RR051-14-106673-6-A Ed. 0

Certification Radio test report
Limited single modular

According to the standard:
CFR47 FCC part 15

Equipment under test:
RFID MODULE HF-ELYCTIS integrated in Biometric/RFID Handheld Control Terminal WA4e-ID-WG-OCR310e

FCC ID:
XGKHFELYWAP3

Company:
COPPERNIC

DISTRIBUTION: Mr Porte **(Company: COPPERNIC)**

Number of pages: 39 with 7 appendixes

Ed.	Date	Modified pages	Written by Name	Written by Visa	Technical Verification and Quality Approval Name	Technical Verification and Quality Approval Visa
0	28/01/2015	Creation	S. LOUIS	SL	DUMESNIL M.	

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.

DESIGNATION OF PRODUCT: **RFID MODULE HF-ELYCTIS**

Installed in HOSTS: Biometric/RFID Handheld Control Terminal WA4e-ID-WG-OCR310e

Serial number (S/N): WPQACE240079C1 (host)

Reference / model (P/N): 1073102

Software version: CpcCertifWAP4

MANUFACTURER: —

COMPANY SUBMITTING THE PRODUCT:

Company: COPPERNIC

Address: 185, avenue Archimède
Les fontaines de la Duranne
13857 Aix-en-Provence
Cedex 3
France

Responsible: Mr PORTE

DATES OF TEST: From 15 January 2015 to 30 January 2015

TESTING LOCATION: EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE
EMITECH ANGERS open area test site in JUIGNE SUR LOIRE (49) FRANCE
21 rue de la Fuye
49610 Juigne sur Loire
France
FCC 2.948 Listed Site Registration Number: 90469

TESTED BY: S. LOUIS

CONTENTS

1. INTRODUCTION

This report presents the results of radio test carried out on the **RFID Module HF-ELYCTIS installed in WAP4 e-ID-WG-OCR310e**, in accordance with normative reference (refer clause 3).

2. PRODUCT DESCRIPTION

EUT is portable and handheld authentication terminal, with the following host:

- Sample 1: Version WA4eID-WG-OCR310e (Elyctis, TECTC1, OCR310E, WIFI/Bluetooth/3G)

For all tests, only the RFID MODULE HF-ELYCTIS is activated.

The power source is an external AC/DC adapter provided by the applicant referenced PSA15R-050P regulated at the voltage of 120VAC / 60Hz.

The EUT can be supplied with a 3.7Vdc Lithium –Ion battery TEKLOGIX model WA3010.

All tests described here after have been performed with the AC/DC adapter.

Standard position: handheld. Tested in vertical position, according to the applicant request.

RFID Module description:

ITU Emission code:	—
Class:	B
Utilization:	Biometric/RFID Handheld Control Terminals
Antenna type and gain:	Integral antenna, gain unknown
Operating frequency range:	From 13.110MHz to 14.010MHz
Number of channels:	1
Channel spacing:	Not concerned
Frequency generation:	Quartz
Power source:	Lithium-ion battery 3.7Vdc

Power level, frequency range and channels characteristics are not user adjustable.
The details pictures of the product 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 (2014)	Radio Frequency Devices
ANSI C63.4	2014 Methods of measurement of Radio-Noise Emissions from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C63.10	2013 Testing Unlicensed Wireless Devices.

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

Subpart A –General
- Paragraph 19: labelling requirements
- Paragraph 21: information to user

Subpart B –Unintentional Radiators
- Paragraph 105: information to the user
- Paragraph 107: Conducted limits
- Paragraph 109: Radiated emission limits
- Paragraph 111: Antenna power conduction limits for receivers

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 212: Modular transmitter
- Paragraph 215: Additional provisions to the general radiated emission limitations
- Paragraph 225: Operation within the band 13.110-14.010 MHz

5. TEST EQUIPMENT CALIBRATION DATES

Equipment	Model	Type	Last verification	Next verification	Validity
0000	BAT-EMC V3.6.0.32	Software	/	/	/
1211	HP 8901B	Modulation analyzer	03/05/2013	03/05/2015	03/07/2015
1406	EMCO 6502	Loop antenna	26/06/2013	26/03/2015	26/05/2015
1922	Microwave DB C020180F-4B1	Low-noise amplifier	20/08/2014	20/08/2015	20/10/2015
1939	IMC WR42	Antenna	20/04/2012	20/04/2016	20/06/2016
1940	IMC WR42	Antenna	20/04/2012	20/04/2016	20/06/2016
2593	MPC B25250	Climatic chamber	22/10/2014	22/10/2016	22/12/2016
3036	ALC Microwave ALN02-0102	Low-noise amplifier	14/05/2014	14/05/2015	14/07/2015
4088	R&S FSP40	Spectrum Analyzer	22/08/2013	22/08/2015	22/10/2015
4353	ATM WR28	Antenna	20/04/2012	20/04/2016	20/06/2016
4354	ALC ALS2640-30-10	Low-noise amplifier	21/07/2014	21/07/2015	21/09/2015
6609	Hewlett Packard HPM11630	High Pass Filter	24/02/2014	24/02/2016	24/04/2016
7001	R&S FSBS	Spectrum Analyzer	04/12/2012	04/12/2014	04/02/2015
8508	California instruments 1251RP	Power source	22/08/2014	22/08/2015	22/10/2015
8511	HP 8447D	Low noise preamplifier	20/08/2014	20/08/2015	20/10/2015
8524	HP 8591EM	Test receiver	30/07/2013	30/07/2015	30/09/2015
8526	Schwarzbeck VHBB 9124	Biconical antenna	12/06/2012	12/06/2016	12/08/2016
8530	CHASE CBL6112A	Bi-log antenna	05/03/2013	05/03/2017	05/05/2017
8535	EMCO 3115	Antenna	29/10/2012	29/10/2016	29/12/2016
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	12/06/2012	12/06/2016	12/08/2016
8593	SIDT Cage 2	Anechoic chamber	/	/	/
8635	R&S EZ-25	High-pass filter	05/08/2014	05/08/2016	05/10/2016
8671	HUGER	Meteo station	04/09/2014	04/09/2016	04/11/2016
8675	AOIP MN5102B	Multimeter	15/01/2013	15/01/2015	15/03/2015
8707	R&S ESI7	Test receiver	11/12/2014	11/12/2016	11/02/2017
8719	Thurbly Thandar Instruments 1600	LISN	23/06/2014	23/06/2016	23/08/2016
8732	Emitech	OATS	23/08/2013	23/08/2016	23/10/2016
8749	La Crosse Technology WS-9232	Meteo station	03/09/2014	03/09/2016	03/11/2016
8750	La Crosse Technology WS-9232	Meteo station	03/09/2014	03/09/2016	03/11/2016
8864	Champ libre Juigné. V3.4	Software	/	/	/
8893	Emitech	Outside room Hors cage	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
10651	Absorber sheath current	Emitech	17/10/2013	17/10/2015	17/12/2015

6. TESTS RESULTS SUMMARY

6.1 general (subpart A)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.19	LABELLING REQUIREMENTS				X	*See certification documents*
FCC Part 15.21	INFORMATION TO USER				X	*See certification documents*

NAp: Not Applicable NAs: Not Asked

6.2 unintentional radiator (subpart B)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.105	INFORMATION TO THE USER				X	*See certification documents*
FCC Part 15.107	CONDUCTED LIMITS	X				*Class B*
FCC Part 15.109	RADIATED EMISSION LIMITS	X				*Class B*
FCC Part 15.111	ANTENNA POWER CONDUCTED LIMITS FOR RECEIVER			X		

NAp: Not Applicable NAs: Not Asked

6.3 intentional radiator (subpart C)

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 15.212	MODULAR TRANSMITTERS	X				*Note 3*
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 4*
	(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 / dedicated antenna. Professionally installed equipment.

Note 2: See FCC part 15.225 (d).

Note 3: Limited single modular transmitter
The host devices of the certified modules shall be properly labeled to identify the module(s) within.

Note 4: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

7. MEASUREMENT OF THE CONDUCTED DISTURBANCES

Standard: FCC Part 15

Test procedure: Paragraph 15.107

Limits: Class B

Software used: BAT-EMC V3.6.0.32

Test set up:

The EUT is isolated and placed on a wooden table, 0.8 m over a 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 / Average

Bandwidth: 9 KHz / 10 KHz

Equipment under test operating condition:

The equipment is blocked in standby / reception mode.

Results:

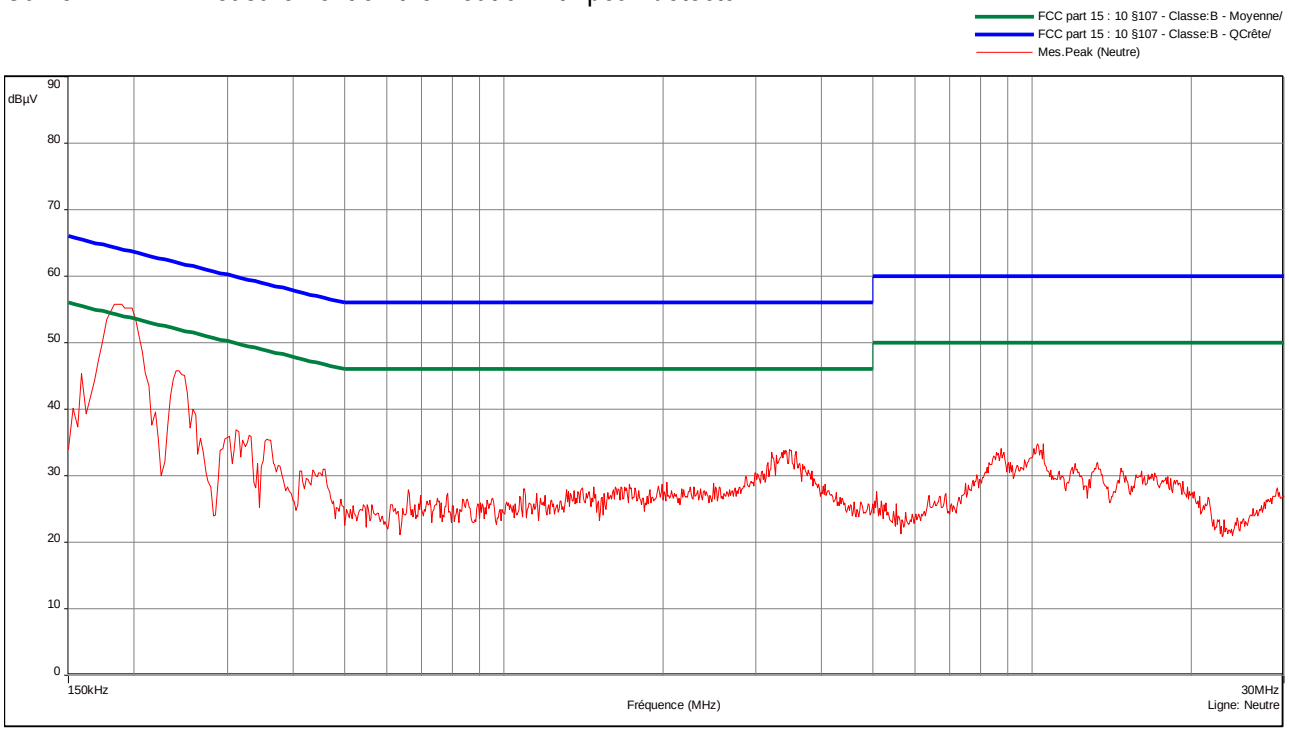
Ambient temperature (°C):	21
Relative humidity (%):	27

Sample N° 1: Version WA4eID-WG-OCR310e

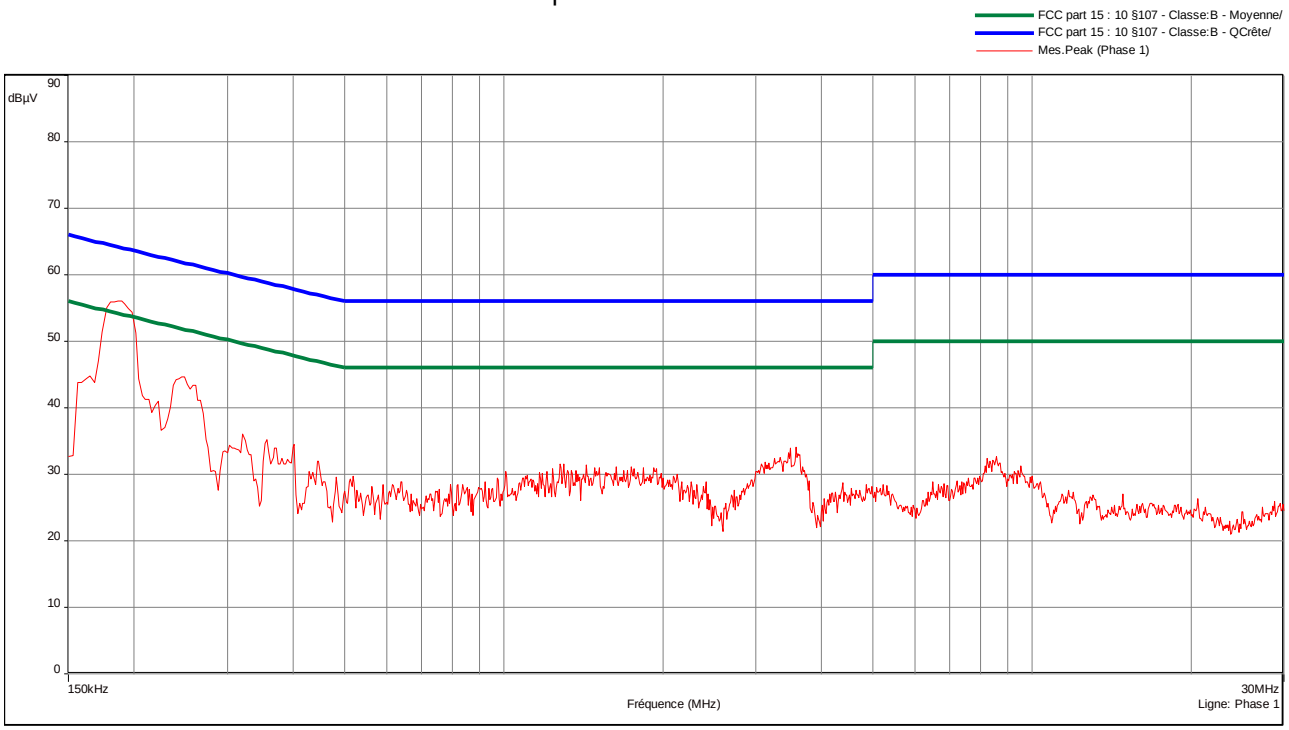
Measurement on the mains power supply – Standby / Reception mode:

The measurement is first realized with Peak detector.

Curve N° 7: measurement on the Neutral with peak detector

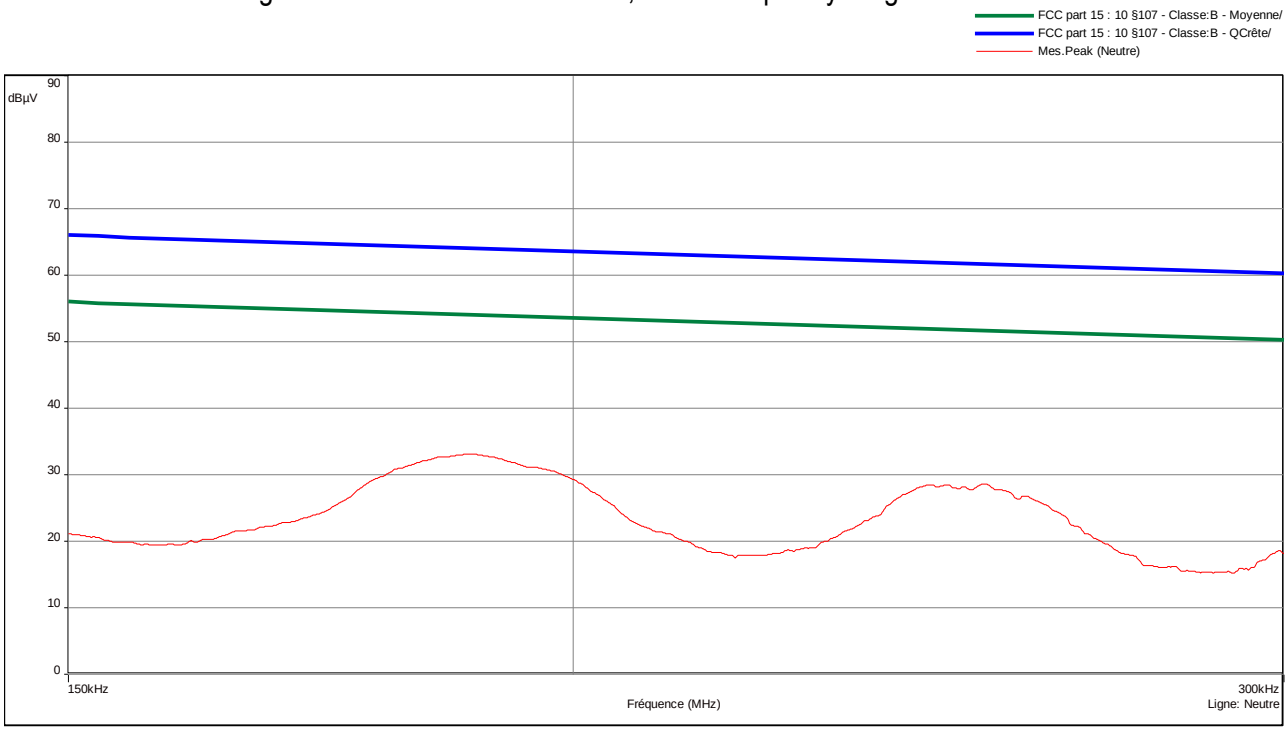


Curve N° 8: measurement on the Line with peak detector

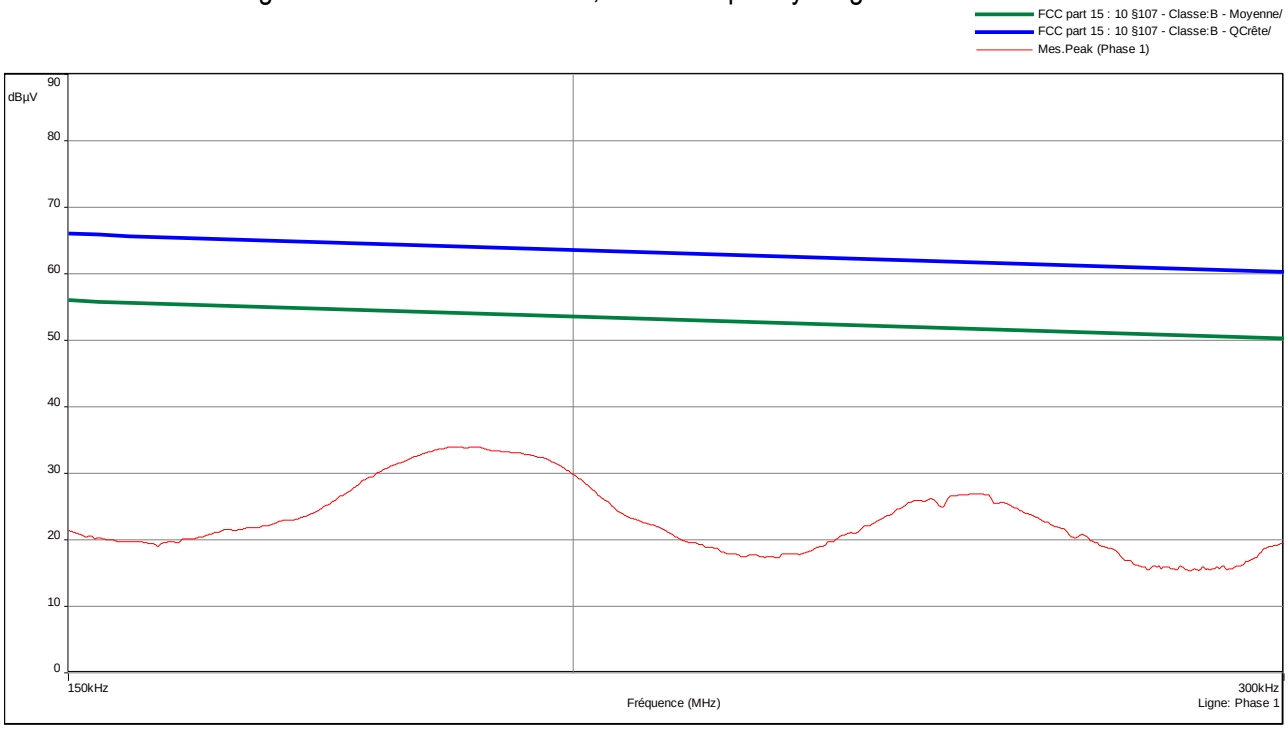


The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

Curve N° 9: average measurement on the Neutral, for the frequency range: 150 KHz – 300 KHz



Curve N° 10: average measurement on the Line, for the frequency range: 150 KHz – 300 KHz



Test conclusion:

RESPECTED STANDARD

8. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 109

Limit class: Class B

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, 1.5m from a ground plane.

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

See photos in appendix 2.

Frequency range: From 30 MHz to 30GHz (5th harmonic of the highest frequency used - 5.8GHz)

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

Bandwidth: 120 kHz (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 is blocked in standby / reception mode.

Results:

Ambient temperature (°C): 20.7
Relative humidity (%): 29

Power source:
We used for power source an external AC/DC adapter provided by the applicant referenced PSA15R-050P regulated at the voltage of 120VAC.

Sample N° 1: Version WA4eID-WG-OCR310e

Not any spurious has been detected.

Applicable limits:	for 30 MHz ≤ F ≤ 88 MHz :	40 dBµV/m at 3 meters
	for 88 MHz < F ≤ 216 MHz :	43.5 dBµV/m at 3 meters
	for 216 MHz < F ≤ 960 MHz :	46 dBµV/m at 3 meters
	Above 960 MHz :	54 dBµV/m at 3 meters

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

Test conclusion:

RESPECTED STANDARD

9. CONDUCTED LIMITS

Standard: FCC Part 15

Test procedure: Paragraph 15.207

Test deviation: Copper tape around RFID reader to reduce the level of the carrier 13.56MHz

Software used: BAT-EMC V3.6.0.32

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 / Average

Bandwidth: 9 KHz / 10 KHz

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.

Results:

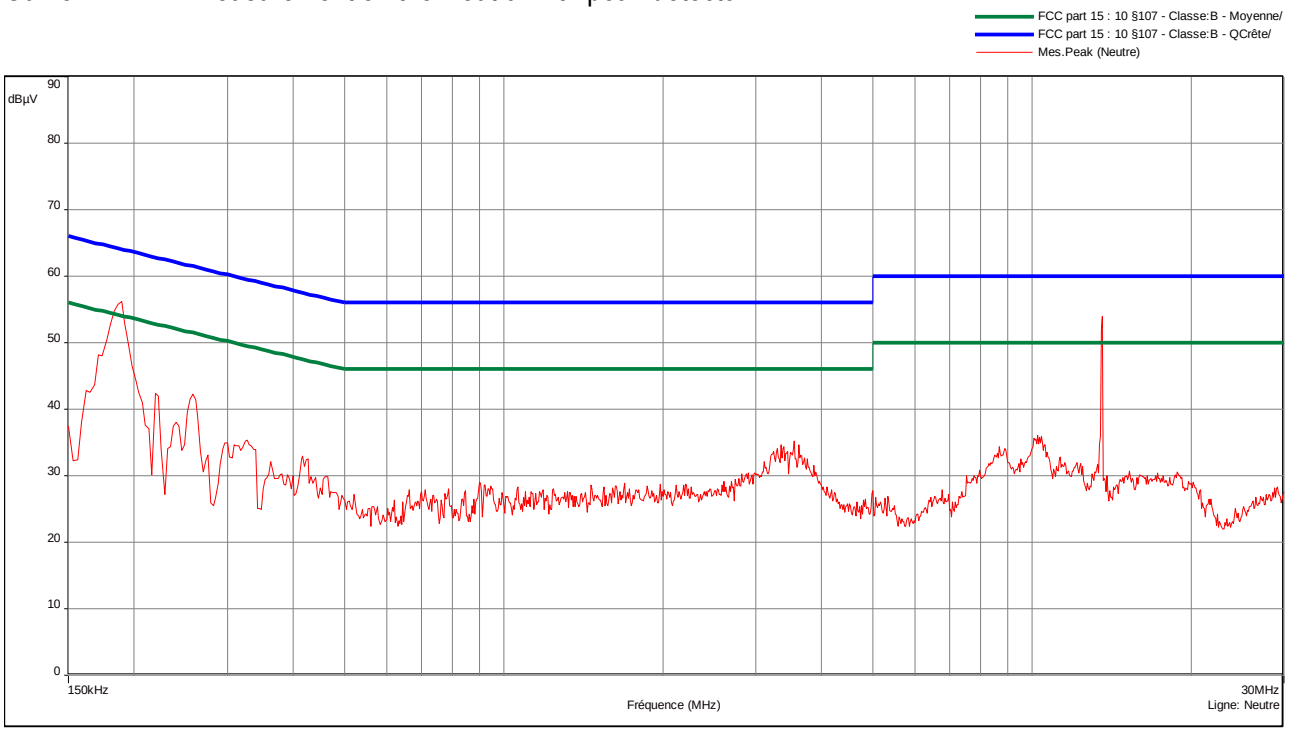
Ambient temperature (°C):	21
Relative humidity (%):	27

Sample N° 1: Version WA4eID-WG-OCR310e

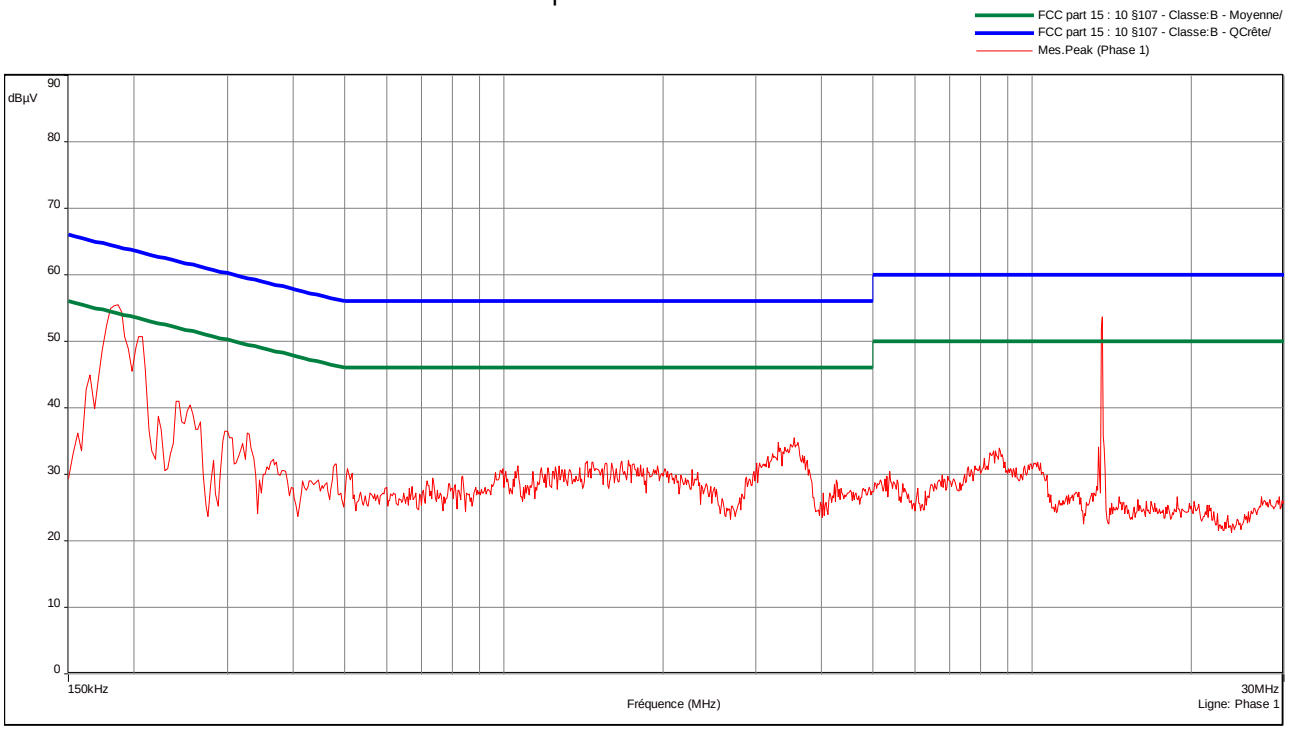
Measurement on the mains power supply – Transmission mode:

The measurement is first realized with Peak detector.

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

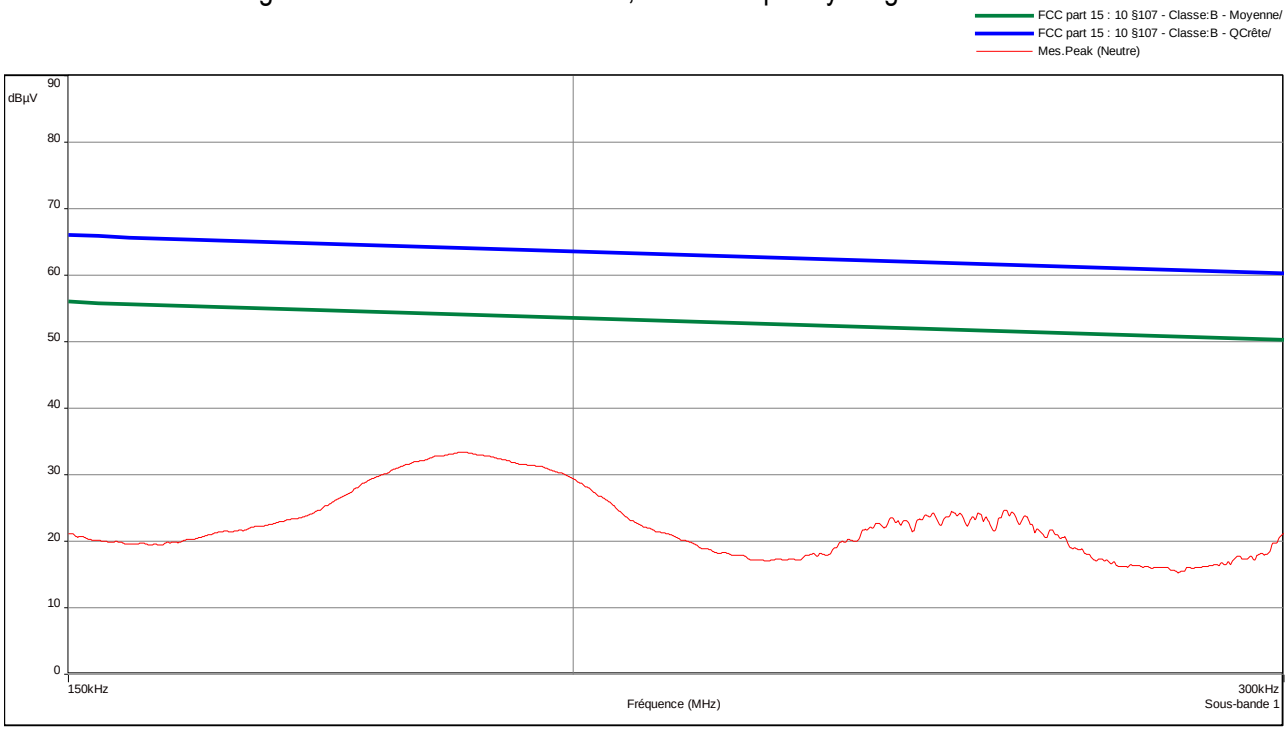


Curve N° 2: measurement on the Line with peak detector

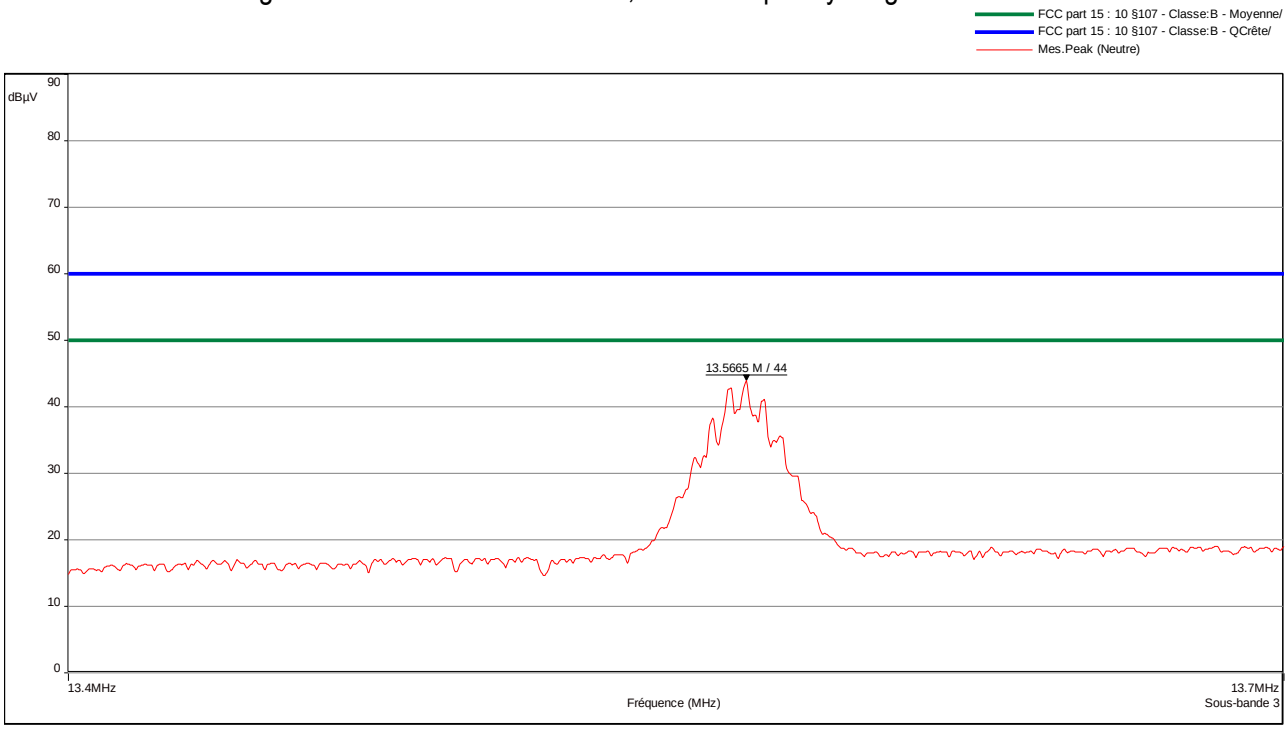


The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

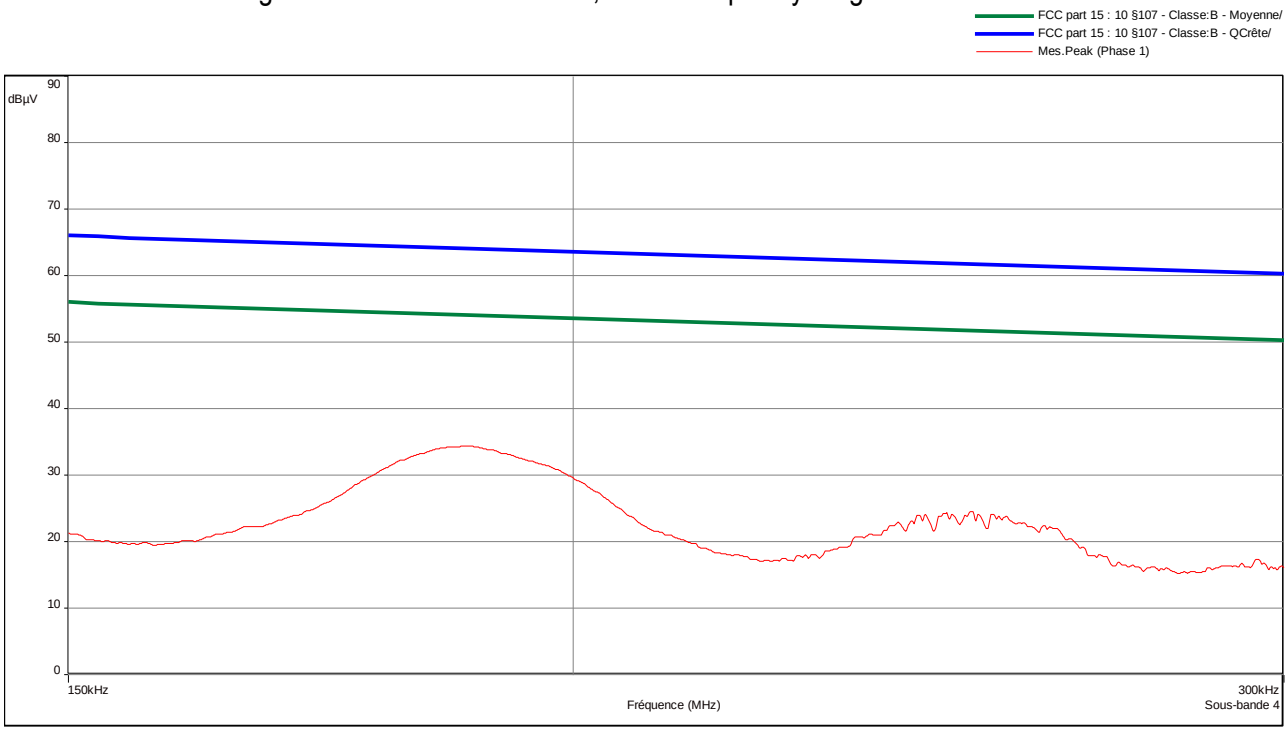
Curve N° 3: average measurement on the Neutral, for the frequency range: 150 KHz – 300 KHz



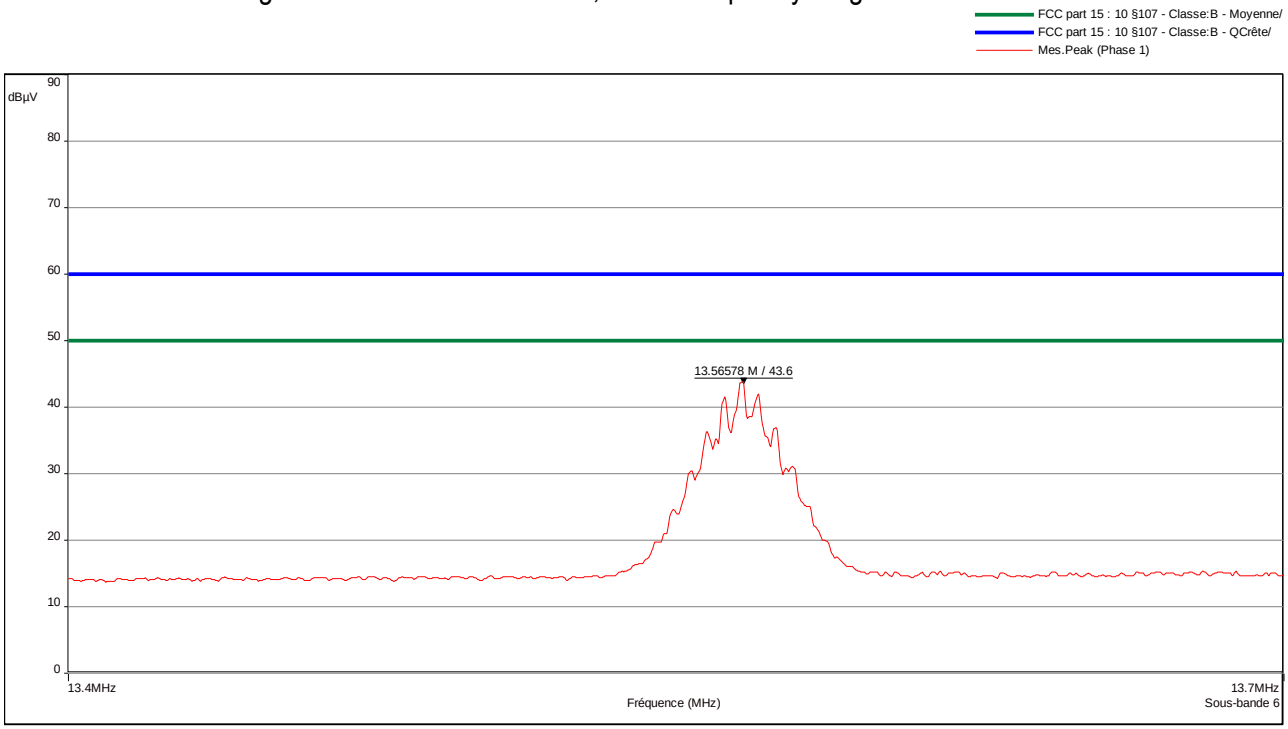
Curve N° 4: average measurement on the Neutral, for the frequency range: 13.4 MHz – 13.7 MHz



Curve N° 5: average measurement on the Line, for the frequency range: 150 KHz – 300 KHz



Curve N° 6: average measurement on the Line, for the frequency range: 13.4MHz – 13.7 MHz



Test conclusion:

RESPECTED STANDARD

10. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS

Standard: FCC Part 15

Test procedure: Paragraph 15.215

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.

Results:

Ambient temperature (°C): 20.8
Relative humidity (%): 33

Power source:
We used for power source an external AC/DC adapter provided by the applicant referenced PSA15R-050P regulated at the voltage of 120VAC.

Lower Band Edge: band from 13.09 MHz to 13.11 MHz
Upper Band Edge: band from 14.01 MHz to 14.03 MHz

Sample N° 1: Version WA4eID-WG-OCR310e

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBµV/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out-of-Band Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
13.560	75.4	Peak	13.090	-35.56	39.84	48.63	8.79
13.560	75.4	Peak	14.017	-41.79	33.61	48.63	15.02

**Marker-Delta method*

20 dB bandwidth curves are given in appendix 5; band-edge curves are given in appendix 6.

Test conclusion:

RESPECTED STANDARD

11. OPERATION WITHIN THE BAND 13.110 – 14.010 MHz

Standard: FCC Part 15

Test procedure: paragraph 15.225 (a), (b), (c), (e)

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.

See photos in annex 2

The frequency tolerance measure is realized in near-field.

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

Bandwidth: 9 kHz (150 kHz < F < 30MHz)

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.

Results:

Ambient temperature (°C): 22.3
Relative humidity (%): 47

Power source:
We used for power source an external AC/DC adapter provided by the applicant referenced PSA15R-050P regulated at the voltage of 120VAC / 60Hz.

Sample N° 1: Version WA4eID-WG-OCR310e

Carrier field strength

	Field strength (dBµV/m) at frequency: MHz extrapolated at 3 meters
Normal test conditions	75.4
Limits (dBµV/m)	124
Margin (dB)	48.6

Polarization of test antenna: perpendicular (height: 100 cm)
Position of equipment: Refer photos (annex 2) (azimuth: 83 degrees)

Frequency stability

			Measured frequency difference (ppm)	Limits (ppm)
Normal test conditions	Temperature (°C): 20 Humidity (%):34	Minimal power source (V):102	-79.04	±100
		Maximal power source (V):138	-88.18	
Extreme test conditions	Minimal temperature (°C): -20	Nominal power source (V):120	-27.13	
	Maximal temperature (°C): +50	Nominal power source (V):120	-6.78	

Field strength within the band 13.110-14.010 MHz

See spectrum mask in annex 6

Test conclusion:

RESPECTED STANDARD

12. FIELD STRENGTH OUTSIDE THE BAND 13.110-14.010MHz

Standard: FCC Part 15

Test procedure: paragraph 209

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, 1.5m from a ground plane.

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

See photos in appendix 2.

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

Detection mode: Quasi-peak (F < 1 GHz) 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 (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 continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 21.2
Relative humidity (%): 44

Power source:
We used for power source an external AC/DC adapter provided by the applicant referenced PSA15R-050P regulated at the voltage of 120VAC.

Sample N° 1: Version WA4eID-WG-OCR310e

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Azimuth (degree)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical P: Perpendicular	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
27.12	QP	100	231	9	P	15.6	29.5	13.9
40.7	QP	100	66	120	V	39.2	40	0.8
54.24	QP	100	247	120	V	35.0	40	5.0
67.8	QP	213	89	120	V	38.9	40	1.1
81.36	QP	380	194	120	V	32.2	40	7.8
108.48	QP	100	145	120	V	32.6	43.5	10.9
122.04	QP	100	0	120	V	39.1	43.5	4.4
135.6	QP	100	307	120	V	43.0	43.5	0.5

Applicable limits: for 9 kHz ≤ F ≤ 490 kHz : 2400/F(kHz) at 300 meters
for 490 kHz < F ≤ 1.705 MHz : 24000/F(kHz) at 30 meters
for 1.705 MHz < F ≤ 30 MHz : 29.5 dBµV/m at 30 meters
for 30 MHz < F ≤ 88 MHz : 40 dBµV/m at 3 meters
for 88 MHz < F ≤ 216 MHz : 43.5 dBµV/m at 3 meters
for 216 MHz < F ≤ 960 MHz : 46 dBµV/m at 3 meters
Above 960 MHz : 54 dBµV/m at 3 meters

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

Test conclusion:

RESPECTED STANDARD
Test conclusion:

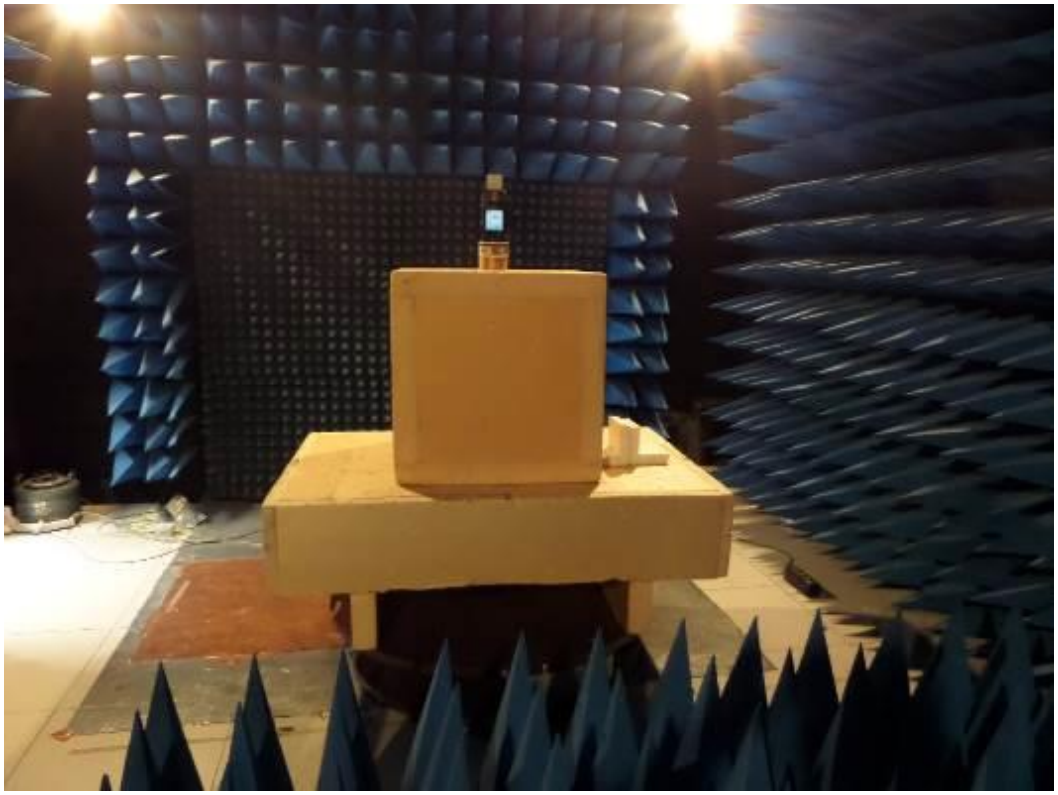
RESPECTED STANDARD

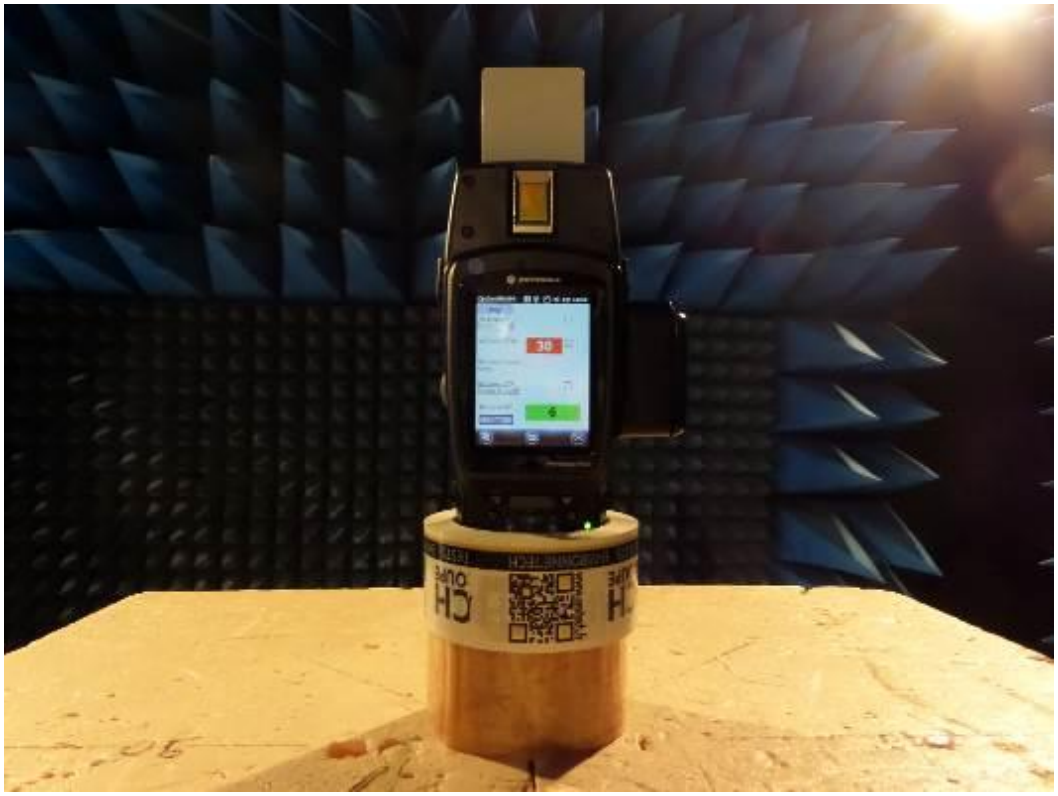
□□□ End of report, 7 appendixes to be forwarded □□□

APPENDIX 1: Photos of the equipment under test


MODEL 7528X
CONTAINS APPROVED RADIO MODULE
MODEL 21-148603-08
CONTAINS FCC ID: UZ7211486308
CONTAINS IC: 109AN-211486308
CE0682
N410
X17-15010

APPENDIX 2: Test set up





APPENDIX 3: Test equipment list

Measurement of the conducted disturbances

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver HP 8591EM	Hewlett Packard	8524
LISN 1600	Thurbly Thandar Instruments	8719
High-pass filter EZ25	R&S	8635
Absorber sheath current	Emitech	10651
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station	HUGER	8671
Software	BAT-EMC V3.6.0.32	0000

Radiated emission limits

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna VHBB 9124	Schwarzbeck	8526
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	EMCO	8535
Antenna WR42	IMC	1939
Antenna WR42	IMC	1940
Antenna WR28	ATM	4353
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Low-noise amplifier ALN02-0102	ALC Microwave	3036
Low-noise amplifier ALS2640-30-10	ALC	4354
High pass filter HPM11630	Hewlett Packard	6609
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Conducted limits

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver HP 8591EM	Hewlett Packard	8524
LISN 1600	Thurbly Thandar Instruments	8719
High-pass filter EZ25	R&S	8635
Absorber sheath current	Emitech	10651
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station	HUGER	8671
Software	BAT-EMC V3.6.0.32	0000

Additional provisions to the general radiated emission limitations

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	GPIBShot V2.4	-

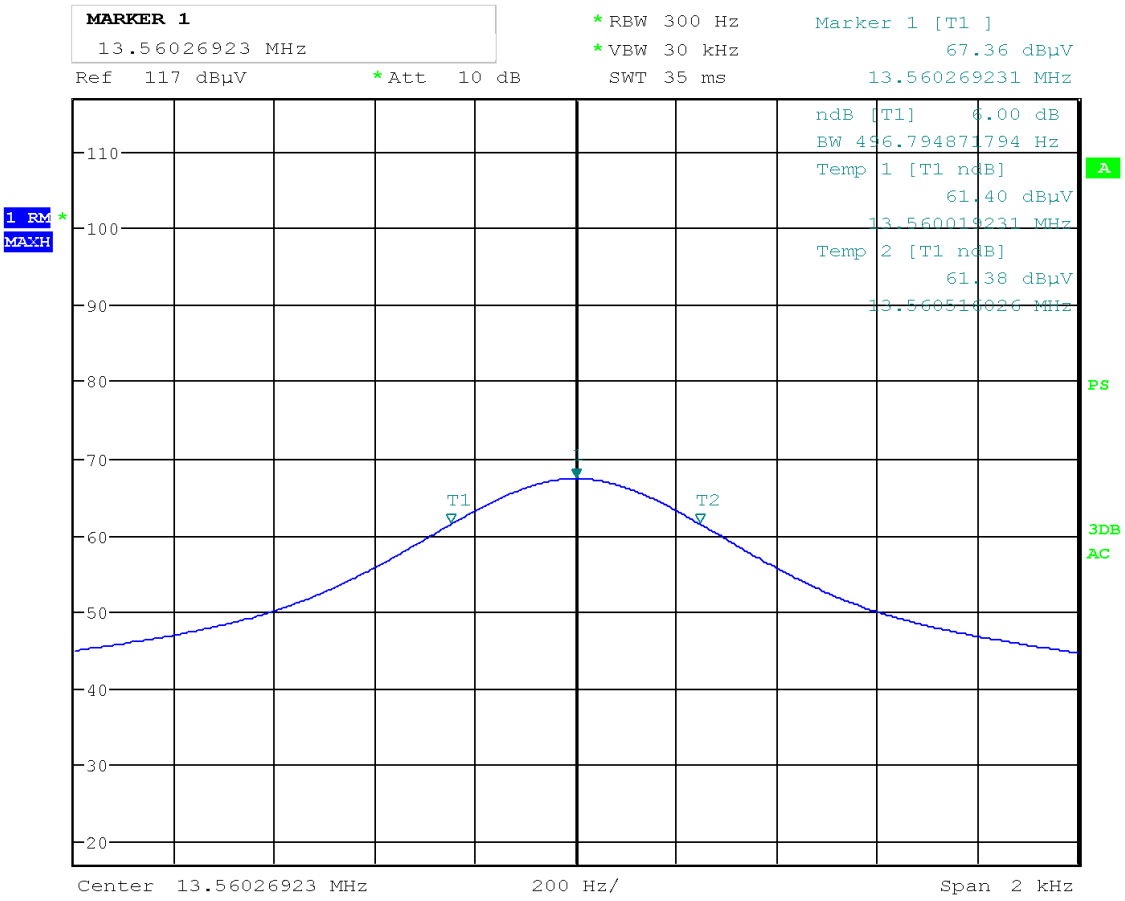
Operation within the band 13.110 – 14.010 MHz

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Modulation analyzer HP 8901B	Hewlett Packard	1211
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSBS	Rohde & Schwarz	7001
Loop antenna 6502	EMCO	1406
Climatic chamber B25250	MPC	2593
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8749
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000
Software	Champ libre Juigné. V3.4	8864

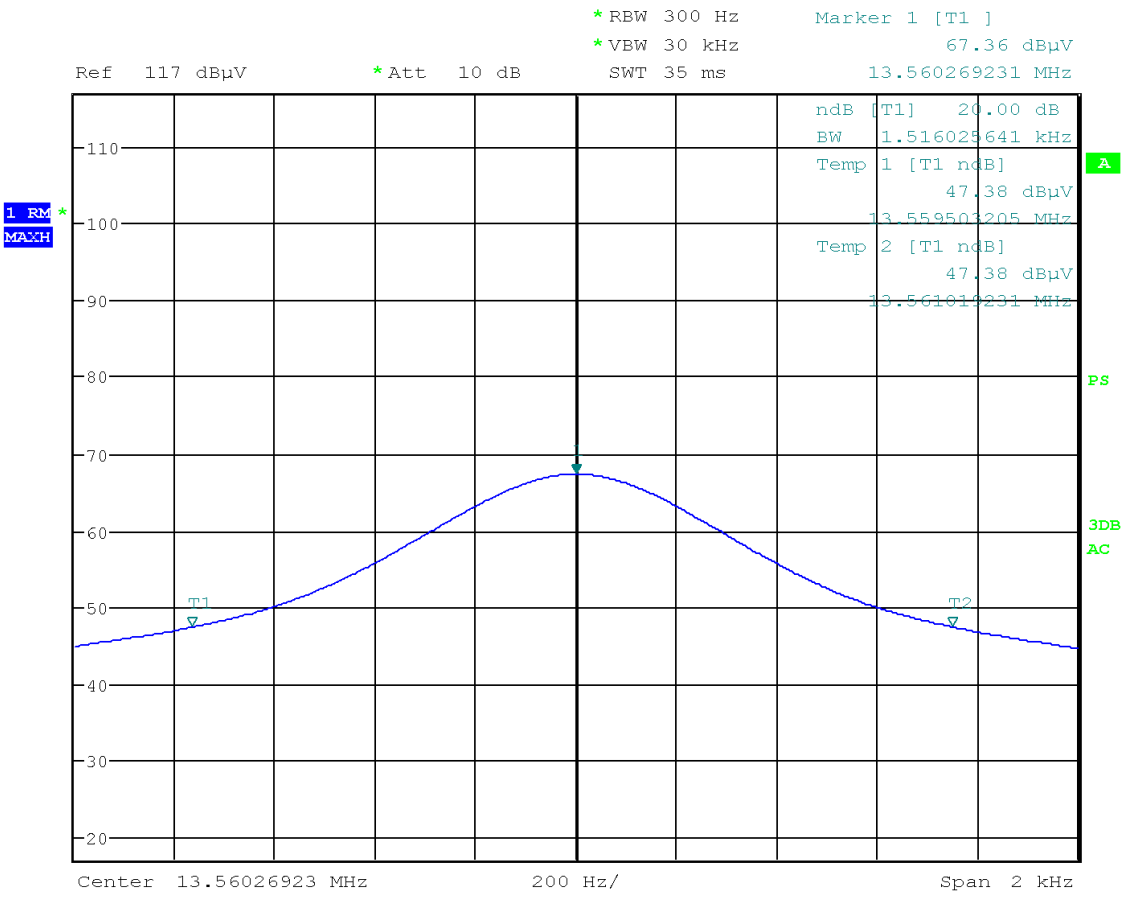
Field strength outside the band 13.110-14.010MHz

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
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 VHBB 9124	Schwarzbeck	8526
Bi-log antenna CBL6112A	Chase	8530
Low-noise amplifier 8447D	Hewlett Packard	8511
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000
Software	Champ libre Juigné. V3.4	8864

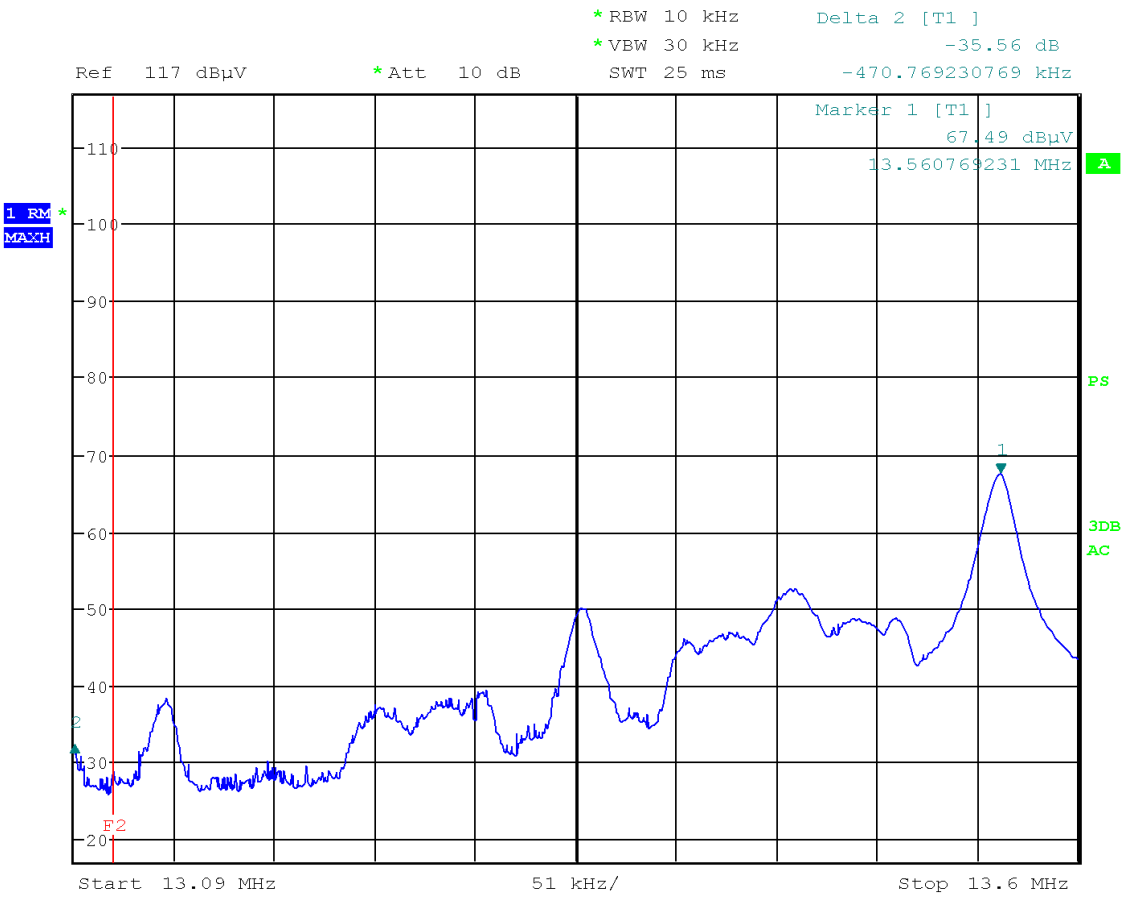
APPENDIX 4: 6 dB bandwidth

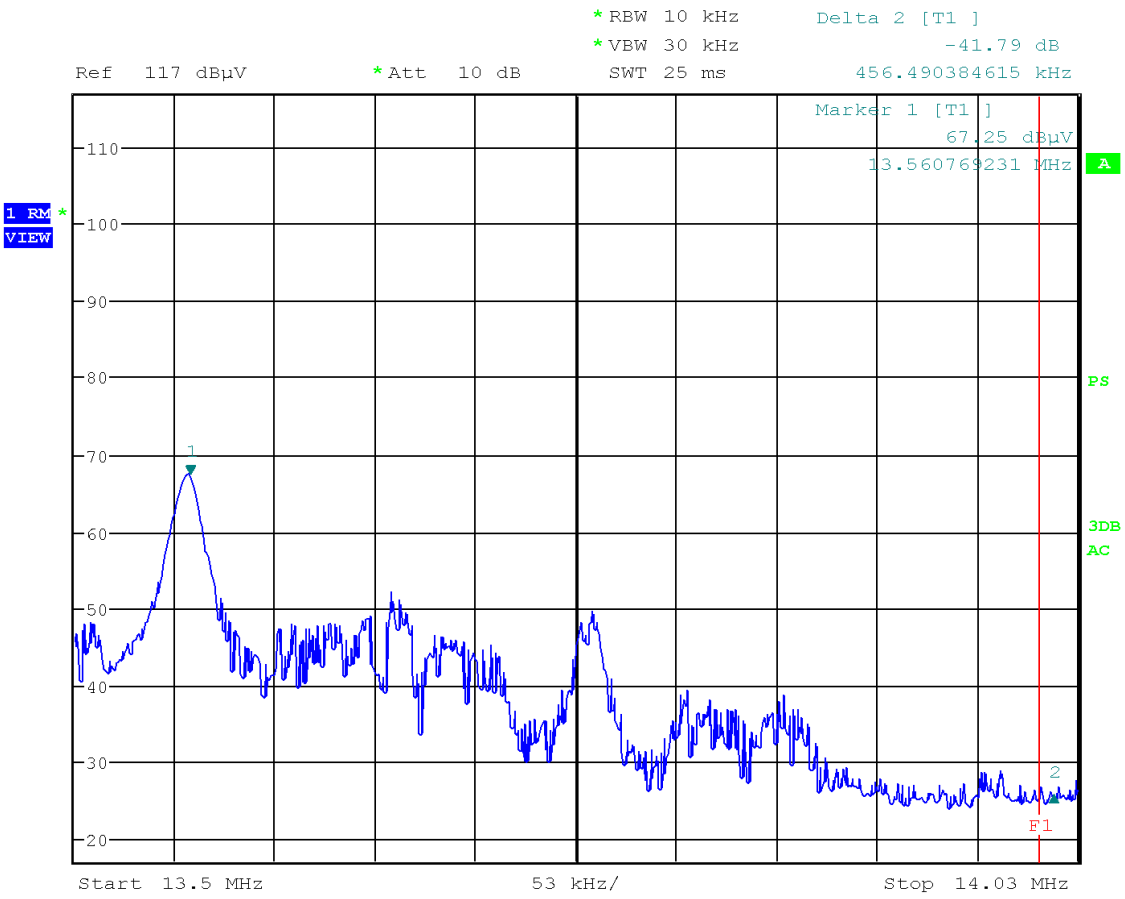


APPENDIX 5: 20 dB bandwidth



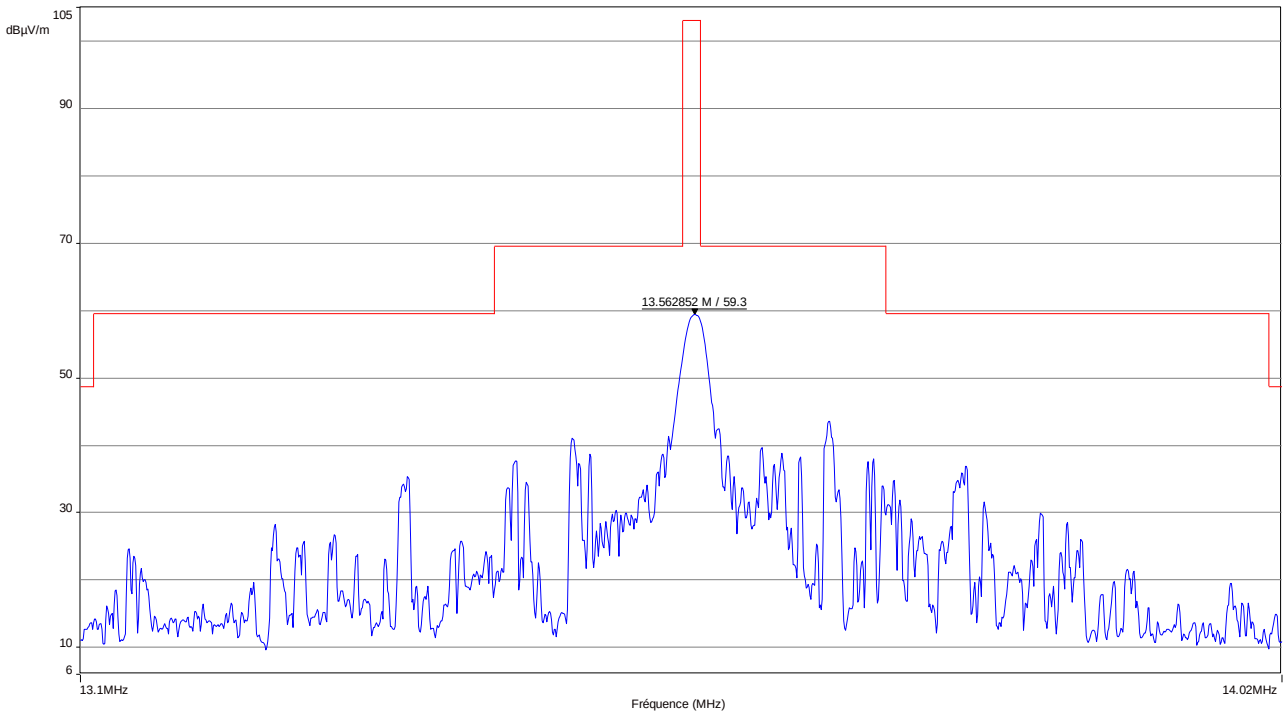
APPENDIX 6: Band edge



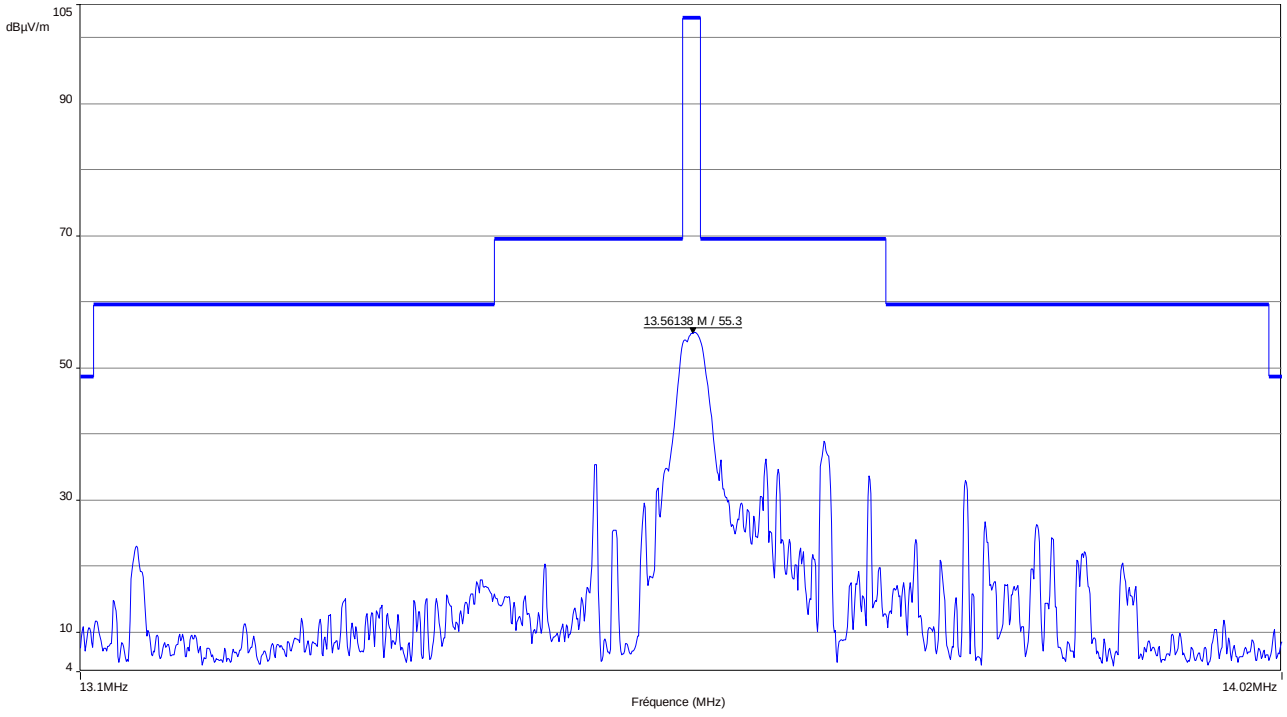

*RBW 10 kHz
*VBW 30 kHz
Ref 117 dBµV
*Att 10 dB
SWT 25 ms
Delta 2 [T1]
-41.79 dB
456.490384615 kHz
Marker 1 [T1]
67.25 dBµV
13.560769231 MHz
A
1 RM *
VIEW
110
100
90
80
70
60
50
40
30
20
PS
3DB
AC
1
2
F1
Start 13.5 MHz
53 kHz/
Stop 14.03 MHz

APPENDIX 7: Spectrum mask

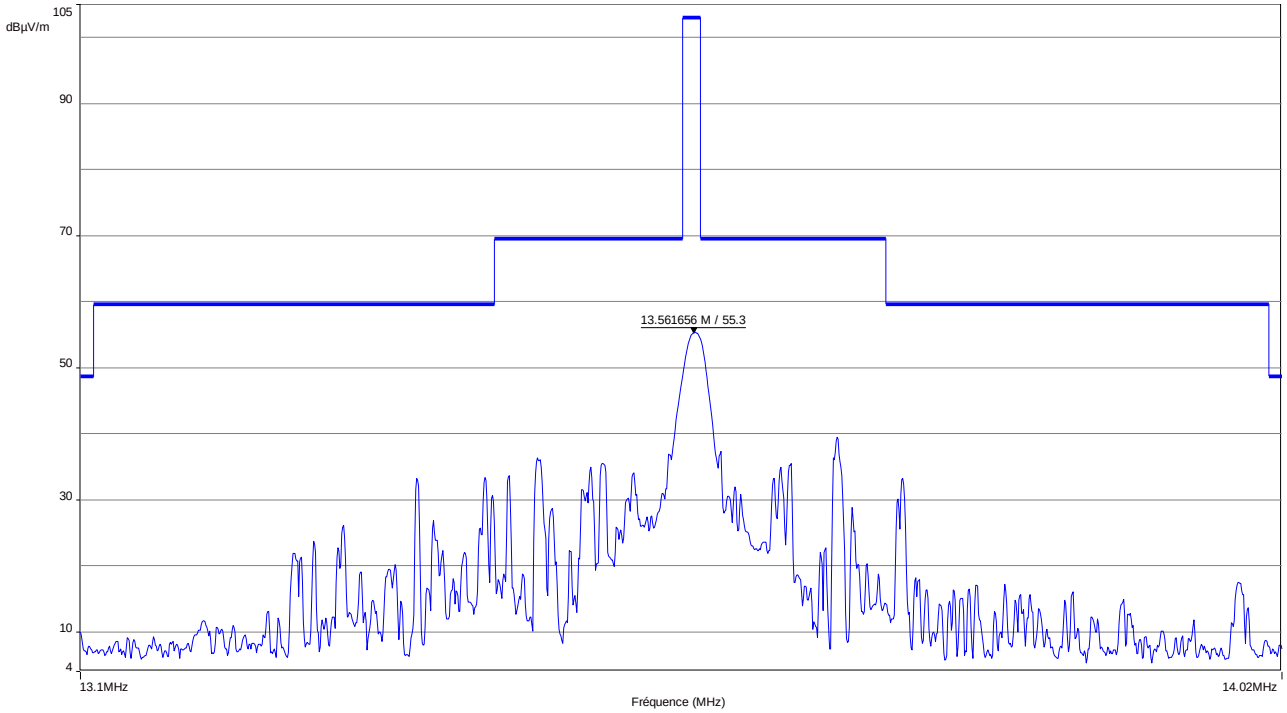
MASK NORMAL CONDITIONS: +20°C; 120VAC



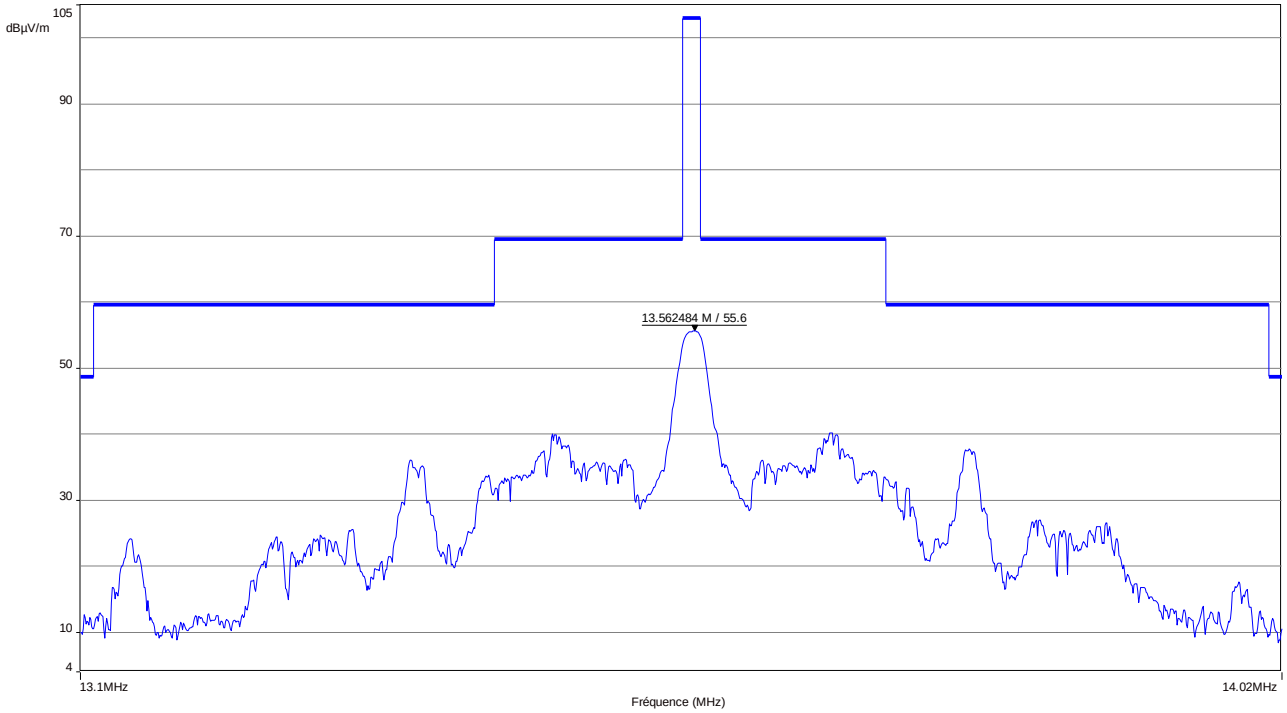
MASK NORMAL CONDITIONS +20°C; 102VAC



MASK NORMAL CONDITIONS +20°C; 138VAC



MASK EXTREME CONDITIONS -20°C; 120VAC



MASK EXTREME CONDITIONS +50°C; 120VAC