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
RSS-247_Issue 3
RSS-Gen Issue 5
ANSI C 63.10: 2013

Company	**ENLESS WIRELESS**
Address.....	45 TER AVENUE DE VERDUN 33520 BRUGES FRANCE

Test item description.	**LoRa wireless transmitter**
Trade Mark.	ENLESS WIRELESS
Manufacturer.	ENLESS WIRELESS
Model/Type reference.....	600138402 / TX PULSE LED 600-138
FCC ID.....	2BEZP600138
IC.	32107-600138
Ratings.....	3.6 Vdc to 3.8 Vdc

Testing Laboratory	**EMITECH MONTPELLIER laboratory**
Address.....	145 rue de Massacan 34740 VENDARGUES FRANCE

Report Reference No.....	**RR-EVE-23B292-5A**
Test procedure.	FCC IC Certification
Diffusion.....	Mr PETIT
Applicant's name.	ENLESS WIRELESS
Date of issue.....	July 19, 2024
Total number of pages.....	49
Revision.....	0
Compiled by.....	Morgan PATEY
Approved by (+ signature).	David MONTAULON (Technical 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.

REPORT INDEX:

1. GENERAL INFORMATIONS 3
2. REFERENCE DOCUMENT(S) 4
3. EQUIPMENT TECHNICAL DESCRIPTION 5
3.1. TEST CONDITIONS 5
3.2. E.U.T. MARKING PLATE 5
3.3. E.U.T. MODIFICATION(S) 5
3.4. E.U.T. GENERAL VIEW 6
3.5. E.U.T. FRONT VIEW 6
3.6. E.U.T. BACK VIEW 7
3.7. E.U.T. INTERNAL VIEW & ELECTRONIC BOARD 7
3.8. E.U.T. MECHANICAL AND ELECTRICAL DESIGN 8
3.9. E.U.T. INPUT/OUTPUT PORTS 8
3.10. EUT RADIO SPECIFICATIONS 9
4. RESULT SUMMARY 10
5. MEASUREMENT UNCERTAINTY 12
6. TEST CONDITIONS AND RESULTS 13
6.1. RADIATED EMISSION LIMITS 13
6.2. NUMBER OF CHANNELS, 20 DB BANDWIDTH, AND AVERAGE TIME OF OCCUPANCY 27
6.3. EQUIVALENT ISOTROPIC RADIATED POWER 35
6.4. BAND-EDGE COMPLIANCE 40
6.5. MEASUREMENT OF FREQUENCY STABILITY 43
6.6. OCCUPIED BANDWIDTH 46

REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	July 19, 2024	/	Creation

1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **Connected measuring device TX PULSE LED 600-138** (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 34740 VENDARGUES 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 November 22nd of 2023 to January 15th of 2024

APPLICANT'S GENERAL INFORMATIONS:	
Company name	ENLESS WIRELESS
Company address.	45 TER AVENUE DE VERDUN 33520 BRUGES 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. **FCC 47 CFR Part 15: October 2023** Code of federal regulations – Title 47 telecommunication - Part 15 - Radio frequency devices **FCC 47 CFR Part 15.247** Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. **RSS-247_Issue 3: August 2023** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence Exempt Local Area Network (LE-LAN) Devices **RSS-Gen Issue 5: April 2018 / AMD1: 2019 / AMD2: 2021** General Requirements for Compliance of Radio Apparatus **ANSI C 63.10: 2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices 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 wireless transmitter
Model/Type reference..... :	600138402 / TX PULSE LED 600-138
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 33520 BRUGES FRANCE

General product information:

N/A

3.2. E.U.T. Marking plate

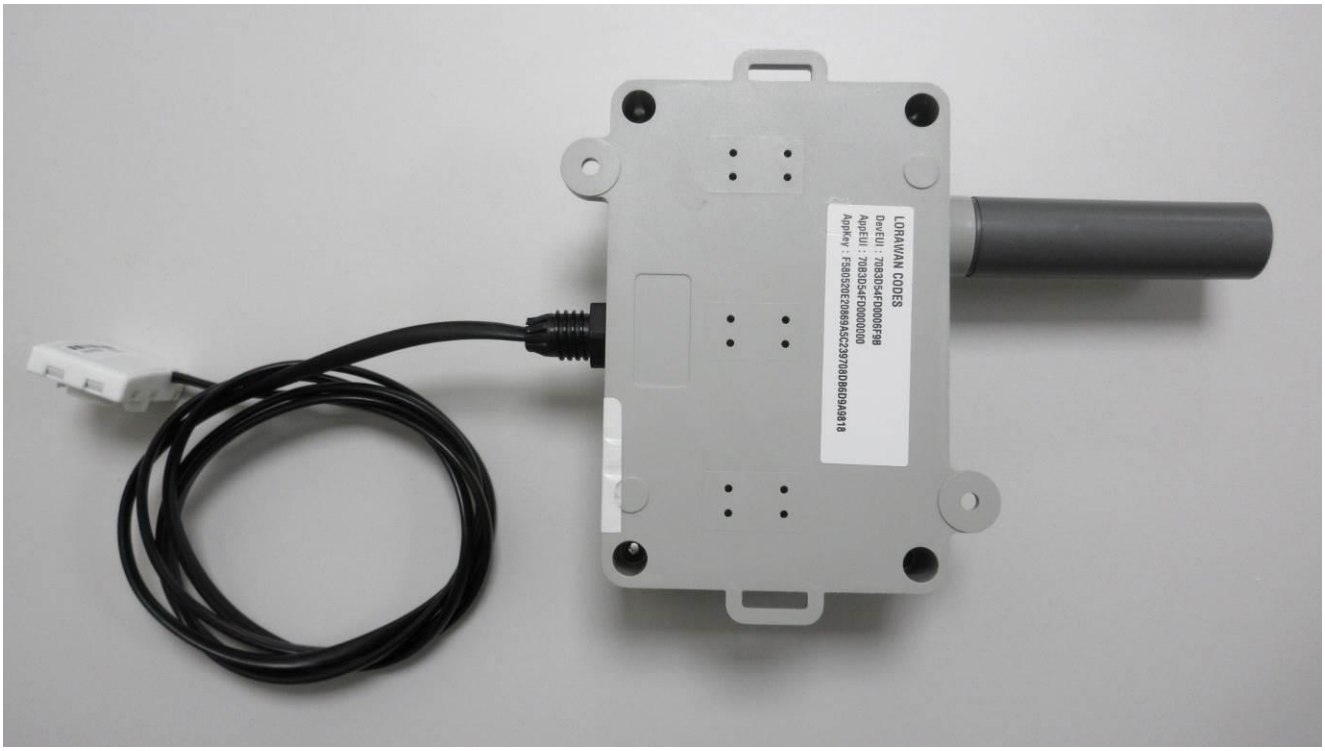
3.3. E.U.T. Modification(s)

No modification

3.4. E.U.T. General view

3.5. E.U.T. Front view

3.6. E.U.T. Back view



3.7. E.U.T. Internal view & Electronic board

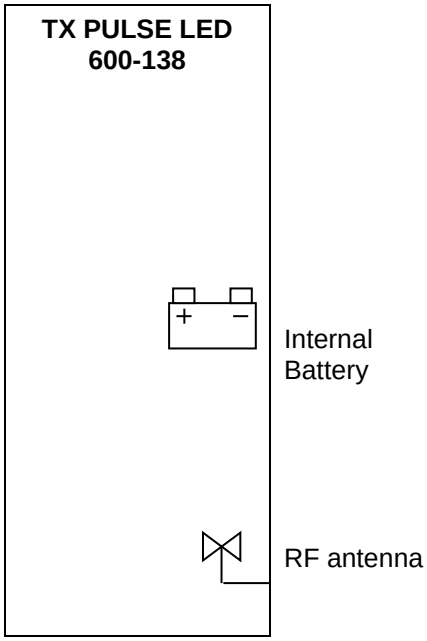
3.8. E.U.T. Mechanical and Electrical Design

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). ..... : *0.118 x 0.079 x 0.048*
Weight (kg). ..... : *0.300*
Temperature range (°C). ..... : *-25 to +55*
Ground bounding strap. ..... : *No*

Comments:

N/A

3.9. E.U.T. Input/Output ports



PORT	NAME	TYPE	LENGTH	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	N/A
1	Battery	DC	N/A	N/A	3.6 Vdc
2	RF antenna	RF	N/A	N/A	900 MHz

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

3.10. 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 ..... : *Integrated* Antenna Gain..... : *Not communicated* **Comments:**
b) TRANSMITTER PARAMETERS (TX)
Frequency bands..... : *902 MHz to 928 MHz* RF Power..... : *N/C* Number of channels / Separation..... : *64 for FHSS/200kHz* *8 for DSSS/1.6MHz (Refer to test report RR-EVE-23B292-4A)* Modulation type ..... : *LoRa* Duty cycle ..... : *Not communicated* Tested frequency..... : *902.3 MHz* *908.5 MHz* *914.9 MHz*
c) RECEIVER PARAMETERS (RX)
Frequency bands..... : *902 MHz to 928 MHz* Category/Class ..... : *Not communicated* 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			15.101
- Verification		N/A	
- Declaration of Conformity		N/A	
CPU boards and power supplies used in personal computers		N/A	15.102
Exempted device		N/A	15.103
Information to the user		N/P	15.105 / See certification documents
Conducted limits		N/A	15.107 / Battery powered equipment
Radiated emission limits	Class B	PASS	15.109
Antenna power conduction limits for receivers		N/A	15.111
Power line carrier systems		N/A	15.113
TV interface devices, including cable system terminal devices		N/A	15.115
TV broadcast receivers		N/A	15.117
Cable ready consumer electronics equipment		N/A	15.118
Program blocking technology requirements for TV receivers		N/A	15.120
Scanning receivers and frequency converters used with scanning receivers		N/A	15.121
Labeling of digital cable ready products		N/A	15.123
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		PASS	a) (1)
- Digital modulation system		N/A	a) (2) Refer to test report RR-EVE-23B292-6A
- **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		PASS	b) (2)
- For system using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands		N/A	b) (3) Refer to test report RR-EVE-23B292-6A
- **Operation with directional antenna gains > 6 dBi**		N/A	c)
- **Out-of-band emissions**		PASS	d)
- **Power spectral density conducted**		N/A	e) Refer to test report RR-EVE-23B292-6A
- **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:	CFR 47 FCC Part 15 §15.109, §15.209 & RSS-Gen
Test method:	ANSI C63.4: 2014 ANSI C63.10: 2013

Test description: : For f <30MHz, EUT is set on an insulating support at 80cm above the ground reference plane.

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°).

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.

For f > 30MHz, EUT is set on an insulating support at 80cm above the ground reference plane (150cm for f >1GHz).

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.

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.

All frequencies were investigated, where applicable.

For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded.

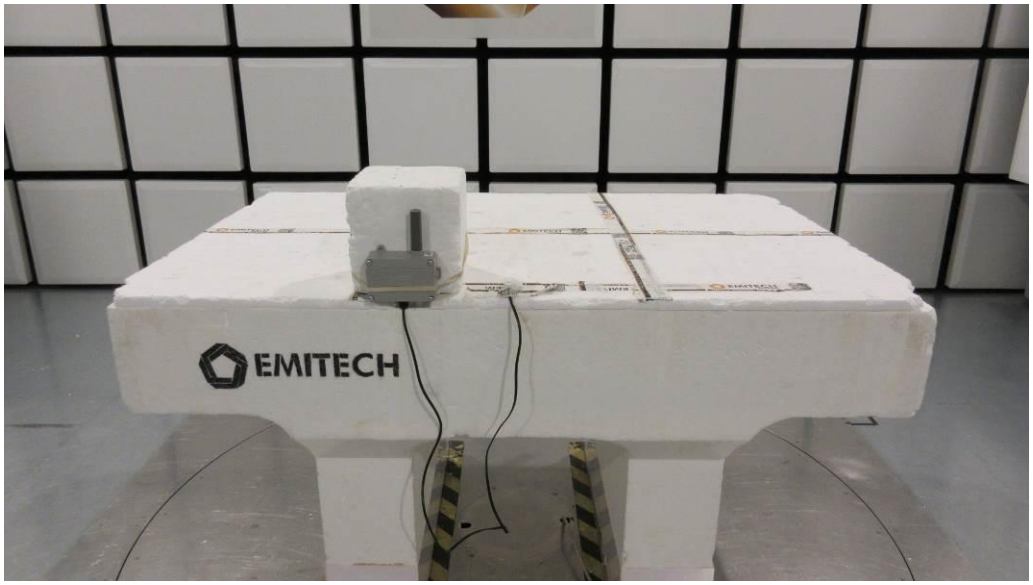
TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Radiated measurement / 9 kHz to 30 MHz / 0°	9kHz-30MHz	15.209	EMI4984	**PASS**
Radiated measurement / 9 kHz to 30 MHz / 45°	9kHz-30MHz	15.209	EMI4985	**PASS**
Radiated measurement / 9 kHz to 30 MHz / 90°	9kHz-30MHz	15.209	EMI4986	**PASS**
Radiated measurement / 30 MHz to 1 GHz / FHSS	30MHz-1GHz	15.209	EMI4860	**PASS**
Radiated measurement / 1 GHz to 12.75 GHz / Low channel	1GHz-12.75GHz	15.209	EMI4905	**PASS**
Radiated measurement / 1 GHz to 12.75 GHz / Mid channel	1GHz-12.75GHz	15.209	EMI4906	**PASS**
Radiated measurement / 1 GHz to 12.75 GHz / High channel	1GHz-12.75GHz	15.209	EMI4907	**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. From 30MHz to 1GHz Quasi peak limit provided is the limit given in §15.209. 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.		

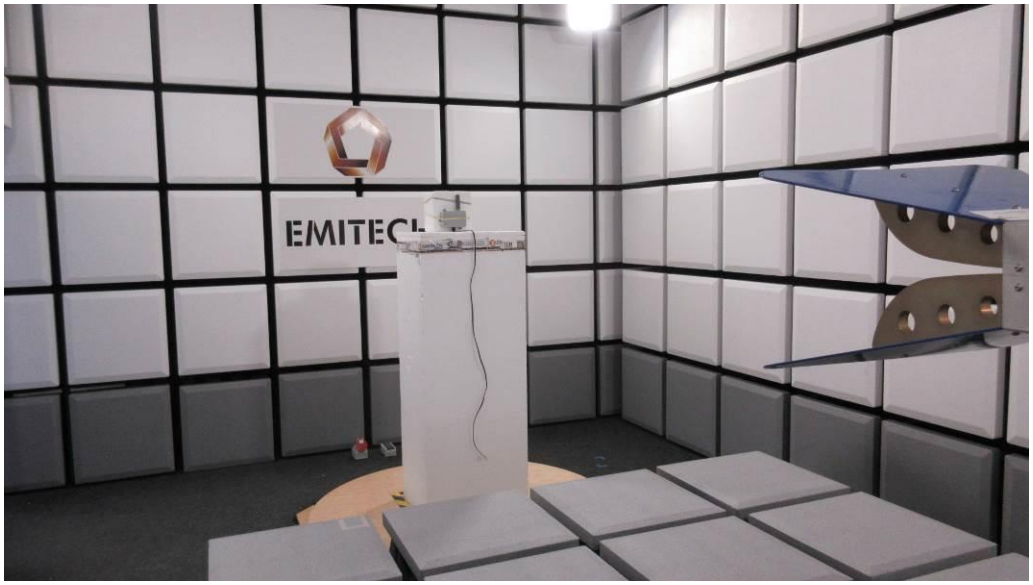
BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

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) - RADIATED MEASUREMENT / POSITION


TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / 30 MHZ TO 1 GHZ

TEST SETUP PHOTO(S) - RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ


RADIATED EMISSION LIMITS – TABULATED RESULTS								
RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 0°							EMI4984	
FREQUENCY (MHZ)	POLARIZATION	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)
1.162	0°	-18.96	N/A	N/A	N/A	N/P	14.80	-33.76
1.241	0°	-19.25	N/A	N/A	N/A	N/P	14.23	-33.48
1.336	0°	-19.30	N/A	N/A	N/A	N/P	13.59	-32.89
1.528	0°	-18.74	N/A	N/A	N/A	N/P	12.42	-31.16
1.458	0°	-18.08	N/A	N/A	N/A	N/P	12.83	-30.91
1.429	0°	-16.13	N/A	N/A	N/A	N/P	13.00	-29.13
COMMENT:	When margin between peak measurements and Average/Qpeak limit(s) is > 6dB, no Average/Qpeak measurements were performed. No spurious were detected.							

RADIATED EMISSION LIMITS – TABULATED RESULTS								
RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 45°							EMI4985	
FREQUENCY (MHZ)	POLARIZATION	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)
0.807	45°	-18.49	N/A	N/A	N/A	N/P	17.97	-36.46
0.931	45°	-18.70	N/A	N/A	N/A	N/P	16.73	-35.43
1.102	45°	-19.30	N/A	N/A	N/A	N/P	15.26	-34.56
1.455	45°	-18.67	N/A	N/A	N/A	N/P	12.85	-31.52
1.481	45°	-18.50	N/A	N/A	N/A	N/P	12.69	-31.19
1.673	45°	-19.18	N/A	N/A	N/A	N/P	11.64	-30.82
COMMENT:	When margin between peak measurements and Average/Qpeak limit(s) is > 6dB, no Average/Qpeak measurements were performed. No spurious were detected.							

RADIATED EMISSION LIMITS – TABULATED RESULTS								
RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 90°							EMI4986	
FREQUENCY (MHZ)	POLARIZATION	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)
0.995	90°	-18.81	N/A	N/A	N/A	N/P	16.15	-34.96
1.029	90°	-19.43	N/A	N/A	N/A	N/P	15.86	-35.29
1.067	90°	-18.57	N/A	N/A	N/A	N/P	15.54	-34.11
1.365	90°	-19.37	N/A	N/A	N/A	N/P	13.40	-32.77
1.525	90°	-19.46	N/A	N/A	N/A	N/P	12.44	-31.90
1.566	90°	-19.09	N/A	N/A	N/A	N/P	12.21	-31.30
COMMENT:	When margin between peak measurements and Average/Qpeak limit(s) is > 6dB, no Average/Qpeak measurements were performed. No spurious were detected.							

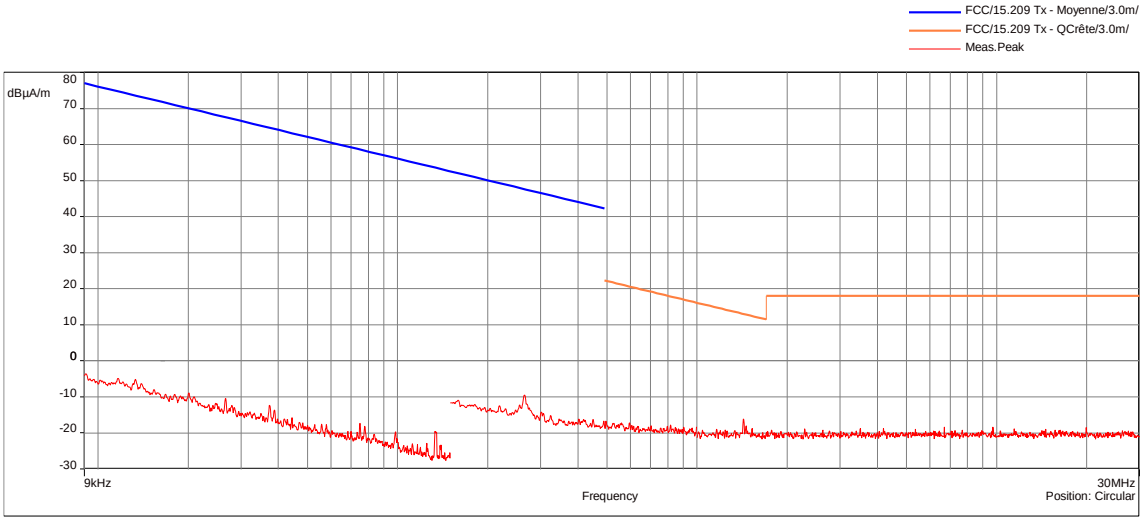
RADIATED EMISSION LIMITS – TABULATED RESULTS					
RADIATED MEASUREMENT / 30 MHZ TO 1 GHZ / FHSS					EMI4860
FREQUENCY (MHZ)	POLARIZATION	PEAK LEVEL (DBµV/M)	QPEAK LEVEL (DBµV/M)	QPEAK LIMIT (DBµV/M)	QPEAK MARGIN (DB)
807.64	Vertical	38.31	N/P	87	-48.69
820.93	Vertical	37.86	N/P	87	-49.14
825.23	Vertical	37.78	N/P	87	-49.22
827.11	Vertical	37.65	N/P	87	-49.35
896.37	Vertical	37.70	N/P	87	-49.30
940.50	Vertical	37.53	N/P	87	-49.47
815.05	Horizontal	33.82	N/P	87	-53.18
816.73	Horizontal	33.87	N/P	87	-53.13
838.07	Horizontal	33.55	N/P	87	-53.45
848.35	Horizontal	33.59	N/P	87	-53.41
900.77	Horizontal	37.43	N/P	87	-49.57
941.38	Horizontal	34.88	N/P	87	-52.12
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						EMI4905	
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)
7796.03	Vertical	47.38	87	-39.62	N/P	67	-19.62
8664.00	Vertical	47.43	87	-39.57	N/P	67	-19.57
8796.38	Vertical	47.65	87	-39.35	N/P	67	-19.35
8987.13	Vertical	47.87	87	-39.13	N/P	67	-19.13
9125.40	Vertical	47.47	74	-26.53	N/P	54	-6.53
9435.21	Vertical	47.56	74	-26.44	N/P	54	-6.44
8120.35	Horizontal	50.14	74	-23.86	45.91	54	-8.09
8658.12	Horizontal	47.76	87	-39.24	N/P	67	-19.24
8993.79	Horizontal	47.88	87	-39.12	N/P	67	-19.12
9344.34	Horizontal	47.94	74	-26.06	N/P	54	-6.06
9586.01	Horizontal	47.84	87	-39.16	N/P	67	-19.16
9662.39	Horizontal	47.92	87	-39.08	N/P	67	-19.08
COMMENT:	When margin between peak measurements and average limit is > 6dB, no average measurements were performed. According to the paragraph (d) §15.247, outside restricted bands the limit is 20 dBc under carrier emission level at 3m without averaging: In this case 107 dBµV/m – 20 dB = 87 dBµV/m						

RADIATED EMISSION LIMITS – TABULATED RESULTS							
RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / MID CHANNEL						EMI4906	
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)
8790.51	Vertical	47.45	88	-40.55	N/P	68	-20.55
9004.37	Vertical	47.78	74	-26.22	N/P	54	-6.22
9250.34	Vertical	47.51	88	-40.49	N/P	68	-20.49
9422.29	Vertical	47.59	74	-26.41	N/P	54	-6.41
9470.86	Vertical	48.07	74	-25.93	N/P	54	-5.93
9913.85	Vertical	47.59	88	-40.41	N/P	68	-20.41
8176.75	Horizontal	49.50	74	-24.50	46.65	54	-7.35
8747.03	Horizontal	47.91	88	-40.09	N/P	68	-20.09
8764.27	Horizontal	47.96	88	-40.04	N/P	68	-20.04
8804.22	Horizontal	47.45	88	-40.55	N/P	68	-20.55
8845.34	Horizontal	47.46	88	-40.54	N/P	68	-20.54
9963.98	Horizontal	47.57	88	-40.43	N/P	68	-20.43
COMMENT:	When margin between peak measurements and average limit is > 6dB, no average measurements were performed. According to the paragraph (d) §15.247, outside restricted bands the limit is 20 dBc under carrier emission level at 3m without averaging: 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						EMI4907	
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)
1829.19	Vertical	47.89	88	-40.11	N/P	68	-20.11
8233.54	Vertical	47.73	74	-26.27	N/P	54	-6.27
8743.90	Vertical	47.88	88	-40.12	N/P	68	-20.12
9529.61	Vertical	47.95	88	-40.05	N/P	68	-20.05
9662.39	Vertical	47.52	88	-40.48	N/P	68	-20.48
9726.62	Vertical	47.38	88	-40.62	N/P	68	-20.62
8233.93	Horizontal	51.76	74	-22.24	48.53	54	-5.47
8589.19	Horizontal	48.85	88	-39.15	N/P	68	-19.15
9360.01	Horizontal	48.82	74	-25.18	N/P	54	-5.18
9442.26	Horizontal	47.99	74	-26.01	N/P	54	-6.01
9584.84	Horizontal	48.10	88	-39.90	N/P	68	-19.90
9639.28	Horizontal	47.99	88	-40.01	N/P	68	-20.01
COMMENT:		When margin between peak measurements and average limit is > 6dB, no average measurements were performed. According to the paragraph (d) §15.247, outside restricted bands the limit is 20 dBc under carrier emission level at 3m without averaging: In this case 108 dBµV/m – 20 dB = 88 dBµV/m					

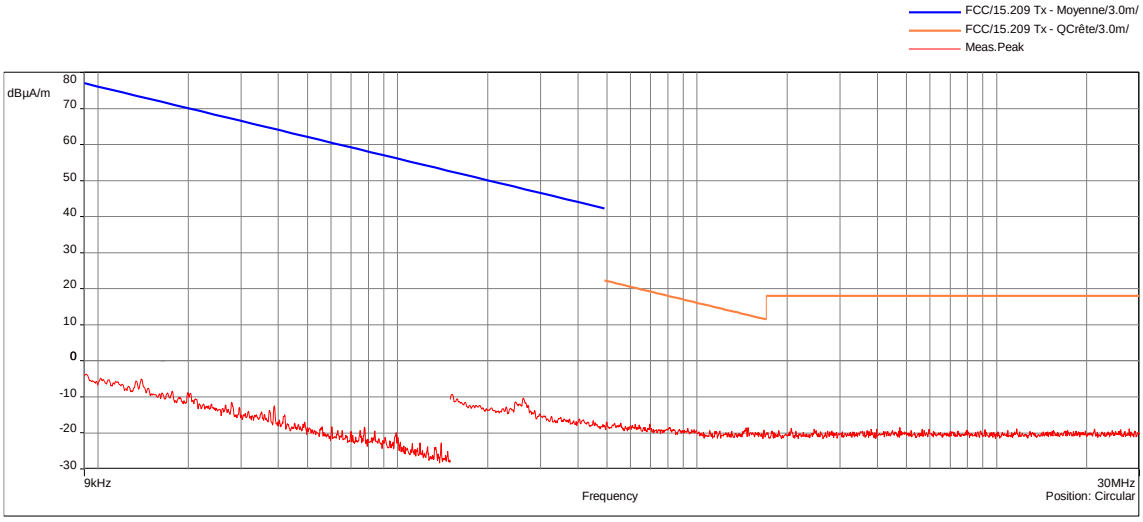
RADIATED EMISSION LIMITS - GRAPH			
RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 600-038 / 0°		EMI4984	
EUT mode:	D-M2	**T (°C):**	20.2
Test Date:	10/01/2024	**H (%):**	32.1
Test Operator:	MPA	**P (hPa):**	1020



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. No spurious emissions were detected.			

EUT modification(s): N/A

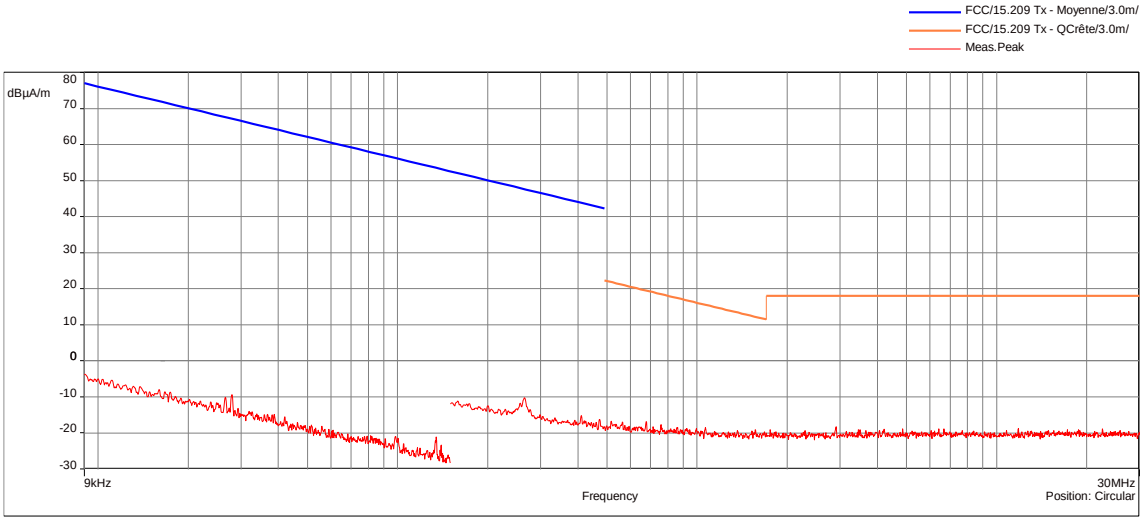
RADIATED EMISSION LIMITS - GRAPH			
RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 600-038 / 45°		EMI4985	
EUT mode:	D-M2	**T (°C):**	20.2
Test Date:	10/01/2024	**H (%):**	32.1
Test Operator:	MPA	**P (hPa):**	1020



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. No spurious emissions were detected.			

EUT modification(s): N/A

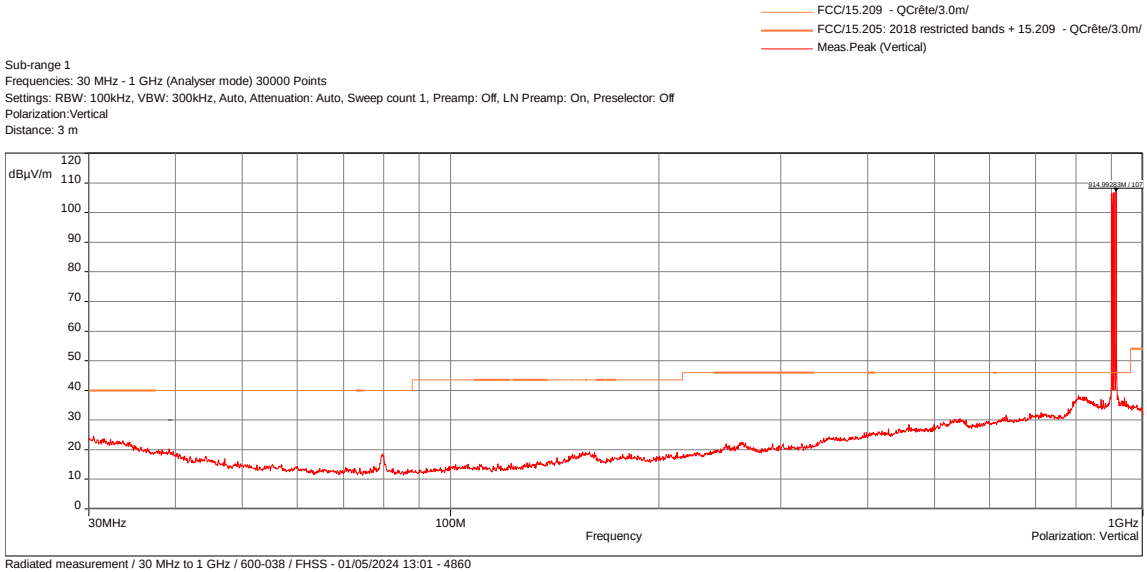
RADIATED EMISSION LIMITS - GRAPH			
RADIATED MEASUREMENT / 9 KHZ TO 30 MHZ / 600-038 / 90°		EMI4986	
EUT mode:	D-M2	**T (°C):**	20.2
Test Date:	10/01/2024	**H (%):**	32.1
Test Operator:	MPA	**P (hPa):**	1020



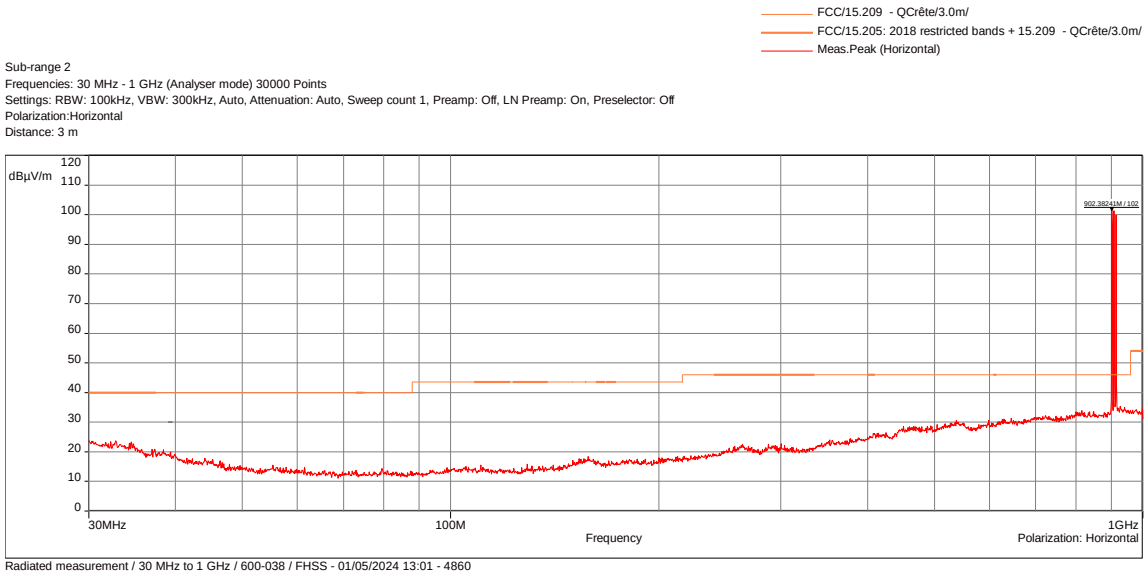
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak
Configuration:	N/A			
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor. No spurious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

EUT modification(s): N/A

RADIATED EMISSION LIMITS - GRAPH			
RADIATED MEASUREMENT / 30 MHZ TO 1 GHZ / FHSS		EMI4860	
EUT mode:	Tx mode	**T (°C):**	20.7
Test Date:	05/01/2024	**H (%):**	43.5
Test Operator:	MPA	**P (hPa):**	1004



Radiated measurement / 30 MHz to 1 GHz / 600-038 / FHSS - 01/05/2024 13:01 - 4860

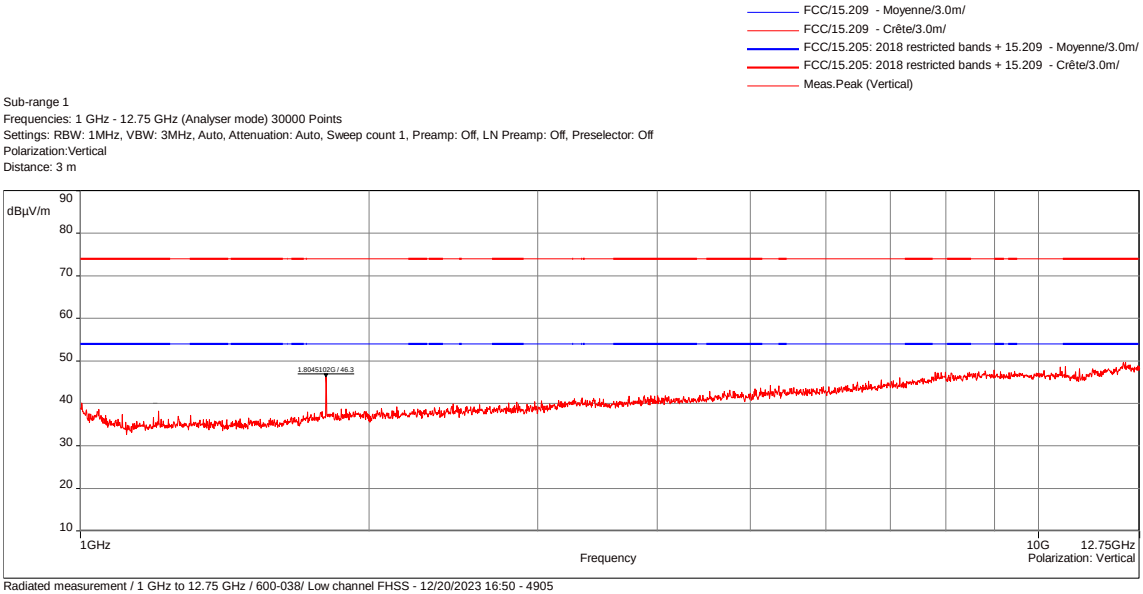


Radiated measurement / 30 MHz to 1 GHz / 600-038 / FHSS - 01/05/2024 13:01 - 4860

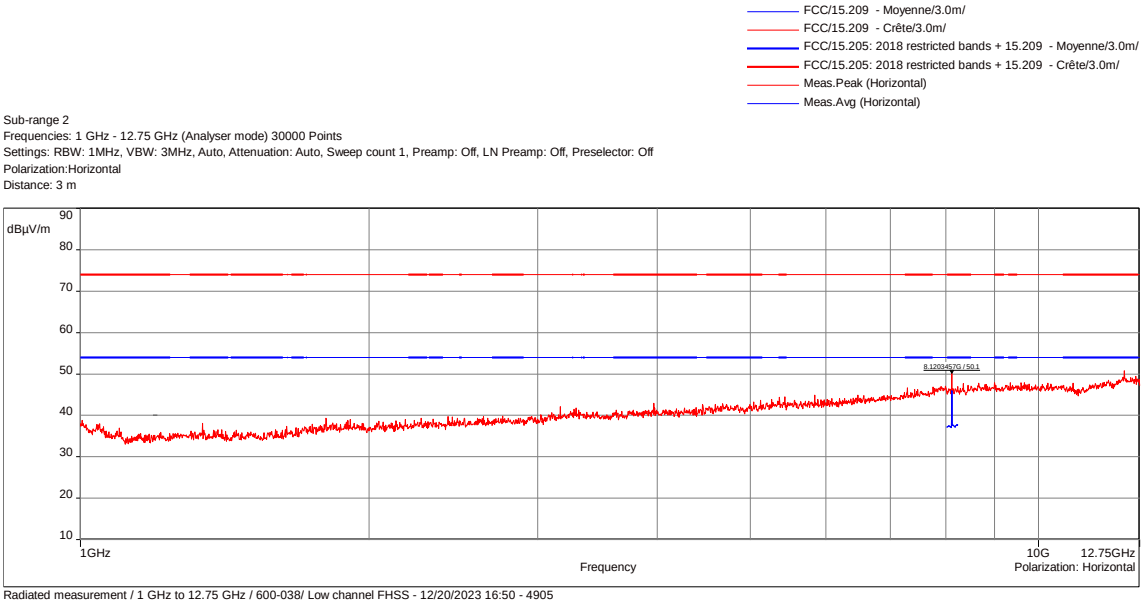
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-1GHz	100kHz	300kHz	Peak
Horizontal	30MHz-1GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			

EUT modification(s): N/A

RADIATED EMISSION LIMITS - GRAPH			
RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / LOW CHANNEL		EMI4905	
EUT mode:	Tx mode	**T (°C):**	21.3
Test Date:	20/12/2023	**H (%):**	36.9
Test Operator:	FMO	**P (hPa):**	1012



Radiated measurement / 1 GHz to 12.75 GHz / 600-038/ Low channel FHSS - 12/20/2023 16:50 - 4905



Radiated measurement / 1 GHz to 12.75 GHz / 600-038/ Low channel FHSS - 12/20/2023 16:50 - 4905

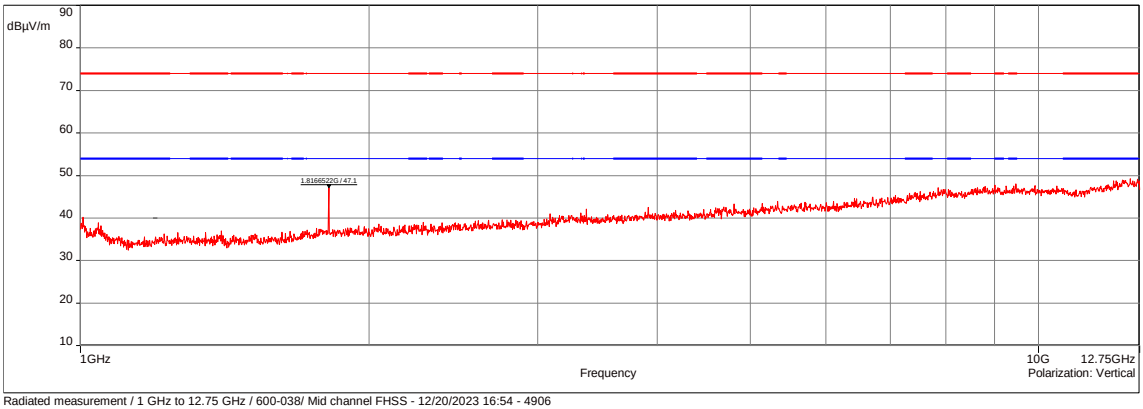
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-12.75GHz	1MHz	3MHz	Peak
Horizontal	1GHz-12.75GHz	1MHz	3MHz	Peak / Average
Configuration:	N/A			
Comments:	N/A			

EUT modification(s): N/A

RADIATED EMISSION LIMITS - GRAPH			
RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / MID CHANNEL		EMI4906	
EUT mode:	Tx mode	**T (°C):**	21.3
Test Date:	20/12/2023	**H (%):**	36.9
Test Operator:	FMO	**P (hPa):**	1012

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)

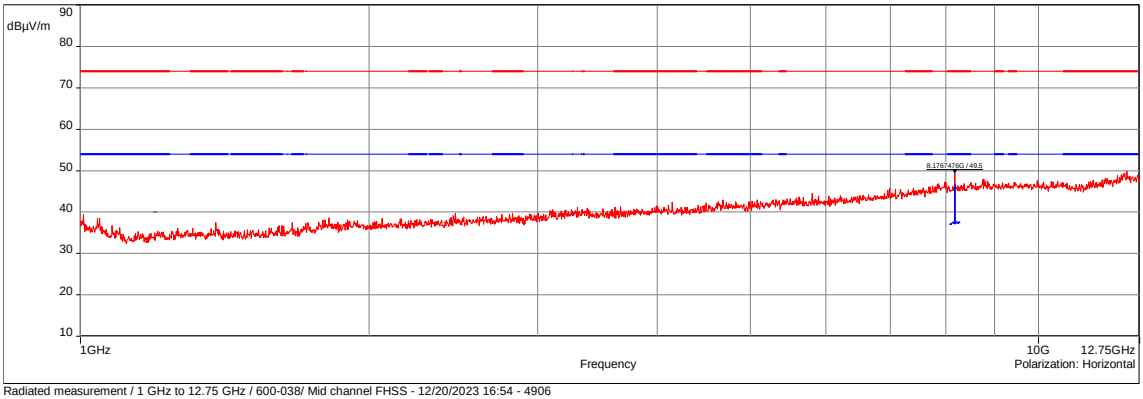
Sub-range 1
Frequencies: 1 GHz - 12.75 GHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



Radiated measurement / 1 GHz to 12.75 GHz / 600-038/ Mid channel FHSS - 12/20/2023 16:54 - 4906

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 / 600-038/ Mid channel FHSS - 12/20/2023 16:54 - 4906

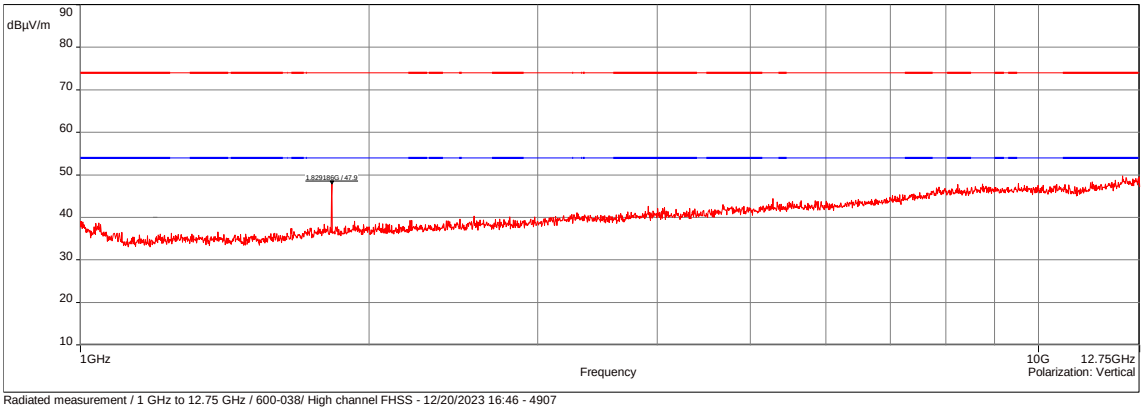
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-12.75GHz	1MHz	3MHz	Peak
Horizontal	1GHz-12.75GHz	1MHz	3MHz	Peak / Average
Configuration:	N/A			
Comments:	N/A			

EUT modification(s): N/A

RADIATED EMISSION LIMITS - GRAPH			
RADIATED MEASUREMENT / 1 GHZ TO 12.75 GHZ / HIGH CHANNEL		EMI4907	
EUT mode:	Tx mode	**T (°C):**	21.3
Test Date:	20/12/2023	**H (%):**	36.9
Test Operator:	FMO	**P (hPa):**	1012

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)

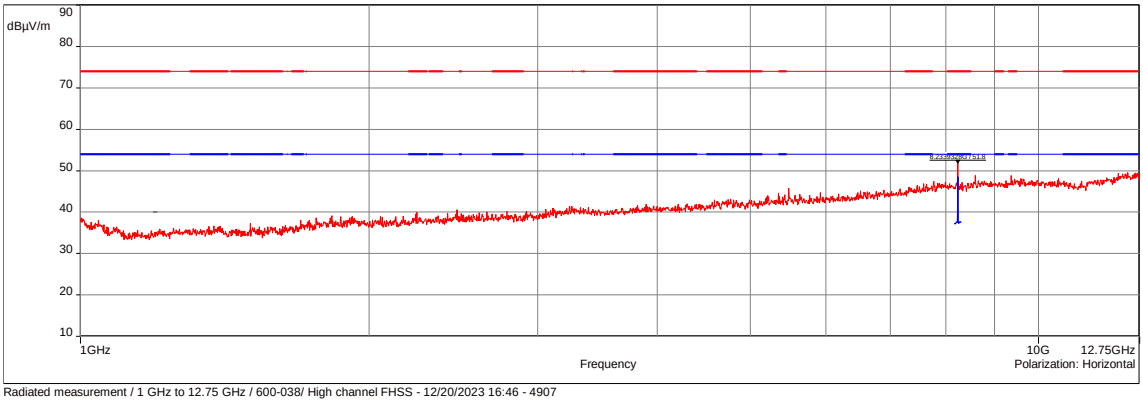
Sub-range 1
Frequencies: 1 GHz - 12.75 GHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



Radiated measurement / 1 GHz to 12.75 GHz / 600-038/ High channel FHSS - 12/20/2023 16:46 - 4907

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 / 600-038/ High channel FHSS - 12/20/2023 16:46 - 4907

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

EUT modification(s): N/A

6.2. Number of channels, 20 dB bandwidth, and average time of occupancy

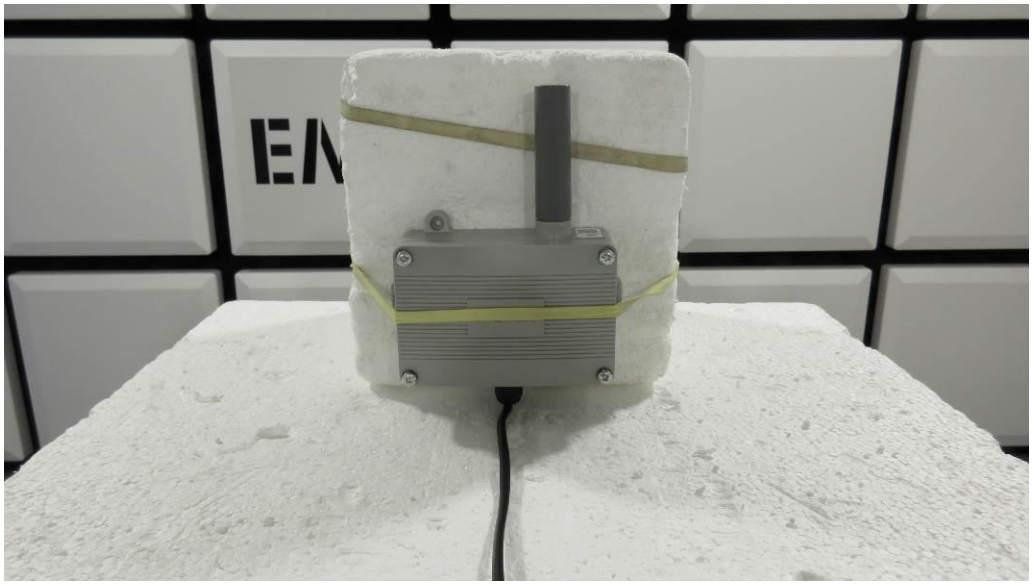
Reference standard:	FCC 47 CFR Part 15.247 RSS 247
Test method:	ANSI C63.10: 2013
Test description: (a) (1) (i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.	

TESTED PARAMETER	RESULT	SEVERITY	RESULT TAB.	VERDICT
Number of channels / 600-038 / FHSS	64 channels	≥ 50 channels	EMI5248	**PASS**
Channels separation / 600-038 / FHSS	200.14 kHz	≥ 200 kHz	EMI5249	**PASS**
20 dB bandwidth / Low channel	146.678 kHz	< 200 kHz	EMI5990	**PASS**
20 dB bandwidth / Mid channel	147.217 kHz	< 200 kHz	EMI5991	**PASS**
20 dB bandwidth / High channel	145.600 kHz	< 200 kHz	EMI5992	**PASS**
Average time of occupancy	0.034 ms / 20 s	≤ 400 ms / 20 s	EMI5993	**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		

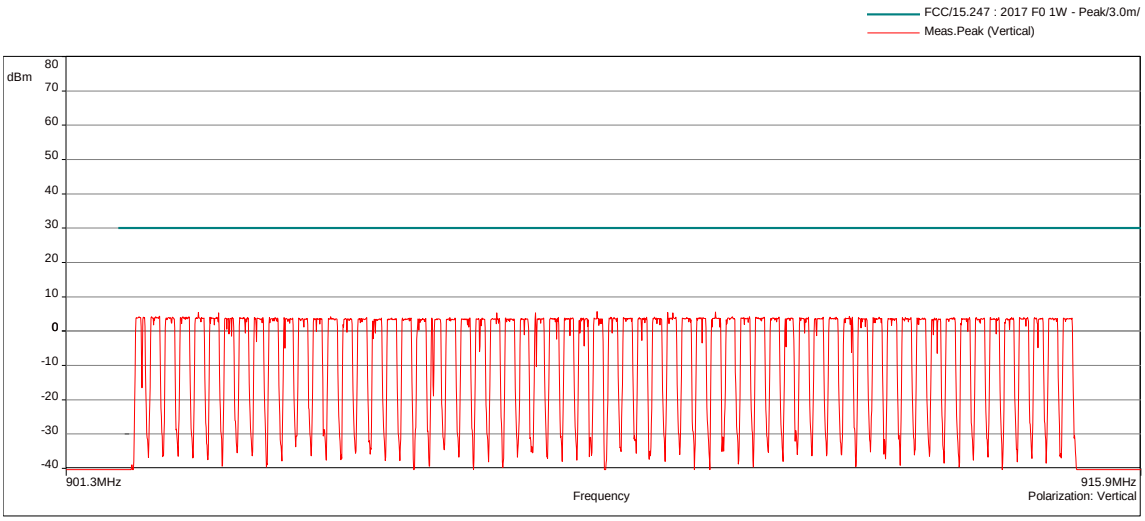
TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	ETS lindgren	3143B	17930	12/08/2021	12/10/2024
Cable	/	N-1m	3625	02/05/2023	02/07/2025
Cable	Techniwave	N-3.5m	18353	17/08/2023	17/10/2025
Cable	Techniwave	N-4m	18355	17/08/2023	17/10/2025
Receiver	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) - POSITION


TEST SETUP PHOTO(S)

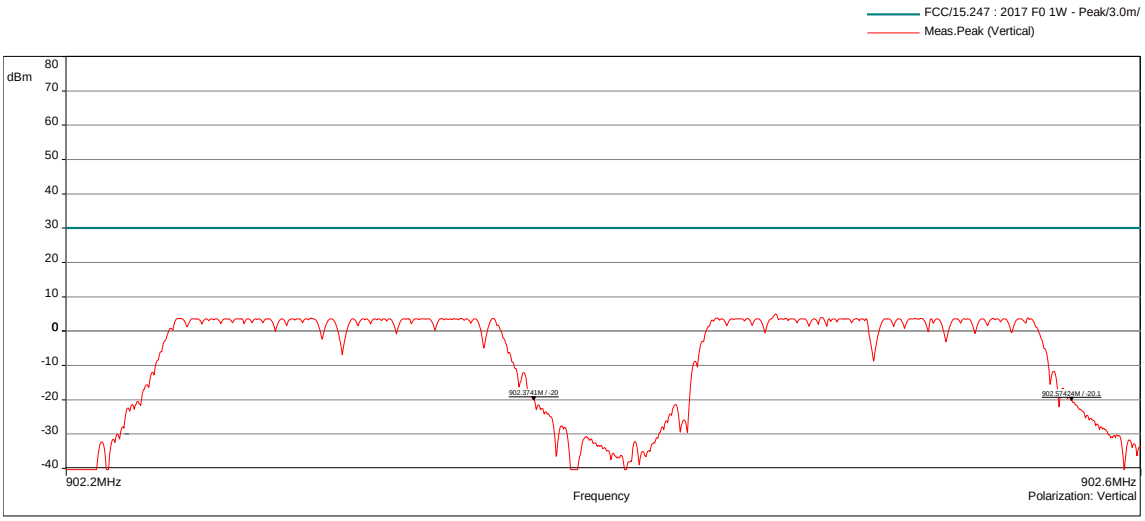
NUMBER OF CHANNELS FOR FREQUENCY HOPPING SYSTEMS - GRAPH			
NUMBER OF CHANNELS / 600-038 / FHSS		EMI5248	
EUT mode:	Tx hopping mode	**T (°C):**	17.5
Test Date:	10/01/2024	**H (%):**	43.8
Test Operator:	MPA	**P (hPa):**	1008



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	901.3MHz-915.9MHz	3kHz	10kHz	Peak
Configuration:	N/A			
Comments:	The system uses 64 channels			

EUT modification(s): N/A

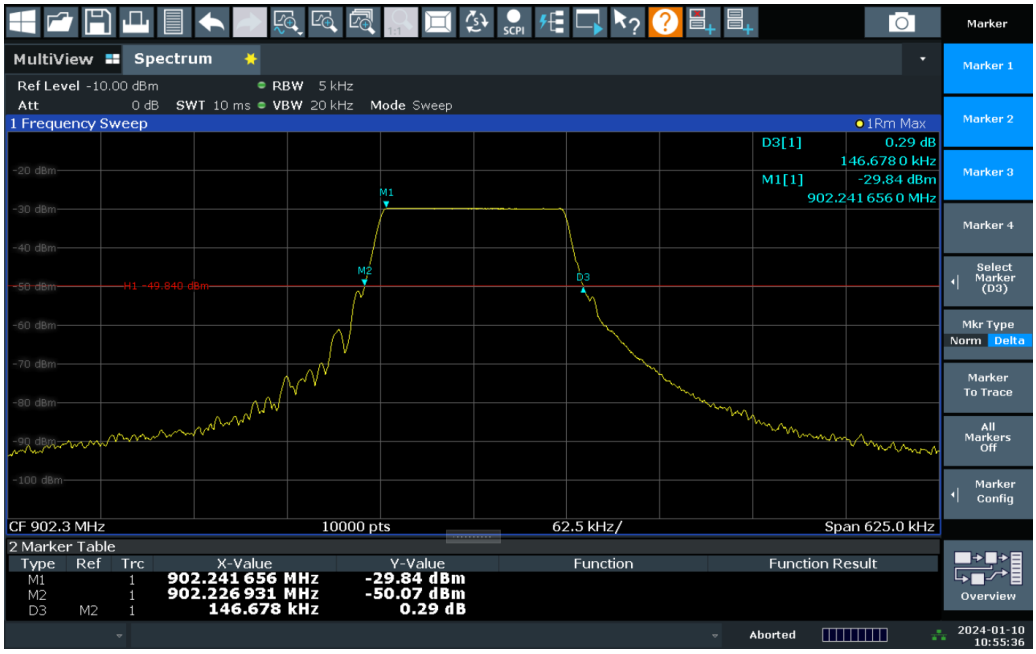
CHANNEL SEPARATION FOR FREQUENCY HOPPING SYSTEMS - GRAPH			
CHANNELS SEPARATION / 600-038 / FHSS		EMI5249	
EUT mode:	Tx hopping mode	**T (°C):**	17.5
Test Date:	10/01/2024	**H (%):**	43.8
Test Operator:	MPA	**P (hPa):**	1008



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	902.2MHz-902.6MHz	3kHz	10kHz	Peak
Configuration:	N/A			
Comments:	The channels separation is almost 200.14 kHz			

EUT modification(s): N/A

20 dB bandwidth for frequency hopping systems - Graph			
20 dB bandwidth / Low 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 system has an OBW of 146.678 kHz

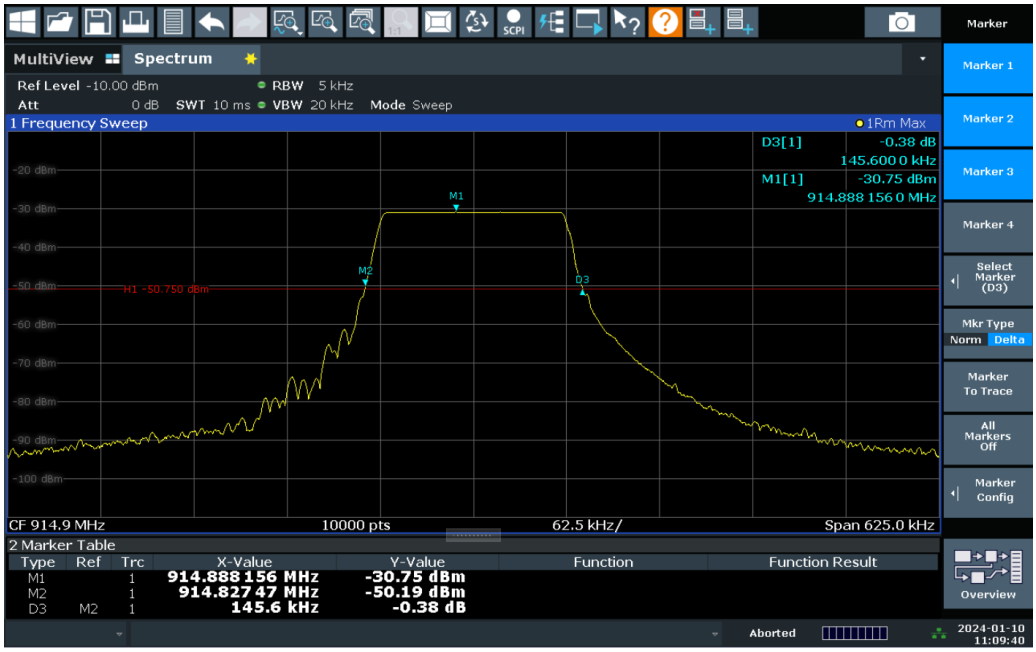
EUT modification(s): N/A

20 dB bandwidth for frequency hopping systems - Graph			
20 dB bandwidth / Mid channel		EMI5991	
EUT mode:	Tx mode	**T (°C):**	17.5
Test Date:	09/01/2024	**H (%):**	43.8
Test Operator:	MPA	**P (hPa):**	1008

Results:	The system has an OBW of 147.217 kHz

EUT modification(s): N/A

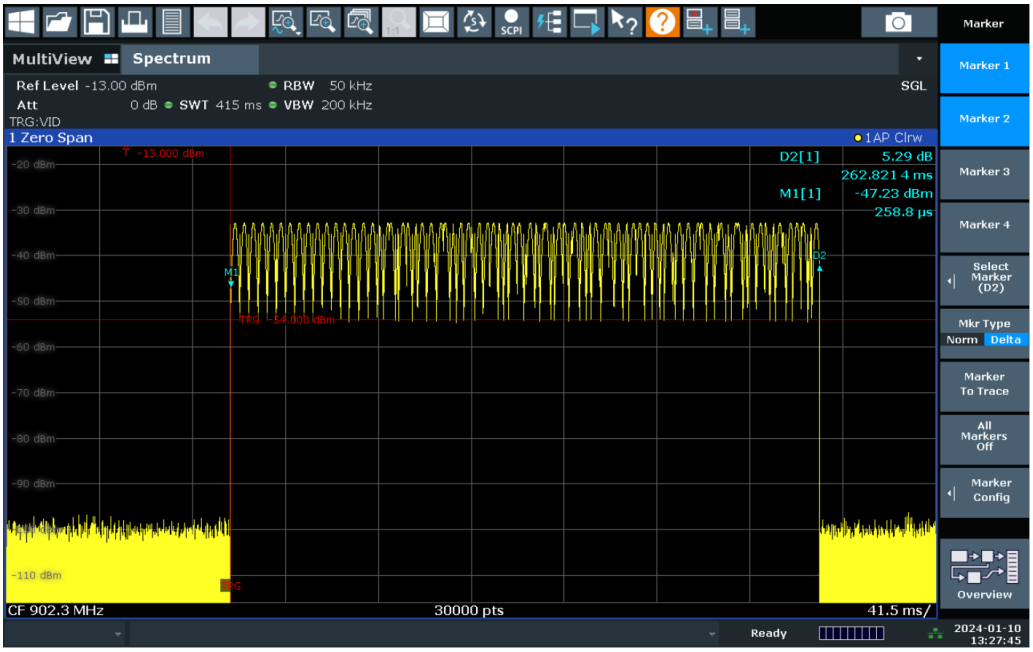
20 dB bandwidth for frequency hopping systems - Graph			
20 dB bandwidth / High channel		EMI5992	
EUT mode:	Tx mode	**T (°C):**	17.5
Test Date:	09/01/2024	**H (%):**	43.8
Test Operator:	MPA	**P (hPa):**	1008

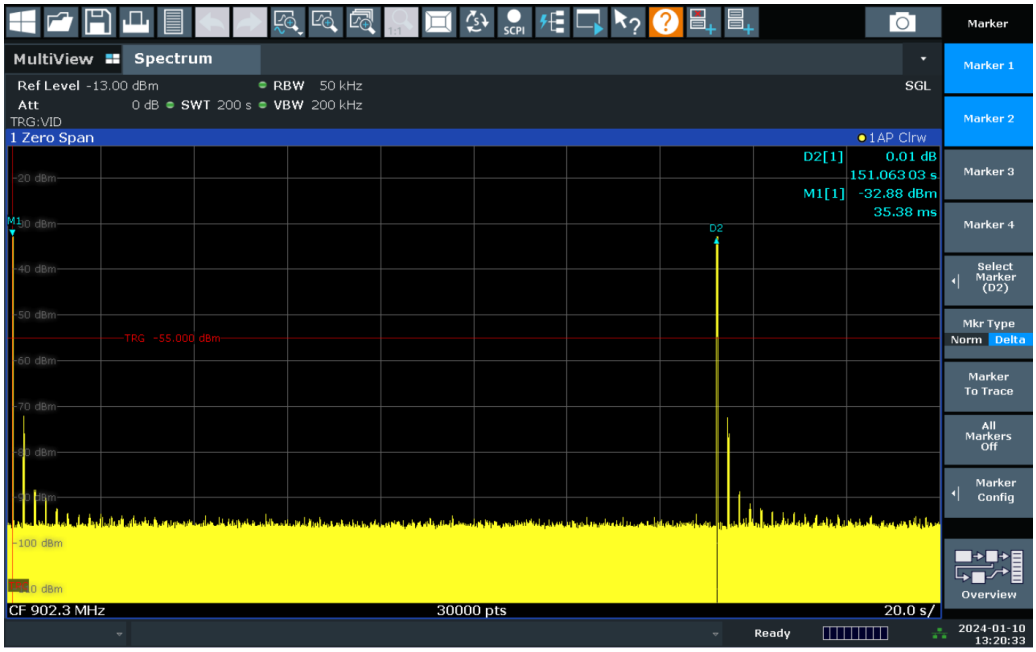


Results:	The system has an OBW of 145.600 kHz

EUT modification(s): N/A

OCCUPANCTION TIME FOR FREQUENCY HOPPING SYSTEMS - GRAPH			
AVERAGE TIME OF OCCUPANCY		EMI5996	
EUT mode:	Tx mode	**T (°C):**	17.5
Test Date:	09/01/2024	**H (%):**	43.8
Test Operator:	MPA	**P (hPa):**	1008





Results:	The averaging time of occupancy on any channel is less than 0.4 seconds within a period of 20 seconds. The EUT transmit during 0.262ms every 151 seconds on each channel.

EUT modification(s): N/A

6.3. Equivalent isotropic radiated power

Reference standard:	FCC Part 15.247 and RSS 247
Test method:	ANSI C63.10: 2013

Test description: b) (2)

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

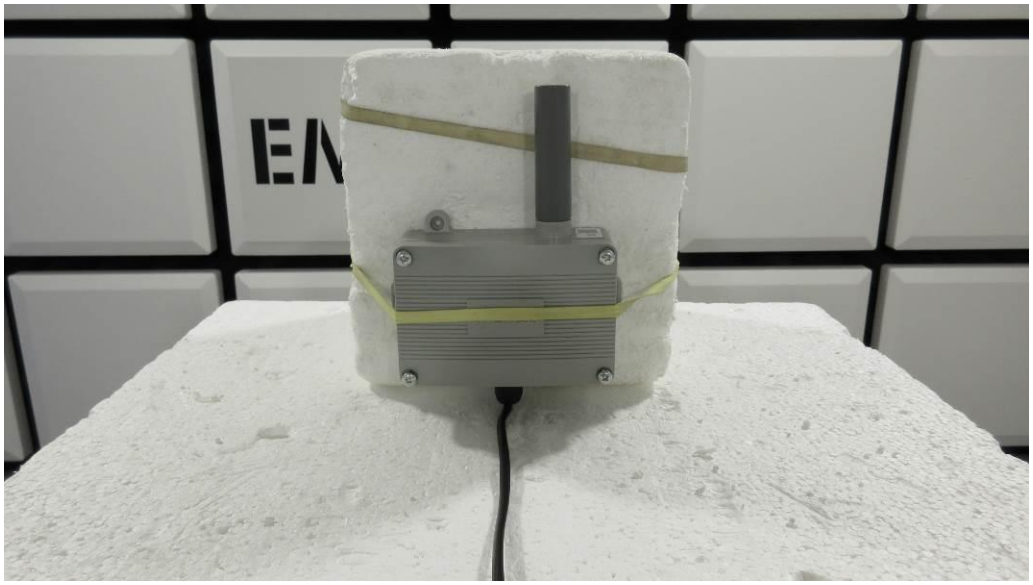
Only the highest levels are recorded. The measurement is performed in radiated mode because the product antenna is a simple wire type antenna. The results are directly compared to the radiated limits (conducted limits + 6dB)

TESTED CONFIGURATION	RESULTS	SEVERITY	RESULT TAB.	VERDICT
RF output power (EIRP) / Low channel	8.87 dBm	1W (30dBm)	EMI4902	**PASS**
RF output power (EIRP) / Mid channel	8.89 dBm	1W (30dBm)	EMI4903	**PASS**
RF output power (EIRP) / High channel	9.32 dBm	1W (30dBm)	EMI4904	**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 done 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

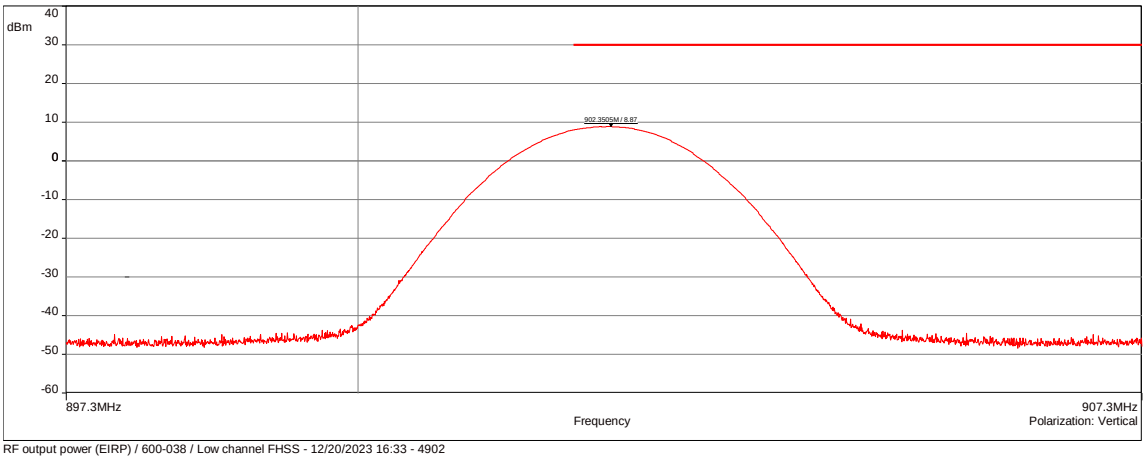
TEST SETUP PHOTO(S) - POSITION


TEST SETUP PHOTO(S)

MAXIMUM PEAK POWER - GRAPH			
RF OUTPUT POWER (EIRP) / LOW CHANNEL		EMI4902	
EUT mode:	Tx mode	**T (°C):**	21.3
Test Date:	20/12/2023	**H (%):**	36.9
Test Operator:	FMO	**P (hPa):**	1012

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

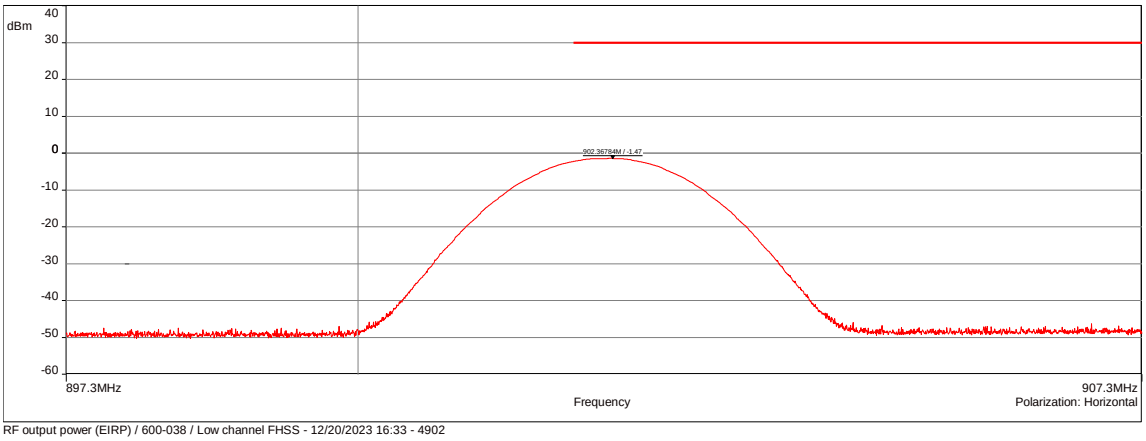
Sub-range 1
Frequencies: 897.3 MHz - 907.3 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



RF output power (EIRP) / 600-038 / Low channel FHSS - 12/20/2023 16:33 - 4902

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

Sub-range 2
Frequencies: 897.3 MHz - 907.3 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) / 600-038 / Low channel FHSS - 12/20/2023 16:33 - 4902

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	897.3MHz-907.3MHz	1MHz	3MHz	Peak
Horizontal	897.3MHz-907.3MHz	1MHz	3MHz	Peak
Configuration:	N/A			
Comments:	N/A			

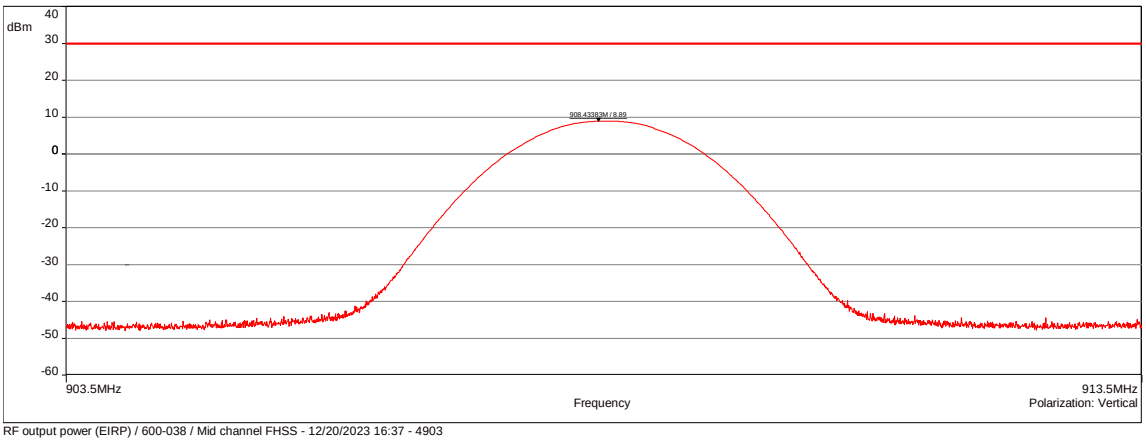
EUT modification(s): N/A

FREQUENCY (MHZ)	POLARIZATION	LEVEL (DBM)	LIMIT (DBM)
902.3	Vertical	8.87	36
902.3	Horizontal	-1.47	36

MAXIMUM PEAK POWER - GRAPH			
RF OUTPUT POWER (EIRP) / MID CHANNEL		EMI4903	
EUT mode:	Tx mode	**T (°C):**	21.3
Test Date:	20/12/2023	**H (%):**	36.9
Test Operator:	FMO	**P (hPa):**	1012

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

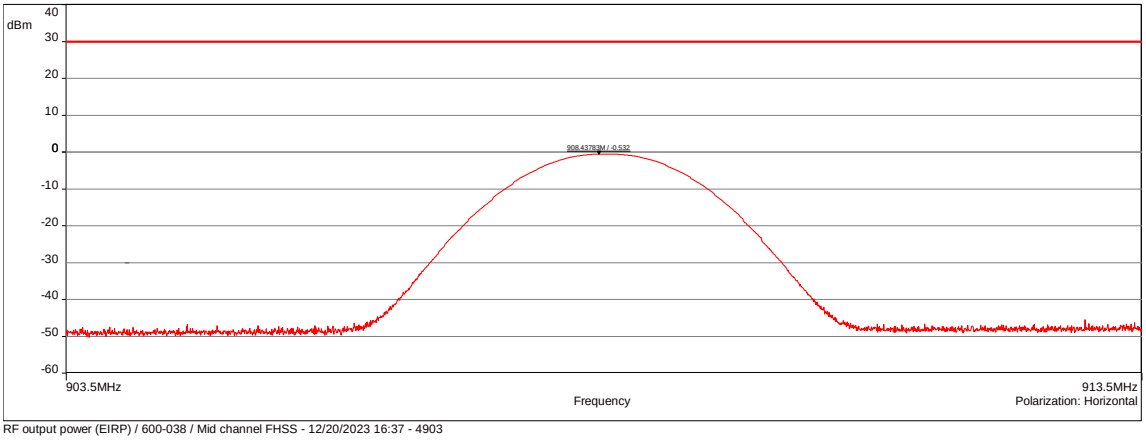
Sub-range 1
Frequencies: 903.5 MHz - 913.5 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



RF output power (EIRP) / 600-038 / Mid channel FHSS - 12/20/2023 16:37 - 4903

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

Sub-range 2
Frequencies: 903.5 MHz - 913.5 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) / 600-038 / Mid channel FHSS - 12/20/2023 16:37 - 4903

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	903.5MHz-913.5MHz	1MHz	3MHz	Peak
Horizontal	903.5MHz-913.5MHz	1MHz	3MHz	Peak
Configuration:	N/A			
Comments:	N/A			

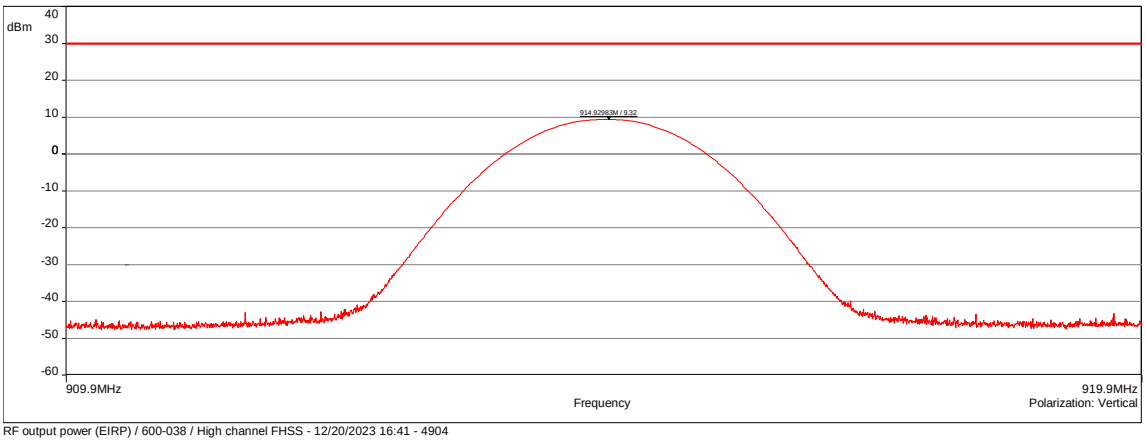
EUT modification(s): N/A

FREQUENCY (MHZ)	POLARIZATION	LEVEL (DBM)	LIMIT (DBM)
908.5	Vertical	8.89	36
908.5	Horizontal	-0.53	36

MAXIMUM PEAK POWER - GRAPH			
RF OUTPUT POWER (EIRP) / HIGH CHANNEL		EMI4904	
EUT mode:	Tx mode	**T (°C):**	21.3
Test Date:	20/12/2023	**H (%):**	36.9
Test Operator:	FMO	**P (hPa):**	1012

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

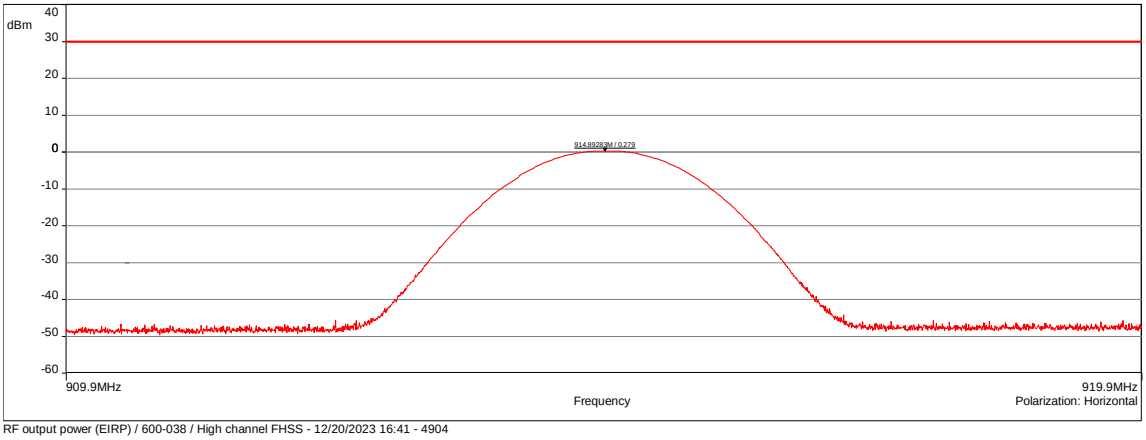
Sub-range 1
Frequencies: 909.9 MHz - 919.9 MHz (Analyser mode) 30000 Points
Settings: RBW: 1MHz, VBW: 3MHz, Auto, Attenuation: Auto, Sweep count 1, Preamp: Off, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



RF output power (EIRP) / 600-038 / High channel FHSS - 12/20/2023 16:41 - 4904

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

Sub-range 2
Frequencies: 909.9 MHz - 919.9 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) / 600-038 / High channel FHSS - 12/20/2023 16:41 - 4904

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	909.9MHz-919.9MHz	1MHz	3MHz	Peak
Horizontal	909.9MHz-919.9MHz	1MHz	3MHz	Peak
Configuration:	N/A			
Comments:	N/A			

EUT modification(s): N/A

FREQUENCY (MHZ)	POLARIZATION	LEVEL (DBM)	LIMIT (DBM)
914.9	Vertical	9.32	36
914.9	Horizontal	0.28	36

6.4. Band-edge compliance

Reference standard:	FCC 47 CFR Part 15.247 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.

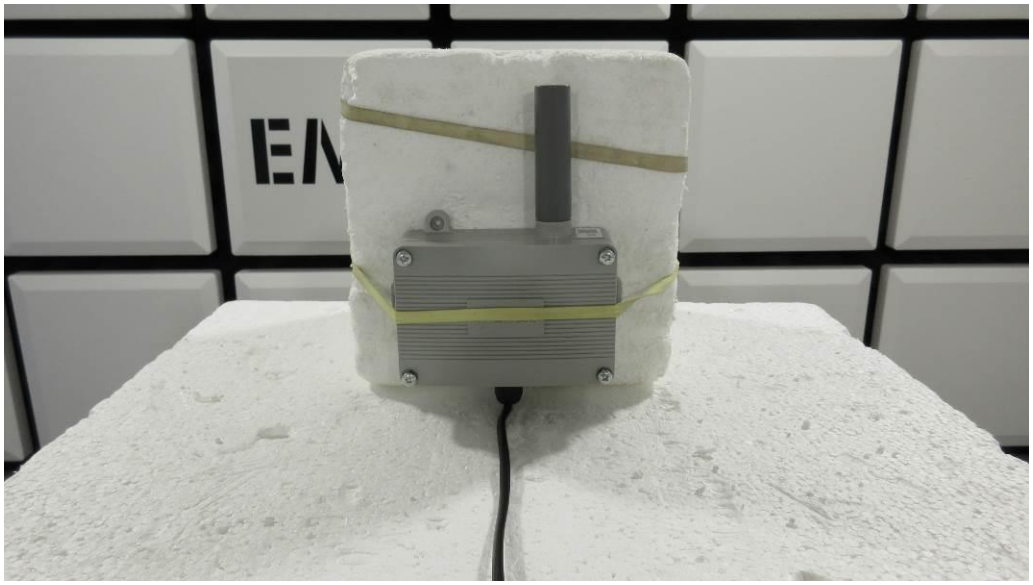
Only the highest levels are recorded.

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Band edge / FHSS	876MHz-954MHz	20 dBc and §15.209	EMI4860	**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		

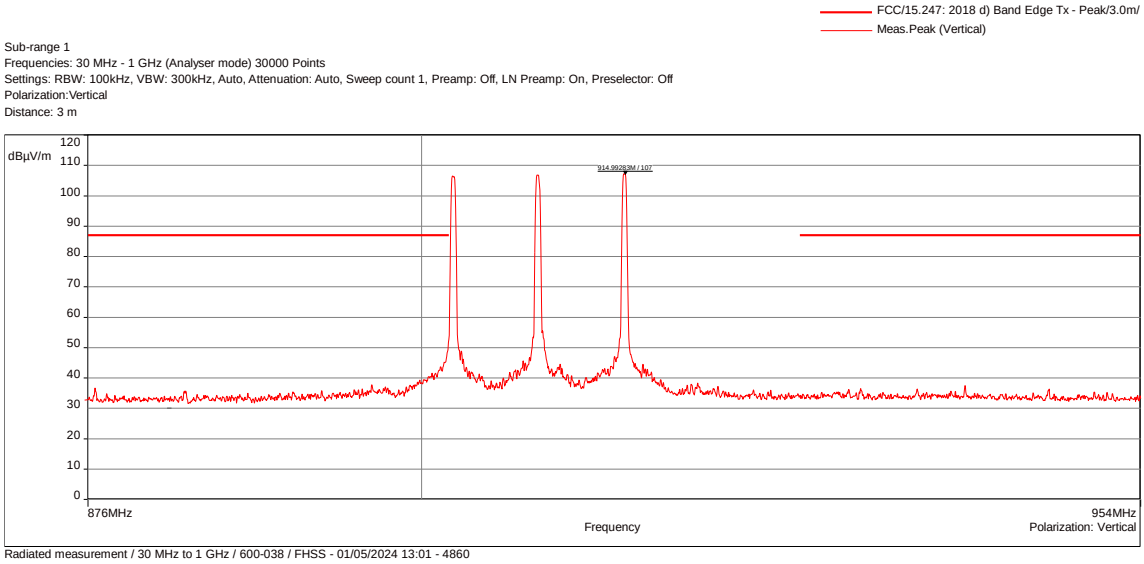
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS lindgren	3142E	14523	27/01/2022	27/03/2025
Cable	Techniwave	N-8m	18349	17/08/2023	17/10/2025
Cable	SUCOFLEX	N-6,5m	14380	17/08/2023	17/10/2025
Cable	SUCOFLEX	N-3m	14378	17/08/2023	17/10/2025
Receiver	Rohde & Schwarz	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) – POSITION


TEST SETUP PHOTO(S)

BAND-EDGE COMPLIANCE - GRAPH			
BAND EDGE / FHSS		EMI4860	
EUT mode:	Tx mode	**T (°C):**	17.5
Test Date:	05/01/2024	**H (%):**	43.8
Test Operator:	MPA	**P (hPa):**	1008



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. Measurement of frequency stability

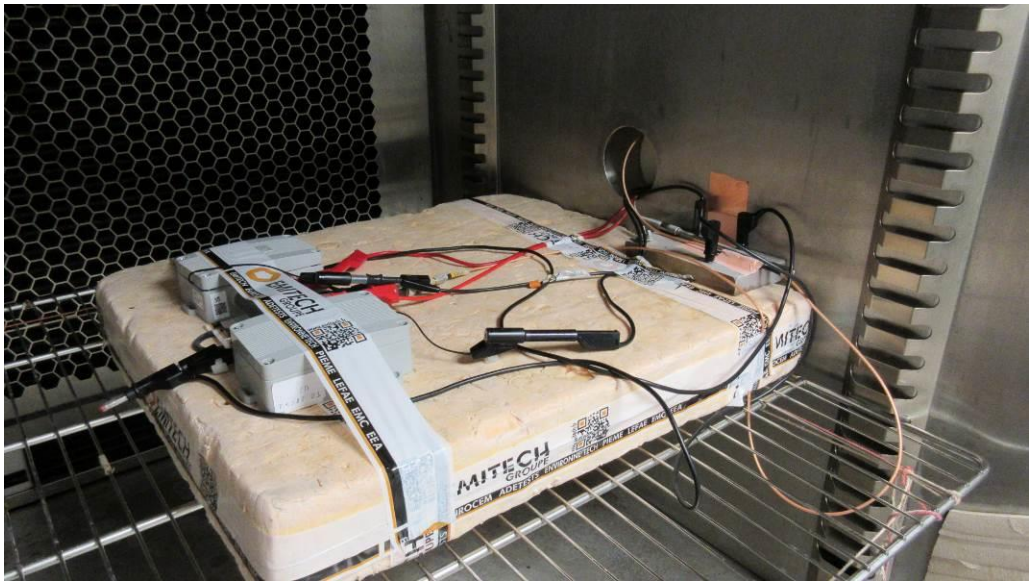
Reference standard:	FCC 47 CFR Part 15.215 RSS-Gen
Test method:	ANSI C63.10: 2013
General test setup: The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques 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. 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	22.0 °C
Relative Humidity	20 to 75 %	37.8 %
Atmospheric pressure	N/A	1012 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	21/06/2024
Multimeter	Agilent Technologies	U1252A	6138	29/06/2023	29/08/2024
Power supply	TTI	PL303QMD	8496		
Receiver	Rohde & Schwarz	FPL1007	17908	03/11/2022	03/07/2024
Thermohygrometer	Bioblock Scientific	Météostar	0963	09/06/2021	09/02/2024
Thermohygrometer	Testo	608-H1	7562	11/06/2021	11/02/2024
Thermometer contactless	GHM Greisinger	GMH 3710	12968	28/02/2023	28/04/2025

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

TEST SETUP PHOTO(S)


MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS					
LOW CHANNEL 138 FHSS					EMI6410
Test case	**Temperature (°C)**	**Power supply (Vdc)**	**Frequency (MHz)**	**Frequency error (kHz)**	**Limit**
Normal conditions	+25	3.7	902.300339	-	Within 902MHz to 928MHz
Extrem voltage conditions	+25	3.6	902.300320	-0.019	
		3.8	902.300025	-0.314	
Extrem temperature conditions	-25	3.7	902.300104	-0.235	
	+55		902.300367	+0.028	

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	908.500182	-	Within 902MHz to 928MHz
Extrem voltage conditions	+25	3.6	908.500241	+0.059	
		3.8	908.500219	+0.037	
Extrem temperature conditions	-25	3.7	908.500176	-0.006	
	+55		908.500133	-0.049	

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	914.900008	-	Within 902MHz to 928MHz
Extrem voltage conditions	+25	3.6	914.900009	+0.001	
		3.8	914.899995	-0.013	
Extrem temperature conditions	-25	3.7	914.900093	+0.085	
	+55		914.900443	+0.435	

6.6. 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 %. The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions. EUT is connected to the measuring receiver via 50Ω attenuator(s).	

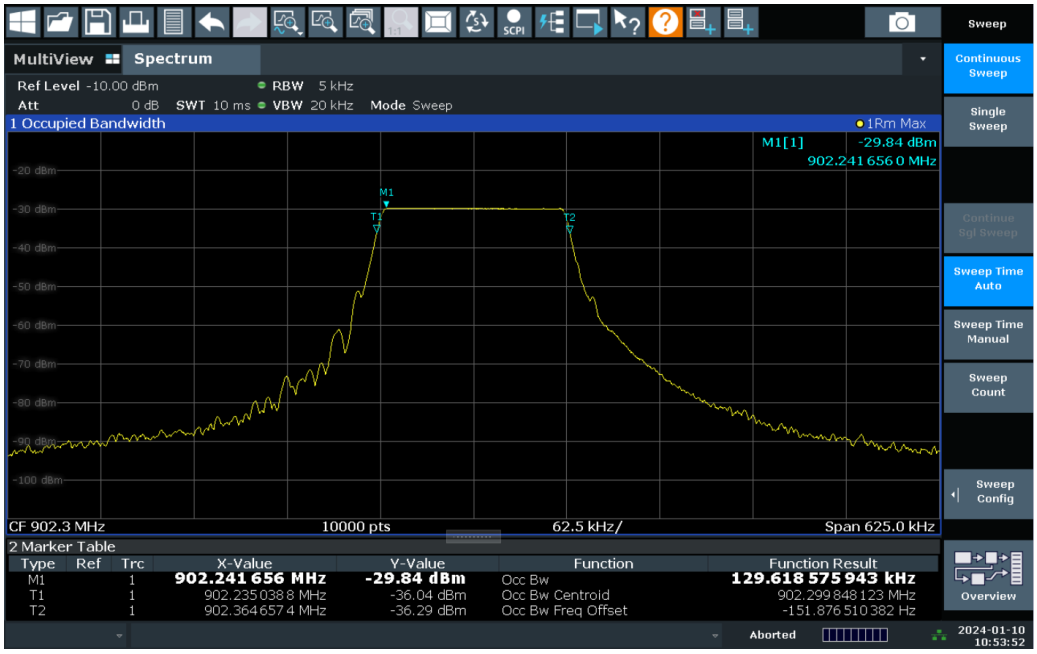
TESTED CABLE	FREQUENCY	SEVERITY	RESULT TAB.	VERDICT
99% Bandwidth / Low channel	902.3 MHz	Within the 902MHz-928MHz band	EMI4470	**PASS**
99% Bandwidth / Mid channel	908.5 MHz	Within the 902MHz-928MHz band	EMI4471	**PASS**
99% Bandwidth / High channel	914.9 MHz	Within the 902MHz-928MHz band	EMI4472	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	20.3 °C
Relative Humidity	20 to 75 %	33.0 %
Atmospheric pressure	N/A	1013 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:	10/01/2024
Test Operator:	MPA



EUT modification(s): N/A

Results:	The system has an OBW of 129.618 kHz

EUT modification(s): N/A

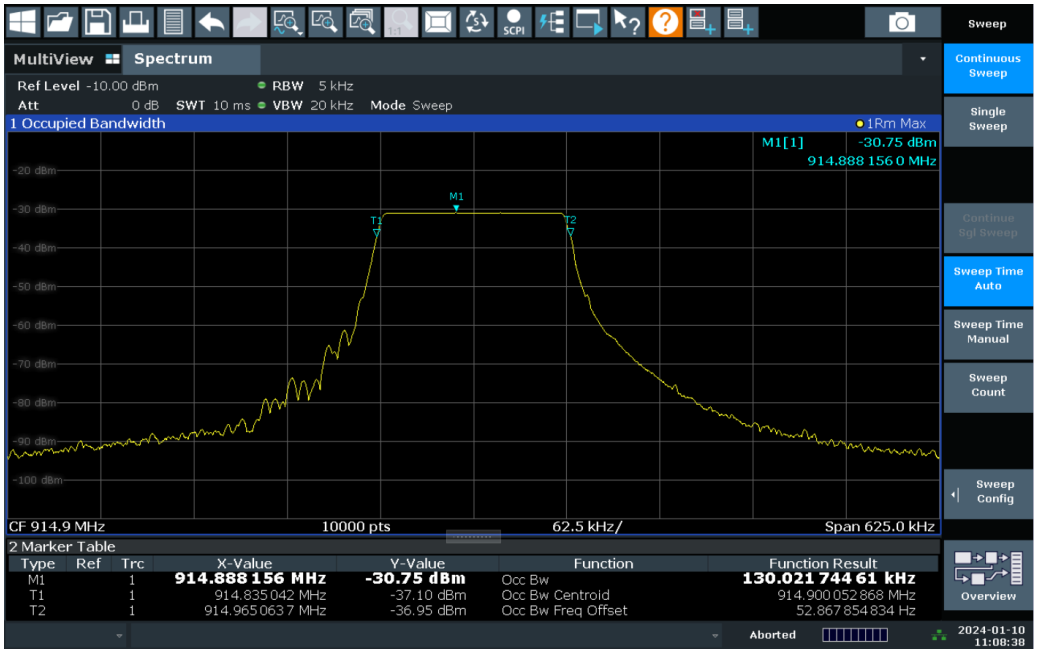
OCCUPIED BANDWIDTH - GRAPH	
99% BANDWIDTH / MID CHANNEL	EMI4471
EUT mode:	Tx mode
Test Date:	10/01/2024
Test Operator:	MPA

EUT modification(s): N/A

Results:	The system has an OBW of 129.852 kHz

EUT modification(s): N/A

OCCUPIED BANDWIDTH - GRAPH	
99% BANDWIDTH / HIGH CHANNEL	EMI4471
EUT mode:	Tx mode
Test Date:	10/01/2024
Test Operator:	MPA



EUT modification(s): N/A

Results:	The system has an OBW of 130.021 kHz

EUT modification(s): N/A

✪✪✪ End of test report ✪✪✪