

RRA-EMIESS22N644ALL-02Av0

Certification Radio test report

According to the standard:
 CFR 47 FCC PART 15
 RSS GEN – Issue 5
 RSS 210 - Issue 10

Equipment under test:
RS430 READER

FCC ID: *NQY-30023*
IC NUMBER: *4246A-30023*

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	18-Sep-23	Creation	M. DUMESNIL, Radio Laboratory Manager	

Duplication of this document 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.
 Information in italics are declared by the manufacturer/customer and are under his responsibility

S51 RTY 000 INT 00014 [02]

DESIGNATION OF PRODUCT: *RS430 READER*

Serial number (S/N): *C151 00142*

Reference / model (P/N): *30020*

Software version 1: *15.38 – Jul 21 2022*
Software version 2: *1-5-9*

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*

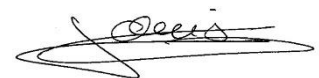
DATES OF TEST: *From 12-Oct-22 to 20-Oct-22*

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: *S. LOUIS*

VISA:



WRITTEN BY: *S. LOUIS*

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	17
10. BAND EDGE	20
11. OPERATION WITHIN THE BAND 13.110 – 14.010 MHZ.....	23
12. FIELD STRENGTH OUTSIDE THE BAND 13.110-14.01 MHZ	28
APPENDIX 1: TEST EQUIPMENT LIST	31

REVISIONS HISTORY

Revision	Date	Modified pages	Modifications
0	25-Oct-22	/	Creation

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **RS430 Reader**, in accordance with normative reference.

The equipment under test integrates:

- a RFID radio part operational at 134.2kHz,
- NFC radio part operational at 13.56MHz,
- Bluetooth radio module already certified (FCC ID:X3ZBTMOD8 / IC: 8828A-MOD8)

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

This report concerns only NFC radio part.

2. PRODUCT DESCRIPTION

Category of equipment (ISED): I

Class: B

Utilization: Handheld control terminals

Antenna type and gain: Integral antenna (unknown gain)

Operating frequency range: 13.56MHz

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
5275	R&S ESPC	Test receiver	13/07/2021	2	13/07/2023
6796	R&S FSP7	Spectrum Analyzer	30/07/2021	2	30/07/2023
7190	R&S HL223	Antenna	17/03/2022	3	16/03/2025
7240	Emco 3110	Biconical antenna	17/03/2022	3	16/03/2025
7279	SUCOFLEX SF104 N 1.5m	Cable	21/05/2022	2	20/05/2024
7566	Testo 608-H1	Meteo station	22/10/2020	2	22/10/2022
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
8635	R&S EZ-25	High-pass filter	04/09/2021	3	03/09/2024
8707	R&S ES17	Test receiver	14/09/2022	1	14/09/2023
8719	Thurbly Thandar Instruments 1600	LISN	24/02/2022	2	24/02/2024
8732	Emitech	OATS	28/03/2022	3	27/03/2025
8775	Fontaine FTN 2515B	Power source	(1)	(1)	(1)
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
9489	Absorber sheath current	Emitech	24/02/2022	2	24/02/2024
10730	Mini-circuit ZFL- 1000LN	Low-noise amplifier	06/01/2022	1	06/01/2023
10759	COMTEST Cage 3	Anechoic chamber	/	/	/
10788	Emitech	Outside room Hors cage	/	/	/
10789	MATURO	Turntable and mat controller NCD	/	/	/
12911	Huber + Suhner N-2m	cable	21/05/2022	2	20/05/2024

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
14475	Oregon Scientific BAR206	Meteo station	27/10/2021	2	27/10/2023
14716	GMH 3710	Precision Thermometer - 30°C/+100°C	22/02/2022	1	22/02/2023
14831	Fluke 177	Multimeter	01/02/2022	2	01/02/2024
15666	R&S FSV40	Spectrum Analyzer	28/09/2022	2	27/09/2024
15882	SUCOFLEX	cable N 5m	/	/	/
16059	CLIMATS EXCAL ² 1411-TA	Climatic chamber	30/11/2020	2	30/11/2022
//	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	$\pm 0.8\text{dB}$
Radiated emission valid to 26 GHz	
9kHz – 30MHz	$\pm 2.7\text{ dB}$
30MHz – 1GHz	$\pm 5.0\text{ dB}$
1GHz – 18GHz	$\pm 5.3\text{ dB}$
18GHz – 40GHz	$\pm 6.1\text{ dB}$
AC Power Lines conducted emissions	$\pm 3.4\text{ dB}$
Temperature	$\pm 1\text{ }^{\circ}\text{C}$
Humidity	$\pm 5\%$

8. AC CONDUCTED EMISSIONS**Temperature (°C) :** 22.7**Humidity (%HR):** 43**Date :** October 20, 2022**Technician :** S. LOUIS**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.

See photos in appendix 2

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 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 antenna connector (see graphs 3 and 4) to demonstrate the conformity inside the fundamental emission band.

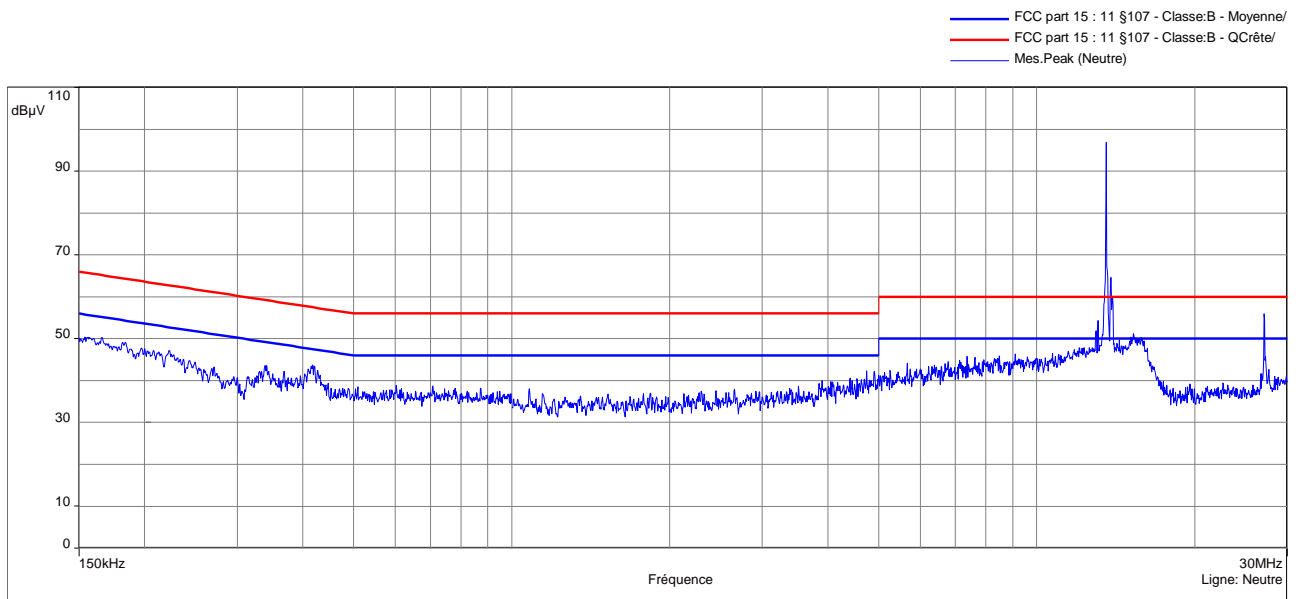
Results:

Sample N° 1:

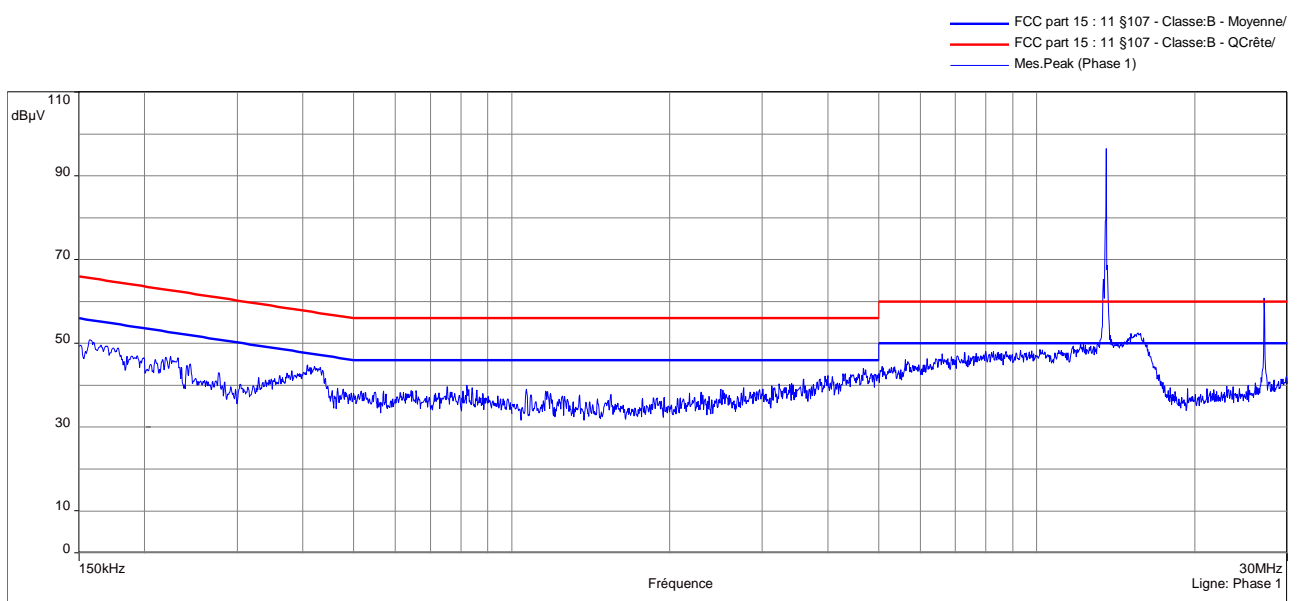
Measurement on the mains power supply:

The measurement is first realized with peak detector with NFC antenna.

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

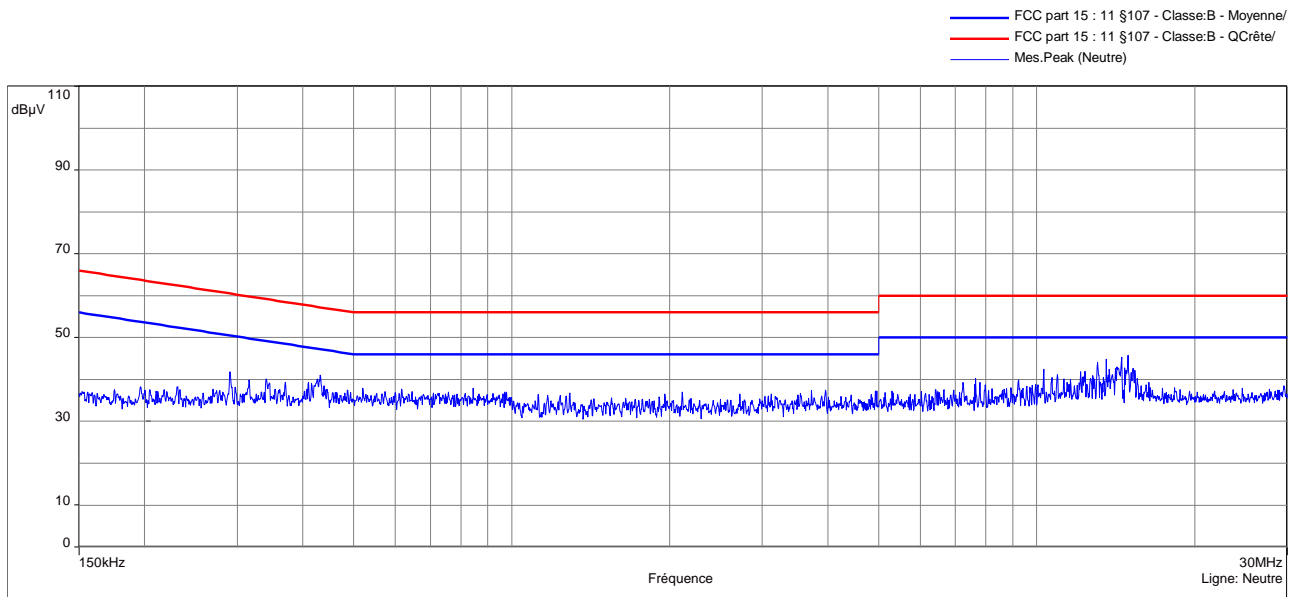


Curve N° 2: measurement on the Line with peak detector

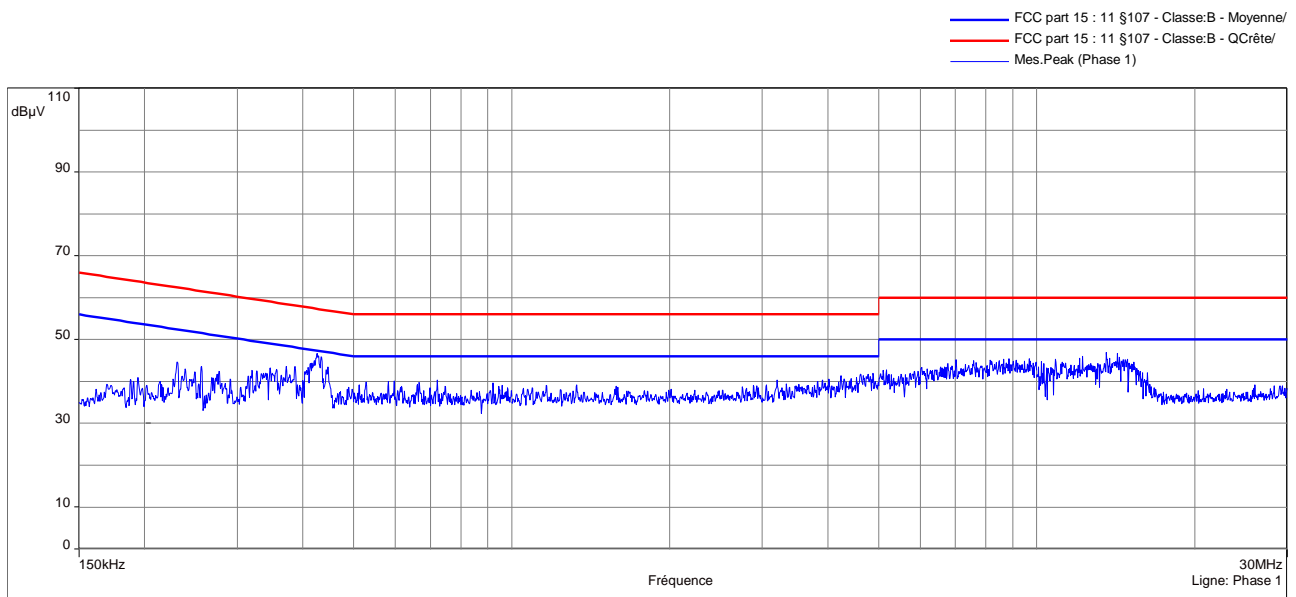


The measurement is first realized with peak detector with NFC antenna replaced by a 50-ohm load

Curve N° 3: average measurement on the neutral, for the frequency range:



Curve N° 4: average measurement on the line, for the frequency range:



The highest frequencies are then analyzed with Quasi-peak detector and Average detector except the frequencies around 13.56MHz which have been measured in table 3 and 4 with NFC antenna replaced by a 50-ohm load.

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

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0.154	47.31	65.8	18.49
0.418	37.42	57.5	20.08
4.902	33.31	56.0	22.69
7.625	37.24	60.0	22.76
7.927	37.29	60.0	22.71
8.490	38.02	60.0	21.98
9.095	38.35	60.0	21.65
9.588	38.51	60.0	21.49
12.050	42.40	60.0	17.60
12.974	43.49	60.0	16.51
13.076	44.42	60.0	15.58
15.289	45.27	60.0	14.73

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0.154	37.75	55.8	18.05
0.418	31.91	47.5	15.59
4.902	26.18	46.0	19.82
7.625	30.26	50.0	19.74
7.927	30.48	50.0	19.52
8.490	31.59	50.0	18.41
9.095	32.04	50.0	17.96
9.588	32.32	50.0	17.68
12.050	36.50	50.0	13.50
12.974	37.66	50.0	12.34
13.076	37.75	50.0	12.25
15.289	39.48	50.0	10.52

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

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0.157	46.31	65.6	19.29
0.822	29.05	56.0	26.95
3.414	32.62	56.0	23.38
4.001	35.59	56.0	20.41
4.675	37.55	56.0	18.45
5.623	39.20	60.0	20.80
6.182	40.22	60.0	19.78
7.290	41.34	60.0	18.66
7.988	41.61	60.0	18.39
8.737	42.28	60.0	17.72
10.148	42.69	60.0	17.31
15.577	48.47	60.0	11.53

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0.157	35.45	55.6	20.15
0.822	28.97	46.0	17.03
3.414	25.92	46.0	20.08
4.001	28.54	46.0	17.46
4.675	29.77	46.0	16.23
5.623	31.51	50.0	18.49
6.182	32.49	50.0	17.51
7.290	33.69	50.0	16.31
7.988	34.11	50.0	15.89
8.737	34.85	50.0	15.15
10.148	35.84	50.0	14.16
15.577	42.15	50.0	7.85

Table N° 3: measurement on the Neutral, for the frequency range:

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0.291	29.74	60.5	30.76
0.341	30.50	59.2	28.70
0.432	32.59	57.2	24.61
0.845	19.18	56.0	36.82
2.113	18.12	56.0	37.88
13.044	29.57	60.0	30.43
13.562	42.53	60.0	17.47
14.510	32.34	60.0	27.66
14.932	30.79	60.0	29.21

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0.291	28.59	50.5	21.91
0.341	28.30	49.2	20.90
0.432	28.24	47.2	18.96
0.845	27.61	46.0	18.39
2.113	17.92	46.0	28.08
13.044	19.27	50.0	30.73
13.562	42.13	50.0	7.87
14.510	19.88	50.0	30.12
14.932	19.84	50.0	30.16

Table N° 4: measurement on the Line, for the frequency range:

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0.347	34.87	59.0	24.13
0.426	39.46	57.3	17.84
0.447	33.47	56.9	23.43
0.597	29.23	56.0	26.77
0.721	26.94	56.0	29.06
3.202	26.60	56.0	29.40
4.879	28.73	56.0	27.27
6.770	31.79	60.0	28.21
8.216	32.89	60.0	27.11
8.855	33.45	60.0	26.55
9.471	33.42	60.0	26.58
10.316	33.58	60.0	26.42
11.192	33.96	60.0	26.04
12.068	33.42	60.0	26.58
13.054	33.78	60.0	26.22
13.560	43.55	60.0	16.45
13.766	35.11	60.0	24.89
14.616	35.60	60.0	24.40
15.001	35.13	60.0	24.87
15.223	34.37	60.0	25.63

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0.347	28.83	49.0	20.17
0.426	28.72	47.3	18.58
0.447	28.29	46.9	18.61
0.597	28.03	46.0	17.97
0.721	27.99	46.0	18.01
3.202	18.46	46.0	27.54
4.879	18.73	46.0	27.27
6.770	19.11	50.0	30.89
8.216	19.43	50.0	30.57
8.855	19.43	50.0	30.57
9.471	19.56	50.0	30.44
10.316	19.64	50.0	30.36
11.192	19.71	50.0	30.29
12.068	19.71	50.0	30.29
13.054	19.71	50.0	30.29
13.560	42.94	50.0	7.06
13.766	20.09	50.0	29.91
14.616	20.21	50.0	29.79
15.001	28.50	50.0	21.50
15.223	20.02	50.0	29.98

Test conclusion:

RESPECTED STANDARD

9. OCCUPIED BANDWIDTH

Temperature (°C) : 23.1 Humidity (%HR): 46 Date : October 19, 2022
 Technician : S. LOUIS

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:

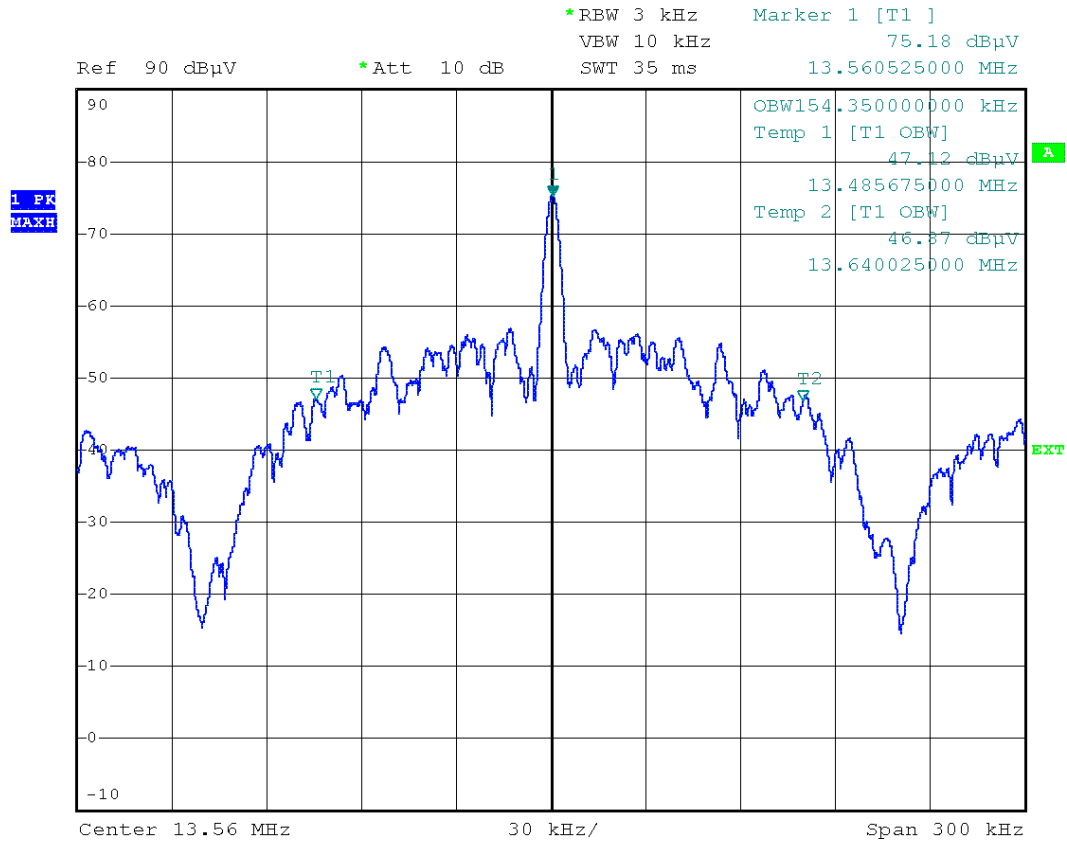
The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

We used for power source the internal battery of the equipment and we noted:
 Voltage at the beginning of test (Vdc): 7.73
 Voltage at the end of test (Vdc): 7.57
 Percentage of voltage drop during the test (%): 2.07

Results:

Sample N° 1

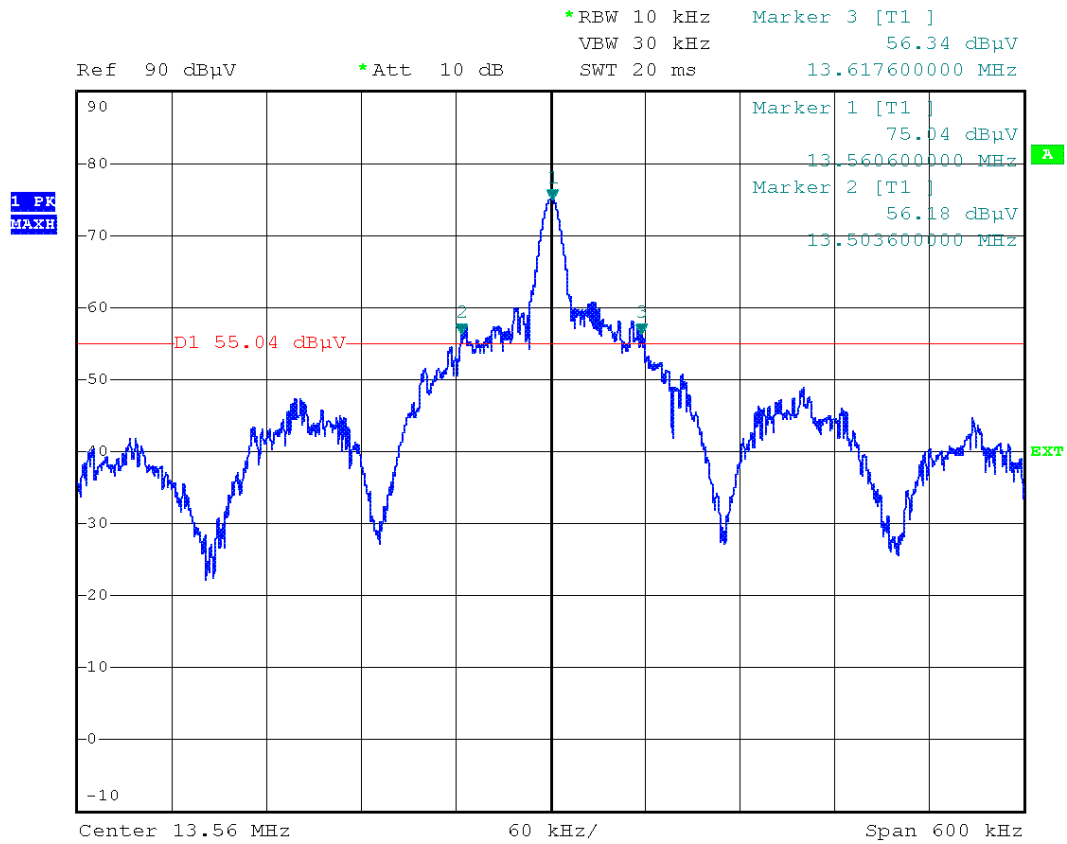
99% bandwidth – Channel 13.56 MHz



Limit:

Measure realized for reporting only

20dB bandwidth – Channel 13.56 MHz



Limit:

Measure realized for reporting only

10. BAND EDGE

Temperature (°C) : 23.1

Humidity (%HR): 46

Date : October 19, 2022

Technician : S. LOUIS

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 continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Measure realized in charging mode and repeated with the battery only.

Battery Mode:

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (Vdc): 7.73

Voltage at the end of test (Vdc): 7.57

Percentage of voltage drop during the test (%): 2.07

Charging mode:

Power source: 120 Vac by an external power supply

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

Results:

Lower Band Edge: From 13.090 MHz to 13.110 MHz

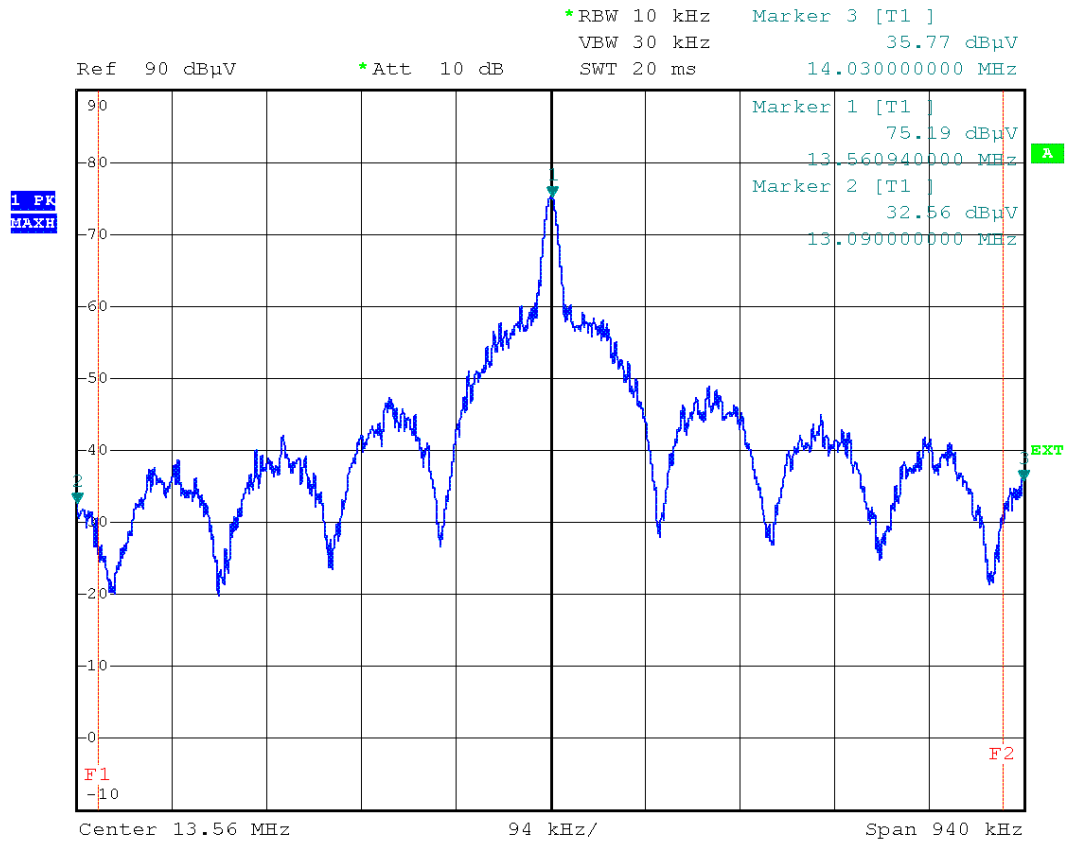
Upper Band Edge: From 14.010 MHz to 14.030 MHz

Sample N° 1:

Battery Mode:

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBµV/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
13.56	52.84	Peak	13.090	42.63	10.21	48.63	38.42
13.56	52.84	Peak	14.030	39.42	13.42	48.63	35.21

(1) Marker-Delta method

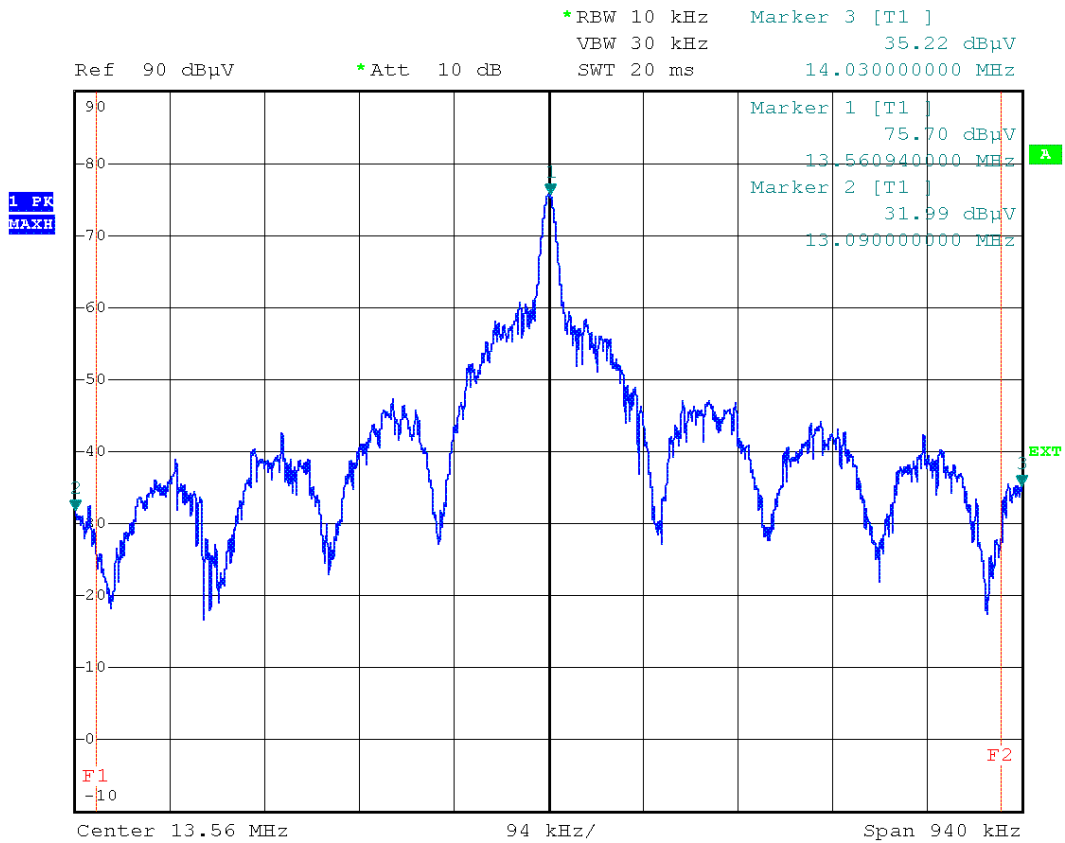


Sample N° 1:

Charging mode:

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBμV/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
13.56	61.55	Peak	13.090	43.71	17.84	48.63	30.79
13.56	61.55	Peak	14.030	40.48	21.07	48.63	27.56

(1) Marker-Delta method



Test conclusion:

RESPECTED STANDARD

11. OPERATION WITHIN THE BAND 13.110 – 14.010 MHZ**Temperature (°C) :** 21.6 / 24.7**Humidity (%HR):** 48 / 49**Date :** October 12, 2022 and
October 13, 2022**Technician :** S. LOUIS**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 continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Charging mode:

Power source: 120 Vac by an external power supply

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

Battery mode:

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (Vdc): 7.4Vdc

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

Results:

Sample N° 1:

Carrier field strength

Measure realized in charging mode and repeated with the battery only

Charging mode

	Field strength (dBμV/m) at frequency: 13.56 MHz
Normal test conditions measure at 10 m	61.55
Normal test conditions correlated at 30 m	42.47
Limits at 30m (dBμV/m)	84
Margin (dB)	41.53

Polarization of test antenna: perpendicular at the equipment at 0 degree.
Position of equipment: upright (azimuth: 102°)

Battery mode

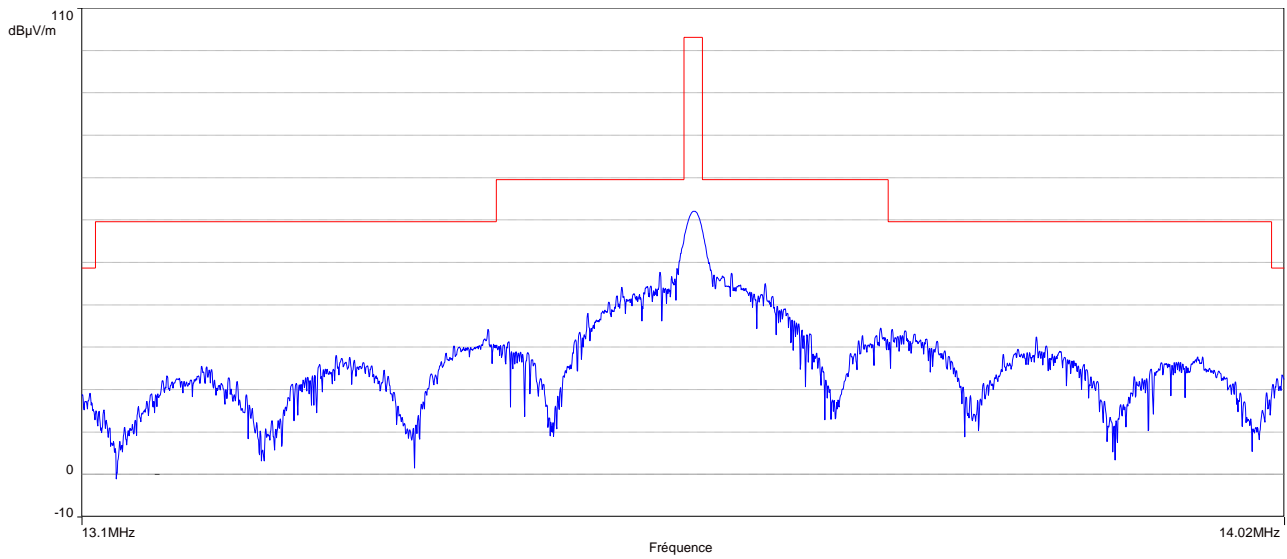
	Field strength (dBμV/m) at frequency: 13.56 MHz
Normal test conditions measure at 10 m	52.84
Normal test conditions correlated at 30 m	33.76
Limits at 30m (dBμV/m)	84
Margin (dB)	50.24

Polarization of test antenna: perpendicular at the equipment at 0 degree.
Position of equipment: upright (azimuth: 0°)

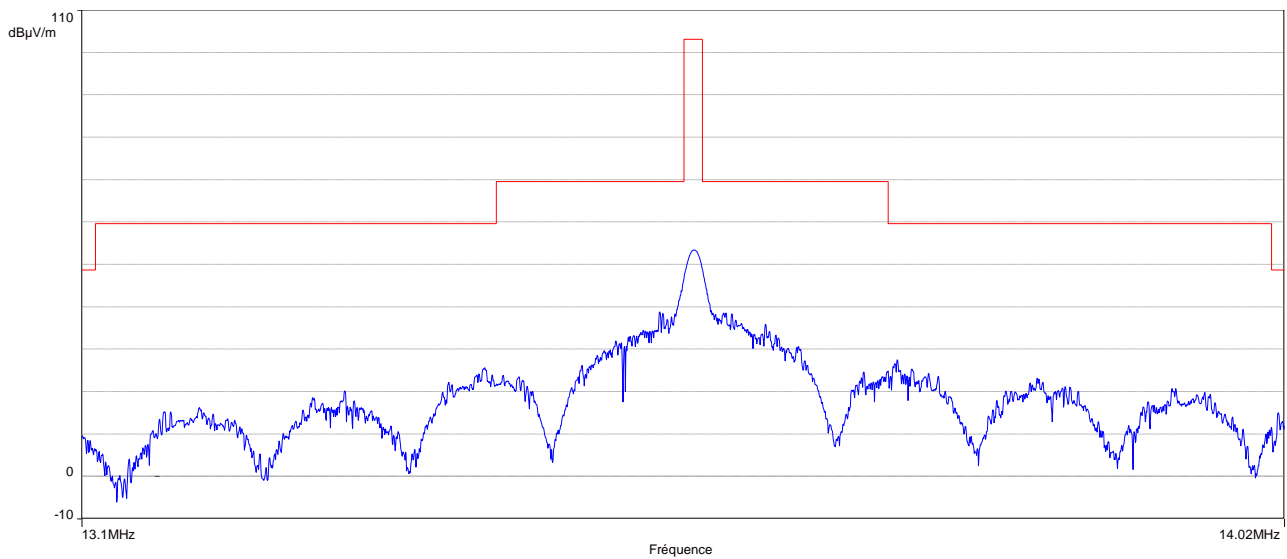
Field strength within the band 13.110-14.010 MHz

Measure realized in charging mode and repeated with the battery only

Charging mode



Battery mode



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)	Frequency measured (MHz)	Frequency drift (kHz)	Frequency measured (MHz)	Frequency drift (kHz)	Frequency measured (MHz)	Frequency drift (kHz)	
50	13.560472	0.472	13.560462	0.462	13.560462	0.462	13.560460	0.460	± 1.356 (a)
40	13.560484	0.484	13.560476	0.476	13.560476	0.476	13.560476	0.476	
30	13.560516	0.516	13.560508	0.508	13.560508	0.508	13.560508	0.508	
20	13.560550	0.550	13.560542	0.542	13.560542	0.542	13.560542	0.542	
10	13.560579	0.579	13.560576	0.576	13.560576	0.576	13.560571	0.571	
0	13.560592	0.592	13.560592	0.592	13.560588	0.588	13.560588	0.588	
-10	13.560588	0.588	13.560592	0.592	13.560592	0.592	13.560592	0.592	
-20	13.560576	0.576	13.560579	0.579	13.560576	0.576	13.560571	0.571	

(a) ±0.01% of the operating frequency

Results for power supply variation

Charging mode

Realized at +20 °C

Power supply (Vac)	Frequency measured (MHz)	Frequency drift (kHz)	Drift limit (kHz)
102	13.560542	0.542	± 1.356 (b)
120	13.560542	0.542	
138	13.560542	0.542	

(b) ±0.01% of the operating frequency

Battery mode

Realized at +20 °C

Power supply (Vdc)	Frequency measured (MHz)	Frequency drift (kHz)	Drift limit (kHz)
6.29	13.560537	0.537	± 1.356 (c)
7.4	13.560537	0.537	

(b) ±0.01% of the operating frequency

Test conclusion:

RESPECTED STANDARD

12. FIELD STRENGTH OUTSIDE THE BAND 13.110-14.01 MHZ**Temperature (°C)** : 19.4 to 24.7**Humidity (%HR)**: 36 to 49**Date** : October 12, 2022 and
October 18, 2022**Technician** : S. LOUIS**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.

Results below have been performed only with AC/DC Adapter which is the more critical configuration.

Charging mode:

Power source: 120 Vac by an external power supply

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

Battery mode:

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (Vdc): 7.4Vdc

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

Results:

Sample N° 1:

Below 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	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	QP	100	0	10	Perpendicular	12.47	-6.61	29.5	36.11

Above 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Position	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	230	76	120	1	V	17.62	28.08	40	11.92
54.24	QP	224	82	120	1	V	17.27	27.73	40	12.27
67.8	QP	230	155	120	2	V	16.23	26.69	40	13.31

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

Applicable limits:

- for 9 kHz \leq F \leq 490 kHz : 2400/F(kHz) at 300 meters
- for 490 kHz < F \leq 1.705 MHz : 24000/F(kHz) at 30 meters
- for 1.705 MHz < F \leq 30 MHz : 29.5 dB μ V/m at 30 meters
- for 30 MHz < F \leq 88 MHz : 40 dB μ V/m at 3 meters
- for 88 MHz < F \leq 216 MHz : 43.5 dB μ V/m at 3 meters
- for 216 MHz < F \leq 960 MHz : 46 dB μ V/m at 3 meters
- Above 960 MHz : 54 dB μ 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 ESPC	Rohde & Schwarz	5275
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
LISN 1600	Thurbly Thandar Instruments	8719
High-pass filter EZ-25	Rohde & Schwarz	8635
Absorber sheath current	Emitech	9489
Cable N-5m RG214	GYL Technologies	8590
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14831
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
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Loop antenna 6502	EMCO	1406
N-1.5M Cable	SUCOFLEX	7279
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Software	RS Commander V1.6.4	//

Band edge

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Loop antenna 6502	EMCO	1406
N-1.5M Cable	SUCOFLEX	7279
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Software	RS Commander V1.6.4	//

Operation within 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 ESPC	Rohde & Schwarz	5275
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Loop antenna 6502	EMCO	1406
Climats EXCAL ² 1411-TA	CLIMATS	16059
Precision thermometer GMH 3710	GHM Greisinger	14716
N-1.5M Cable	SUCOFLEX	7279
N-2M Cable	Huber + Suhner	12911
N-5M Cable	SUCOFLEX	15882
N-1.5M Cable	SUCOFLEX	9398
Power source 1251RP	California instruments	8508
Power source FTN 2515B	Fontaine	8775
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Meteo station BAR 206	Oregon Scientific	14475
Software	BAT-EMC V3.18.0.26	0000

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 FSV40	Rohde & Schwarz	15666
Loop antenna 6502	EMCO	1406
Biconical antenna VHA 9103	Schwarzbeck	8528
Biconical antenna 3110	Emco	7240
Log periodic antenna HL223	Rohde & Schwarz	7190
Low-noise amplifier ZFL-1000LN	Mini-circuit	10730
N-1.5M Cable	SUCOFLEX	7279
N-2M Cable	Huber + Suhner	12911
N-5M Cable	SUCOFLEX	15882
N-1.5M Cable	SUCOFLEX	9398
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Meteo station BAR 206	Oregon Scientific	14475
Software	BAT-EMC V3.18.0.26	0000
Software	Champ libre Juigné. V3.5	8864