EMITECH GROUPE

RC-032-PTE-15-105080-2-A

E.M.C Test Report

According to the standards:
FCC 47 CFR PART 15 : 2015 (§15.247)

Equipment under test:
Hand Pendant RX
with BLE 2.4 GHz
FCC ID: 2AHZSHP-FIX

Company:
IBA

FCC accredited: FR0004

DISTRIBUTION: Mr. AGRAM **(Company:** IBA)

Number of pages: 49 with 6 annexes

Ed.	Date	Modified page(s)	Written by Name / Visa	Technical Verification and Quality Approval Name / Visa
0	18/04/16	Creation	F. LHEUREUX FL	B. Pellegrini

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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 production of the item tested.

TEST CERTIFICATION FOR:	FCC Certification
NAME OF THE EQUIPMENT UNDER TEST:	Hand Pendant RX
Serial number:	5653-00005
Reference / model (P/N):	P4000032
Software version:	WMEB - 1.0.0 - RadioTests
NAME OF THE MANUFACTURER:	IBA
ADDRESS OF THE APPLICANT:	
Company:	IBA
Address:	Chemin du Cyclotron 3 1348 LOUVAIN-LA-NEUVE BELGIUM
Person in charge:	Mr. AGRAM
Person present during the tests	Mr. BOURMORCK
DATES OF TESTS:	05 and 06/04/2016
TESTS LOCATION:	EMITECH laboratory in Montigny Le Bretonneux (78) FRANCE.
TESTS OPERATORS:	F. LHEUREUX / C. FOURCADE
TESTS TUTOR:	B. PELLERIN

TABLE OF CONTENTS

1. INTRODUCTION

This document presents the results of Electromagnetic Compatibility tests performed on the equipment «Hand Pendant RX» according to reference documents listed below.

2. REFERENCE DOCUMENTS

FCC 47 CFR Part 15: 2015
Code of Federal Regulations. Title 47- Telecommunication
Chapter 1- Federal Communication Commission
Part 15- Radio frequency devices

ANSI C63.4: 2014
Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.

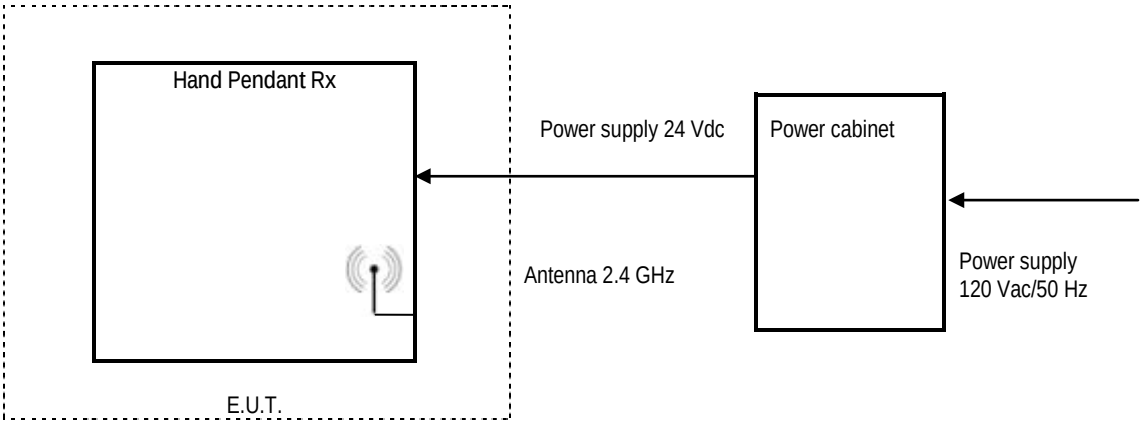
KDB 558074 D01 DTS Meas Guidance V03r04
Guidance for performing compliance measurement on Digital Transmission Systems (DTS) operating under § 15.247

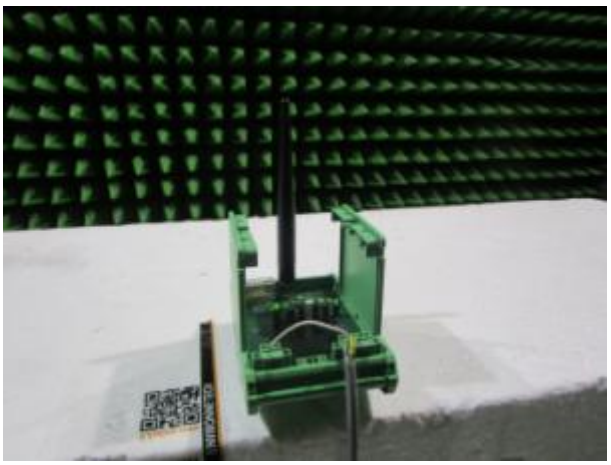
3. PRODUCT DESCRIPTION

Class:	B (Medical environment)
Antenna type and gain:	Integral antenna: Not communicated
Operating frequency range:	from 2402 MHz to 2480 MHz
Number of channels:	40
Channel spacing:	2 MHz
Modulation:	-
Power source:	24 Vdc
Software power setting:	WMEB - 1.0.0 - RadioTests

Modification of the equipment during the tests: No.

The equipment under test is presented in a plastic housing, for use in fixed installation in a medical environment, it is tested with its antenna in a horizontal position and a vertical position. Only the vertical position is retained for all measurements. The equipment under test is supplied by 24 Vdc.
The equipment under test is intented for use of +15°c to +30°c.





4. TESTS AND CONCLUSION

The following table summarizes test results of the EUT.

Subpart B of the standard FCC part 15 – Unintentional radiators

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.107	Measurement of conducted emission on AC mains ports	X				
15.109	Radiated emission limits	X				

Subpart C of the standard FCC part 15 – Intentional radiators

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.205	Restricted bands of operation	X				
15.207	Measurement of conducted emission on AC mains ports	X				
15.209	Radiated emission limits; general requirements	X				
15.215	Additional provisions to the general radiated emission limitations					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of § 15.247 frequency bands	X				
	(c) 20 dB bandwidth and band-edge compliance	X				
15.247	Intentional radiated emissions					
	a) frequency hopping and digitally modulated					
	a) (1) hopping mode			X		
	a) (1) (i) frequency hopping in the band 902-928 MHz			X		
	a) (1) (ii) frequency hopping in the band 5725–5850 MHz			X		
	a) (1) (iii) frequency hopping in the band 2400–2483.5 MHz			X		
	a) (2) systems using digital modulation in the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz (6 dB bandwith)	X				
	b) maximum peak conducted					
	b) (1) frequency hopping in the bands 2400–2483.5 MHz or 5725–5850 MHz			X		
	b) (2) frequency hopping in the band 902-928 MHz			X		

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
	b) (3) systems using digital modulation in the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz	X				
	b) (4) maximum peak conducted > 6 dBi					
	b) (4) (i) frequency hopping in the band 2400–2483.5 MHz			X		
	b) (4) (ii) frequency hopping in the band 5725–5850 MHz			X		
	b) (4) (iii) fixed, point-to-point			X		
	c) directional antenna > 6 dBi					
	c) (1) fixed, point-to-point operation			X		
	c) (1) (i) in the band 2400–2483.5 MHz			X		
	c) (1) (ii) in the band 5725–5850 MHz			X		
	c) (1) (iii) fixed, point-to-point			X		
	c) (2) multiple directional beams in the band 2400–2483.5 MHz			X		
	c) (2) (i) information			X		
	c) (2) (ii) sum of the power supplied to all antennas			X		
	c) (2) (iii) one antenna for multiple directional beams			X		
	c) (2) (iv) single directional beam			X		
	d) intentional radiator	X				
	e) peak power spectral density	X				
	f) hybrid system			X		
	g) continuous data stream during the test			X		
	h) to avoid hopping on occupied channels			X		
	i) RF exposure compliance			X		P < 500 mW

N.A.: Not Applicable
N.P.: Not Performed

Conclusion:

The tested sample «Hand Pendant RX» submitted to the tests complies with the requirements of the standard:

- FCC 47 CFR PART 15 : 2015

According to the limits specified in this report.

5. DIGITAL MODULATION SYSTEMS

Standard: FCC 47 CFR PART 15 : 2015

Section: §15.247 a) (2)

Test configuration:

The system is tested in normalized test site.

The test unit 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 level was maximised in antenna height, azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Distance of antenna: 3 meters

Instrumentation test list:

CATEGORY	BRAND	TYPE	Nr EMITECH
Antenna	Emco	Emco	3374
Antenna mast	Maturo	MCU	8410
Antenna mast	Maturo	AM 4.0	8411
Cable	C&C	C&C	11136
Cable	C&C	C&C	11172
Cable	C&C	N-2m	11177
Shielded enclosure	SIDT	SIDT	0549
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175

Equipment under test operating condition:

EUT is in continuous transmission mode.

Measure conditions:

Ambient temperature (°C): 21
Relative humidity (%): 39

Resolution bandwidth: 100 kHz

Results:

Power source: 24 Vdc

6 dB bandwidth

Frequency	Mode	Results	Comments
2402 MHz	advertising	0.690 MHz	See annex n°4
2426 MHz		0.700 MHz	See annex n°4
2480 MHz		0.650 MHz	See annex n°4

20 dB bandwidth

Frequency	Mode	Results	Comments
2402 MHz	advertising	1.190 MHz	See annex n°4
2426 MHz		1.200 MHz	See annex n°4
2480 MHz		1.190 MHz	See annex n°4

Test conclusion: Complies with the requirements of the standard.

6. TRANSMITTER OUTPUT POWER

Standard: FCC 47 CFR PART 15 : 2015

Section: §15.247 b) (3)

Test configuration:

The system is tested in normalized test site.

The test unit 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 level was maximised in antenna height, azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Distance of antenna: 3 meters

Instrumentation test list:

CATEGORY	BRAND	TYPE	Nr EMITECH
Antenna	Emco	Cornet 3115	3374
Antenna mast	Maturo	MCU	8410
Antenna mast	Maturo	AM 4.0	8411
Cable	C&C	N-6m	11136
Cable	C&C	N-2m	11172
Cable	C&C	N-2m	11177
Shielded enclosure	SIDT	C.4	0549
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175

Equipment under test operating condition:

EUT is in continuous transmission mode.

Measure conditions:

Ambient temperature (°C): 21
Relative humidity (%): 39

Resolution bandwidth: 2 MHz

Results:

Power source: 24 Vdc

Frequency	Mode	Electro-magnetic field (dBµV/m)	TP* (dBm)	Limit (dBm)
2402 MHz	advertising	90.25	- 7.13	+ 30
2426 MHz		89.02	- 8.36	+ 30
2480 MHz		91.93	- 5.45	+ 30

* TP = $(E \times d)^2 / (30 \times 1.64)$ for d = 3 m

Test conclusion: Complies with the requirements of the standard.

7. PEAK POWER SPECTRAL DENSITY

Standard: FCC 47 CFR PART 15 : 2015

Section: §15.247 e)

Test configuration:

The system is tested in normalized test site.

The test unit 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 level was maximised in antenna height, azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Distance of antenna: 3 meters

Instrumentation test list:

CATEGORY	BRAND	TYPE	Nr EMITECH
Antenna	Emco	Cornet 3115	3374
Antenna mast	Maturo	MCU	8410
Antenna mast	Maturo	AM 4.0	8411
Cable	C&C	N-6m	11136
Cable	C&C	N-2m	11172
Cable	C&C	N-2m	11177
Receiver	Rohde & Schwarz	FSU8	9129
Shielded enclosure	SIDT	C.4	0549
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175

Equipment under test operating condition:

EUT is in continuous transmission mode.

Measure conditions:

Ambient temperature (°C): 21
Relative humidity (%): 39

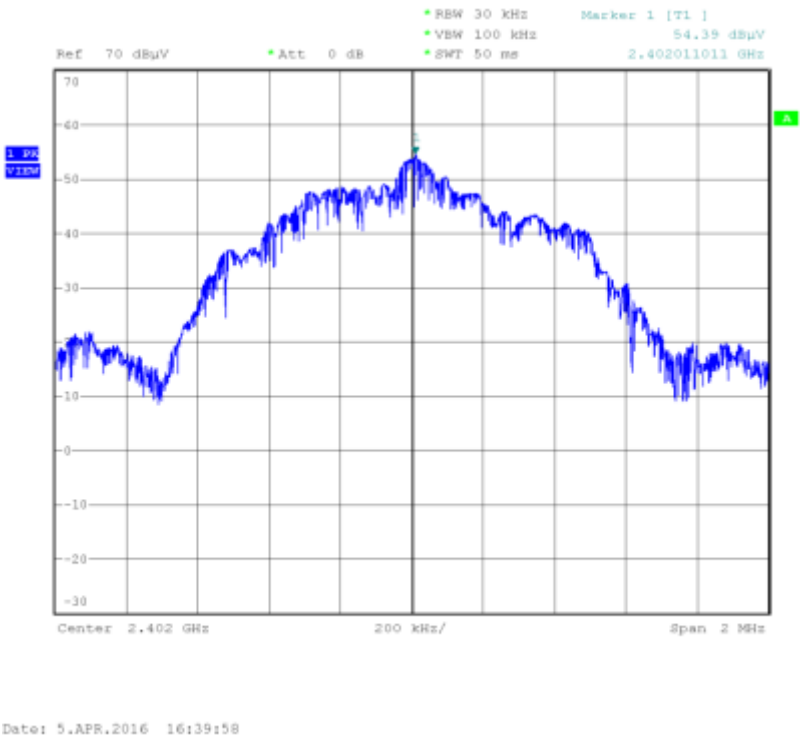
Resolution bandwidth: 30 kHz
Video bandwidth: 100 kHz

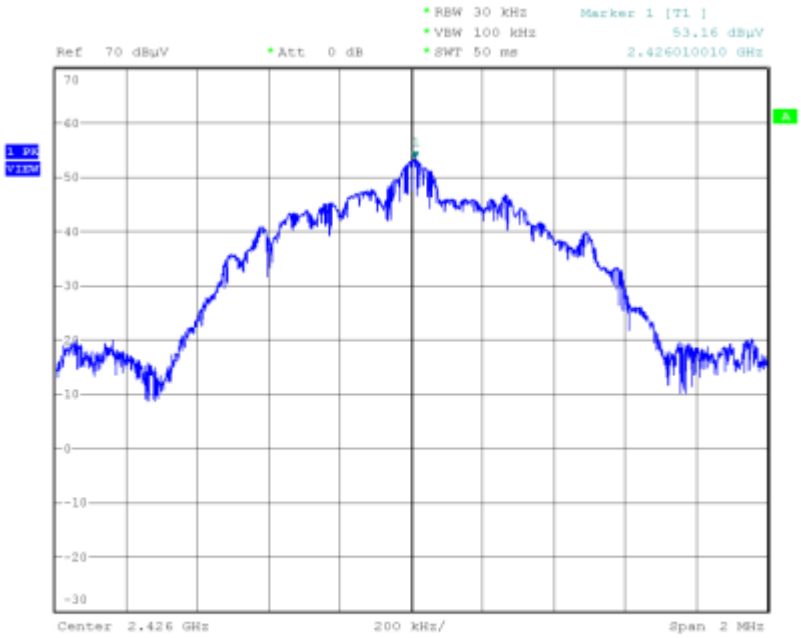
Results:

Power source: 24 Vdc

Frequency	Mode	Electro-magnetic field (dBµV/m)	PPSD* (dBm)	Limit (dBm)
2402 MHz	Advertising	89.09	- 8.29	+ 8.0
2426 MHz		87.96	- 9.42	
2480 MHz		91.61	- 5.77	

* PPSD = $(E \times d)^2 / (30 \times 1.64)$ for d = 3 m





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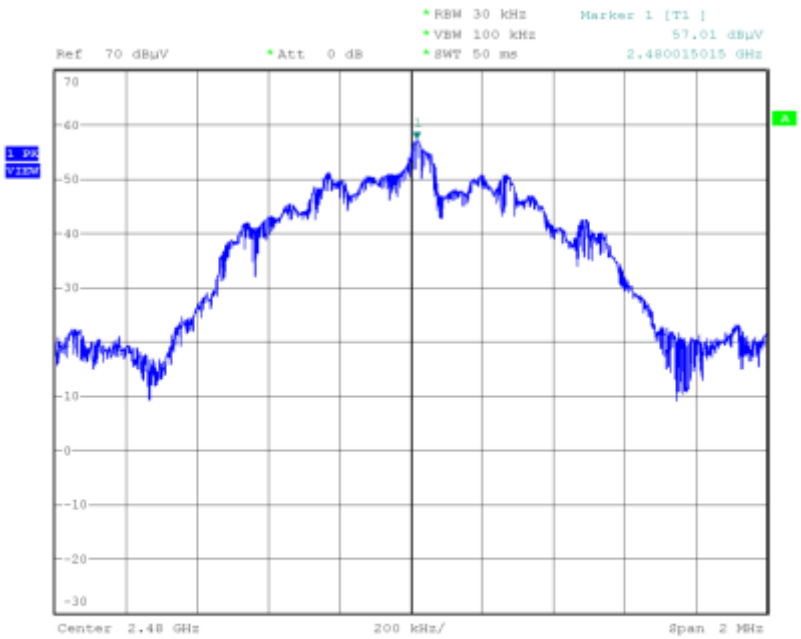

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Test conclusion: Complies with the requirements of the standard.

8. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSIONS LIMITATION

Standard: FCC 47 CFR PART 15 : 2015

Sections: §15.215 (b) and §15.247 (d)

Instrumentation test list:

CATEGORY	BRAND	TYPE	Nr EMITECH
Antenna	Emco	Cornet 3115	3374
Antenna mast	Maturo	MCU	8410
Antenna mast	Maturo	AM 4.0	8411
Cable	C&C	N-6m	11136
Cable	C&C	N-2m	11172
Cable	C&C	N-2m	11177
Shielded enclosure	SIDT	C.4	0549
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175

Equipment under test arrangement:

The system is tested in normalized test site.
The test unit 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 level was maximised in antenna height, azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Results:

Ambient temperature (°C): 21
Relative humidity (%): 39

Lower Band Edge: from 2310 MHz to 2390 MHz
Upper Band Edge: from 2483.5 MHz to 2500 MHz

Polarization of test antenna: Vertical (height = 110 cm)
Position of equipment: azimuth = 310° } For 2402 MHz

Polarization of test antenna: Vertical (height = 100 cm)
Position of equipment: azimuth = 50° } For 2480 MHz

- advertising 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) *	Calculated Max Out of Band Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)
2401.77	88.78	Average	2351.53	40.1	48.7	54.0	5.3
2480.25	91.07	Average	2493.26	41.2	49.9	54.0	4.1

* According to step 2 of Marker-Delta Method DA 00-705.

Band-edge curves are given in annex 5.

9. *UNINTENTIONAL RADIATED EMISSIONS AND TRANSMITTER UNWANTED EMISSION IN THE BAND 9 KHz – 25 GHz*

Standard: FCC 47 CFR PART 15 : 2015

Section: §15.205; 15.209 and §15.247

Equipment under test arrangement:

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal metal ground plane.

For maximum meter reading at each frequency, the antenna height is adjusted between 1 m and 4 m above the ground plane. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization. The frequency azimuth and antenna height are presented in the table on the next pages.

The E.U.T. is blocked in continuous transmission.

Frequencies range: 9 kHz – 30 MHz
30 MHz - 1 GHz
1 GHz – 25 GHz

Detection mode: Quasi-peak for 9 kHz – 30 MHz
Quasi-peak for 30 MHz - 1 GHz
Average for 1 GHz – 25 GHz

Resolution bandwidth: 200 Hz for 9 kHz – 150 kHz
9 kHz for 150 kHz – 30 MHz
120 kHz for 30 MHz - 1 GHz
1 MHz for 1 GHz – 25 GHz

Measurement distance: 3 meters from 9 kHz to 30 MHz
3 meters from 30 MHz to 25 GHz

- Limit for emission radiated outside the frequency band, except the harmonics, shall be attenuated by at least 20 dB below the level of fundamental or the general radiated emission limits.

From 9 kHz to 30 MHz

Frequencies range	Limit (µV/m)
9 – 490 kHz	2400/F (F in kHz) *
490 – 1705 kHz	24000/F (F in kHz) **
1.705 – 30 MHz	30 **

* Limits in µV/m can be extrapolated to 3 m using 40 dB / decade.
** Limits in µV/m can be extrapolated to 3 m using 20 dB / decade.

From 30 MHz to 25 GHz

Frequencies range (MHz)	Limit (dBµV/m)	(µV/m)
30 to 88	40.0	100
88 to 216	43.5	150
216 to 960	46.0	200
Above 960	54.0	500

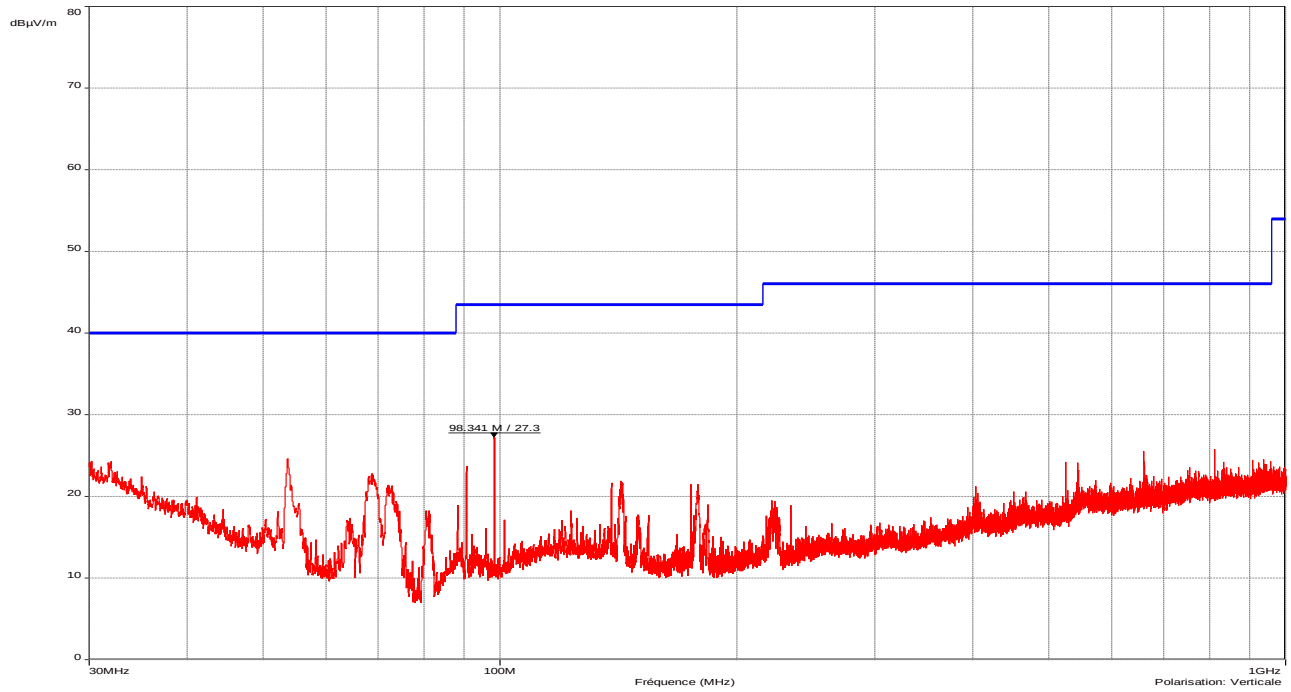
CATEGORY	BRAND	TYPE	Nr EMITECH
Amplifier	Mini-circuit	ZFL-1000LN	6367
Amplifier	Miteq	AFS42-00102650-42-10P-42	3229
Antenna	Schaffner	CBL 6143A	5647
Antenna	Emco	3115	3374
Antenna	Oritel	CM 42/25	1045
Antenna	Emco	6502	9579
Antenna mast	Maturo	MCU	8410
Antenna mast	Maturo	AM 4.0	8411
Cable	C&C	N-2m	11181
Cable	C&C	N-10m	11136
Cable	C&C	N-2m	11182
Cable	C&C	N-6m	11172
Cable	C&C	K-2m	11132
Cable	C&C	K-2m	11133
Filter	Micro-Tronics	HPM 14758	4691
Receiver	Rohde & Schwarz	ESRP7	10517
Shielded enclosure	SIDT	C.4	0549
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175

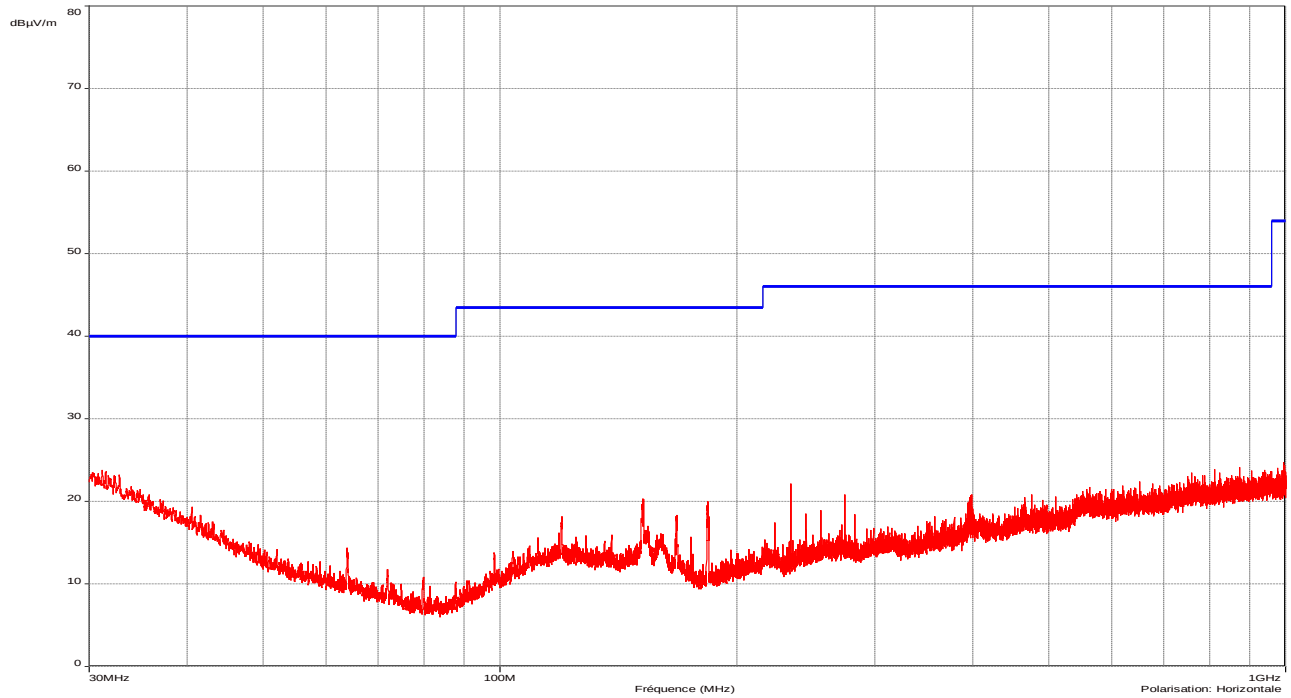
Results:

Ambient temperature (°C): 21
Relative humidity (%): 39
Power source: 24 Vdc

Curves 1 and 2

Frequency 2402 MHz

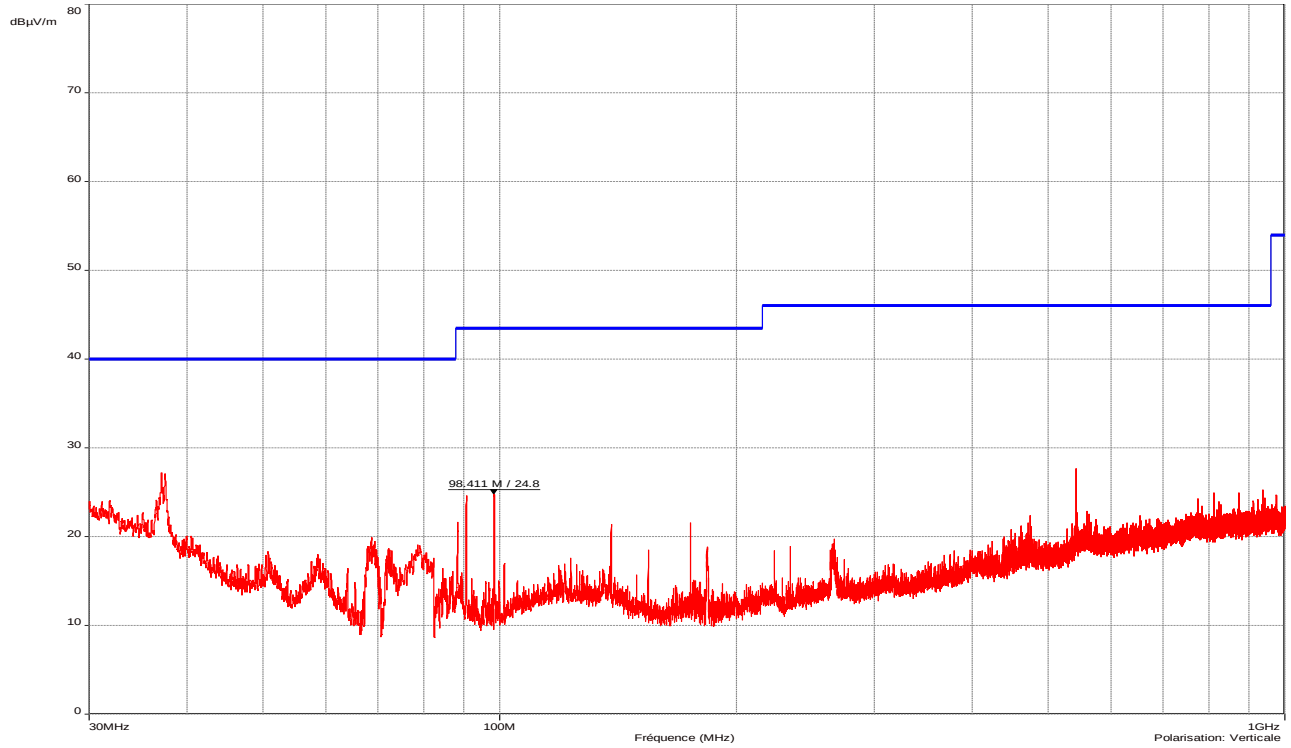


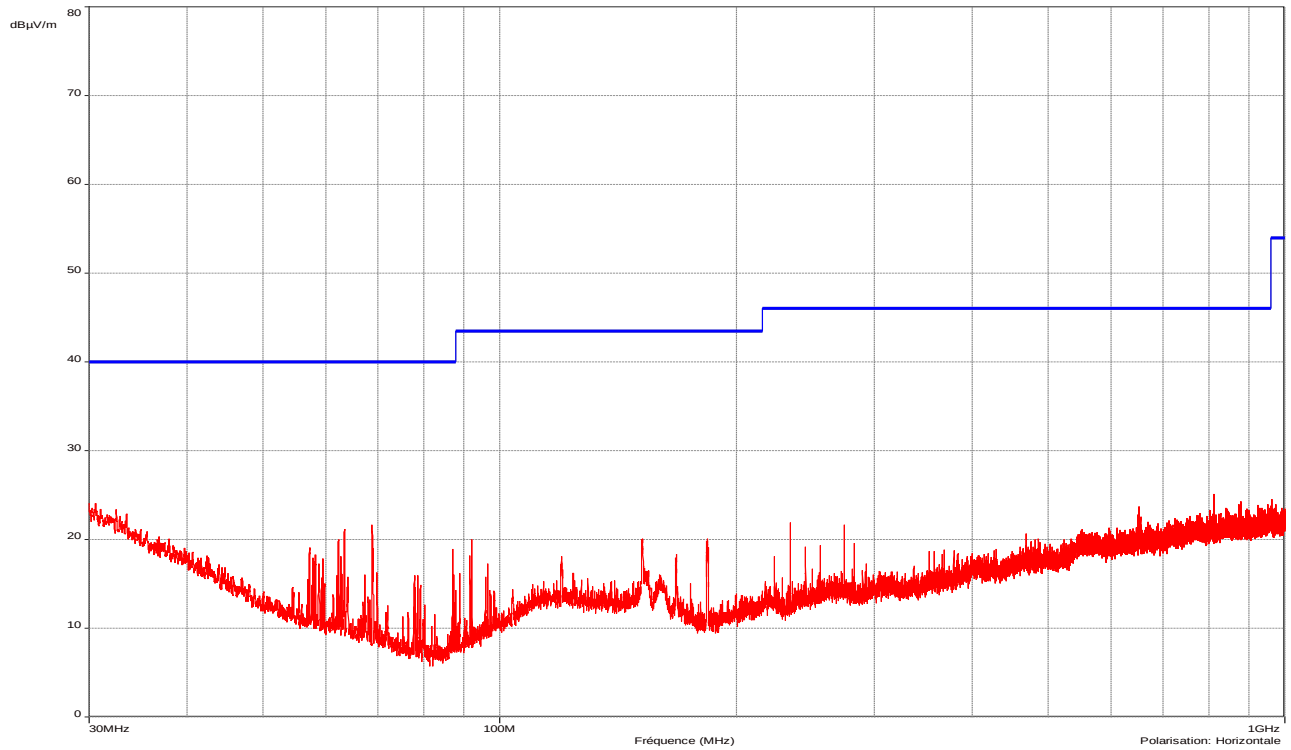


No significant frequency has been found other than those given above between 9 kHz to 30 MHz and 1 GHz to 25 GHz.
Frequency at 98.341 MHz is external frequency.

Curves 3 and 4

Frequency 2480 MHz

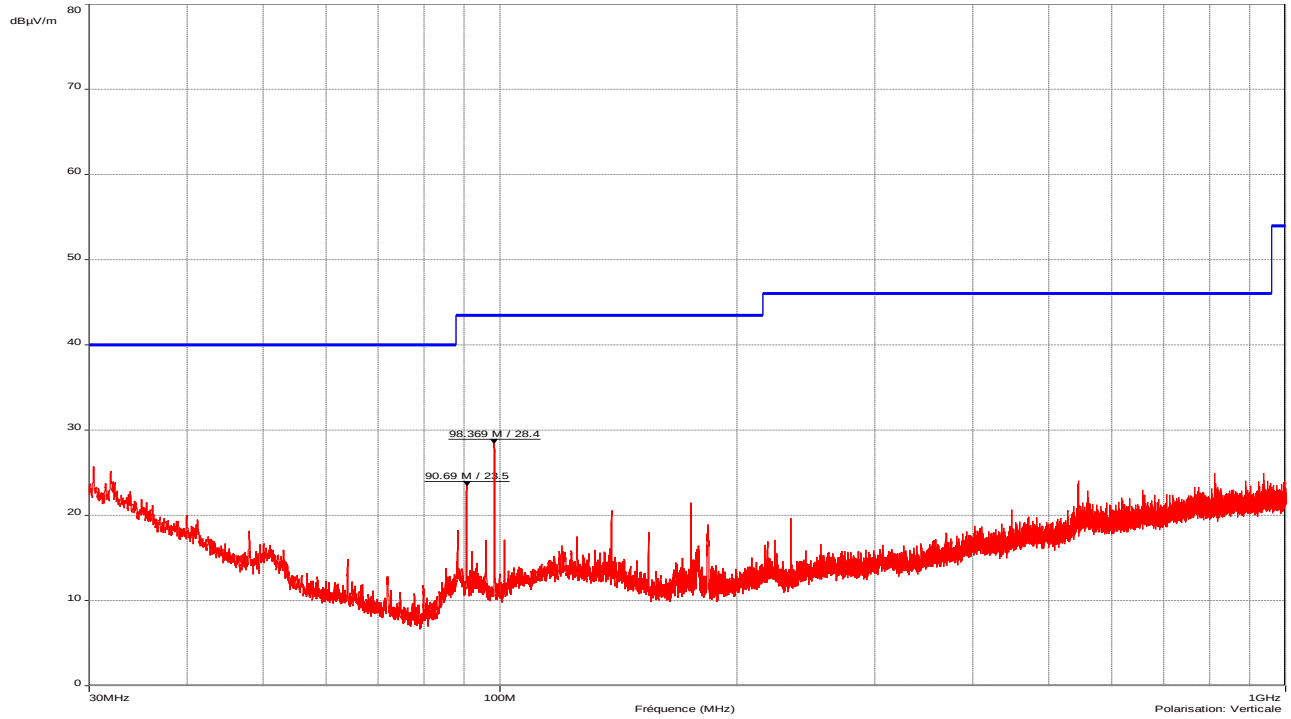


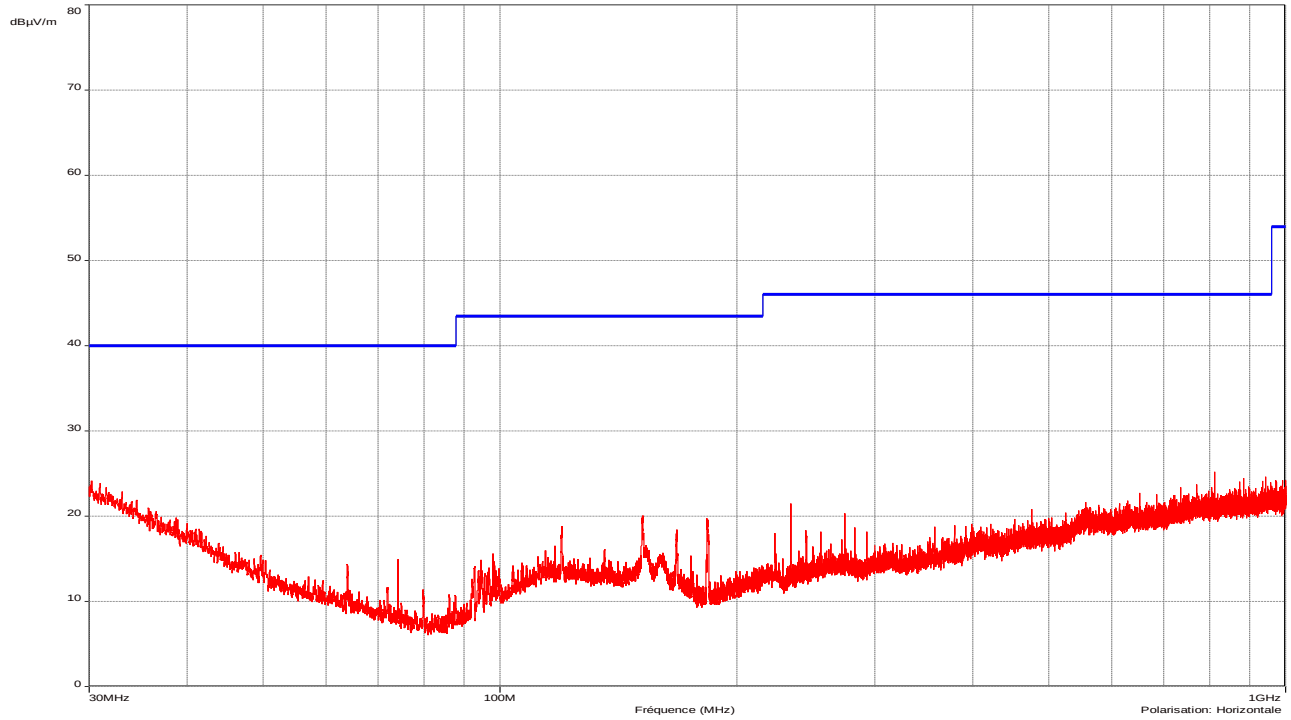


No significant frequency has been found other than those given above between 9 kHz to 30 MHz and 1 GHz to 25 GHz.
Frequency at 98.4 MHz is external frequency.

Curves 5 and 6

In transmission mode





No significant frequency has been found other than those given above between 9 kHz to 30 MHz and 1 GHz to 25 GHz.
Frequency at 98.369 MHz is external frequency.

Test conclusion:

The equipment complies with the requirements of the standard.

10. CONDUCTED EMISSION

Standard: FCC 47 CFR PART 15 : 2015

Test method: Part 15.107 and 15.207

Test configuration:

Tested cable	Measure with	E.U.T. height
Power supply 120 Vac / 60 Hz (Nominal configuration)	L.I.S.N.	80 cm

Frequencies band	Tested cable	Resolution bandwidth	Video bandwidth
150 kHz - 30 MHz	Power supply 120 Vac / 60 Hz (Nominal configuration)	10 kHz	30 kHz
150 kHz - 30 MHz	Power supply 120 Vac / 60 Hz (Nominal configuration)	9 kHz	Auto

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	Nr EMITECH
Bobine PE	Emitech	CISPR 16-2-1 : 2008	10063
Cable	-	N-2m	2873
Cable	-	N-2m	2814
Cable	C&C	BNC-0.3m	9953
LISN	Rohde & Schwarz	ESH3-Z5	6602
Multimeter	Emitech	Absorbeur courant de gaine	12366
Receiver	Rohde & Schwarz	ESRP7	10517
Surges Suppressor	Hewlett Packard	11947A	0237
Test enclosure	Emitech	JD1	1804

Results:

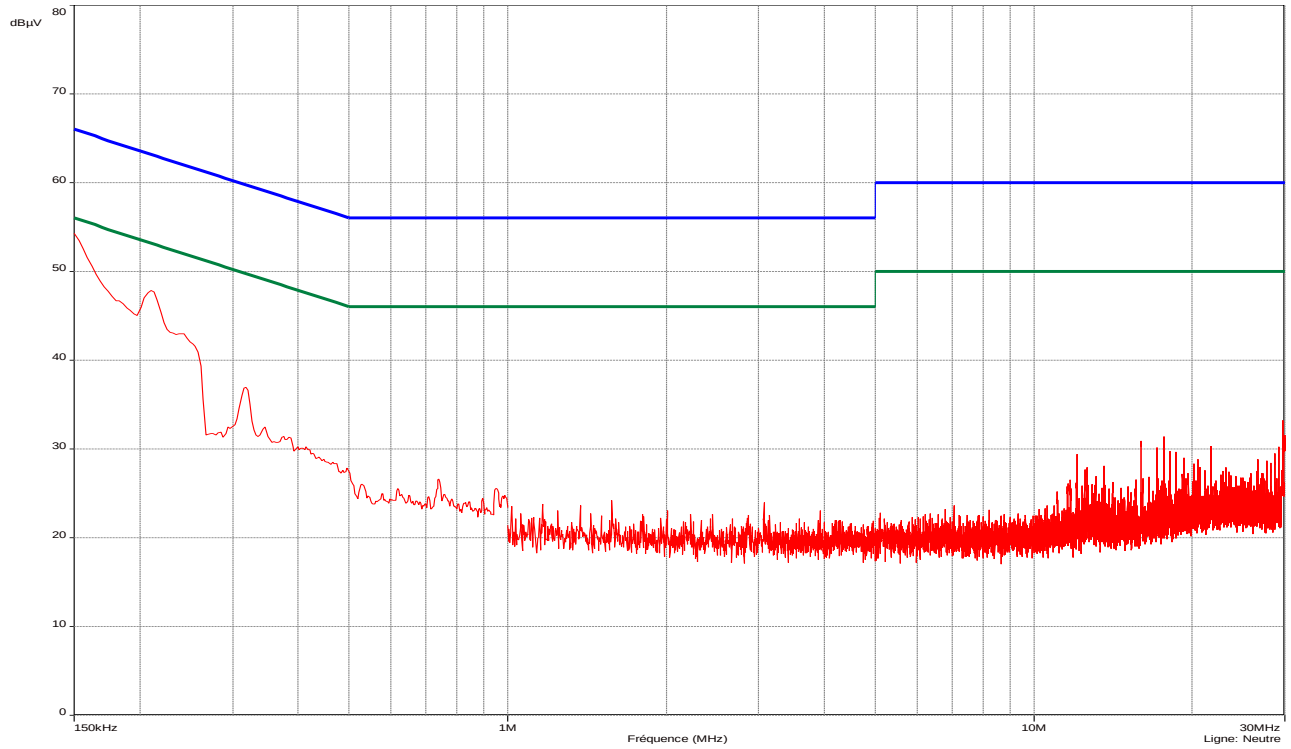
See curves below including detections and limits in peak (red), average (green) and quasi-peak (blue).

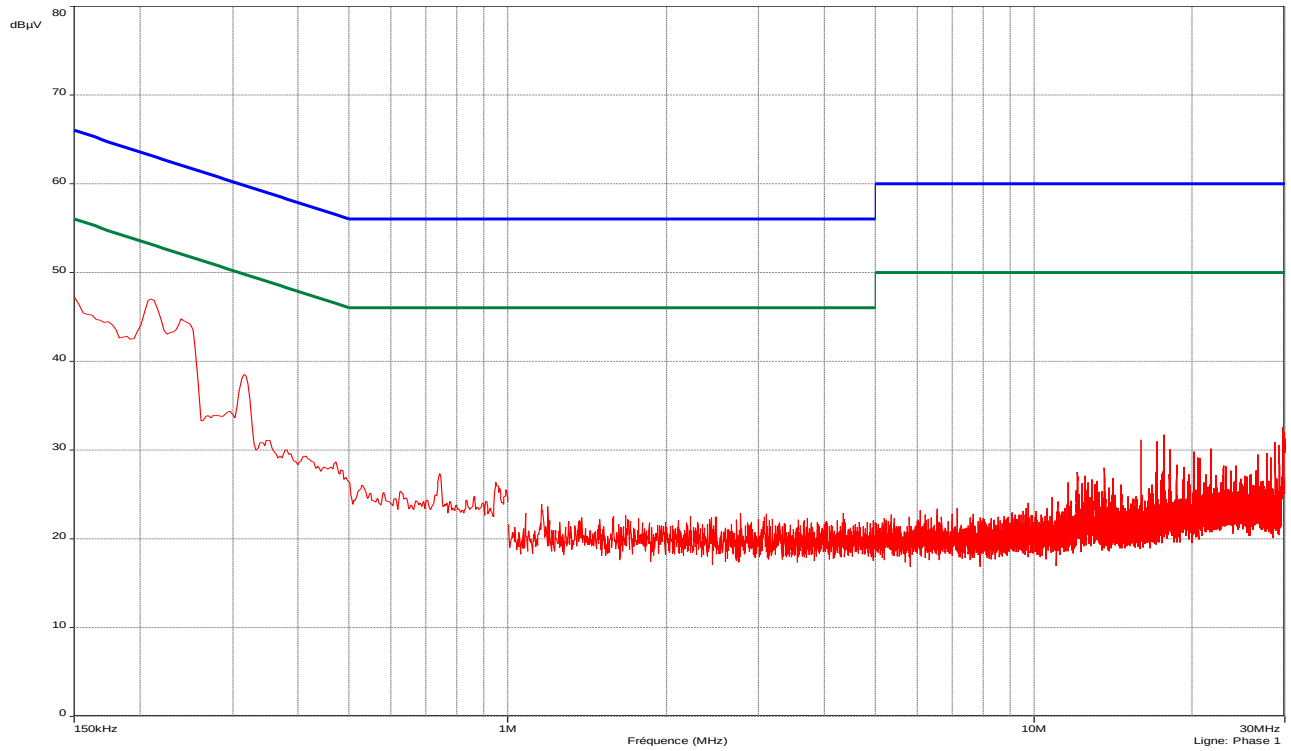
Curves 7 and 8

Hand Pendant RX

Conducted voltage emission (measurement): Power supply 120 Vac / 60 Hz
(Nominal configuration) in peak detection

06/04/2016





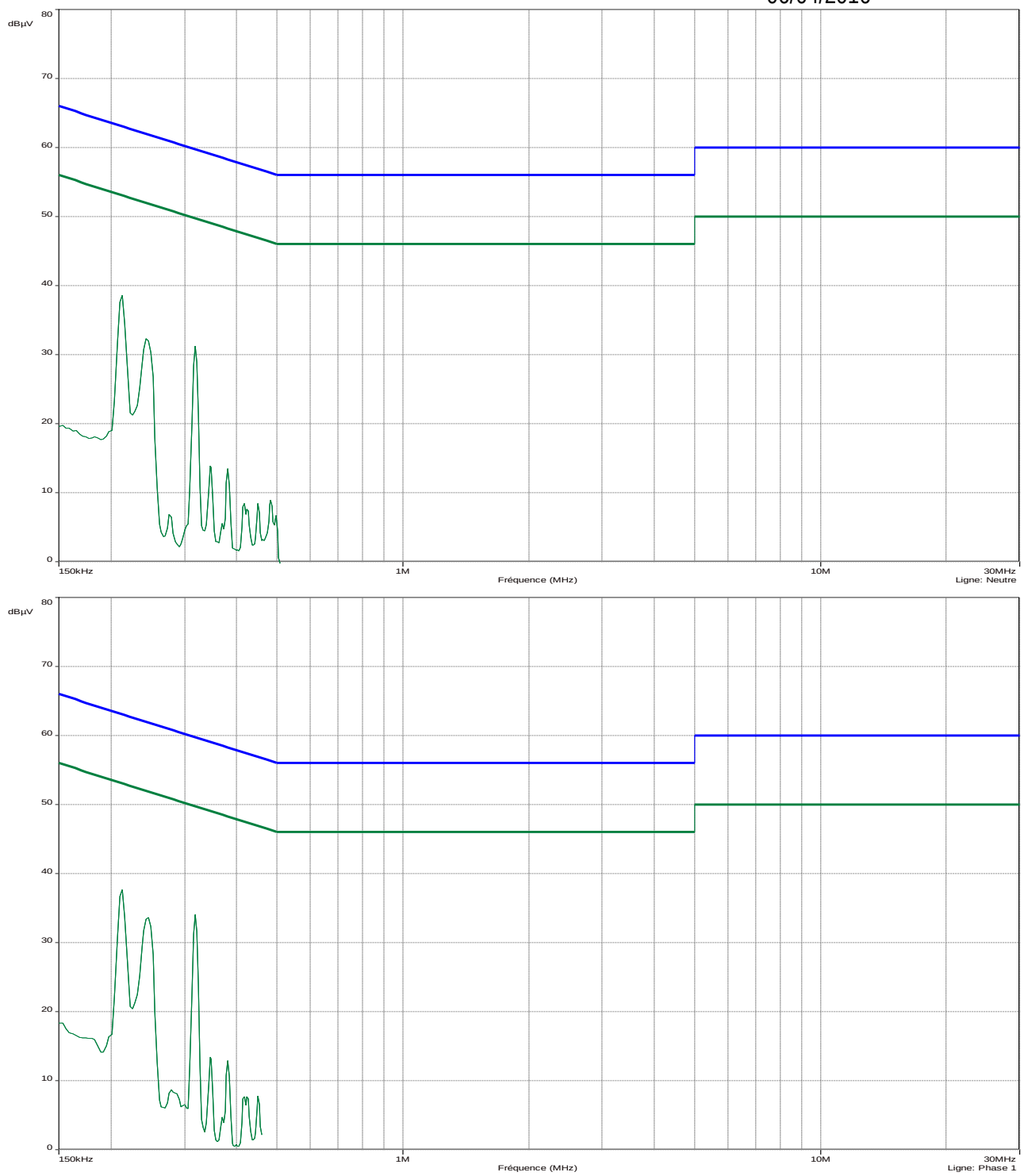
Class: B of the standard

Curves 9 and 10

Hand Pendant RX

Conducted voltage emission (measurement): Power supply 120 Vac / 60 Hz
(Nominal configuration) in average value detection

06/04/2016



Class: B of the standard

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ANNEX 1:

ANTENNA FACTORS, INSERTION LOSSES AND AMPLIFIER VALUES

BILL OF MATERIAL

The test antenna used for the radiated emission between 9 kHz and 30 MHz is the active loop antenna n°9579. Antenna factors are given in table 1.

The test antenna used for the radiated emission between 30 MHz and 1 GHz is the bilog n°5647.
Antenna factors are given in table 2.

The measuring receiver n°10517 used in the frequency range 9 kHz to 1 GHz has an integrated preamplifier.

The spectrum analyzer n°5175 is used in the frequency range 1 GHz to 25 GHz.

The test cable used between 9 kHz and 30 MHz to connect the antennas to the receiver for measurements at a distance of 3 meters has losses given in table 3.

The test cable used between 30 MHz and 1 GHz to connect the antennas to the receiver for measurements at a distance of 3 meters has losses given in table 4a, 4b and 4c.

The test antenna used for the radiated emission between 1 GHz and 18 GHz is the horn antenna n°3374. Factors are given in table 5.

The test antenna used for the radiated emission between 18 GHz and 25 GHz is the horn antenna n°1045. Factors are given in table 6.

The amplifier n°3229 used to connect the spectrum analyzer to the test cable has gain values given in the table 7.

The test cable used between 1 GHz and 18 GHz to connect the horn antenna to the amplifier for measurements at distance of 3 meters has losses given in table 8.

The test cable used between 18 GHz and 26 GHz to connect the horn antenna to the amplifier for measurements at distance of 3 meters has losses given in table 9a and 9b.

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
0.009	20.9	0.8	11.2
0.01	20.2	1	11.2
0.015	16.6	1.5	11.1
0.02	15.1	2	11.0
0.03	13.8	3	10.9
0.05	12.4	5	10.7
0.08	11.9	8	10.3
0.1	11.8	10	10.0
0.15	11.7	15	9.3
0.2	11.6	20	8.4
0.3	11.5	25	6.3
0.5	11.4	30	5.7

TABLE 1 : ACTIVE LOOP ANTENNA

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
30	23.5	160	10.8
35	20.5	180	10.3
40	17.9	200	11.6
45	15.4	250	13.4
50	13.0	300	14.1
60	10.7	400	16.4
70	8.9	500	17.2
80	7.4	600	18.5
90	8.3	700	19.1
100	10.9	800	19.9
120	13.8	900	20.1
140	12.4	1000	20.6

TABLE 2 : BILOG ANTENNA

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
0.009	0.0	6.000	0.5
0.020	0.0	7.000	0.5
0.050	0.0	8.000	0.5
0.100	0.1	9.000	0.6
0.500	0.1	10.00	0.6
1.000	0.2	15.00	0.8
2.000	0.3	20.00	0.9
3.000	0.3	25.00	1.0
4.000	0.4	30.00	1.1
5.000	0.4	-	-

TABLE 3 : TEST CABLE FOR 3M MEASUREMENT INTO 9 kHz AND 30 MHz

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
30	0.1	250	0.2
40	0.1	300	0.3
50	0.1	400	0.3
60	0.1	500	0.4
70	0.1	600	0.4
80	0.1	700	0.5
90	0.1	800	0.5
100	0.1	900	0.6
150	0.2	1000	0.6
200	0.2	-	-

TABLE 4a : TEST CABLE FOR 3M MEASUREMENT INTO 30 MHz AND 1 GHz

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
30	0.3	250	0.8
40	0.3	300	0.8
50	0.4	400	1.0
60	0.4	500	1.1
70	0.4	600	1.2
80	0.4	700	1.3
90	0.5	800	1.4
100	0.5	900	1.5
150	0.6	1000	1.5
200	0.7	-	-

TABLE 4b : TEST CABLE FOR 3M MEASUREMENT INTO 30 MHz AND 1 GHz

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
30	0.3	250	1.1
40	0.4	300	1.2
50	0.5	400	1.4
60	0.5	500	1.7
70	0.5	600	1.8
80	0.6	700	2.0
90	0.6	800	2.1
100	0.7	900	2.3
150	0.8	1000	2.4
200	1.0	-	-

TABLE 4c : TEST CABLE FOR 3M MEASUREMENT INTO 30 MHz AND 1 GHz

Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)
1.0	23.7	10.0	37.6
1.5	25.0	10.5	37.8
2.0	27.5	11.0	38.1
2.5	28.8	11.5	38.3
3.0	29.8	12.0	38.8
3.5	31.2	12.5	38.8
4.0	32.5	13.0	39.4
4.5	32.5	13.5	40.0
5.0	33.5	14.0	40.1
5.5	34.1	14.5	40.6
6.0	34.1	15.0	40.6
6.5	34.4	15.5	39.7
7.0	35.4	16.0	39.3
7.5	36.6	16.5	39.9
8.0	36.6	17.0	41.4
8.5	37.0	17.5	45.1
9.0	37.1	18.0	46.3
9.5	37.2	-	-

TABLE 5 : HORN ANTENNA

Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)
18.0	30.7	22.5	30.9
18.5	30.7	23.0	31.2
19.0	30.5	23.5	31.1
19.5	30.7	24.0	31.3
20.0	30.7	24.5	31.5
20.5	30.8	25.0	31.0
21.0	30.9	25.5	31.0
21.5	30.5	26.0	31.4
22.0	30.6	-	-

TABLE 6 : HORN ANTENNA

Frequency (GHz)	Gain value (dB)	Frequency (GHz)	Gain value (dB)
1.0	33.4	12.0	32.4
1.5	33.7	13.0	32.5
2.0	33.9	14.0	31.6
2.5	34.0	15.0	33.0
3.0	33.9	16.0	33.5
4.0	34.3	17.0	33.9
5.0	35.2	18.0	34.3
6.0	34.7	19.0	34.4
7.0	34.0	20.0	32.9
8.0	33.7	21.0	33.2
9.0	31.8	22.0	34.3
9.5	31.1	23.0	34.6
10.0	30.5	24.0	34.4
10.5	30.7	25.0	34.5
11.0	31.1	26.0	32.5

TABLE 7 : AMPLIFIER GAIN VALUE

Frequency (GHz)	Gain value (dB)	Frequency (GHz)	Gain value (dB)
1.0	1.6	9.5	5.6
1.5	2.0	10.0	5.7
2.0	2.4	10.5	5.8
2.5	2.7	11.0	5.9
3.0	3.0	12.0	6.2
4.0	3.4	13.0	6.4
5.0	3.8	14.0	6.6
6.0	4.1	15.0	7.1
7.0	4.6	16.0	7.3
8.0	5.1	17.0	7.6
9.0	5.5	18.0	7.8

TABLE 8 : TEST CABLE FOR 3M MEASUREMENT INTO 1 TO 18 GHz

Frequency (GHz)	Loss (dB)
18.0	3.8
19.0	3.8
20.0	3.9
21.0	4.0
22.0	4.1
23.0	4.2
24.0	4.3
25.0	4.4
26.0	4.5

TABLE 9a: TEST CABLE FOR 3M MEASUREMENT INTO 18 TO 26 GHz

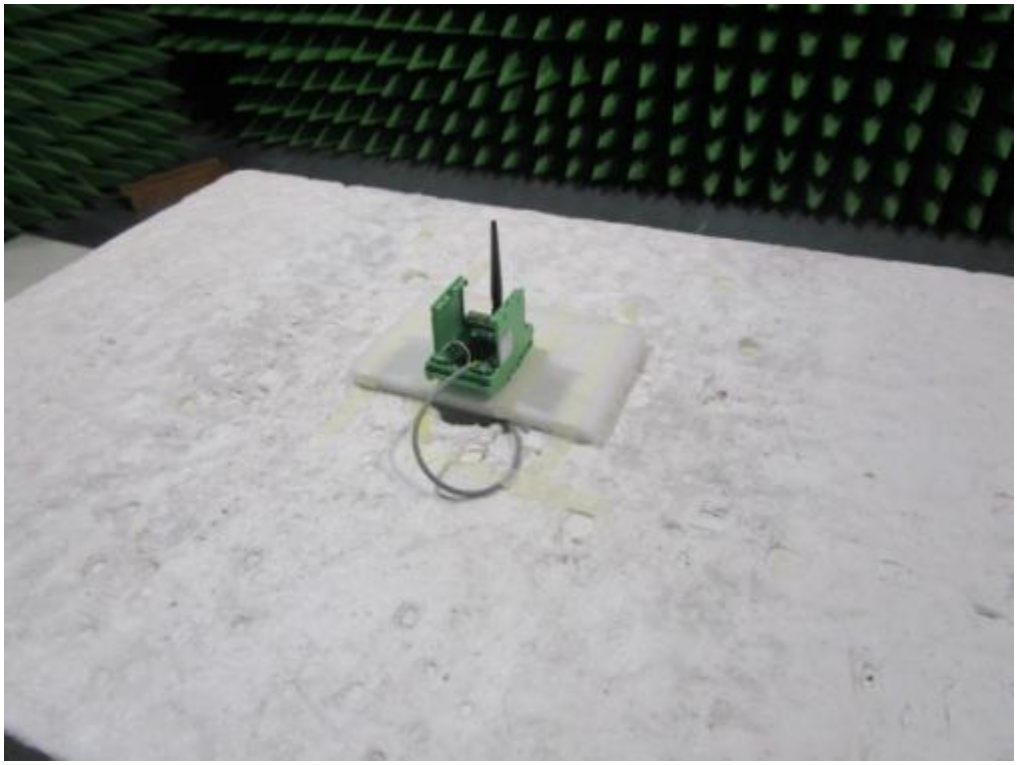
Frequency (GHz)	Loss (dB)
18.0	3.8
19.0	3.8
20.0	3.9
21.0	4.0
22.0	4.1
23.0	4.2
24.0	4.3
25.0	4.4
26.0	4.5

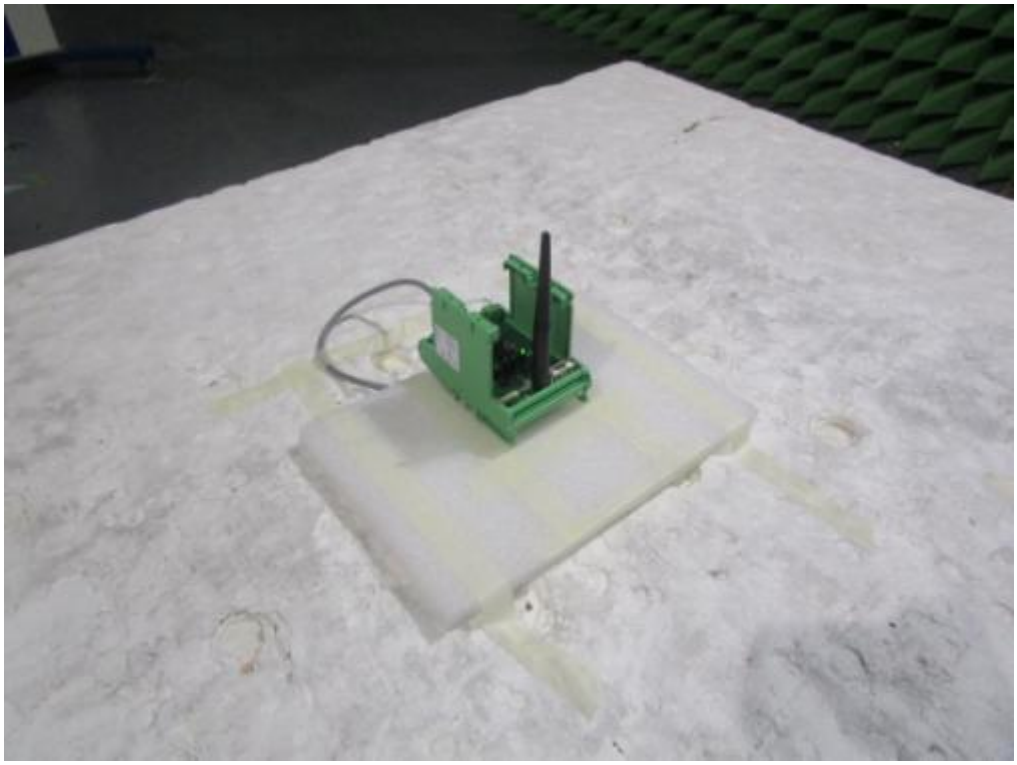
TABLE 9b: TEST CABLE FOR 3M MEASUREMENT INTO 18 TO 26 GHz

ANNEX 2:

EXTERNAL PHOTOGRAPH


Fix Module for the MEB_S
THELIS ENGINEERING
10/2015
125mA-Fast
5557-00005
TX EN
TX
RX



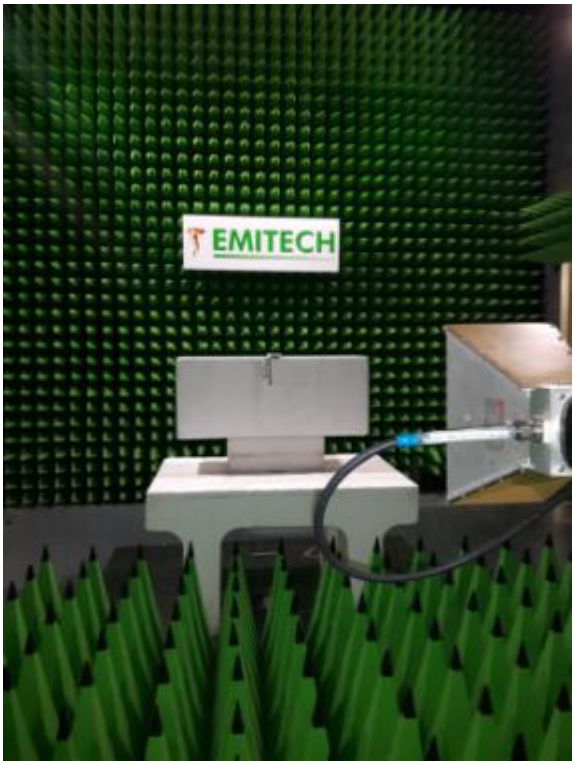


ANNEX 3:

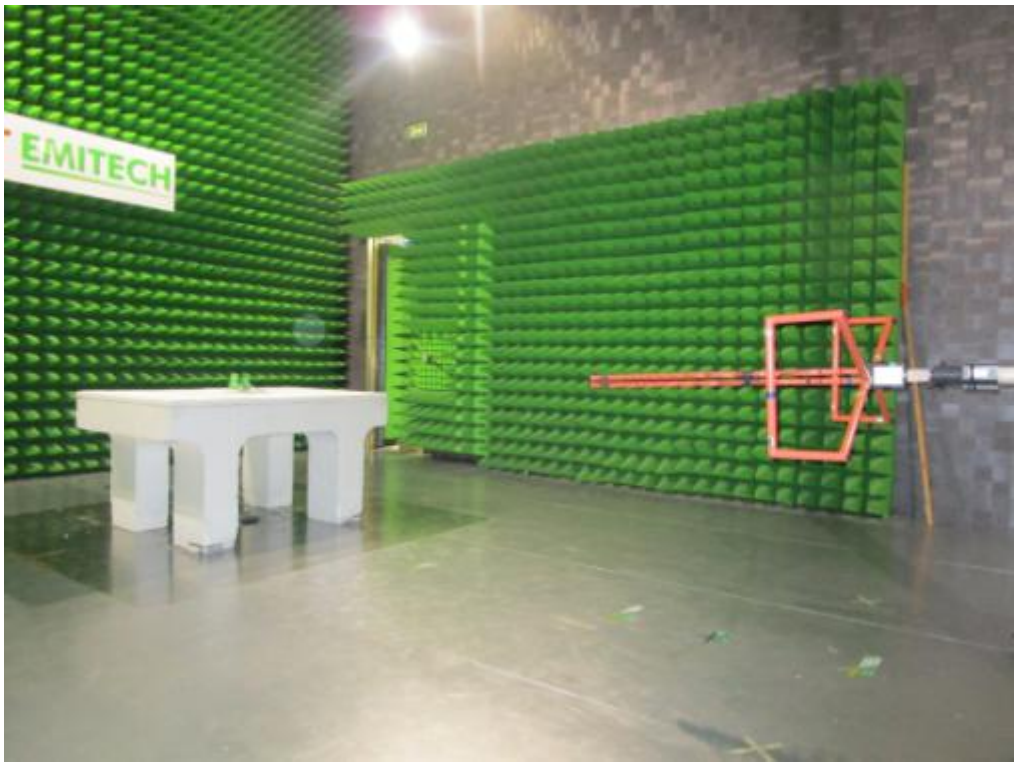
TEST SETUP PHOTOGRAPHS


EMITECH


EMITECH


EMITECH


EMITECH


EMITECH

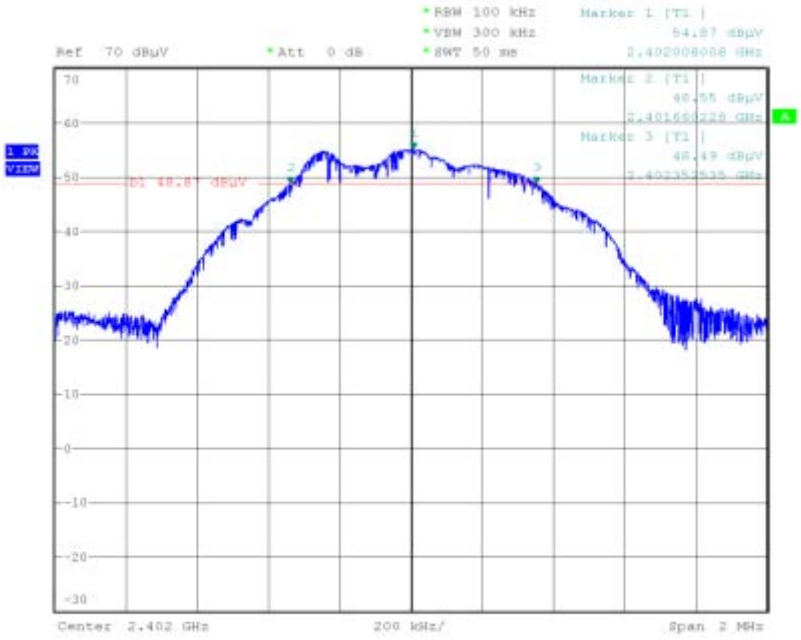
Power supply 120 Vac / 60 Hz (Nominal configuration)

ANNEX 4

6 dB BANDWIDTH
20 dB BANDWIDTH

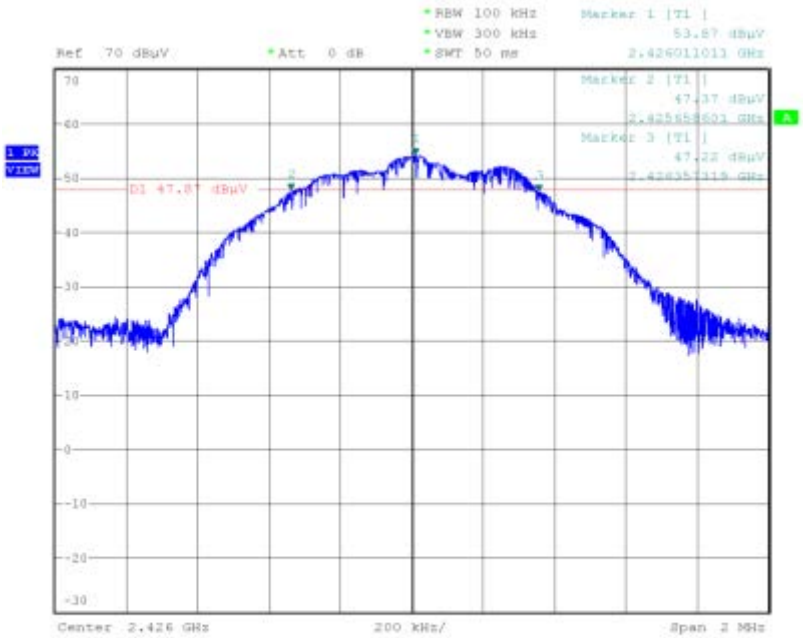
6 dB BANDWIDTH

Frequency 2402 MHz

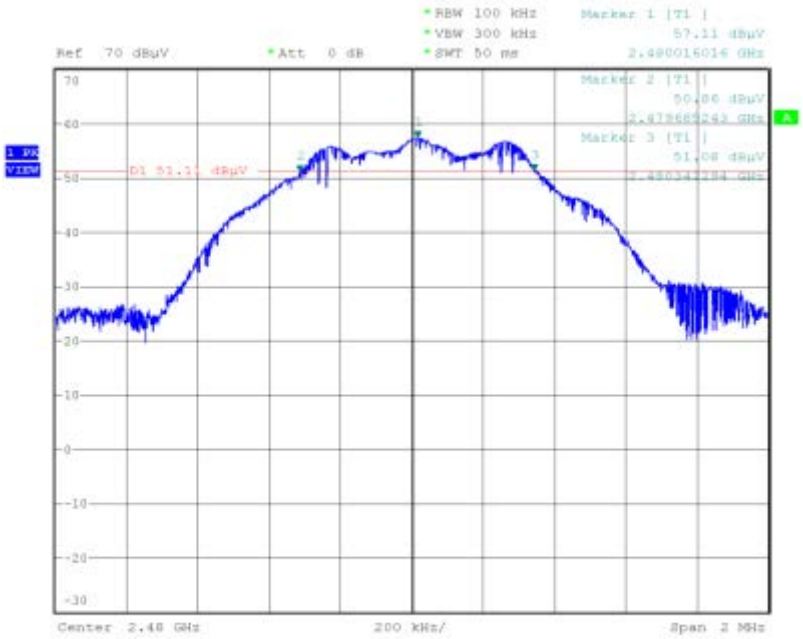


Date: 5.APR.2016 16:35:33

Frequency 2426 MHz

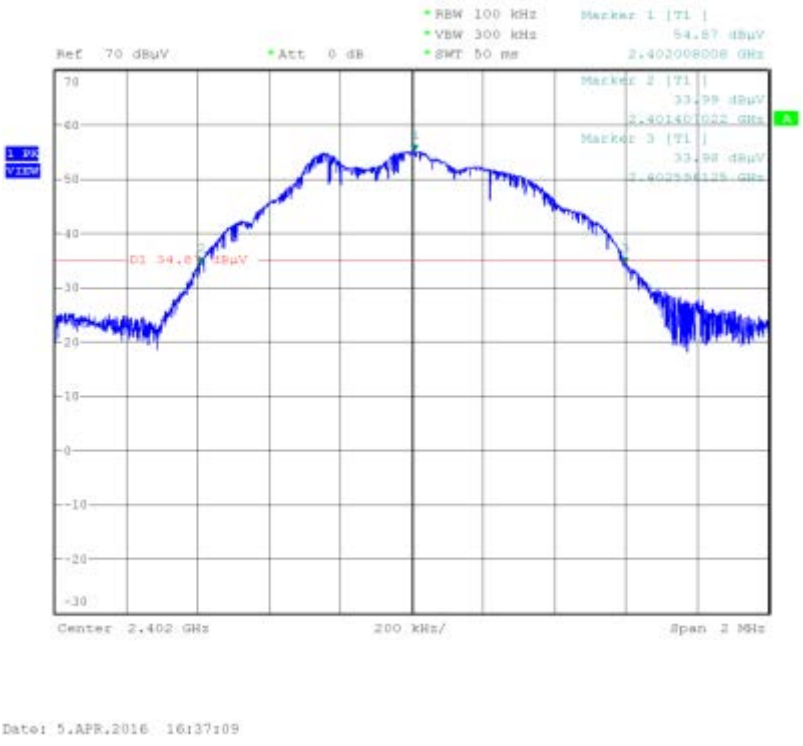


Frequency 2480 MHz

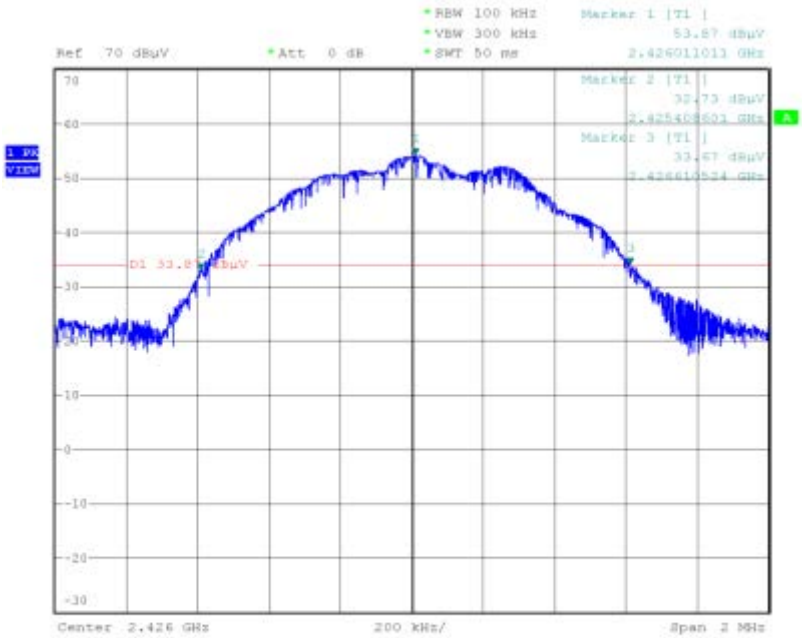


20 dB BANDWIDTH

Frequency 2402 MHz



Frequency 2426 MHz



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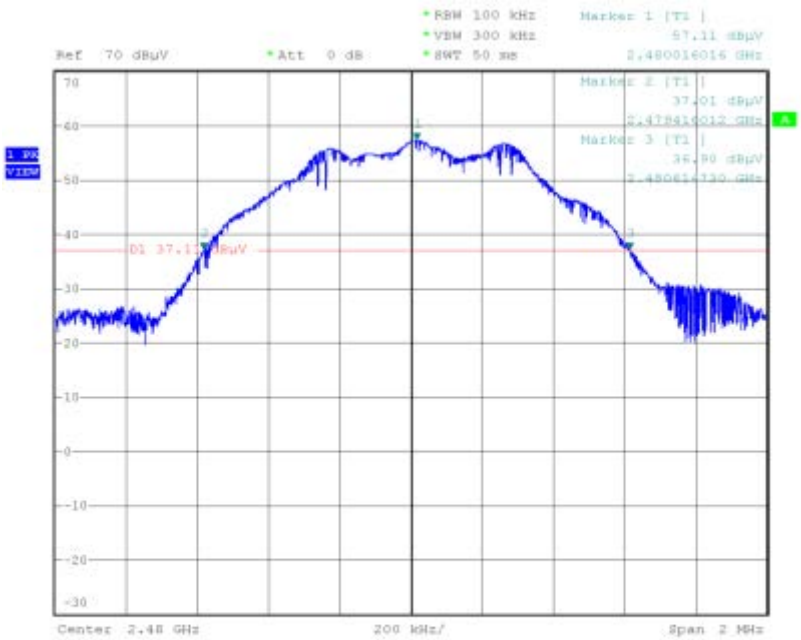
Frequency 2480 MHz



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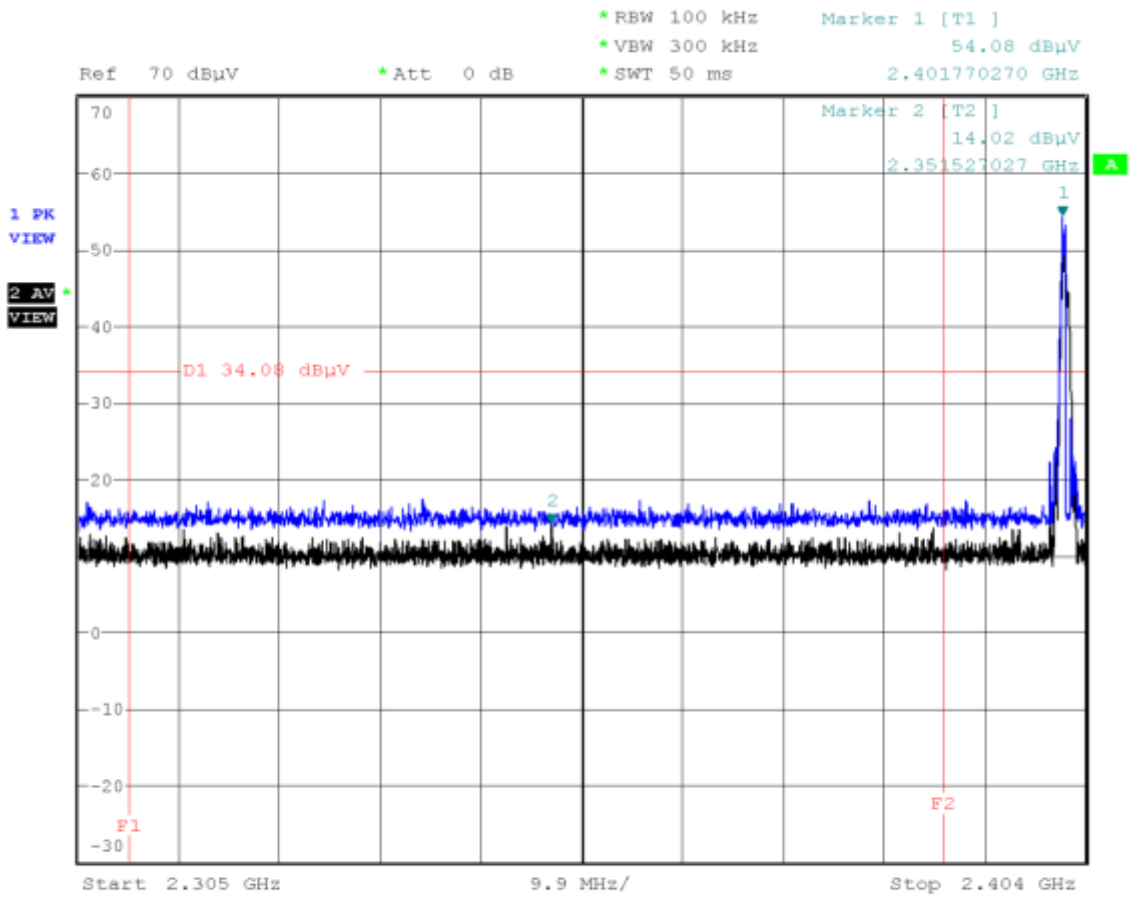
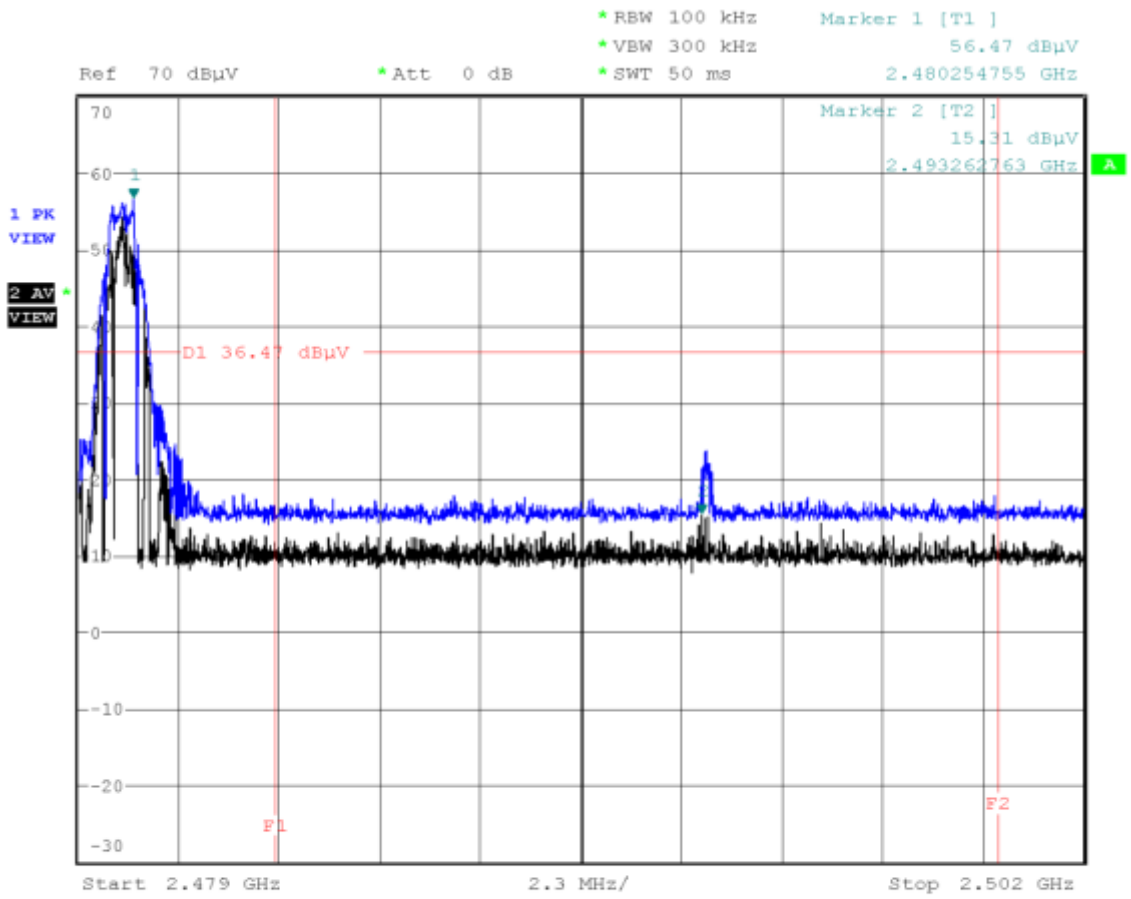
ANNEX 5

BAND EDGE



Date: 5.APR.2016 16:45:27



Date: 5.APR.2016 17:36:25

ANNEX 6

CALIBRATION DATES

N° EMITECH	LAST CALIBRATION	CALIBRATION DUE DATE
10517	18/09/2014	18/09/2016
5175	01/04/2016	01/04/2018
0549	16/02/2015	16/02/2018
0317	18/02/2015	18/02/2019
3106	05/06/2014	05/06/2016
11136	10/03/2014	10/05/2016
11172	28/03/2014	28/05/2016
11181	28/03/2014	28/05/2016
11182	28/03/2014	28/05/2016
1045	21/03/2015	21/03/2019
11132	10/03/2014	10/05/2016
11133	10/03/2014	10/05/2016
3374	28/10/2015	28/10/2018
9579	21/08/2015	21/08/2017
3229	02/04/2015	02/06/2016
6367	16/07/2015	16/07/2016