

RRA-EMIESS22N643ALL-03Av0

Certification Radio test report

According to the standard:

CFR 47 FCC PART 15

RSS GEN – Issue 5

RSS 210 - Issue 10

Equipment under test:

RS420NFC_SCR READER

FCC ID: NQY-30022

IC NUMBER: 4246A-30022

Company:

ALLFLEX USA, Inc

Distribution: Mr LANGOUET

(Company: ALLFLEX USA, Inc)

Number of pages: 33 with 1 appendix

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval	
			Name and Function	Visa
0	15-Sep-23	Creation	M. DUMESNIL, Radio Laboratory Manager	

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Information in italics are declared by the manufacturer/customer and are under his responsibility

DESIGNATION OF PRODUCT: RS420NFC_SCR READER

Serial number (S/N): C143 01542

Reference / model (P/N): 30022

Software version: 2.51.00 – Jun 24 2021

MANUFACTURER: ALLFLEX USA, Inc

COMPANY SUBMITTING THE PRODUCT:

Company: ALLFLEX USA, Inc

Address: 2805 East 14th Street
P.O Box 612266
75261-2266 Dallas
Texas
USA

Responsible: Mr LANGOUET

Person(s) present during the tests: /

DATES OF TEST: From 7-Oct-22 to 12-Oct-22

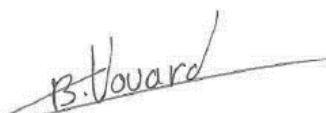
TESTING LOCATION: EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE

FCC Accredited under US-EU MRA Designation Number: FR0009
Test Firm Registration Number: 873677

ISED Accredited under CANADA-EU MRA Designation Number: FR0001
Industry Canada Registration Number: 4452A

TESTED BY: B. VOVARD

VISA:



WRITTEN BY: B. VOVARD

CONTENTS

TITLE	PAGE
1. INTRODUCTION.....	4
2. PRODUCT DESCRIPTION	4
3. NORMATIVE REFERENCE.....	5
4. TEST METHODOLOGY.....	5
5. TEST EQUIPMENT CALIBRATION DATES	6
6. TESTS RESULTS SUMMARY.....	8
7. MEASUREMENT UNCERTAINTY.....	11
8. AC CONDUCTED EMISSIONS.....	12
9. OCCUPIED BANDWIDTH	16
10. BAND EDGE.....	21
11. OPERATION WITHIN THE BAND 13.110 – 14.010 MHZ.....	24
12. FIELD STRENGTH OUTSIDE THE BAND 13.110-14.01 MHZ	28
APPENDIX 1: TEST EQUIPMENT LIST	32

REVISIONS HISTORY

Revision	Date	Modified pages	Modifications
0	17-Oct-22	/	Creation

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **RS420NFC SCR READER**, in accordance with normative reference.

The equipment under test integrates:

- Bluetooth radio part module already certified using 2.4 GHz (FCC ID: X3ZBTMOD3 / IC ID: 8828A-MOD3),
- RFID radio part already certified operational at 134.2 kHz,
- NFC radio part already certified operational at 13.56MHz,

This report concerns only the NFC part.

All tests are performed, firstly on battery only then on representative AC/DC Adapter referenced **FJ-SW20181201500**.

2. PRODUCT DESCRIPTION

Category of equipment (ISED): I

Class: B

Utilization: Handheld animal control tag

Antenna type and gain: Integral antenna (unknown gain)

Operating frequency range: 13.56 MHz

Number of channels: 1

Channel spacing: Not concerned

Modulation: ASK

Power source: 7.4Vdc Ni-MH batteries, Rechargeable
by AC/DC Adapter 100-240Vac to 12Vdc

The applicant declares that the equipment can emit during the recharge of batteries.

Power level, frequency range and channels characteristics are not user adjustable.

The details pictures of the product and the circuit boards are joined with this file.

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below. They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

CFR 47 FCC Part 15 (2022)	Radio Frequency Devices
ANSI C63.10	2013 Procedures for Compliance Testing of Unlicensed Wireless Devices.
RSP-100	Issue 12, August 2019 Certification of Radio Apparatus and Broadcasting equipment
RSS-Gen	Issue 5, April 2018 General Requirements for Compliance of Radio Apparatus
RSS-210	Issue 10, December 2019 Licence-Exempt Radio Apparatus: Category I equipment.

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

Subpart C – Intentional Radiators

- Paragraph 203: Antenna requirement
- Paragraph 205: Restricted bands of operation
- Paragraph 207: Conducted limits
- Paragraph 209: Radiated emission limits; general requirements
- Paragraph 215: Additional provisions to the general radiated emission limitations
- Paragraph 225: Operation within the band 13.110-14.010 MHz

Radio performance tests procedures given in RSS-Gen:

- Paragraph 2 - General
- Paragraph 3 - Normative publications and related documents
- Paragraph 4 - Labelling requirements
- Paragraph 6 - General administrative and technical requirements
- Paragraph 8 - Licence-exempt Radio Apparatus

Radio performance tests procedures given in RSS-210:

- Paragraph 5 – RSS-Gen compliance
- Paragraph 7 - Technical specifications
- Annex B - Devices Operating in Frequency Bands for Any Application
 - Annex B.6 Band 13.110-14.010 MHz

5. TEST EQUIPMENT CALIBRATION DATES

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
0	BAT-EMC V3.18.0.26	Software	/	/	/
1406	EMCO 6502	Loop antenna	08/04/2022	1	08/04/2023
4088	R&S FSP40	Spectrum Analyzer	14/05/2022	2	13/05/2024
6796	R&S FSP7	Spectrum Analyzer	30/07/2021	2	30/07/2023
7566	Testo 608-H1	Meteo station	22/11/2020	2	22/11/2022
8508	California instruments 1251RP	Power source	(1)	(1)	(1)
8528	Schwarzbeck VHA 9103	Biconical antenna	20/05/2022	3	19/05/2025
8590	RG214 N-5m	Cable	23/02/2022	2	23/02/2024
8707	R&S ESI7	Test receiver	14/09/2022	1	14/09/2023
8720	R&S ESH3-Z5	LISN	02/02/2021	2	02/02/2023
8732	Emitech	OATS	28/03/2022	3	27/03/2025
8775	Fontaine FTN 2515B	Power source	(1)	(1)	(1)
8783	EMCO 3147	Log periodic antenna	18/03/2022	3	17/03/2025
8855	EMITECH	Turntable and mat controller	/	/	/
8864	Champ libre Juigné. V3.5	Software	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
9398	N-1.5m	cable	23/07/2022	2	22/07/2024
10523	EMITECH	Absorber sheath current	24/02/2022	2	24/02/2024
10759	COMTEST Cage 3	Anechoic chamber	/	/	/
10771	EMCO 3117	Antenna	30/11/2019	3	29/11/2022
10788	Emitech	Outside room Hors cage	/	/	/
10789	MATURO	Turntable and mat controller NCD	/	/	/
11535	R&S EZ-25	High pass filter	28/05/2022	3	27/05/2025
12590	LUCIX Corp S005180M3201	Low-noise amplifier	22/07/2022	1	22/07/2023
12912	Huber + Suhner N-5m	cable	23/07/2022	2	22/07/2024
14303	SUCOFLEX N-2m	cable	26/01/2021	2	26/01/2023
14304	SUCOFLEX N-2.5m	cable	26/01/2021	2	26/01/2023
14716	GMH 3710	Precision Thermometer - 30°C/+100°C	22/02/2022	1	22/02/2023

14903	Fluke 177	Multimeter	01/02/2022	2	01/02/2024
16059	CLIMATS EXCAL ² 1411-TA	Climatic chamber	30/11/2020	2	30/11/2022
18335	R&S ESW44	Test receiver	15/12/2021	1	15/12/2022
18412	MecHANC - N - 5m	Cable	15/02/2022	2	15/02/2024
-	RS Commander V1.6.4	Software	/	/	/

(1) The equipment is not verified; instead, the output voltage is checked before each measurement with the calibrated multimeter.

6. TESTS RESULTS SUMMARY

6.1 CFR 47 part 15 requirements

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				Note 1
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS	X				
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				Note 2
FCC part 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of §15.225 frequency bands	X				Note 3
	(c) 20 dB bandwidth and band-edge compliance	X				
FCC Part 15.225	OPERATION WITHIN THE BAND 13.110-14.010 MHZ					
	(a) Field strength within the band 13.553-13.567 MHz	X				
	(b) Field strength within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	X				
	(c) Field strength within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	X				
	(d) Field strength outside the band 13.110-14.010 MHz	X				
	(e) Carrier frequency tolerance	X				
	(f) Powered tags			X		

NAp: Not Applicable NAs: Not Asked

Note 1: Integral antenna without standard connector.

Note 2: See FCC part 15.225 (d).

Note 3: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

6.2 RSS-Gen requirements

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
Paragraph 2	General	X				
Paragraph 3	Normative publications and related documents	X				
Paragraph 4	Labelling requirements	X				
Paragraph 6	General administrative and technical requirements	X				
§ 6.7	Occupied bandwidth (or 99% emission bandwidth) and x dB bandwidth	X				
Paragraph 8	Licence-exempt radio apparatus					
§ 8.1	Measurement Bandwidths and Detector Functions	X				
§ 8.2	Pulsed operation	X				
§ 8.3	Prohibition of amplifiers	X				
§ 8.4	User manual notice	X				see certification documents
§ 8.5	Measurement of licence-exempt devices on-site (in-situ)			X		
§ 8.6	Operating frequency range of devices in master/slave networks			X		
§ 8.7	Radio frequency identification (RFID) devices	X				
§ 8.8	AC power line conducted emissions limits	X				
§ 8.9	Transmitter emission limits	X				
§ 8.10	Restricted frequency bands	X				
§ 8.11	Frequency stability	X				

NAp: Not Applicable

NAs: Not Asked

6.3 RSS-210 requirements

Test Procedure RSS-210	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
Paragraph 5	RSS-Gen compliance	X				
Paragraph 7	Technical Specifications					
7.1	Emission Falling Within Restricted Frequency Bands	X				
7.2	General Field Strength Limits	X				
7.3	Transmitters with wanted and unwanted emissions that are within the general field strength limits	X				
7.4	Cordless Telephones			X		
Annex B	Device Operating in Frequency Bands for Any Application					
Annex B.6	Band 13.110-14.010 MHz					
(a) i	Field strength within the band 13.553-13.567 MHz	X				
(a) ii	Field strength within the bands 13.410-13.553 MHz and 13.67-13.710 MHz	X				
(a) iii	Field strength within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	X				
(a) iv	Field strength outside the band 13.110-14.010 MHz	X				
(b)	Carrier frequency stability				X	

NAp: Not Applicable

NAs: Not Asked

7. MEASUREMENT UNCERTAINTY

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the result(s)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage probability of approximately 95%.

Parameter	Emitech Uncertainty
RF power, conducted	± 0.8 dB
Radiated emission valid to 26 GHz	
9kHz – 30MHz	± 2.7 dB
30MHz – 1GHz	± 5.0 dB
1GHz – 18GHz	± 5.3 dB
18GHz – 40GHz	± 6.1 dB
AC Power Lines conducted emissions	± 3.4 dB
Temperature	± 1 °C
Humidity	± 5 %

8. AC CONDUCTED EMISSIONS

Temperature (°C) : 24

Humidity (%HR): 46

Date : October 12, 2022

Technician : B. VOVARD

Standard: FCC Part 15

RSS-Gen

Test procedure:

For FCC Part 15: § 15.207

For RSS-Gen: § 8.8

Method of § 6.2 of ANSI C63.10

Software used: BAT-EMC V3.18.0.26

Test set up:

The EUT is isolated and placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane. The equipment is powered with the AC power operating voltage of 120 V / 60 Hz.

Frequency range: 150 kHz - 30 MHz

Detection mode: Peak / Quasi-peak / Average

Bandwidth: 10 kHz / 9 kHz

Equipment under test operating condition:

The equipment under test is blocked in discontinuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

According to the KDB 174176 D01 Line Conducted FAQ v01r01 Q5

As the NFC emissions exceed the authorized limit, a complementary measurement was performed with 50ohm load on connector antenna. (see graphs 3 and 4) to demonstrate the conformity on the fundamental emission band.

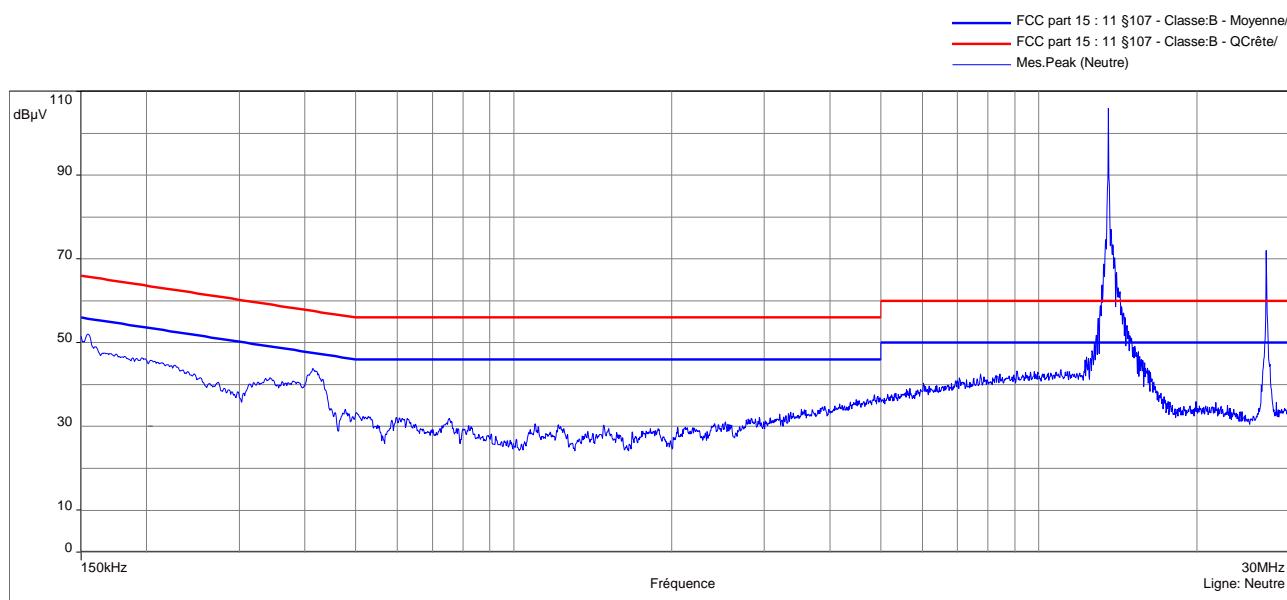
Results:

Sample N° 1:

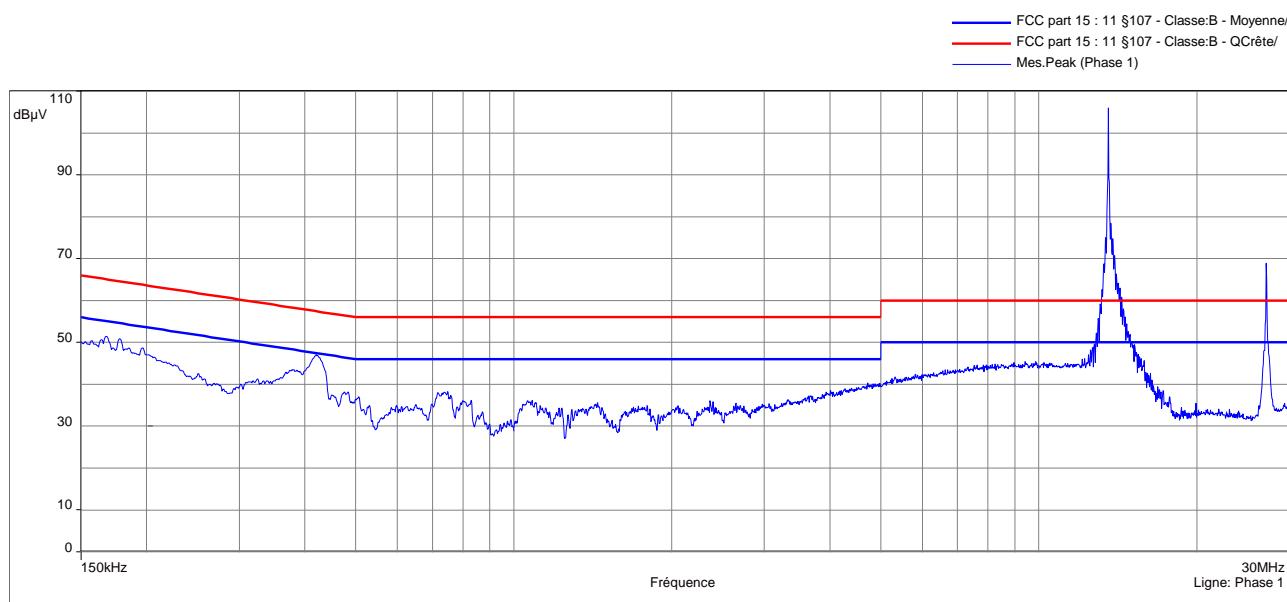
Measurement on the mains power supply:

The measurement is first realized with peak detector with antenna.

Curve N° 1: measurement on the Neutral with peak detector

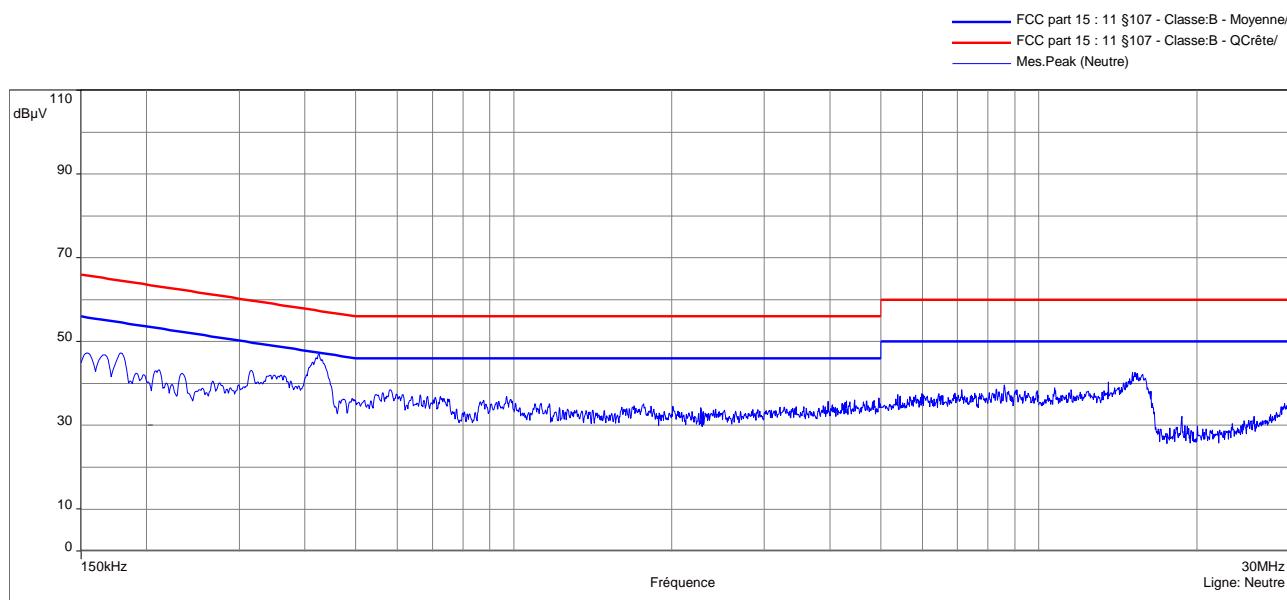


Curve N° 2: measurement on the Line with peak detector

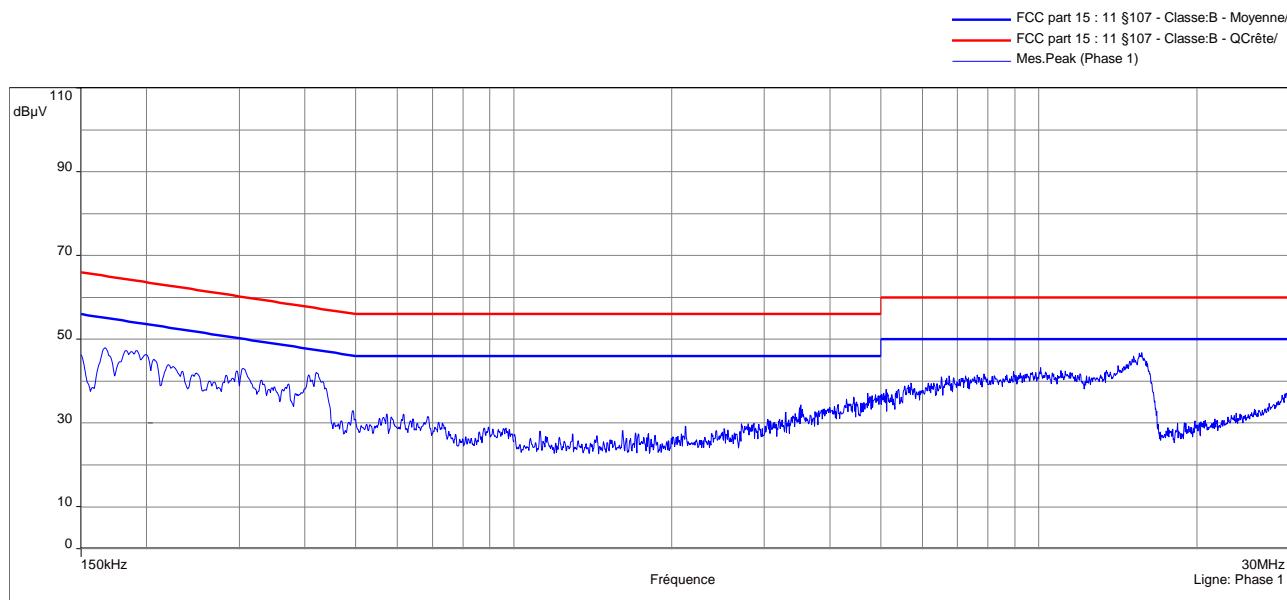


The following measurement is realized with peak detector without antenna (50 ohms load).

Curve N° 3: measurement on the Neutral with peak detector



Curve N° 4: measurement on the Line with peak detector



With or without the antenna the results are identical, that's why only the results without the antenna are reported on the table below.

The frequencies which are not 6 dB under the Quasi-peak limit are then analyzed with Quasi-peak detector.

The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

Table N° 1: measurement on the Neutral, for the frequency range:

Frequency (MHz)	Quasi-peak (dB μ V)	QP Limit (dB μ V)	QP margin (dB)
0.316	34.16	59.8	25.64
0.360	33.61	58.7	25.09
0.407	37	57.7	20.70
0.425	39.53	57.3	17.77
0.442	35.67	57.0	21.33
0.474	26.62	56.4	29.78
0.581	28.19	56.0	27.81
0.664	27.64	56.0	28.36
0.725	26.91	56.0	29.09
0.969	26.18	56.0	29.82
1.127	26.32	56.0	29.68
13.560	33.26	60.0	26.74
15.079	32.50	60.0	27.50
15.759	33.14	60.0	26.86

Frequency (MHz)	Average (dB μ V)	Average Limit (dB μ V)	Average margin (dB)
0.316	19.73	49.8	30.07
0.360	19.98	48.7	28.72
0.407	21.47	47.7	26.23
0.425	23.12	47.3	24.18
0.442	20.95	47.0	26.05
0.474	16.58	46.4	29.82
0.581	17.48	46.0	28.52
0.664	17.13	46.0	28.87
0.725	17.19	46.0	28.81
0.969	16.79	46.0	29.21
1.127	17.22	46.0	28.78
13.560	22.12	50.0	27.88
15.079	20.08	50.0	29.92
15.759	20.87	50.0	29.13

Table N° 2: measurement on the Line, for the frequency range:

Frequency (MHz)	Quasi-peak (dB μ V)	QP Limit (dB μ V)	QP margin (dB)
0.207	33.46	63.3	29.84
0.331	29.30	59.4	30.10
0.407	30.21	57.7	27.49
0.421	32.09	57.4	25.31
0.442	28.09	57.0	28.91
7.856	30.43	60.0	29.57
10.072	31.42	60.0	28.58
12.002	31.11	60.0	28.89
14.156	32.56	60.0	27.44
15.159	35.85	60.0	24.15
15.717	37.13	60.0	22.87
16.205	33.51	60.0	26.49
29.612	26.21	60.0	33.79

Frequency (MHz)	Average (dB μ V)	Average Limit (dB μ V)	Average margin (dB)
0.207	19.87	53.3	33.43
0.331	17.29	49.4	32.11
0.407	18.25	47.7	29.45
0.421	18.92	47.4	28.48
0.442	17.59	47.0	29.41
7.856	18.35	50.0	31.65
10.072	19.27	50.0	30.73
12.002	19.04	50.0	30.96
14.156	19.88	50.0	30.12
15.159	21.65	50.0	28.35
15.717	22.57	50.0	27.43
16.205	21.75	50.0	28.25
29.612	18.30	50.0	31.70

Test conclusion:

RESPECTED STANDARD

9. OCCUPIED BANDWIDTH

Temperature (°C) : 24

Humidity (%HR): 45

Date : October 11, 2022

Technician : B. VOVARD

Standard: FCC Part 15
RSS-210

Test procedure:

Method of § 6.9.3 of ANSI C63.10 (99% Measurement)

Method of § 6.9.2 of ANSI C63.10 (20dB Measurement)

Test set up:

Test realized in near field.

Setting:

Measure	99%	20dB
Center frequency	The centre frequency of the channel under test	
Detector	Peak	
Span	1.5 to 5 times the OBW	2 to 5 times the OBW
RBW	1% to 5% of the OBW	1% to 5% of the OBW
VBW	3 x RBW	3 x RBW
Trace	Max hold	
Sweep	Auto	

Test operating condition of the equipment:

The equipment under test is blocked in discontinuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Configuration 1: E.U.T supplied by battery

Power source: Fully charged battery

Percentage of voltage variation during the test (%): ± 1

Configuration 2: E.U.T supplied with AC/DC power supply

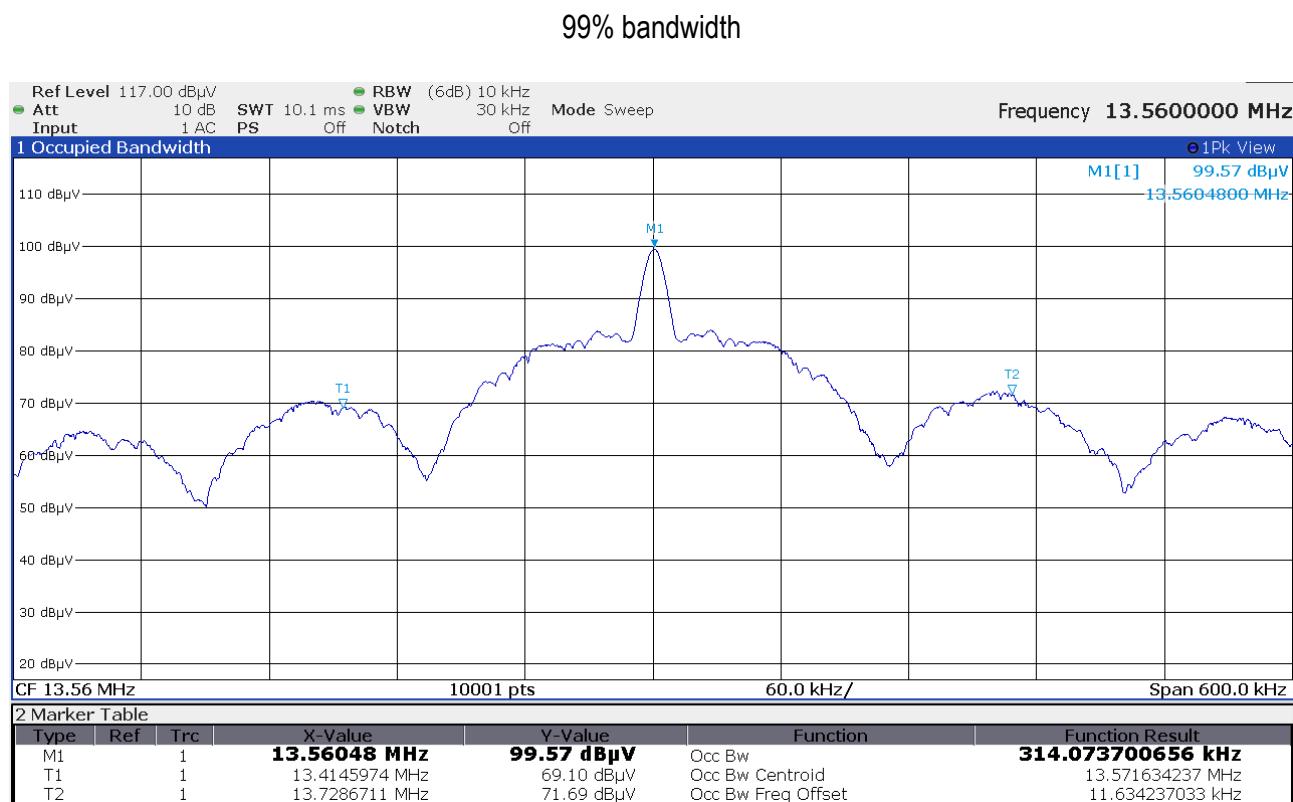
Power source: 120 Vac 60 Hz trough a variac

Percentage of voltage variation during the test (%): ± 1

Results:

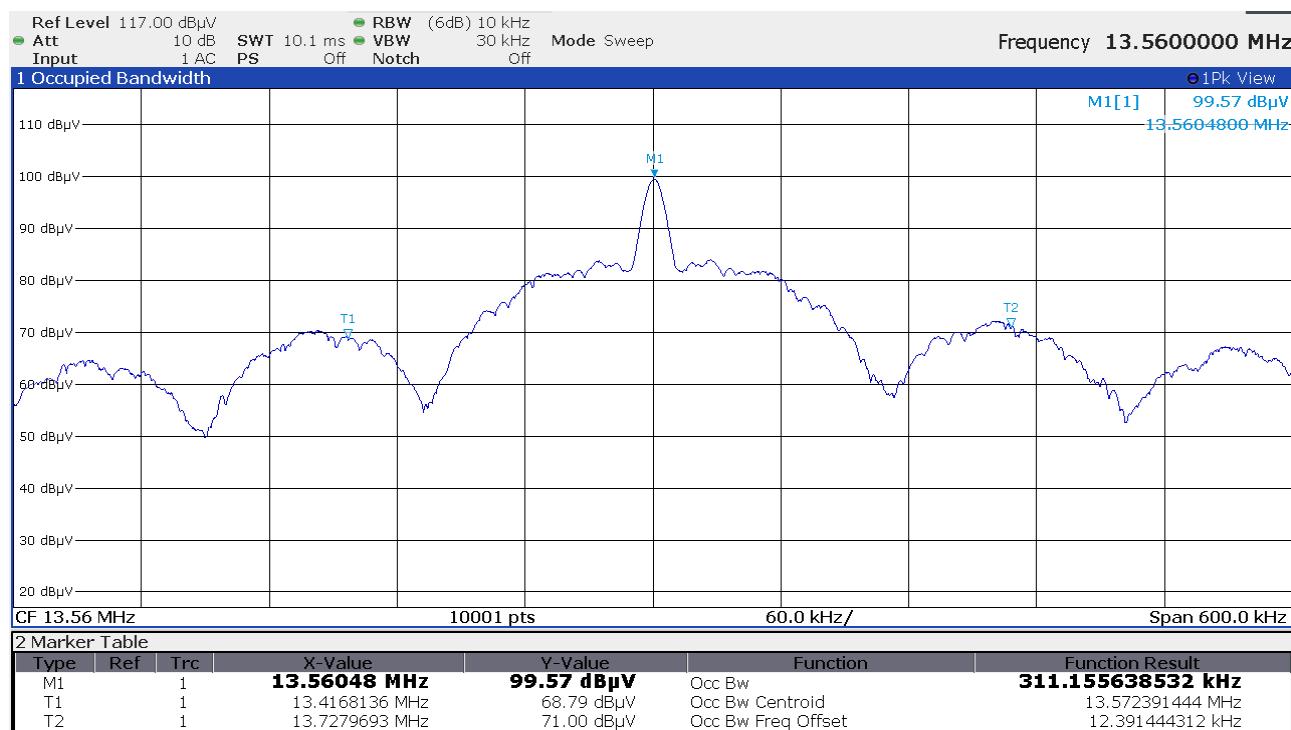
Sample N° 1

Configuration 1



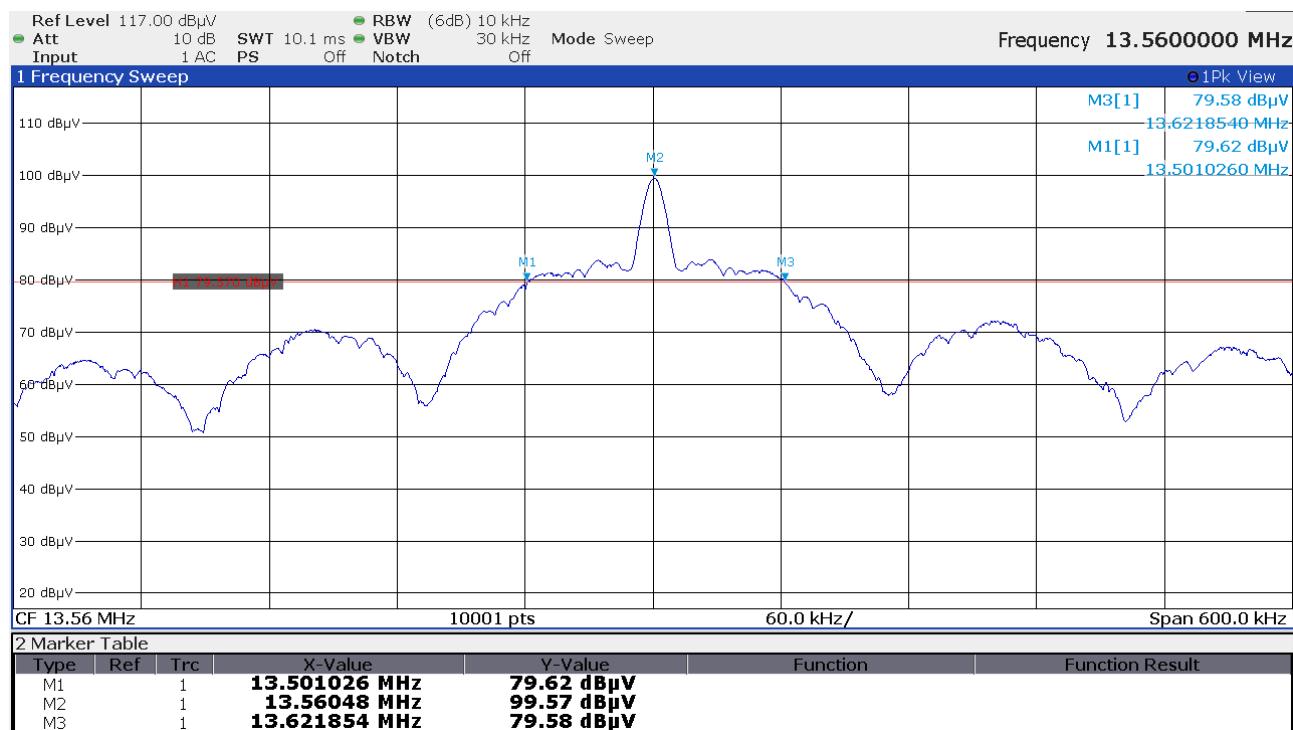
Configuration 2

99% bandwidth



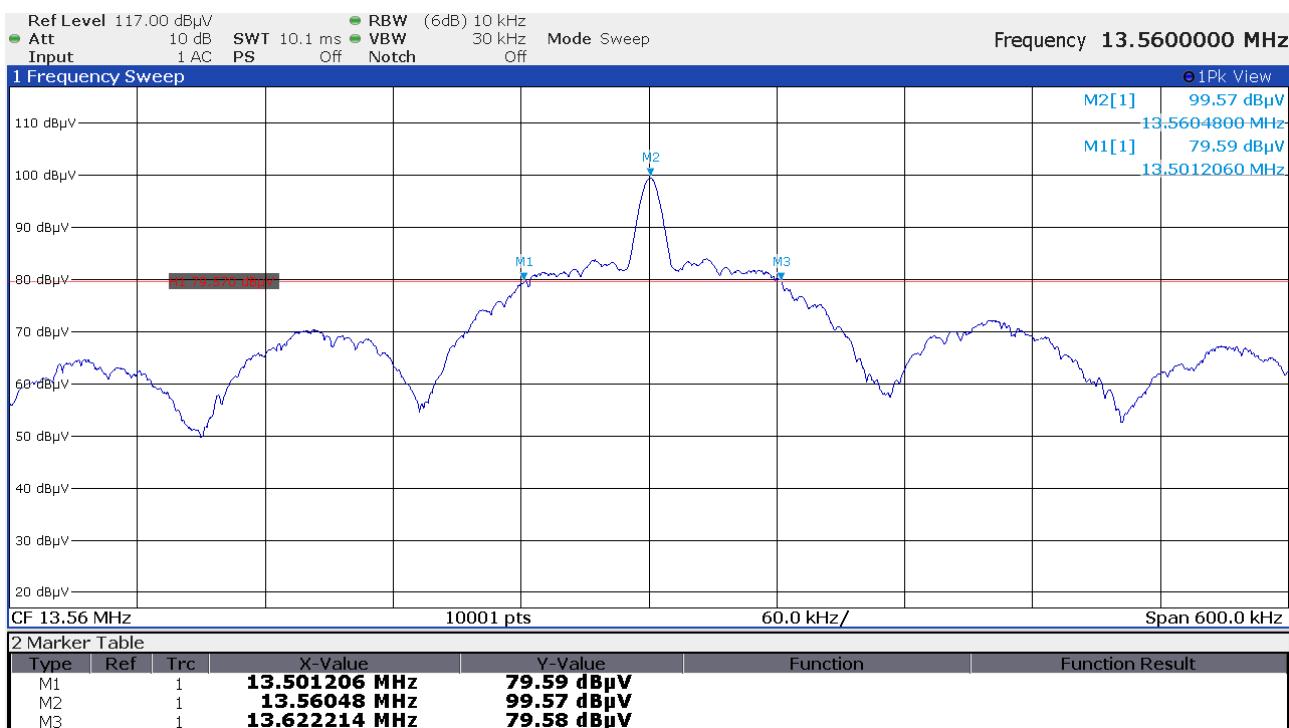
Configuration 1

20 dB bandwidth



Configuration 2

20 dB bandwidth



Limit:

Measure realized for reporting only

10. BAND EDGE**Temperature (°C) : 24****Humidity (%HR): 45****Date : October 11, 2022****Technician : B. VOVARD****Standard: FCC Part 15****Test procedure:**

For FCC Part 15: § 15.215

Method of § 6.10.6 of ANSI C63.10

Test set up:

Test realized in near field. All field strength measurements are correlated with the radiated maximum peak output power

Test operating condition of the equipment:

The equipment under test is blocked in discontinuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Configuration 1: E.U.T supplied by battery

Power source: Fully charged battery

Percentage of voltage variation during the test (%): ± 1**Configuration 2: E.U.T supplied with AC/DC power supply**

Power source: 120 Vac 60 Hz trough a variac

Percentage of voltage variation during the test (%): ± 1

Results:

Lower Band Edge: From 13.090 MHz to 13.110 MHz

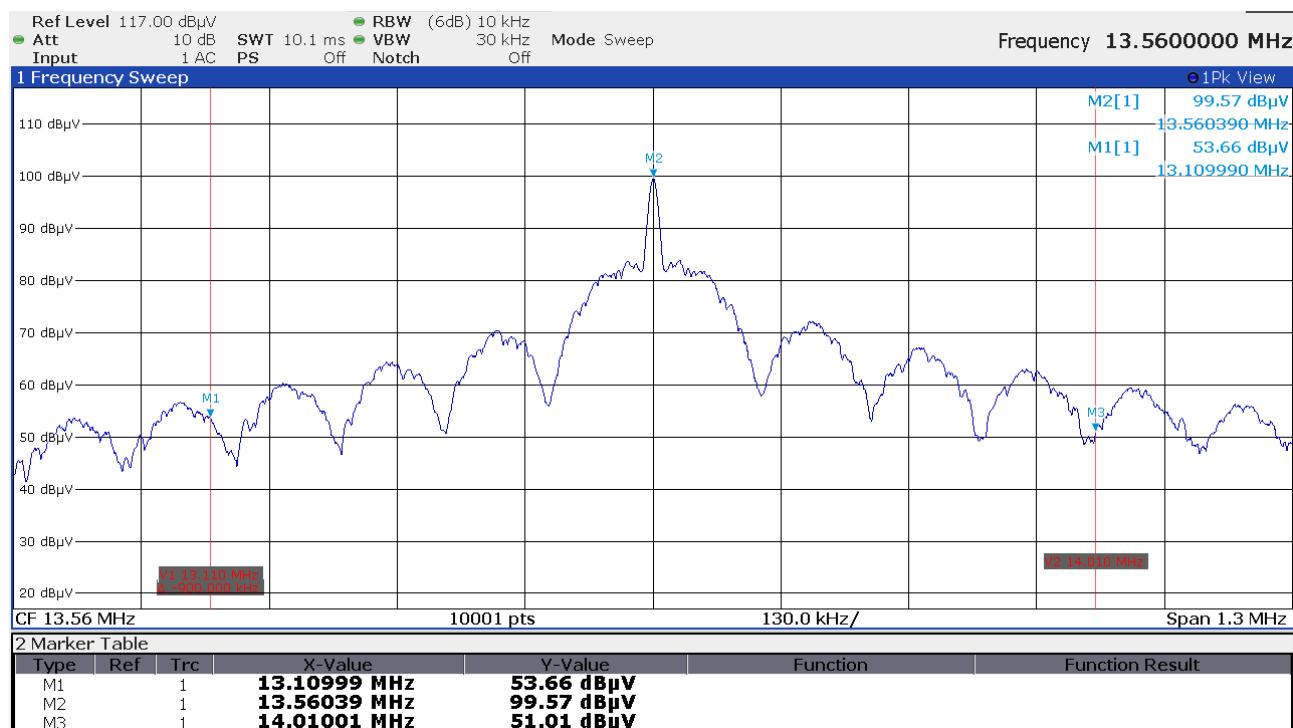
Upper Band Edge: From 14.010 MHz to 14.030 MHz

Sample N° 1

Configuration 1

Fundamental frequency (MHz)	Field Strength Level of fundamental (dB μ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
13.56	60.80	Peak	13.10999	45.91	14.89	48.63	33.74
13.56	60.80	Peak	14.01001	48.56	12.24	48.63	36.39

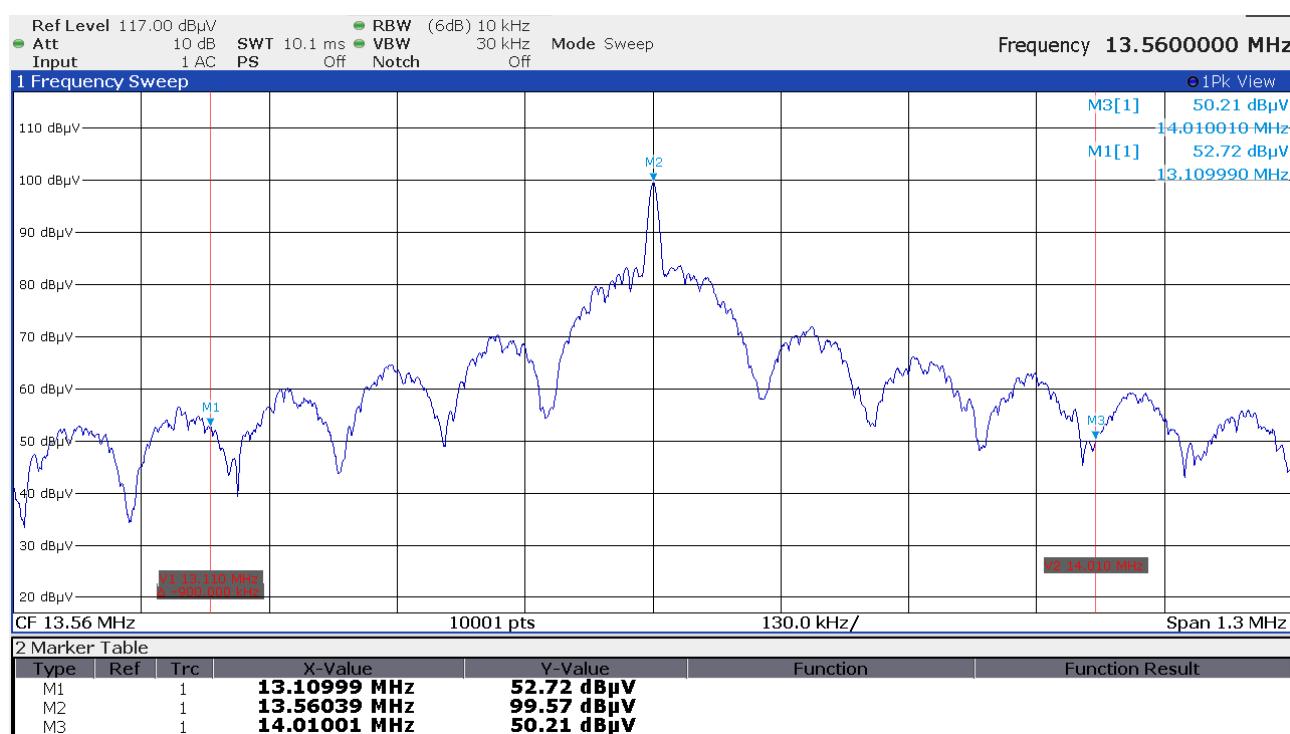
(1) Marker-Delta method



Configuration 2

Fundamental frequency (MHz)	Field Strength Level of fundamental (dB μ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
13.56	74.34	Peak	13.10999	46.85	27.49	48.63	21.14
13.56	74.34	Peak	14.01001	49.36	24.98	48.63	23.65

(1) Marker-Delta method



Test conclusion:

RESPECTED STANDARD

11. OPERATION WITHIN THE BAND 13.110 – 14.010 MHZ**Temperature (°C) :** 21 to 23**Humidity (%HR):** 52 to 47**Date :** October 10, 2022**Technician :** B. VOVARD**Standard:** FCC Part 15

RSS-210

Test procedure:

For FCC Part 15: § 15.209, § 15.225 (a), (b), (c), (e)

For RSS-210: § Annex B.6 (a), (b), (c)

Method of § 6.3 of ANSI C63.10

Method of § 6.4 of ANSI C63.10

Method of § 6.8 of ANSI C63.10

Test set up:

First an exploratory radiated measurement was performed. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The system is tested in an open area test site (OATS). The EUT is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

The frequency stability measure is realized in near-field with the product in a climatic chamber.

Detection mode: Quasi-peak ($F < 1$ GHz)**Bandwidth:** 9 kHz (150 kHz $< F < 30$ MHz)**Distance of antenna:** 10 meters**Antenna height:** 1 meter

Antenna polarization: oriented in the vertical plane. The lowest point of the loop is 1m above ground level.

Equipment under test operating condition:

The equipment under test is blocked in discontinuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Configuration 1: E.U.T supplied by battery

Power source: Fully charged battery

Percentage of voltage variation during the test (%): ± 1 **Configuration 2: E.U.T supplied with AC/DC power supply**

Power source: 120 Vac 60 Hz trough a variac

Percentage of voltage variation during the test (%): ± 1

Results:

Sample N° 1

Configuration 1

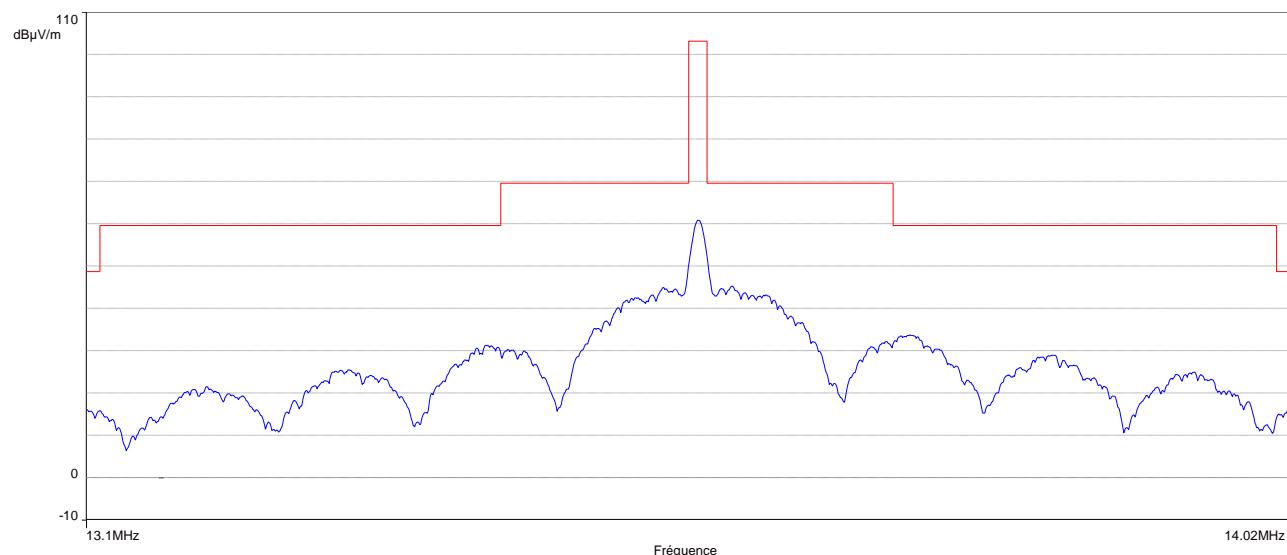
Carrier field strength

Field strength (dB μ V/m) at frequency: 13.56 MHz	
Normal test conditions measure at 10 m	60.80
Normal test conditions correlated at 30 m	41.72
Limits at 30m (dBμV/m)	84
Margin (dB)	42.28

Polarization of test antenna: perpendicular at the equipment at 0 degree.

Position of equipment: upright (azimuth: 100°)

Field strength within the band 13.110-14.010 MHz



Configuration 2

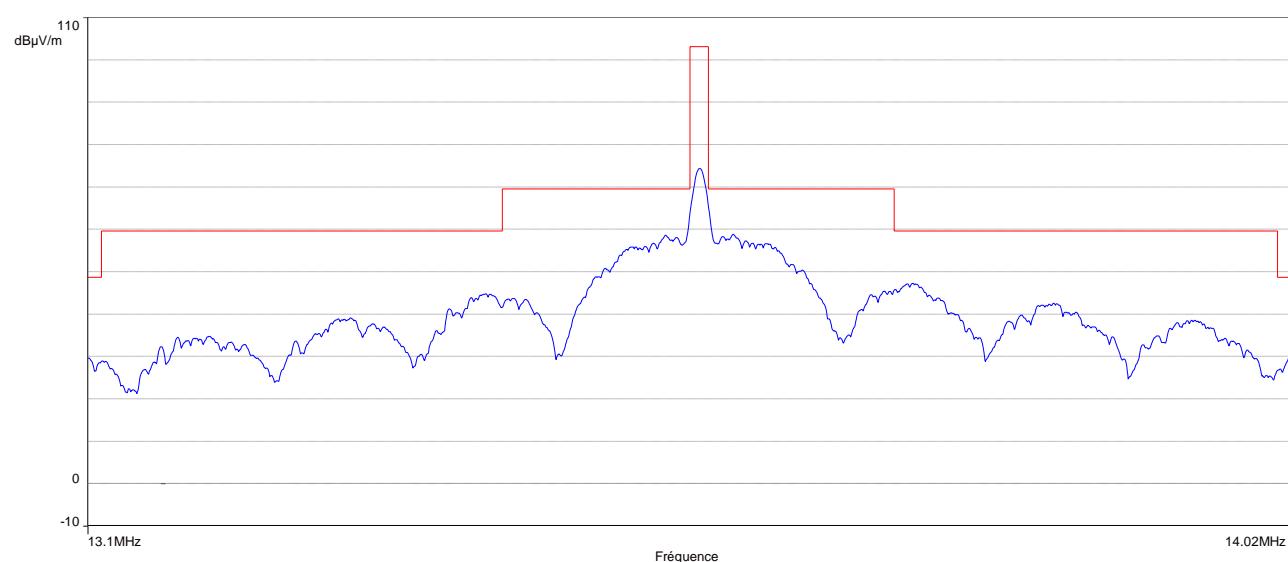
Carrier field strength

	Field strength (dB μ V/m) at frequency: 13.56 MHz
Normal test conditions measure at 10 m	74.34
Normal test conditions correlated at 30 m	55.26
Limits at 30m (dB μ V/m)	84
Margin (dB)	28.74

Polarization of test antenna: perpendicular at the equipment at 0 degree.

Position of equipment: upright (azimuth: 100°)

Field strength within the band 13.110-14.010 MHz



Frequency stability

Results for temperature variation

Realized with a power source at 120 Vac – 60 Hz through a variac

Temperature (°C)	Mesure at startup		Measure at 2 min		Measure at 5 min		Measure at 10 min		Drift limit (kHz)
	Frequency measured (MHz)	Frequency drift (kHz)							
50	13.560584	0.584	13.560585	0.585	13.560586	0.586	13.560586	0.586	± 1.356 (a)
40	13.560595	0.595	13.560590	0.590	13.560588	0.588	13.560587	0.587	
30	13.560612	0.612	13.560606	0.606	13.560603	0.603	13.560601	0.601	
20	13.560633	0.633	13.560627	0.627	13.560624	0.624	13.560623	0.623	
10	13.560653	0.653	13.560649	0.649	13.560647	0.647	13.560646	0.646	
0	13.560659	0.659	13.560662	0.662	13.560661	0.661	13.560661	0.661	
-10	13.560643	0.643	13.560653	0.653	13.560655	0.655	13.560656	0.656	
-20	13.560603	0.603	13.560624	0.624	13.560627	0.627	13.560628	0.628	

(a) ±0.01% of the operating frequency

Results for power supply variation

Configuration 1

Realized at +20 °C

Power supply (Vac)	Frequency measured (MHz)	Frequency drift (kHz)	Drift limit (kHz)
6.29	13.560602	0.602	± 1.356 (b)
7.4	13.560603	0.603	
8.51	13.560603	0.603	

(b) ±0.01% of the operating frequency

Configuration 2

Realized at +20 °C

Power supply (Vac)	Frequency measured (MHz)	Frequency drift (kHz)	Drift limit (kHz)
102	13.560614	0.614	± 1.356 (b)
120	13.560613	0.613	
138	13.560612	0.612	

(b) ±0.01% of the operating frequency

Test conclusion:

RESPECTED STANDARD

12. FIELD STRENGTH OUTSIDE THE BAND 13.110-14.01 MHZ**Temperature (°C) : 23****Humidity (%HR): 44****Date : October 7, 2022****Technician : B. VOVARD****Standard: FCC Part 15****Standard: FCC Part 15**
RSS-210**Test procedure:**

For FCC Part 15: § 15.209, § 15.225 (d)

For RSS-210: § Annex B.6 (d)

Method of § 6.3 of ANSI C63.10

Method of § 6.4 of ANSI C63.10

Method of § 6.5 of ANSI C63.10

Test set up:

First an exploratory radiated measurement was performed. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The measure is realized on open area test site under 1 GHz and in anechoic chamber above 1 GHz.

When the system is tested in an open area test site (OATS), the EUT is placed on a rotating table, 0.8m from a ground plane.

When the system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

Frequency range: From 9 kHz to 140MHz - 10th harmonic of the highest fundamental frequency (13.56MHz)

Detection mode: Quasi-peak (F < 1 GHz)

Peak / Average (F > 1 GHz)

Bandwidth: 200Hz (9 kHz < F < 150kHz)
9 kHz (150 kHz < F < 30MHz)
120 kHz (30 MHz < F < 1 GHz)
1 MHz (F > 1 GHz)**Distance of antenna:** 10 meters (in open area test site) / 3 meters (in anechoic room)**Antenna height:** 1 to 4 meters (in open area test site) / 1.5 meter (in anechoic room)**Antenna polarization:** vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment under test is blocked in discontinuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Configuration 1: E.U.T supplied by battery

Power source: Fully charged battery

Percentage of voltage variation during the test (%): ± 1

Configuration 2: E.U.T supplied with AC/DC power supply

Power source: 120 Vac 60 Hz trough a variac

Percentage of voltage variation during the test (%): ± 1

Results:
Sample N° 1
Configuration 1

Below 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Polarization Parallel Perpendicular Horizontal)	Field strength Measured at 10 m (dB μ V/m)	Field strength Computed at 30 m (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
27.12	P	1	9	V	22.94 (1)	3.86	29.5	25.64

Above 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dB μ V/m)	Field strength Computed at 3 m (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
40.68	QP	1	120	V	15.3 (1)	25.76	40	14.24
54.24	QP	1	120	V	14.96 (1)	25.42	40	14.58
67.8	QP	1	120	V	15.84 (1)	26.3	40	13.7
81.36	QP	1	120	V	14.24 (1)	24.7	40	15.3
108.48	QP	1	120	H	15.15 (1)	25.61	43.5	17.89

P= Peak, QP=Quasi-peak, Av=Average

(1) Noise floor

Configuration 2

Below 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Polarization (Parallel Perpendicular Horizontal)	Field strength Measured at 10 m (dB μ V/m)	Field strength Computed at 30 m (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
27.12	P	1	9	Perpendicular	23.05 (1)	3.97	29.5	25.53

Above 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dB μ V/m)	Field strength Computed at 3 m (dB μ V/m)	Limits (dB μ V/m) or (dBm)	Margin (dB)
40.68	QP	1	120	V	15.22 (1)	25.68	40	14.32
54.24	QP	1	120	V	15.10 (1)	25.56	40	14.44
67.8	QP	1	120	V	15.62 (1)	26.08	40	13.92
81.36	QP	1	120	V	15.10 (1)	25.56	40	14.44
108.48	QP	1	120	H	15.31 (1)	25.77	43.5	17.73

P= Peak, QP=Quasi-peak, Av=Average

(1) Noise floor

Applicable limits: for $9 \text{ kHz} \leq F \leq 490 \text{ kHz}$: $2400/F(\text{kHz})$ at 300 meters
for $490 \text{ kHz} < F \leq 1.705 \text{ MHz}$: $24000/F(\text{kHz})$ at 30 meters
for $1.705 \text{ MHz} < F \leq 30 \text{ MHz}$: $29.5 \text{ dB}\mu\text{V/m}$ at 30 meters
for $30 \text{ MHz} < F \leq 88 \text{ MHz}$: $40 \text{ dB}\mu\text{V/m}$ at 3 meters
for $88 \text{ MHz} < F \leq 216 \text{ MHz}$: $43.5 \text{ dB}\mu\text{V/m}$ at 3 meters
for $216 \text{ MHz} < F \leq 960 \text{ MHz}$: $46 \text{ dB}\mu\text{V/m}$ at 3 meters
Above 960 MHz : $54 \text{ dB}\mu\text{V/m}$ at 3 meters

Test conclusion:

RESPECTED STANDARD

□□□ End of report, 1 appendix to be forwarded □□□

APPENDIX 1: Test equipment list

AC Conducted emissions

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	10788
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESW44	Rohde & Schwarz	18335
LISN ESH3-Z5	Rohde & Schwarz	8720
High-pass filter EZ-25	Rohde & Schwarz	11535
Absorber sheath current	Emitech	10523
Cable N-5m RG214	GYL Technologies	8590
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14903
Meteo station 608-H1	Testo	7566
Software	BAT-EMC V3.18.0.26	0000

Occupied bandwidth

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESW44	Rohde & Schwarz	18335
Cable N-5m	Mechanc	18412
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14903
Meteo station 608-H1	Testo	7566
Software	RS Commander	-

Band edge

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESW44	Rohde & Schwarz	18335
Cable N-5m	Mechanc	18412
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14903
Meteo station 608-H1	Testo	7566
Software	RS Commander	-

Operation within the band 13.110 – 14.010 MHz

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Turntable and mat controller	EMITECH	8855
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Climats EXCAL ² 1411-TA	CLIMATS	16059
Precision thermometer GMH 3710	GHM Greisinger	14716
Test receiver ESW44	Rohde & Schwarz	18335
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Loop antenna 6502	EMCO	1406
Cable N-5m	Mechanc	18412
Power source 1251RP	California instruments	8508
Power source FTN 2515B	Fontaine	8775
Multimeter 177	Fluke	14903
Meteo station 608-H1	Testo	7566

Field strength outside the band 13.110-14.010 MHz

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Turntable and mat controller	EMITECH	8855
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna 3147	EMCO	8783
Antenna 3117	ETS-Lindgren	10771
Low-noise amplifier S005180M3201	LUCIX Corp.	12590
N-1.5M Cable	SUCOFLEX	9398
N-2M Cable	SUCOFLEX	14303
N-2.5M Cable	SUCOFLEX	14304
N-5M Cable	Huber + Suhner	12912
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14903
Meteo station 608-H1	Testo	7566
Software	BAT-EMC V3.18.0.26	0000
Software	Champ libre Juigné. V3.5	8864