This test report cancels and replaces RR-EVE-22O143-1A Ed.0

Test report issued under the responsibility of:
EMITECH MONTPELLIER laboratory

RADIO TEST REPORT

EN 300 328 V2.2.2
(Partial tests)

Company ..... :	**ZODIAC POOL CARE EUROPE**
Address..... :	ZA DE LA BALME BP 42 31450 BELBERAUD FRANCE

Test item description. ..... :	**Battery pool cleaner**
Trade Mark. ..... :	ZODIAC POOL CARE EUROPE
Manufacturer. ..... :	ZODIAC POOL CARE EUROPE
Model/Type reference..... :	*WR000507 RF 5600 iQ*
Ratings..... :	*100-240VAC / 50-60Hz (Charger)* *19,6VDC to 29,4VDC (Cleaner internal battery)*

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

Report Reference No..... :	**RR-EVE-22O143-1A**
Test procedure. ..... :	CE Marking
Diffusion..... :	Mr OBEIN
Applicant's name. ..... :	ZODIAC POOL CARE EUROPE
Date of issue..... :	December 2, 2022
Total number of pages..... :	29
Revision. ..... :	1 *(see revision history page 2)*
Compiled by..... :	Morgan PATEY
Approved by (+ signature). ..... :	Olivier AELBRECHT (RF Expert)

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:

REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	December 1, 2022	/	Creation
1	December 2, 2022	5	<u>General product information added according to customer request:</u> *- The test results can be extended to all models coded as described below:* *EBXYZZ where* *E=ETL* *B=CBAT Series* *X= Voltage rating: 1=220-240VAC, 2=100-130VAC, 3=100-240VAC;* *Y= any digit from 1 thru 9 to indicate country in which product is to be marketed: 1 =EU, 2 =CH, 3 =UK, 4 =RSA, 5 =AUS, 6 =Japan, 7 =US* *ZZ = any two digit number, e.g. 01, 02, 03 to indicate version of product; may be followed by a single letter A thru Z used for marketing purposes.* *- The brand can be: Zodiac or Polaris or AquaProducts or AstralPool or Fluidra.*

1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **Battery pool cleaner WR000507 RF 5600 iQ** (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.	CE Marking
Tested by	Morgan PATEY
Test supervisor	None
Date of receipt of test item	N/A
Date (s) of performance of tests	September the 29th of 2022

APPLICANT'S GENERAL INFORMATIONS:

Company name	ZODIAC POOL CARE EUROPE
Company address.	ZA DE LA BALME BP 42 31450 BELBERAUD FRANCE
Person(s) present during the tests.	No representative for company attended the tests.
Responsible.	Mr OBEIN

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
OATS	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

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:
The following referenced documents are necessary for the application of the present test report. **EN 300 328 V2.2.2** Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard for access to radio spectrum 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.	:	Battery pool cleaner
Model/Type reference.	:	WR000507 RF 5600 iQ
Trade Mark.	:	ZODIAC POOL CARE EUROPE
Serial number (S/N).	:	WR000507
Part number (P/N).	:	WR000507 – ESL5
Software version.	:	*N/A*
Firmware version.	:	*Inboard: V22E3.0.0* *Keyboard: V22B3.0.0 (STM32) V22C3.0.0 (ESP32)*
Type of sample.	:	Pre-serial
Function(s).	:	Battery pool cleaner with its charging station
Manufacturer name.	:	ZODIAC POOL CARE EUROPE
Address.	:	ZA DE LA BALME BP 42 31450 BELBERAUD FRANCE

General product information:

- The test results can be extended to all models coded as described below:

EBXYZZ where

E=ETL

B=CBAT Series

X= Voltage rating: 1=220-240VAC, 2=100-130VAC, 3=100-240VAC;

Y= any digit from 1 thru 9 to indicate country in which product is to be marketed: 1 =EU, 2 =CH, 3 =UK, 4 =RSA, 5 =AUS, 6 =Japan, 7 =US

ZZ = any two digit number, e.g. 01, 02, 03 to indicate version of product; may be followed by a single letter A thru Z used for marketing purposes.

- The brand can be: Zodiac or Polaris or AquaProducts or AstralPool or Fluidra.

3.2. EUT Marking plate

3.3. EUT General view

Cleaner

Charger (charging stand model: EB3X)

3.4. EUT Modification

An USB cable was connected to the EUT internal board, in order to set it in test modes.

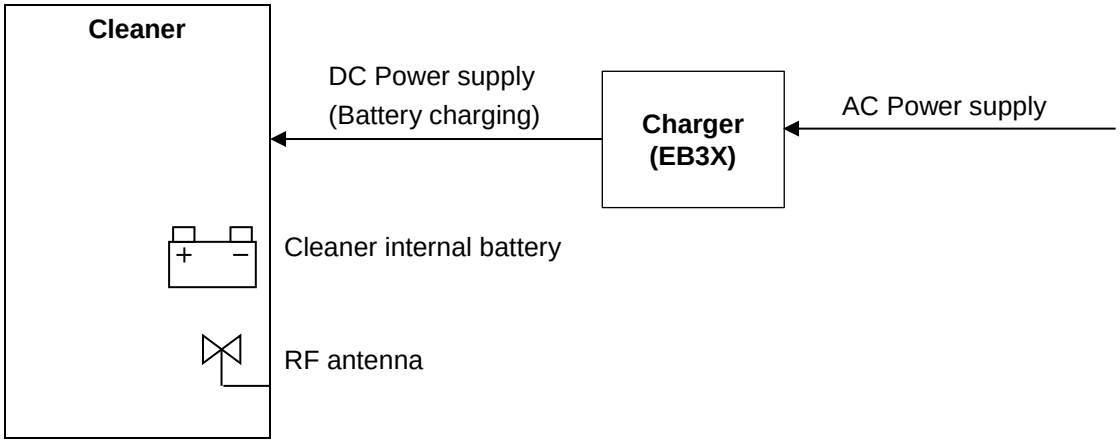
3.5. EUT Mechanical and Electrical Design

Power supply.	:	*230V_{AC} / 50Hz (Charger)* *29.4 V_{DC}(Cleaner internal battery)*
Power supply range.	:	*100-240V_{AC} / 50-60Hz (Charger)* *19,6V_{DC} to 29,4V_{DC} (Cleaner)*
Power type.	:	*Single phase without earth (Charger)* *Internal battey (Cleaner)*
Power (W).	:	*60W (2A - 29.4VDC Output)*
Nominal current (A).	:	*0.26A (230V_{AC}) / 0.55 (110V_{AC})*
Dimensions (L x W x H) (m).	:	*Cleaner: L425mm x W390mm x H270mm* *Charger: L460mm x W300mm x H260mm*
Weight (kg).	:	*Cleaner: 9.5kg* *Charger: 2.3kg*
Temperature range (°C).	:	*5° to 35°C*
Ground bounding strap.	:	*No*

Comments:

N/A

3.6. EUT Input/Output ports



PORT	NAME	TYPE	LENGTH	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	N/A
1	AC Power supply	AC	N/A	N/A	230V_{AC} / 50Hz
2	DC Power supply (Battery charging)	DC	N/A	N/A	29.4 V_{DC}
3	Cleaner internal battery	DC	N/A	N/A	29.4 V_{DC}
4	RF antenna	RF	N/A	N/A	2.4GHz

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

3.7. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
Laptop	DELL	Latitude 5510	Used to set the EUT in test mode through USB and as companion device for blocking test.

LAPTOP (AE)

3.8. EUT Radio Specifications

a) GENERAL INFORMATIONS
According to manufacturer's declarations : EUT type..... : *Transceiver* Technology ..... : *Wi-Fi and BLE* Environmental profile..... : *Data transmissions* Temperature range..... : *5°C to 35°C* Antenna type ..... : *Integrated (PCB antenna)* Antenna Gain..... : *3.7 dBi* **Comments:** *EUT includes an RF module already certified, see appropriates tests report for full testing results.*
b) TRANSMITTER PARAMETERS (TX)
Frequency bands..... : *BLE : 2400 MHz to 2483.5 MHz* *Wi-Fi : 2400 MHz to 2483.5 MHz* RF Power..... : *BLE : 9 dBm* *Wi-Fi : 20 dBm* Number of channels / Separation..... : *BLE: 40 channels - 2MHz* *(37 data channels + 3 advertising channels)* *WiFi: 14 channels - 20MHz* Modulation type ..... : *Not communicated* Duty cycle ..... : *Not communicated* Tested frequency..... : *BLE : 2402 MHz (Low channel)* *Wi-Fi : 2412 MHz (Low channel)*
c) RECEIVER PARAMETERS (RX)
Frequency bands..... : *BLE : 2400 MHz to 2483.5 MHz* *Wi-Fi : 2400 MHz to 2483.5 MHz* Category/Class ..... : *Category 2* Bandwidth..... : *Not communicated*

4. OPINION(S) AND INTERPRETATION(S)

TEST(S) PERFORMED	DEVIATION(S) TO TEST METHOD(S)
EN 300 328 V2.2.2 §5.4.2	N/A
EN 300 328 V2.2.2 §5.4.9.2.2	N/A
EN 300 328 V2.2.2 §5.4.10	N/A
EN 300 328 V2.2.2 §5.4.11	N/A

Comments: N/A

5. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
RF output power			**EN 300 328 V2.2.2 §5.4.2**
- EIRP / Wi-Fi	20 dBm	**PASS**	
- EIRP / BLE	20 dBm	**PASS**	
Power Spectral Density	-	**N/P**	**Customer's request**
Duty Cycle, Tx-sequence, Tx-gap	-	**N/P**	**Customer's request**
Medium Utilization factor	-	**N/P**	**Customer's request**
Adaptivity (non-FHSS)	-	**N/P**	**Customer's request**
Occupied Channel Bandwidth	-	**N/P**	**Customer's request**
Transmitter unwanted emissions in the out-of band domain	-	**N/P**	**Customer's request**
Transmitter unwanted emissions in the spurious domain			**EN 300 328 V2.2.2 §5.4.9.2.2**
- Tx mode / for Freq < 1GHz / Wi-Fi	Tx	**PASS**	
- Tx mode / for Freq > 1GHz / Wi-Fi	Tx	**PASS**	
- Tx mode / for Freq < 1GHz / BLE	Tx	**PASS**	
- Tx mode / for Freq > 1GHz / BLE	Tx	**PASS**	
Receiver spurious emissions			**EN 300 328 V2.2.2 §5.4.10**
- Rx mode / for Freq < 1GHz / Wi-Fi & BLE	Rx	**PASS**	
- Rx mode / for Freq > 1GHz / Wi-Fi & BLE	Rx	**PASS**	
Receiver Blocking			**EN 300 328 V2.2.2 §5.4.11**
- All channels / Wi-Fi	Category 2	**PASS**	
- All channels / BLE	Category 2	**PASS**	
Geo-location capability	-	**N/A**	**Applies to equipment with geo-location capility**

Sample subject to the test complies for tests done 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 into account of uncertainty associated with the results with the exception of emission tests based on CISPR standards.

TEST(S) PERFORMED	MODIFICATION(S)
EN 300 328 V2.2.2 §5.4.2	An USB cable was connected to the EUT internal board, in order to set it in test modes.
EN 300 328 V2.2.2 §5.4.9.2.2	An USB cable was connected to the EUT internal board, in order to set it in test modes.
EN 300 328 V2.2.2 §5.4.10	An USB cable was connected to the EUT internal board, in order to set it in test modes.
EN 300 328 V2.2.2 §5.4.11	An USB cable was connected to the EUT internal board, in order to set it in test modes.

6. MEASUREMENT UNCERTAINTY

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	MINIMAL STANDARD UNCERTAINTY
Radio frequency	± 1 x 10^{-7}	±1 x 10^{-7}
Blocking	± 4.0 dB	± 4 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
40 GHz – 110 GHz	± 5.9 dB	Between ± 6 to 10 dB
RF power (EN 300328 / EN 301893)	± 5.3 dB	± 6 dB
EIRP and power spectral density with diode	± 5.7 dB	± 6 dB
RF level for a given BER	± 0.8 dB	± 1.5 dB
Supply voltages	± 3 %	± 3 %
Temperature	± 1 °C	± 1°C
Humidity	± 5 %	± 5 %
40GHz – 140GHz	± 5.7 dB	/

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

7. TEST CONDITIONS AND RESULTS

7.1. RF output power

Reference standard:	EN 300 328 V2.2.2 §4.3.2.2
Test method:	EN 300 328 V2.2.2 §5.4.2.2

General test setup: EUT is set on an insulating support at 150cm above the ground reference plane.

Measurement are done on a normalized test site by the substitution method.

The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected.

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

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
EIRP / Wi-Fi	Radiated measurement	20dBm	EMI555	**PASS**
EIRP / BLE	Radiated measurement	20dBm	EMI556	**PASS**

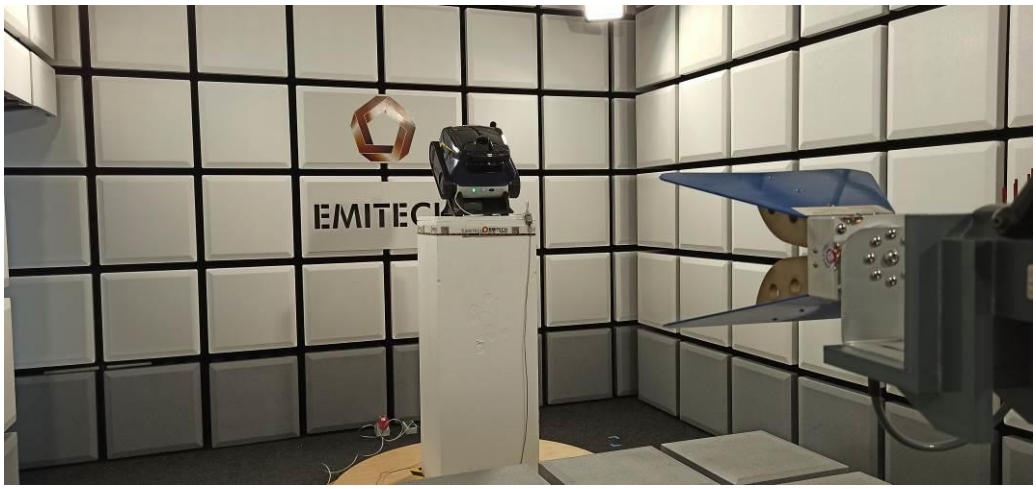
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: Measurement was realized on worst case of polarization, and azimuth.		

TEST EQUIPMENT USED

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	AARONIA	Powerlog 70180	15306	24/07/2019	24/03/2023
Attenuator	EMITECH	SUB.V4-V	18111	05/01/2022	05/03/2023
Cable	Techniwave	N-1.5m	18341	25/01/2022	25/03/2024
Cable	Techniwave	N-1.5m	18342	25/01/2022	25/03/2024
Cable	/	N-1m	3622	10/11/2021	10/01/2024
Filter	Micro-Tronics	HPM18865	12843	24/08/2021	24/10/2024
Filter	BL Microwave	BP2442-84-7CS	8441	27/07/2019	27/03/2023
Power probe	Keysight	L2062XA	17083	21/09/2022	21/11/2024
Preamplifier	IMPULSE	CA118-546ACN	9169	26/04/2022	26/06/2023
Shielded enclosure	COMTEST	FAR-3m	18014	17/08/2021	17/10/2024
Software	EMITECH	EN 300 328 Test Tool V1.0	18333		
Spectrum analyzer	Rohde & Schwarz	FSW43	14830	10/08/2022	10/10/2024
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023
Thermohygrometer	Testo	608-H2	12269	07/06/2022	07/08/2024

Blank cells = Permanent validity

TEST SETUP PHOTO(S) – EUT POSITION


TEST SETUP PHOTO(S)


RF OUTPUT POWER - GRAPH					
EIRP / WI-FI				EMI555	
EUT mode:	Tx mode			**T (°C):**	22.4
Test Date:	29/09/2022			**H (%):**	54.1
Test Operator:	MPA			**P (hPa):**	999
Frequency (MHz)	**Antenna Polarization**	**Azimuth**	**Level (dBm)**	**Limit (dBm)**	
2412	Vertical	215°	18.53	20.00	
EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.					

RF OUTPUT POWER - GRAPH					
EIRP / BLE				EMI556	
EUT mode:	Tx mode			**T (°C):**	22.4
Test Date:	29/09/2022			**H (%):**	54.1
Test Operator:	MPA			**P (hPa):**	999
Frequency (MHz)	**Antenna Polarization**	**Azimuth**	**Level (dBm)**	**Limit (dBm)**	
2402	Vertical	215°	5.60	20.00	
EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.					

7.2. Transmitter unwanted emissions in the spurious domain

Reference standard:	EN 300 328 V2.2.2 §4.3.2.9
Test method:	EN 300 328 V2.2.2 §5.4.9.2.2

General test setup: EUT is set on an insulating support at 150cm above the ground reference plane.

Measurement are done on a normalized test site by the substitution method.

The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected.

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

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Tx mode / for Freq < 1GHz / Wi-Fi	30MHz-1GHz	Tx	EMI4550	**PASS**
Tx mode / for Freq > 1GHz / Wi-Fi	1GHz-12.75GHz	Tx	EMI4547	**PASS**
Tx mode / for Freq < 1GHz / BLE	30MHz-1GHz	Tx	EMI4553	**PASS**
Tx mode / for Freq > 1GHz / BLE	1GHz-12.75GHz	Tx	EMI4552	**PASS**

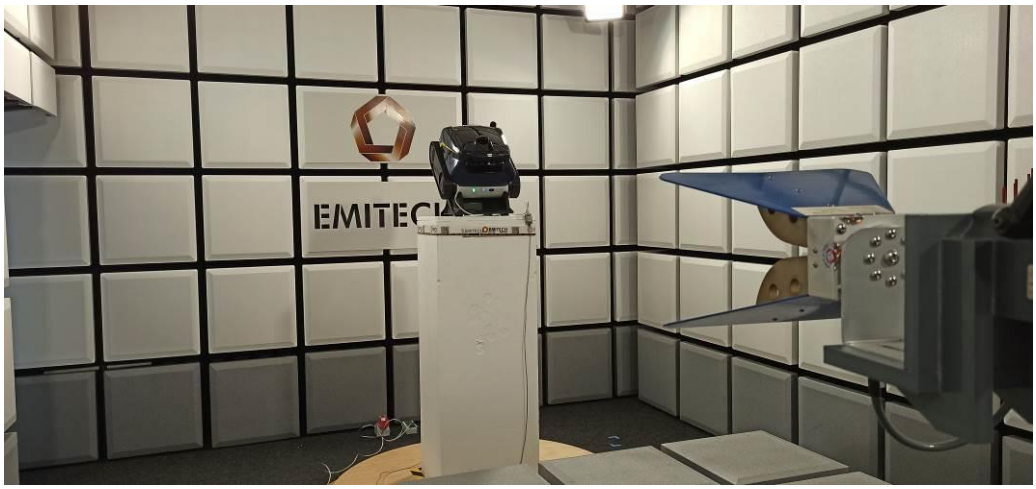
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(s)*
Relative Humidity	20 to 75 %	*See Graph(s)*
Atmospheric pressure	N/A	*See Graph(s)*
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	ETS lindgren	3143B	17930	12/08/2021	12/10/2024
Antenna	AARONIA	Powerlog 70180	15306	24/07/2019	24/03/2023
Attenuator	EMITECH	SUB.V4-H	18112	05/01/2022	05/03/2023
Attenuator	EMITECH	SUB.V4-V	18111	05/01/2022	05/03/2023
Cable	Techniwave	N-1.5m	18341	25/01/2022	25/03/2024
Cable	Techniwave	N-1.5m	18342	25/01/2022	25/03/2024
Cable	/	N-1m	3622	10/11/2021	10/01/2024
Cable	Techniwave	N-3.5m	18353	25/01/2022	25/03/2024
Cable	Techniwave	N-4m	18355	25/01/2022	25/03/2024
Converter		2.15	9988		
Filter	Micro-Tronics	HPM 15162	10273	26/11/2021	26/01/2025
Filter	Micro-Tronics	HPM18865	12843	24/08/2021	24/10/2024
Filter	Wainwright Instruments	WRCGV 2402/2480-2380/2500-40/10EE-200W	9771	15/03/2022	15/05/2025
Preamplifier	IMPULSE	CA118-546ACN	9169	26/04/2022	26/06/2023
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	07/06/2021	07/08/2023

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 SPURIOUS EMISSIONS (TRANSMITTER) – TABULATED RESULT					
TX MODE / FOR FREQ < 1GHZ / WI-FI					EMI4550
FREQUENCY (MHZ)	POLARIZATION	PEAK LEVEL (dBm)	TDP LEVEL (dBm)	LIMIT (dBm)	MARGING (dB)
59.974	Vertical	-60.43	N/P	-54	-6.43
119.986	Vertical	-58.47	N/P	-36	-22.47
179.967	Vertical	-69.01	N/P	-54	-15.01
479.998	Vertical	-60.86	N/P	-54	-6.86
960.002	Vertical	-54.17	N/P	-36	-18.17
59.974	Horizontal	-68.03	N/P	-54	-14.03
119.986	Horizontal	-63.00	N/P	-36	-27.00
479.965	Horizontal	-57.80	N/P	-54	-3.80
960.002	Horizontal	-57.20	N/P	-36	-21.20
Supplementary information: N/A					

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) – TABULATED RESULT					
TX MODE / FOR FREQ > 1GHZ / WI-FI					EMI4547
FREQUENCY (MHZ)	POLARIZATION	PEAK LEVEL (dBm)	TDP LEVEL (dBm)	LIMIT (dBm)	MARGING (dB)
1448.563	Vertical	-47.92	N/P	-30	-17.92
1897.126	Vertical	-45.58	N/P	-30	-15.58
4823.372	Vertical	-40.02	N/P	-30	-10.02
1439.989	Horizontal	-49.15	N/P	-30	-19.15
4823.372	Horizontal	-42.29	N/P	-30	-12.29
Supplementary information: N/A					

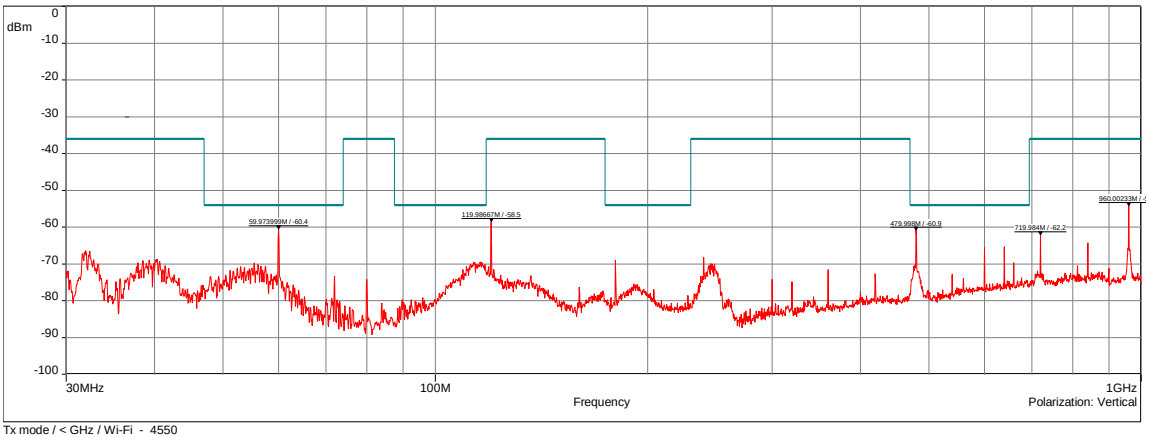
RADIATED SPURIOUS EMISSIONS (TRANSMITTER) – TABULATED RESULT					
TX MODE / FOR FREQ < 1GHZ / BLE					EMI4553
FREQUENCY (MHZ)	POLARIZATION	PEAK LEVEL (dBm)	TDP LEVEL (dBm)	LIMIT (dBm)	MARGING (dB)
59.974	Vertical	-61.30	N/P	-54	-7.30
119.986	Vertical	-58.47	N/P	-36	-22.47
179.967	Vertical	-66.46	N/P	-54	-12.46
479.998	Vertical	-61.31	N/P	-54	-7.31
960.002	Vertical	-55.29	N/P	-36	-19.29
59.974	Horizontal	-69.99	N/P	-54	-15.99
119.986	Horizontal	-63.10	N/P	-36	-27.10
479.998	Horizontal	-57.55	N/P	-54	-3.55
960.002	Horizontal	-54.22	N/P	-36	-18.22
Supplementary information: N/A					

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) – TABULATED RESULT					
TX MODE / FOR FREQ > 1GHZ / BLE					EMI4552
FREQUENCY (MHZ)	POLARIZATION	PEAK LEVEL (dBm)	TDP LEVEL (dBm)	LIMIT (dBm)	MARGING (dB)
1439.896	Vertical	-47.32	N/P	-30	-17.32
1892.193	Vertical	-50.66	N/P	-30	-20.66
3202.163	Vertical	-47.84	N/P	-30	-17.84
1440.162	Horizontal	-47.88	N/P	-30	-17.88
1891.926	Horizontal	-46.77	N/P	-30	-16.77
Supplementary information: N/A					

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) - GRAPH			
TX MODE / FOR FREQ < 1GHZ / WI-FI		EMI4550	
EUT mode:	Tx mode	**T (°C):**	22.4
Test Date:	29/09/2022	**H (%):**	51.2
Test Operator:	MPA	**P (hPa):**	999

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) Tx - RMS/3.0m/
Meas.Peak (Vertical)

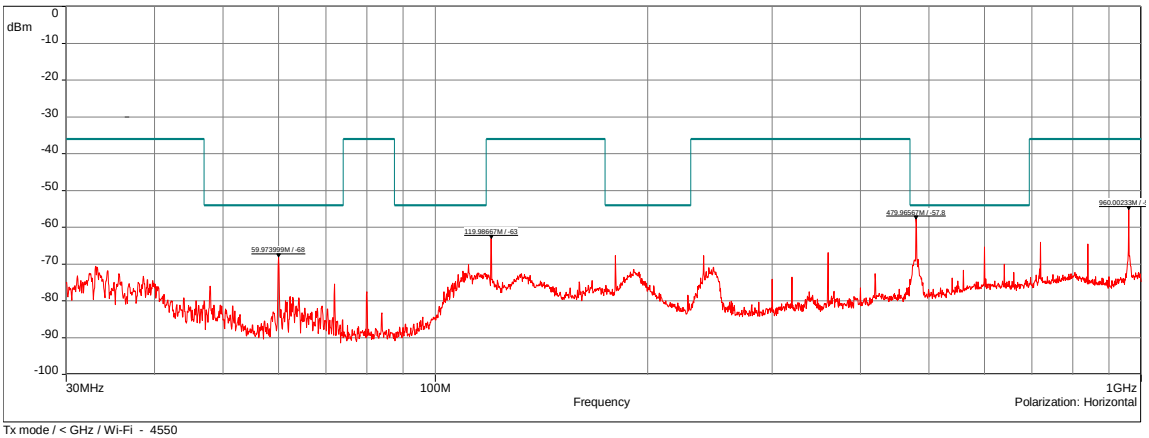
Sub-range 1
Frequencies: 30 MHz - 1 GHz (Analyser mode) 30000 Points
Settings: RBW: 100kHz, VBW: 300kHz, Auto, Attenuation: 10 dB, Sweep count 1, Preamp: On: 20 dB, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



Tx mode / < GHz / Wi-Fi - 4550

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) Tx - RMS/3.0m/
Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 30 MHz - 1 GHz (Analyser mode) 30000 Points
Settings: RBW: 100kHz, VBW: 300kHz, Auto, Attenuation: 10 dB, Sweep count 1, Preamp: On: 20 dB, LN Preamp: Off, Preselector: Off
Polarization:Horizontal
Distance: 3 m

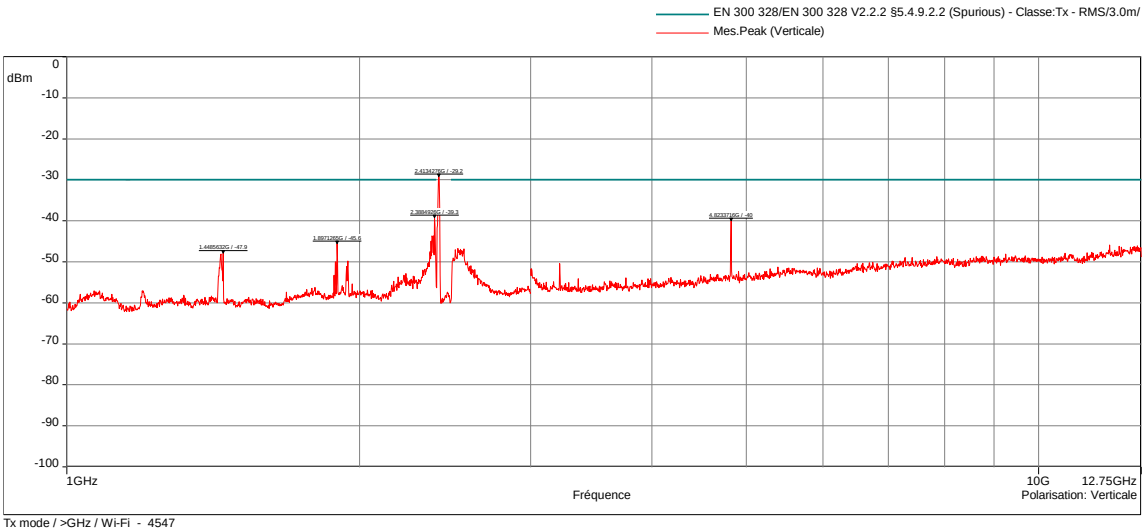


Tx mode / < GHz / Wi-Fi - 4550

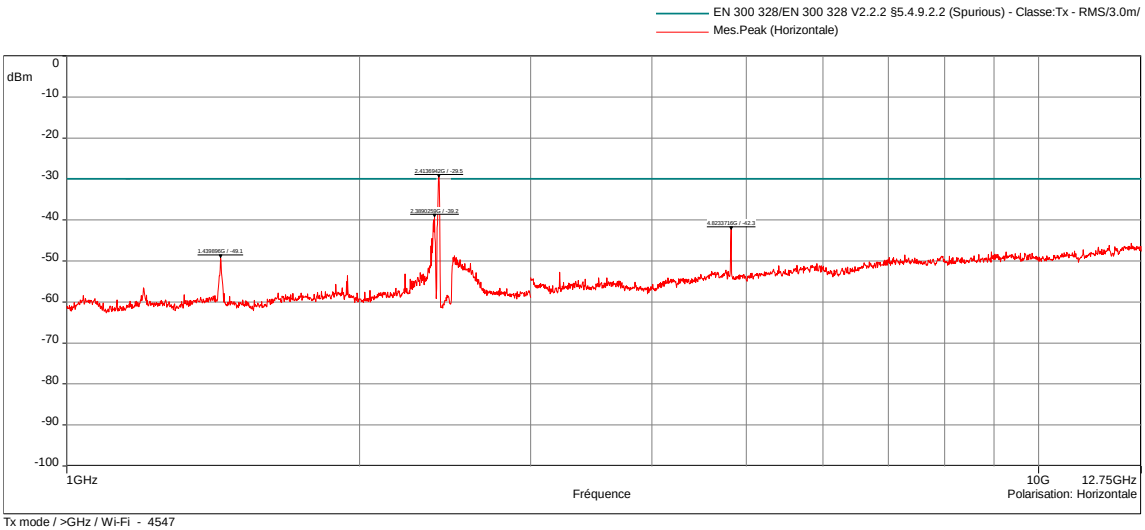
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-1GHz	100kHz	300kHz	Peak
Horizontal	30MHz-1GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			

EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) - GRAPH			
TX MODE / FOR FREQ > 1GHZ / WI-FI		EMI4547	
EUT mode:	Tx mode	**T (°C):**	22.4
Test Date:	29/09/2022	**H (%):**	54.1
Test Operator:	MPA	**P (hPa):**	999



Tx mode / >GHz / Wi-Fi - 4547



Tx mode / >GHz / Wi-Fi - 4547

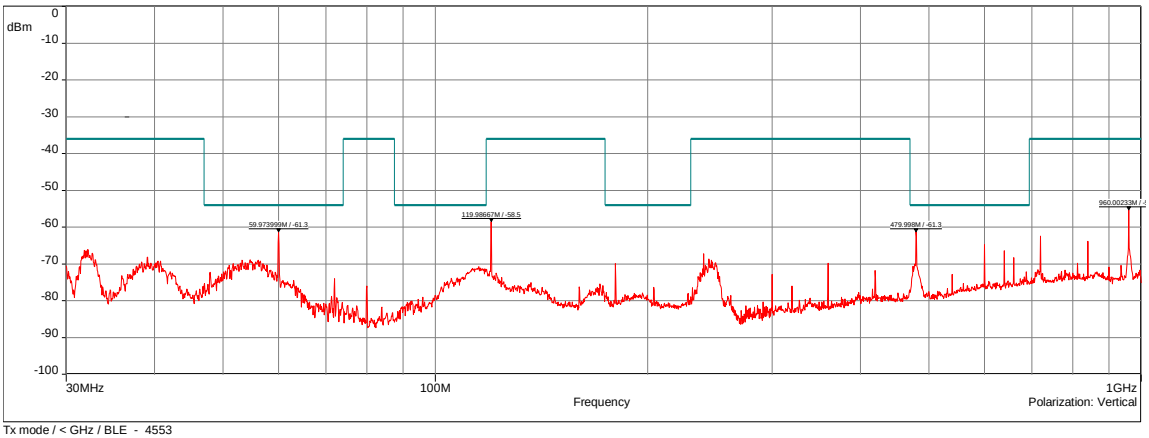
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-12.75GHz	1MHz	3MHz	Peak
Horizontal	3GHz-12.75GHz	1MHz	3MHz	Peak
Configuration:	N/A			
Comments:	The 2412 MHz is the main carrier frequency of the EUT Wi-Fi signal.			

EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) - GRAPH			
TX MODE / FOR FREQ < 1GHZ / BLE		EMI4553	
EUT mode:	Tx mode	**T (°C):**	22.4
Test Date:	29/09/2022	**H (%):**	51.2
Test Operator:	MPA	**P (hPa):**	999

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) Tx - RMS/3.0m/
Meas.Peak (Vertical)

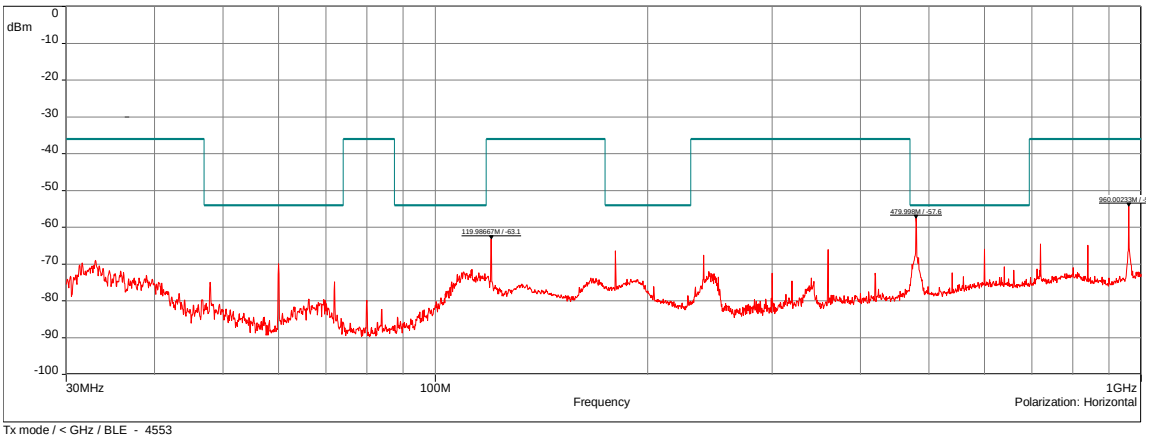
Sub-range 1
Frequencies: 30 MHz - 1 GHz (Analyser mode) 30000 Points
Settings: RBW: 100kHz, VBW: 300kHz, Auto, Attenuation: 10 dB, Sweep count 1, Preamp: On: 20 dB, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



Tx mode / < GHz / BLE - 4553

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) Tx - RMS/3.0m/
Meas.Peak (Horizontal)

Sub-range 2
Frequencies: 30 MHz - 1 GHz (Analyser mode) 30000 Points
Settings: RBW: 100kHz, VBW: 300kHz, Auto, Attenuation: 10 dB, Sweep count 1, Preamp: On: 20 dB, LN Preamp: Off, Preselector: Off
Polarization:Horizontal
Distance: 3 m

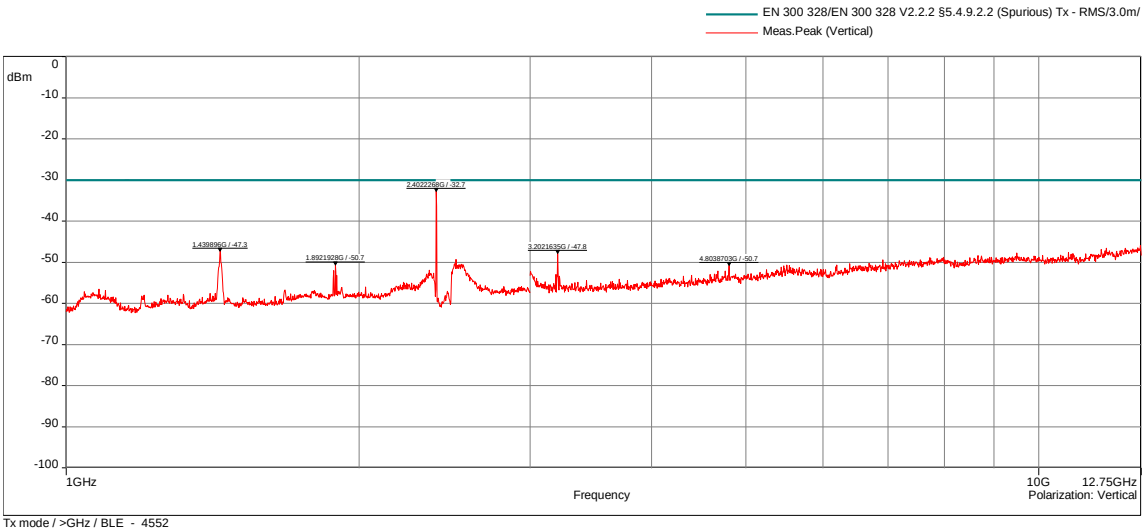


Tx mode / < GHz / BLE - 4553

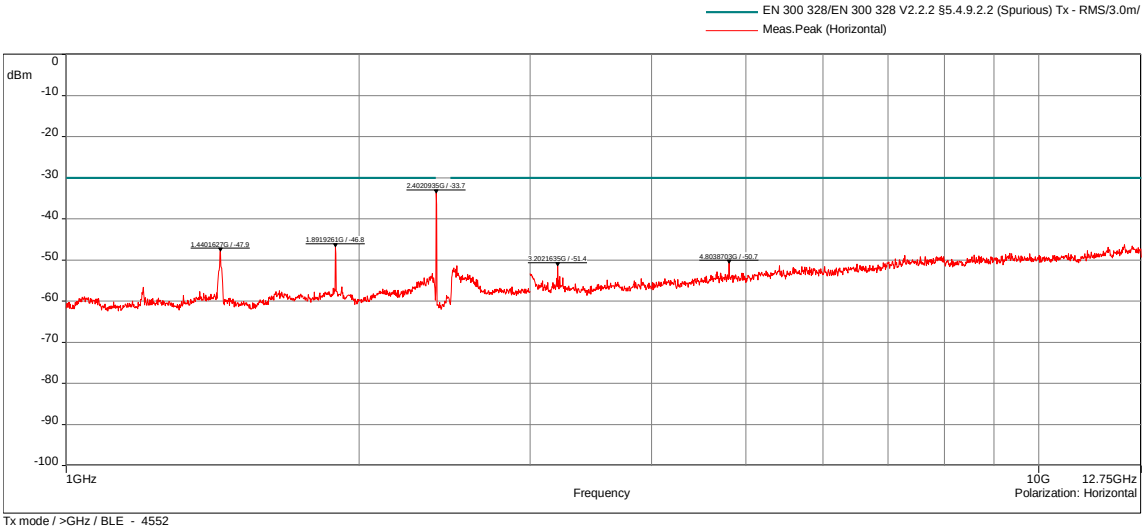
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-1GHz	100kHz	300kHz	Peak
Horizontal	30MHz-1GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			

EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.

RADIATED SPURIOUS EMISSIONS (TRANSMITTER) - GRAPH			
TX MODE / FOR FREQ > 1GHZ / BLE		EMI4552	
EUT mode:	Tx mode	**T (°C):**	22.4
Test Date:	29/09/2022	**H (%):**	54.1
Test Operator:	MPA	**P (hPa):**	999



Tx mode / >GHz / BLE - 4552



Tx mode / >GHz / BLE - 4552

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	1GHz-3GHz	1MHz	3MHz	Peak
Horizontal	1GHz-3GHz	1MHz	3MHz	Peak
Vertical	3GHz-12.75GHz	1MHz	3MHz	Peak
Horizontal	3GHz-12.75GHz	1MHz	3MHz	Peak
Configuration:	N/A			
Comments:	The 2402 MHz is the main carrier frequency of the EUT BLE signal.			

EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.

7.3. Receiver spurious emissions

Reference standard:	EN 300 328 V2.2.2 §4.3.2.10
Test method:	EN 300 328 V2.2.2 §5.4.10

General test setup: EUT is set on an insulating support at 150cm above the ground reference plane.

Measurement are done on a normalized test site by the substitution method.

The test antenna is oriented in the two polarizations (vertical and horizontal), and the product is rotated at 360° in the horizontal plane (See photo(s) for initial position of the EUT(0°)). If applicable the test antenna was raised and lowered through the specified range of height until a maximum signal level is detected.

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

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Rx mode / for Freq < 1GHz / Wi-Fi & BLE	30MHz-1GHz	Rx	EMI4549	**PASS**
Rx mode / for Freq > 1GHz / Wi-Fi & BLE	1GHz-12.75GHz	Rx	EMI4548	**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: N/A		

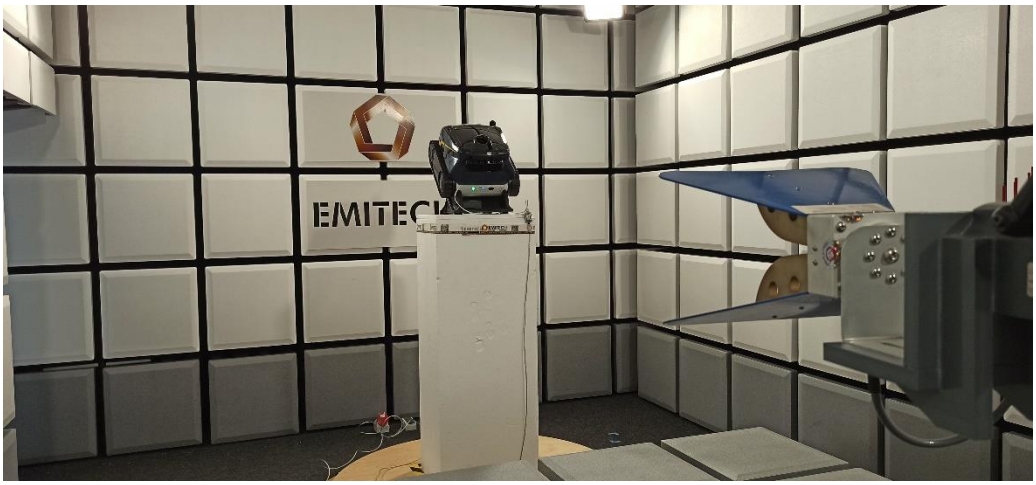
TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	ETS lindgren	3143B	17930	12/08/2021	12/10/2024
Antenna	AARONIA	Powerlog 70180	15306	24/07/2019	24/03/2023
Attenuator	EMITECH	SUB.V4-H	18112	05/01/2022	05/03/2023
Attenuator	EMITECH	SUB.V4-V	18111	05/01/2022	05/03/2023
Cable	Techniwave	N-1.5m	18341	25/01/2022	25/03/2024
Cable	Techniwave	N-1.5m	18342	25/01/2022	25/03/2024
Cable	/	N-1m	3622	10/11/2021	10/01/2024
Cable	Techniwave	N-3.5m	18353	25/01/2022	25/03/2024
Cable	Techniwave	N-4m	18355	25/01/2022	25/03/2024
Converter		2.15	9988		
Filter	Micro-Tronics	HPM18865	12843	24/08/2021	24/10/2024
Preamplifier	IMPULSE	CA118-546ACN	9169	26/04/2022	26/06/2023
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	07/06/2021	07/08/2023

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 18 GHZ



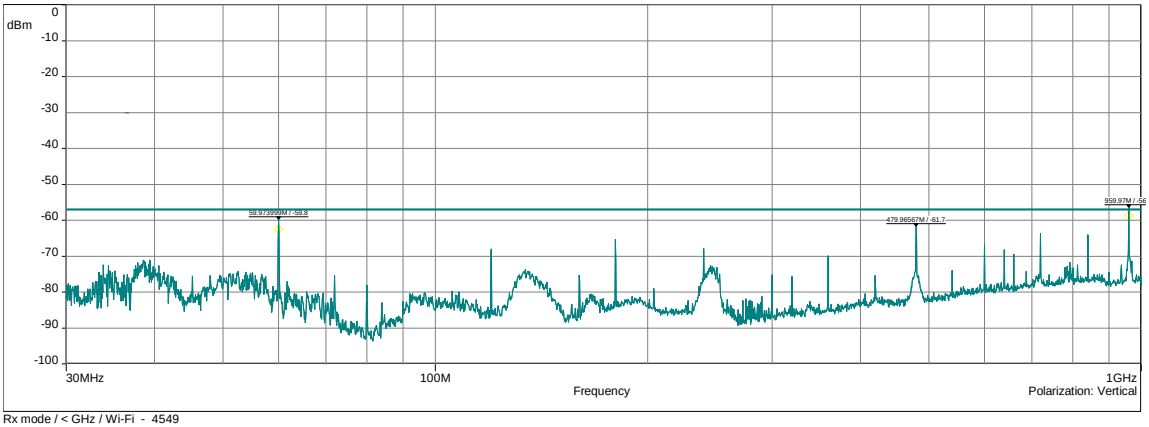
RADIATED SPURIOUS EMISSIONS (RECEIVER) – TABULATED RESULT					
RX MODE / FOR FREQ < 1GHZ / WI-FI & BLE					EMI4549
FREQUENCY (MHZ)	POLARIZATION	PEAK LEVEL (dBm)	TDP LEVEL (dBm)	LIMIT (dBm)	MARGING (dB)
59.941	Vertical	-59.84	-62.46	-57	-5.46
179.999	Vertical	-65.44	N/P	-57	-8.44
479.966	Vertical	-61.74	N/P	-57	-4.74
719.984	Vertical	-63.72	N/P	-57	-6.72
839.977	Vertical	-64.07	N/P	-57	-7.07
959.970	Vertical	-56.57	-57.02	-57	-0.02
59.973	Horizontal	-65.07	N/P	-57	-8.07
119.986	Horizontal	-63.80	N/P	-57	-6.80
479.965	Horizontal	-59.80	-62.10	-57	-5.10
960.002	Horizontal	-57.32	-59.11	-57	-2.11
Supplementary information: N/A					

RADIATED SPURIOUS EMISSIONS (RECEIVER) – TABULATED RESULT					
RX MODE / FOR FREQ > 1GHZ / WI-FI & BLE					EMI4548
FREQUENCY (MHZ)	POLARIZATION	PEAK LEVEL (dBm)	TDP LEVEL (dBm)	LIMIT (dBm)	MARGING (dB)
1439.856	Vertical	-50.59	-51.86	-47	-4.86
3215.732	Vertical	-57.04	N/P	-47	-10.04
1439.856	Horizontal	-53.22	N/P	-47	-6.22
3216.124	Horizontal	-59.04	N/P	-47	-12.04
Supplementary information: N/A					

RADIATED SPURIOUS EMISSIONS (RECEIVER) - GRAPH			
RX MODE / FOR FREQ < 1GHZ / WI-FI & BLE		EMI4549	
EUT mode:	Rx mode	**T (°C):**	22.4
Test Date:	29/09/2022	**H (%):**	54.1
Test Operator:	MPA	**P (hPa):**	999

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) Rx - RMS/3.0m/
Level (Manual suspects) (Vertical)
Meas.Avg (Vertical)

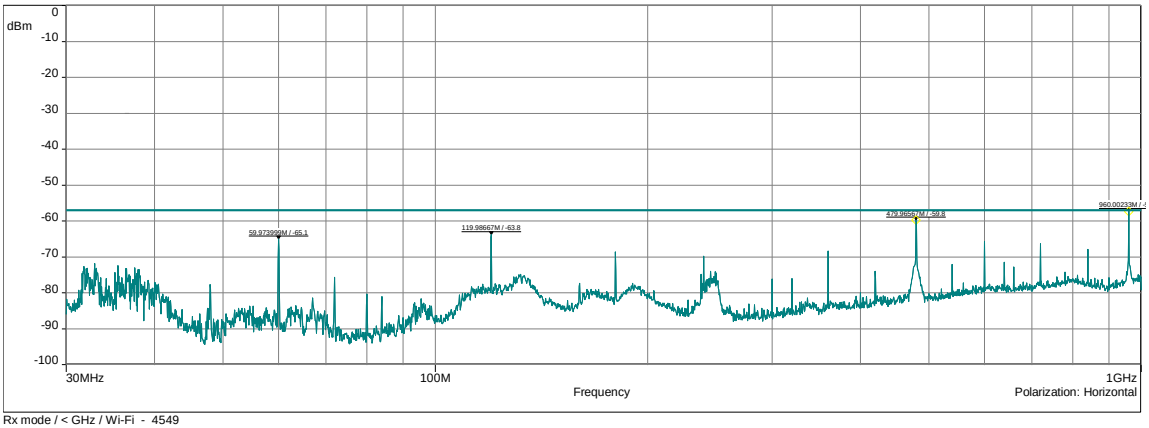
Sub-range 1
Frequencies: 30 MHz - 1 GHz (Analyser mode) 30000 Points
Settings: RBW: 100kHz, VBW: 300kHz, Auto, Attenuation: 10 dB, Sweep count 1, Preamp: On: 20 dB, LN Preamp: Off, Preselector: Off
Polarization:Vertical
Distance: 3 m



Rx mode / < GHz / Wi-Fi - 4549

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) Rx - RMS/3.0m/
Level (Manual suspects) (Horizontal)
Meas.Avg (Horizontal)

Sub-range 2
Frequencies: 30 MHz - 1 GHz (Analyser mode) 30000 Points
Settings: RBW: 100kHz, VBW: 300kHz, Auto, Attenuation: 10 dB, Sweep count 1, Preamp: On: 20 dB, LN Preamp: Off, Preselector: Off
Polarization:Horizontal
Distance: 3 m



Rx mode / < GHz / Wi-Fi - 4549

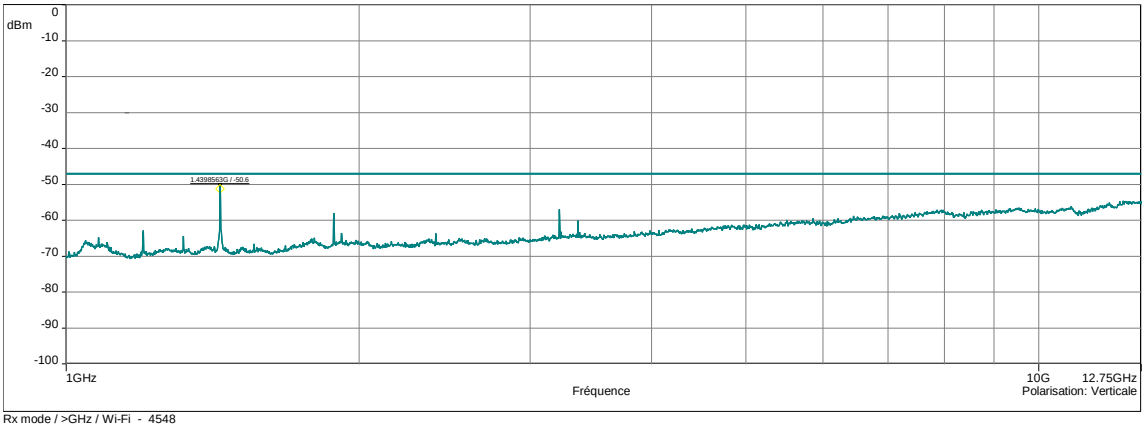
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-1GHz	100kHz	300kHz	RMS
Horizontal	30MHz-1GHz	100kHz	300kHz	RMS
Configuration:	N/A			
Comments:	N/A			

EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.

RADIATED SPURIOUS EMISSIONS (RECEIVER) - GRAPH			
RX MODE / FOR FREQ > 1GHZ / WI-FI & BLE		EMI4548	
EUT mode:	Rx mode	**T (°C):**	22.4
Test Date:	29/09/2022	**H (%):**	54.1
Test Operator:	MPA	**P (hPa):**	999

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) - Classe:Rx - RMS/3.0m/
Niveau (Suspect Manuel) (Verticale)
Mes.Avg (Verticale)

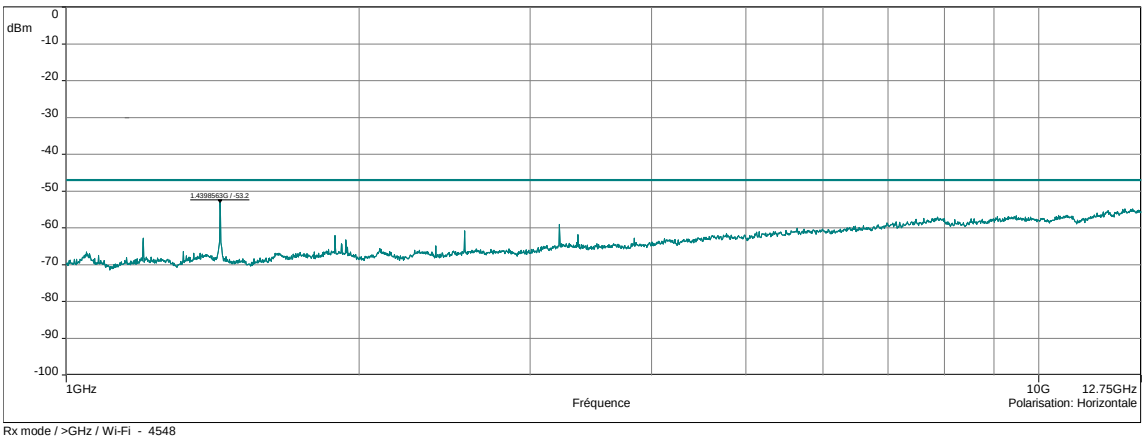
Description Sous-bande 1
Fréquences:1 GHz - 12.75 GHz (Mode analyseur) 30000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Verticale
Distance: 3 m



Rx mode / >GHz / Wi-Fi - 4548

EN 300 328/EN 300 328 V2.2.2 §5.4.9.2.2 (Spurious) - Classe:Rx - RMS/3.0m/
Mes.Avg (Horizontale)

Description Sous-bande 2
Fréquences:1 GHz - 12.75 GHz (Mode analyseur) 30000 Points
Réglages: RBW: 1MHz, VBW: 3MHz, Auto, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: Off
Polarisation:Horizontale
Distance: 3 m



Rx mode / >GHz / Wi-Fi - 4548

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

EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.

7.4. Receiver Blocking

Reference standard:	EN 300 328 V2.2.2 §4.3.2.11
Test method:	EN 300 328 V2.2.2 §5.4.11

Test description: Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels or bands.

Wanted modulated signal and unwanted signal are connected to the EUT via a combiner.

For EUT without dedicated or integral antenna, test is done in conducted.

For EUT with integral or dedicated antenna, measurements are done on a normalized test site by the substitution method. The EUT is set on an insulating support at 150cm above the ground reference plane and placed at the location of the turntable at the orientation of the most sensitive position.

For portable equipements a research of maximum level is done on the 3 axes.

For category 1, the wanted signal level is set to Pmin +20dB (Pmin +26dB for 2380MHz and 2504MHz) for blocking level measurements.

For category 2, the wanted signal level is set to Pmin +26dB for blocking level measurements.

For category 3, the wanted signal level is set to Pmin +30dB for blocking level measurements.

Pmin is the minimum level of wanted signal required to meet the minimum performance criteria.

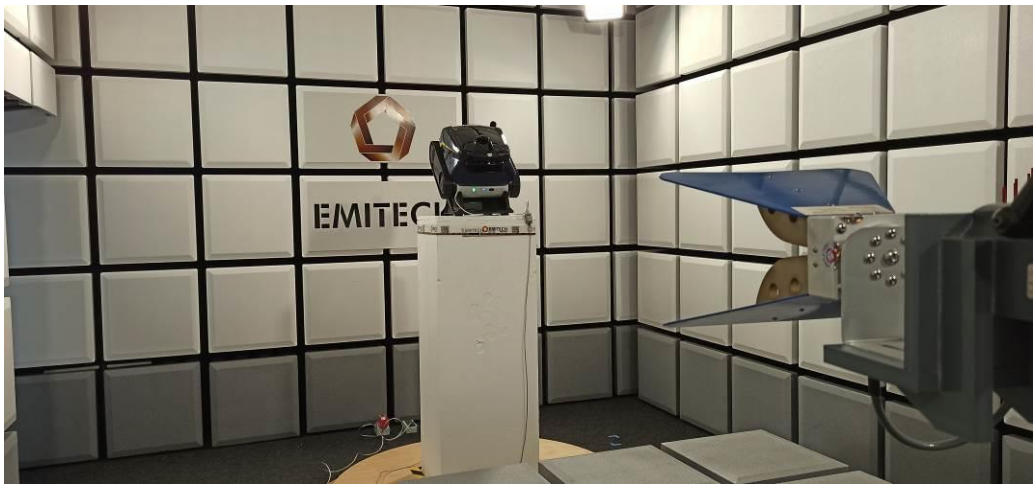
TEST CASE	PERFORMANCE CRITERIA	SEVERITY	RESULT TAB.	VERDICT
All channels / Wi-Fi	FER < 10%	Category 2	EMI4518	**PASS**
All channels / Wi-Fi	FER < 10%	Category 2	EMI4519	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	25.6 °C
Relative Humidity	20 to 75 %	41.2 %
Atmospheric pressure	N/A	1012 hPa
Test method deviation: N/A		
Supplementary information: Test was realized on worst case of polarization, position, and azimuth.		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	AARONIA	Powerlog 70180	15306	24/07/2019	24/03/2023
Attenuator	Hewlett Packard	8494A	10271	13/12/2019	13/02/2023
Attenuator	Hewlett Packard	8496B	10272	17/12/2019	17/02/2023
Attenuator	EMITECH	SUB.V4-V	18111	05/01/2022	05/03/2023
Cable	C&C	N-3m	14335	18/03/2021	18/05/2023
Cable	Techniwave	N-3m	18345	25/01/2022	25/03/2024
Cable	Techniwave	N-2.5m	18350	25/01/2022	25/03/2024
Cable	Techniwave	N-3.5m	18352	25/01/2022	25/03/2024
Cable	STORM MICROWAVE	N-0.2M	18704	18/08/2022	18/10/2024
Cable	/	N-1m	3622	10/11/2021	10/01/2024
Shielded enclosure	COMTEST	FAR-3m	18014	17/08/2021	17/10/2024
Synthetizer	Rohde & Schwarz	SMBV100A	15284	03/08/2022	03/10/2025
Thermohygrometer	Testo	608-H2	12269	07/06/2022	07/08/2024
Thermohygrometer	Bioblock Scientific	Météostar	0963	07/06/2021	07/08/2023

Blank cells = Permanent validity

TEST SETUP PHOTO(S) – EUT POSITION


TEST SETUP PHOTO(S)


RECEIVER BLOCKING - TABULATED RESULTS						
ALL CHANNELS / WI-FI						EMI4518
EUT CHANNEL	POLARIZATION	Azimuth	BLOCKING SIGNAL FREQUENCY (MHz)	BLOCKING LEVEL (dBm)	LIMIT (dBm)	VERDICT
Low channel	Vertical	215°	2300	-18	-34	**PASS**
Low channel	Vertical	215°	2380	-18	-34	**PASS**
Allocated Band (2400 MHz to 2483.5 MHz)						
High channel	Vertical	215°	2504	-18	-34	**PASS**
High channel	Vertical	215°	2584	-18	-34	**PASS**
Comments:	N/A					
Configuration:	N/A					

RECEIVER BLOCKING - TABULATED RESULTS						
ALL CHANNELS / BLE						EMI4519
EUT CHANNEL	POLARIZATION	Azimuth	BLOCKING SIGNAL FREQUENCY (MHz)	BLOCKING LEVEL (dBm)	LIMIT (dBm)	VERDICT
All channels	Vertical	215°	2300	-18	-34	**PASS**
All channels	Vertical	215°	2380	-18	-34	**PASS**
Allocated Band (2400 MHz to 2483.5 MHz)						
All channels	Vertical	215°	2504	-18	-34	**PASS**
All channels	Vertical	215°	2584	-18	-34	**PASS**
Comments:	N/A					
Configuration:	N/A					

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.	MPA	29/09/2022	EMI4518
EUT modification(s): An USB cable was connected to the EUT internal board, in order to set it in test modes.	MPA	29/09/2022	EMI4519

End of test report