OBW of 517.135 kHz |

*EUT modification(s): N/A*

| OCCUPIED BANDWIDTH - GRAPH | |
|---|---|
| 99% BANDWIDTH / MID CHANNEL | EMI4471 |
| **EUT mode:** | Tx mode |
| **Test Date:** | 09/01/2024 |
| **Test Operator:** | MPA |

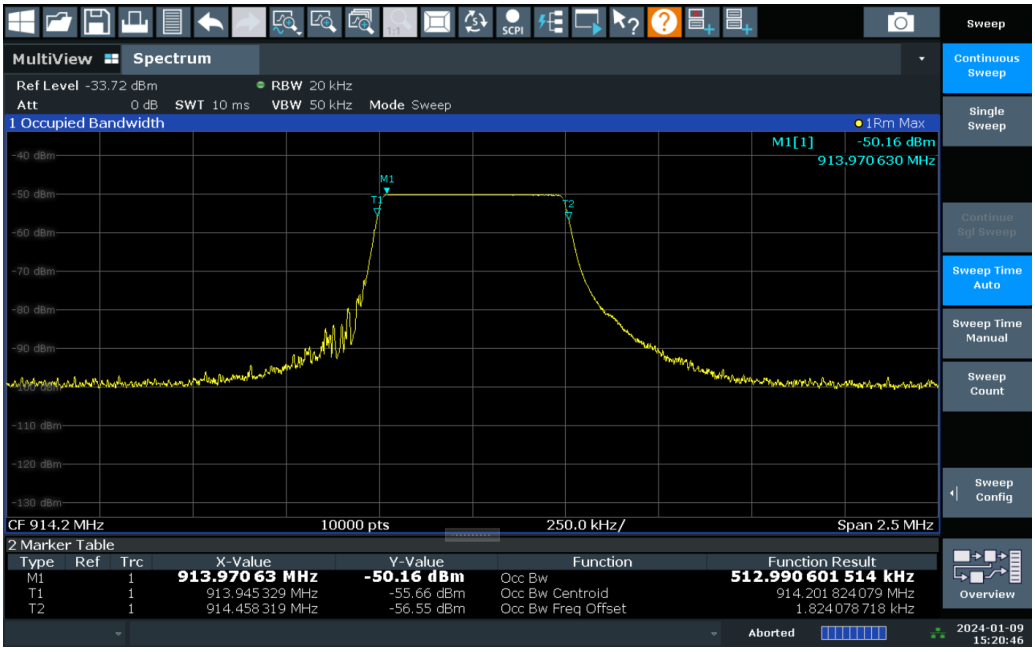



EUT modification(s): N/A

| | |
|---|---|
| **Results:** | The system has an OBW of 516.707 kHz |

*EUT modification(s): N/A*

| OCCUPIED BANDWIDTH - GRAPH | |
|---|---|
| 99% BANDWIDTH / HIGH CHANNEL | EMI4471 |
| **EUT mode:** | Tx mode |
| **Test Date:** | 09/01/2024 |
| **Test Operator:** | MPA |




| | |
|---|---|
| EUT modification(s): N/A | |
| **Results:** | The system has an OBW of 512.990 kHz |
| *EUT modification(s): N/A* | |

**End of test report**