

RRA-300-18-100651-1-A

E.M.C. TESTS REPORT

According to the standard:
FCC 47 CFR part 15 : 2017 (§15.225)

Equipment under test:
Table top PRD7310008B02
(FCC ID: 2AKUFPRD73108B)


Company:
BIOLOG-ID

FCC accredited: FR0004

Distribution: Mrs. BAYEUX

(Company: BIOLOG-ID)

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0	03/04/2018	Creation	G. SCIPION GS		B. Pellerin 	

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NAME OF THE EQUIPMENT UNDER TEST (E.U.T.) : Table top PRD7310008B02

Serial number : BI1802000100

Part number : N.C.

Software Version : N.C.

MANUFACTURER'S NAME : BIOLOG-ID

APPLICANT'S ADDRESS:

Company : BIOLOG-ID

Address : 1 rue du commandant Robert Malrait
27300 BERNAY - FRANCE

Person present during the tests : -

Responsible : Mrs. BAYEUX

DATES OF TESTS : From 22/01 to 26/01/2018

TESTS LOCATION : EMITECH laboratory in Montigny Le Bretonneux
(78) - FRANCE

TESTS SUPERVISOR : B. PELLERIN

TESTS OPERATOR : G. SCIPION

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1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment «**TABLE TOP PRD7310008B02**» (denominated hereafter E.U.T.: equipment under test) according to documents listed below.

2. REFERENCE DOCUMENTS**FCC 47 CFR Part 15: 2017**

Code of Federal Regulations

Title 47- Telecommunication

Chapter 1- Federal Communication Commission

Part 15- Radio frequency devices

C63.10 : 2013

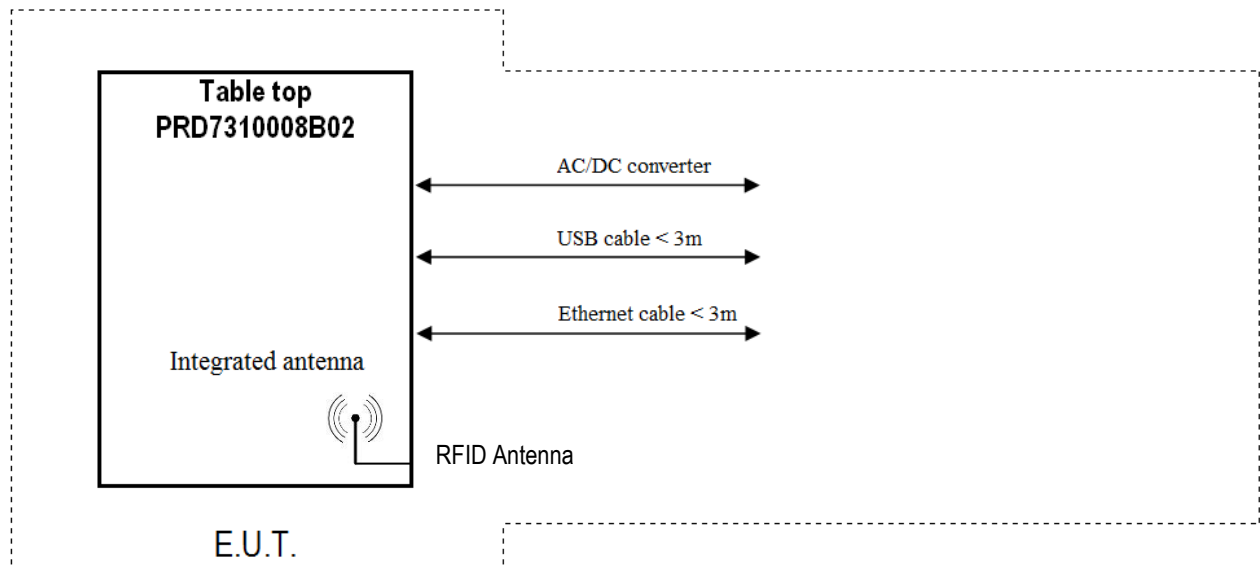
American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

3. EQUIPMENT UNDER TEST CONFIGURATION

Equipment under test (E.U.T.) description:

Class: B (residential environment)

RFID tag system



Antenna type and gain: internal antenna

Operating frequency range: from 13.553 MHz to 13.567 MHz

Number of channels: 1

Power source: 120Vac / 60Hz

Modification of the equipment during the tests: No.

Cycle and operating mode during emission tests:

The equipment under test is in a constant modulated RF emission mode.

4. SUMMARY OF TESTS RESULTS

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				
15.225	intentional radiated emissions in the band 13.110 MHz – 14.010 MHz					
	a) 13.553 MHz - 13.567 MHz	X				
	b) 13.410-13.553 MHz and 13.567-13.710 MHz	X				
	c) 13.110-13.410 MHz and 13.710-14.010 MHz	X				
	d) outside 13.110 MHz and 14.010 MHz	X				
	e) Frequency drift	X				
	f) Tag			X		

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

Conclusion:

The tested sample "**TABLE TOP PRD7310008B02**" submitted to the tests complies with the requirements of the standard:

- FCC 47 CFR PART 15: 2017

According to the limits specified in this report.

To declare or not compliance with the specification, it has not been given explicit account of the uncertainty associated with results.

5. INTENTIONAL RADIATED EMISSIONS IN THE BAND 13.553 MHz – 13.567 MHz

Standard: FCC 47 CFR PART 15: 2017

Section: 15.225 (a)

Test configuration:

The system is tested in open area test site.

The equipment under test (EUT) is placed on a non-conductive test table at 1 m above the horizontal reference ground plane.

Antenna height is 1 m above the ground plane.

For each frequency corresponding to an emission, EUT carried out a rotation through 360° with the aid of the turntable, with the aim to find the maximum of signal.

The test antenna is oriented in all orientations. Only the highest level is recorded.

Frequency range: 13.553 MHz – 13.567 MHz

Detection mode: Quasi-peak

Resolution bandwidth: 9 kHz

Measurement distance: 10 meters

Limit:

Frequency range (MHz)	Frequency field strength		Frequency measurement distance (meters)
	µV/m	dBµV/m	
13.553 – 13.567	15848	84	30
	-	103.08	10

①: $84 \text{ dB}\mu\text{V/m} + 20 \log(30/10)^2$

Operating mode during the test:

RF ON mode.

Instrumentation test list:

Category	Brand	Type	N ^R Emitech	Last validity date	Next validity date
Antenna	Emco	6502	7179	05/07/2017	05/09/2019
Cable	/	N-2m	4358	21/06/2016	21/08/2018
Cable	Câbles et Connectiques	N-13m	2452	05/07/2017	05/09/2019
Cable	/	N-30m	4359	03/08/2016	03/10/2018
OATS	Emitech	Aunainville	0187	-	-
Receiver	Rohde & Schwarz	ESH3 (V 335.8017.52)	0181	01/07/2016	01/09/2018
Spectrum analyzer	Rohde & Schwarz	FSP7 (V 2.80FP3-V1.4-26-2)	6801	15/09/2017	15/11/2019

Results:

Ambient temperature (°C): 16

Relative humidity (%): 40

Power source: 120Vac/60Hz

FREQUENCY (MHz)	ANTENNA ORIENTATION	AZIMUTH (degrees)	MEASUREMENT (dB μ V/m)	LIMIT (dB μ V/m)	MARGIN (dB)
13.5600	perpendicular	90	66.38	103.08	37.42

Test conclusion: Complies with the requirements of the standard.

6. INTENTIONAL RADIATED EMISSIONS IN THE BAND 13.110 MHz – 14.010 MHz

Standard: FCC 47 CFR PART 15: 2016

Section: 15.225 (b) and (c)

Test configuration:

The measure is realized in near field and the results are correlated with the intentional radiated emission at 10 meters.

Frequency range: 13.110 MHz – 14.010 MHz

Detection mode: Peak

Resolution bandwidth: 10 kHz

Instrumentation test list:

Category	Brand	Type	N ^R Emitech	Last validity date	Next validity date
Antenna	Emco	6502	7179	05/07/2017	05/09/2019
Cable	/	N-2m	4358	21/06/2016	21/08/2018
Cable	Câbles et Connectiques	N-13m	2452	05/07/2017	05/09/2019
Cable	/	N-30m	4359	03/08/2016	03/10/2018
OATS	Emitech	Aunainville	0187	-	-
Receiver	Rohde & Schwarz	ESH3 (V 335.8017.52)	0181	01/07/2016	01/09/2018
Spectrum analyzer	Rohde & Schwarz	FSP7 (V 2.80FP3-V1.4-26-2)	6801	15/09/2017	15/11/2019

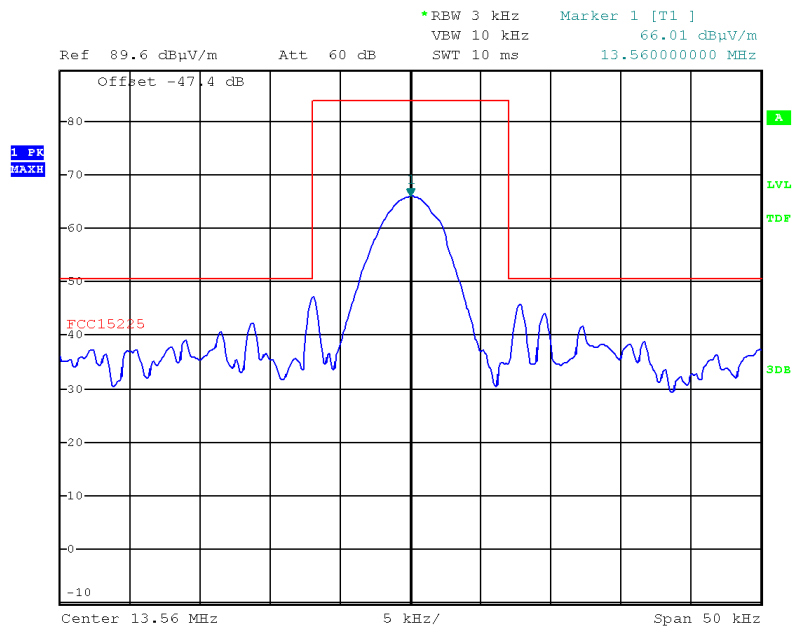
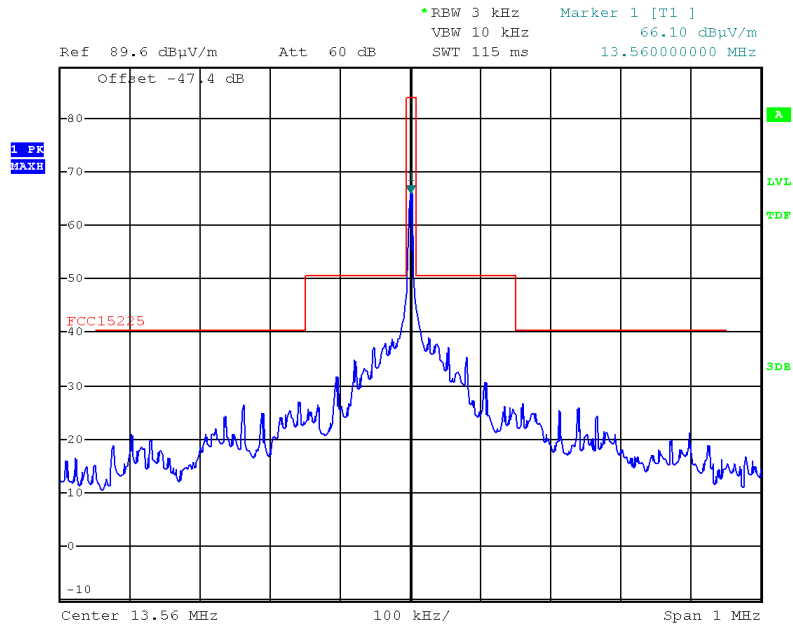
Limit:

Frequencies range (MHz)	Frequency field strength		Frequency measurement distance (meters)
	μV/m	dBμV/m	
13.110 – 13.410 and 13.710 – 14.010	106.0	40.5	30
13.410 – 13.553 and 13.567 – 13.710	334.0	50.5	30
13.110 – 13.410 and 13.710 – 14.010	-	59.6①	10
13.410 – 13.553 and 13.567 – 13.710	-	69.6①	10

①: $E \text{ (dB}\mu\text{V/m)} + 20\log(30/10)^2$

Results:

Ambient temperature (°C): 20
 Relative humidity (%): 40
 Power source: 120Vac / 60Hz



Test conclusion: Complies with the requirements of the standard.

7. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 9 KHz – 30 MHz

Standard: FCC 47 CFR PART 15: 2016

Sections: 15.109 and 15.209

Equipment under test arrangement

The system is tested in open area test site.

The equipment under test (EUT) is placed on a non-conductive test table at 1 m above the horizontal reference ground plane.

Antenna height is 1 m.

For each frequency corresponding to an emission, EUT carried out a rotation through 360° with the aid of the turntable, with the aim to find the maximum of signal.

The test antenna is oriented in all orientations. Only the highest level is recorded.

Frequency range: 9 kHz - 30 MHz.

Detection mode: Quasi-peak except frequency bands 9-90 kHz and 110-490 kHz (average).

Resolution bandwidth: 200 Hz from 9 kHz to 150 kHz.
9 kHz from 150 kHz to 30 MHz

Measurement distance: 10 meters.

Limit:

Frequency range (MHz)	Frequency field strength (µV/m)	Frequency measurement distance (meters)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30

Limits in dBµV/m can be extrapolated to 30 m using 40 dB / decade.

Instrumentation test list:

Category	Brand	Type	N ^R Emitech	Last validity date	Next validity date
Antenna	Emco	6502	7179	05/07/2017	05/09/2019
Cable	/	N-2m	4358	21/06/2016	21/08/2018
Cable	Câbles et Connectiques	N-13m	2452	05/07/2017	05/09/2019
Cable	/	N-30m	4359	03/08/2016	03/10/2018
OATS	Emitech	Aunainville	0187	-	-
Receiver	Rohde & Schwarz	ESH3 (V 335.8017.52)	0181	01/07/2016	01/09/2018
Spectrum analyzer	Rohde & Schwarz	FSP7 (V 2.80FP3-V1.4-26-2)	6801	15/09/2017	15/11/2019

Results:

Ambient temperature (°C): 16
 Relative humidity (%): 40
 Power source: 120Vac / 60Hz

Not any spurious has been detected.

Test conclusion: Complies with the requirements of the standard.

8. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHz – 1 GHz

Standard: FCC 47 CFR PART 15: 2016

Sections: 15.109 and 15.209

Equipment under test arrangement:

The system is tested in normalized test site.

The equipment under test (EUT) is placed on a non-conductive test table at 1 m above the horizontal reference 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 tables on the next pages.

Frequency range: 30 MHz – 1 GHz

Detection mode: Quasi-peak

Resolution bandwidth: 120 kHz

Measurement distance: 3 meters

Limit: The EUT must satisfy requirements of the section 15.109 and 15.209 as shown in table below.

Frequency range (MHz)	Limit (dB μ V/m)
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 to 1000	54.0

Instrumentation test list :

Category	Brand	Type	N ^R Emitech	Last validity date	Next validity date
Amplifier	Mini-circuit	ZFL-1000LN	5744	25/09/2017	25/11/2018
Antenna	Rohde & Schwarz	HK116	0293	12/06/2015	12/08/2018
Antenna	Rohde & Schwarz	HL223	0294	05/07/2017	05/09/2020
Antenna	Emco	DB-2	1383	27/09/2017	27/11/2020
Antenna	Emco	3121C-DB3	14694	27/09/2017	27/11/2020
Antenna	Emco	3121C-DB1	14696	27/09/2017	27/11/2020
Cable	C&C	N-10m	11170	16/04/2016	16/06/2018
Cable	C&C	N-2m	11176	18/04/2016	18/06/2018
Cable	C&C	N-6m	14224	02/09/2016	02/11/2018
Cable	C&C	N-4m	14226	02/09/2016	02/11/2018
Cable	c&c	N-4m	14227	02/09/2016	02/11/2018
Shielded enclosure	comtest	SAC 3m	14622	---	---
Spectrum analyzer	Rohde & Schwarz	ESR7	12811	01/08/2017	01/10/2018
Synthesizer	Rohde & Schwarz	SMBV100A	14566	09/06/2017	09/08/2019

Results:

Ambient temperature (°C): 20
 Relative humidity (%): 40
 Power source: 120Vac / 60Hz

Frequency (MHz)	Polarization	Antenna Height (cm)	Azimuth (degrees)	Q-Peak Measure (dB μ V/m)	Limit (dB μ V/m)	Margin
40.675	Vertical	100	100	24.7	40.0	15.3
54.234	Vertical	100	100	31.8	40.0	8.2
67.807	Vertical	100	100	19.1	40.0	20.9
81.373	Vertical	100	58	22.2	40.0	17.8
135.6	Horizontal	100	100	26	43.5	17.5
155.8	Horizontal	100	290	26.84	43.5	16.6

V = Vertical; H = Horizontal

Test conclusion: Complies with the requirements of the standard.

9. CONDUCTED EMISSION

Standard: FCC 47 CFR PART 15: 2016

Test method: Part 15.107 and 15.207

Test configuration:

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

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

(*) for measurement in average detection.

Test method deviation: No

Test equipment list:

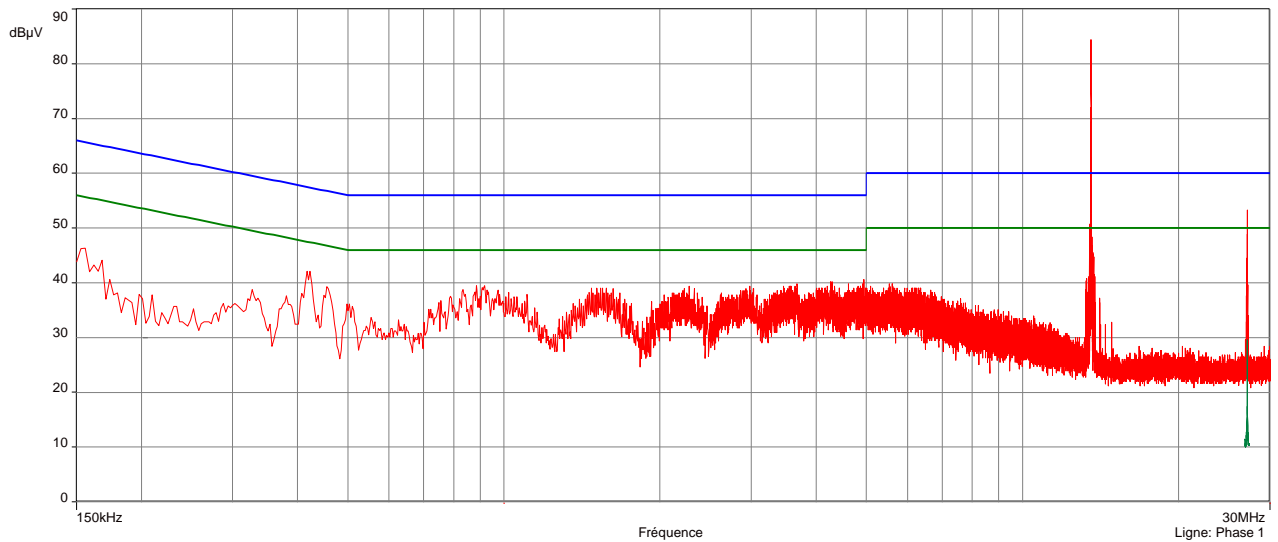
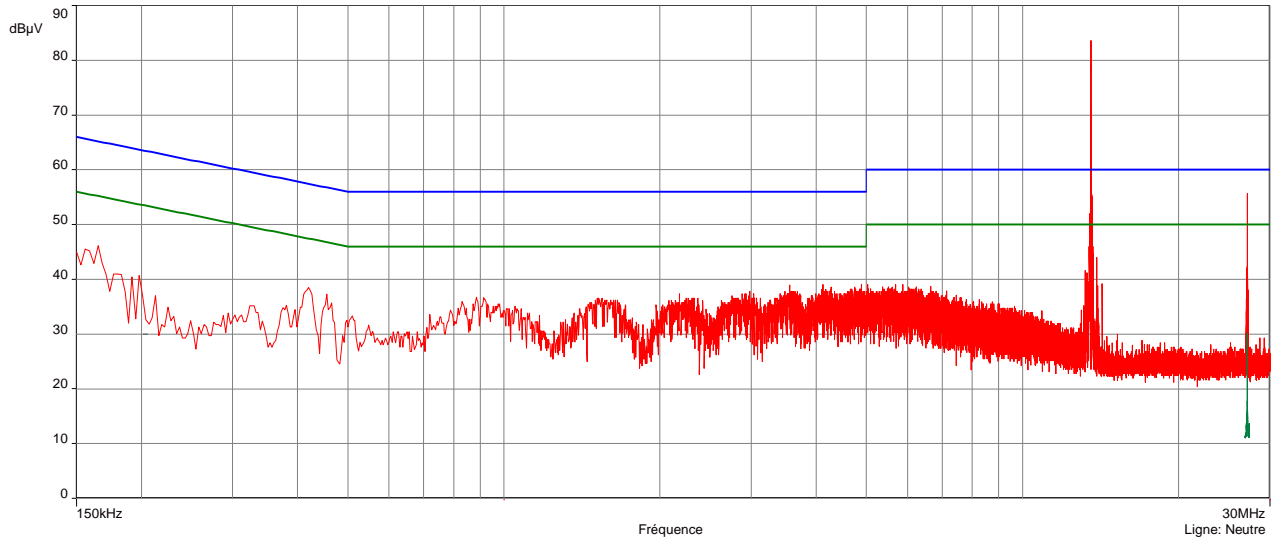
Category	Brand	Type	N° Emitech	Last validity date	Next validity date
Absorption clamp	Rohde & Schwarz	MDS21	5288	17/02/2016	17/04/2020
Cable	C&C	BNC-0.3m	10027	29/04/2017	29/06/2019
Cable	Sucoflex	N-3m	12919	29/04/2016	29/06/2018
Multimeter	Emitech	Sheath current absorber	12356	31/10/2017	31/12/2019
Power supply	Schaffner	NSG 1007-5-400	4637	30/03/2017	30/05/2018
QP adapter	Hewlett Packard	HP 85650 A	0491	14/03/2016	14/05/2018
Receiver	Rohde & Schwarz	ESH3 (V 335.8017.52)	6569	08/04/2016	08/06/2018
Resistor	Emitech	150 Ohms	14343	02/01/2017	02/03/2019
Spectrum analyzer	Hewlett Packard	HP 8568 B	0019	10/03/2016	10/05/2018
Test enclosure	Emitech	JD 3P1	14875	---	---

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

Curves 1 and 2

TABLE TOP PRD7310008B02

Conducted voltage emission (measurement): Power supply 120 Vac / 60 Hz in peak detection (red) and average value detection (green)



Class B of the standard FCC 47 CFR PART 15: 2017

10. FREQUENCY DRIFT

Standard: FCC 47 CFR Part 15: 2017

Section: 15.225 (e)

Test configuration:

The measure is realized in near field and the results are correlated with the intentional radiated emission at 30 meters.

Test equipment used:

CATEGORY	BRAND	TYPE	N° EMITECH	Last validity date	Next validity date
Autotransformer	E.T.A.T.	Cx520P	0931	---	---
Climatic enclosure	Flonic Schlumberger	200P	2694	---	---
Power supply	APT	AC07040	10635	06/01/2017	06/03/2018
Resistance thermometer	GHM Greisinger	GMH 3710	12832	21/07/2017	21/09/2018
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175	01/04/2016	01/06/2018
Tests enclosure	Emitech	LER	12079	---	---

Measurement conditions:

Resolution bandwidth: 10 kHz

Video bandwidth: 30 kHz

Test operating conditions of the equipment:

The transmitter is in RF ON mode.

Results:

			F (MHz)	Deviation (kHz)	Curve	Limit (1)
Normal test conditions	Temperature (+20°C) Humidity (40%)	Nominal power source (120.0 V)	13.5599	0.1	1	± 1.356 kHz
		Minimal power source (102 V)	13.5599	0.1	2	
		Maximal power source (138 V)	13.5599	0.1	3	
Extreme test conditions	Minimal temperature (-20°C) Minimal temperature (-30°C) Maximal temperature (+50°C)	Nominal power source (120 V)	13.5599	0.1	4	
			13.5599	0.1	5	
			13.5599	0.1	6	

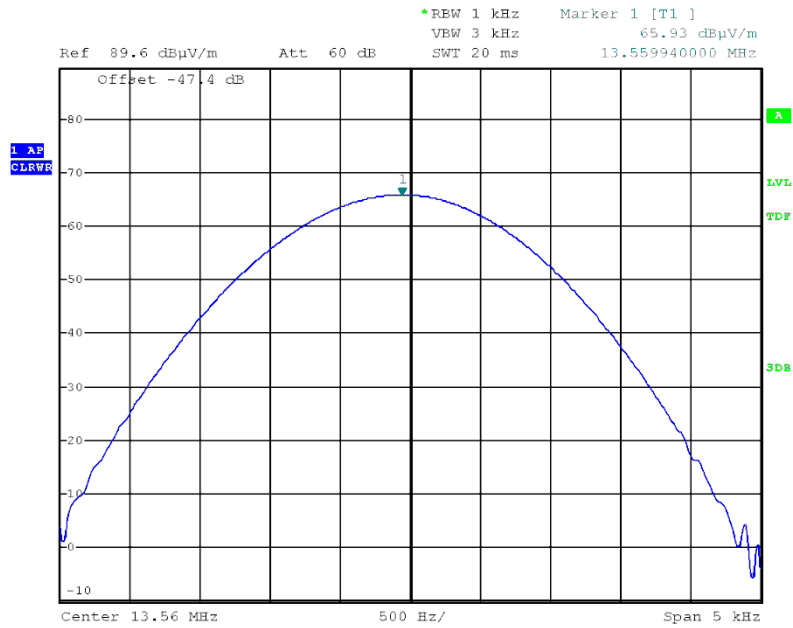
(1) ± 0.01 % of the operating frequency.

N.A. : Not Applicable

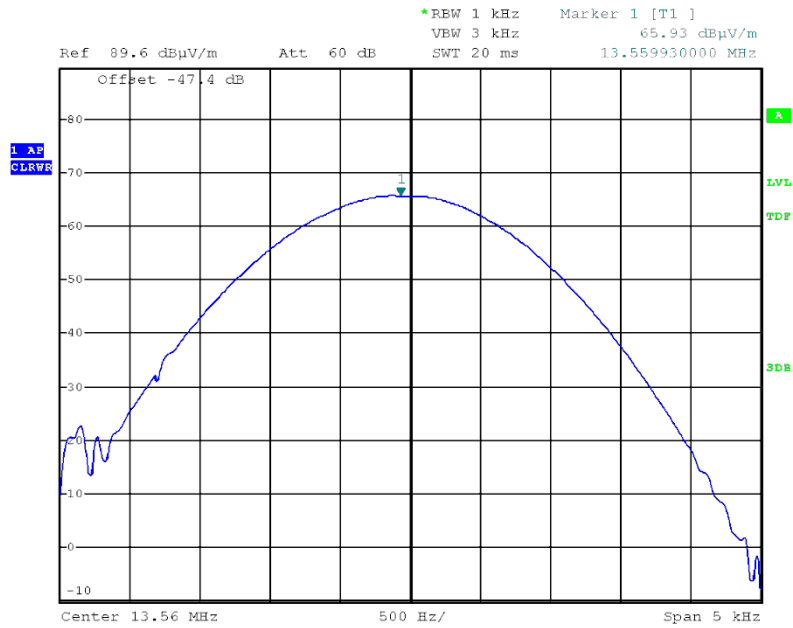
Measurement uncertainty: ± 1 x 10⁻⁷

Test conclusion: Complies with the requirements of the standard.

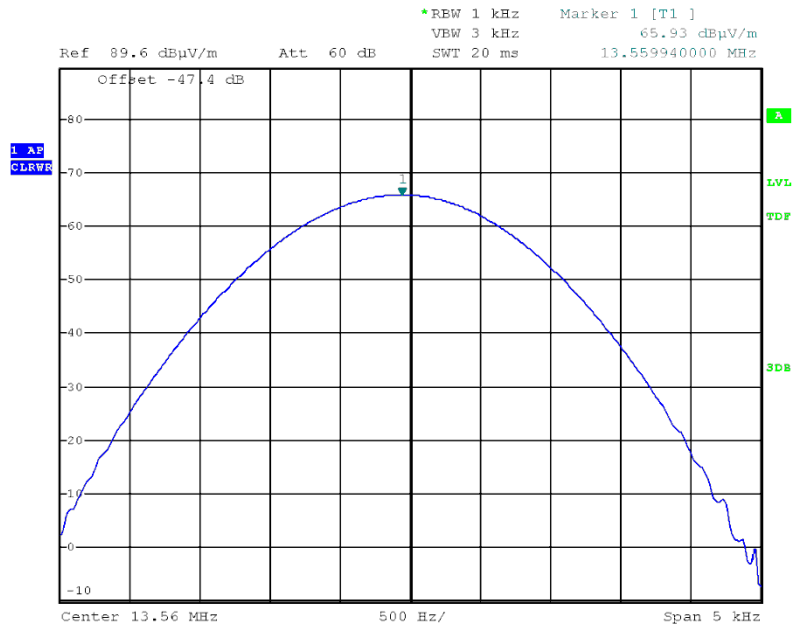
Curve 1



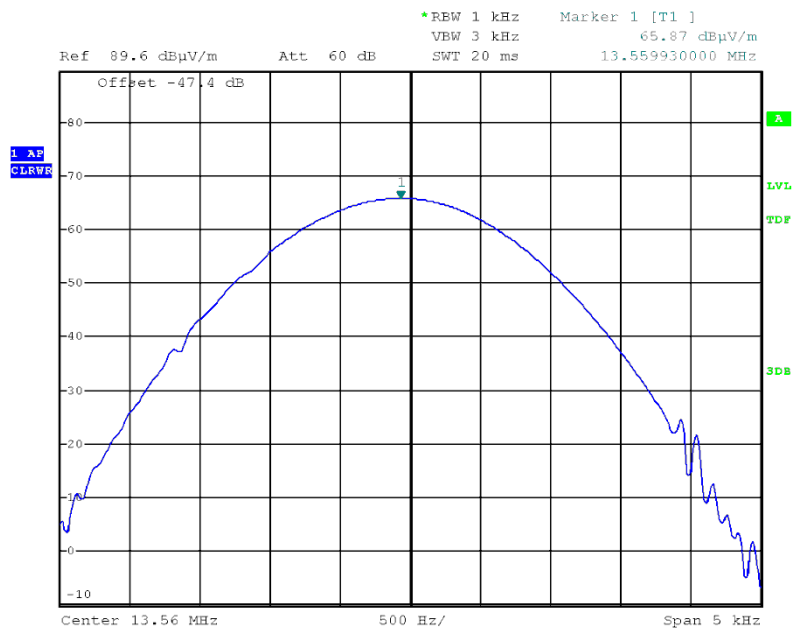
Curve 2



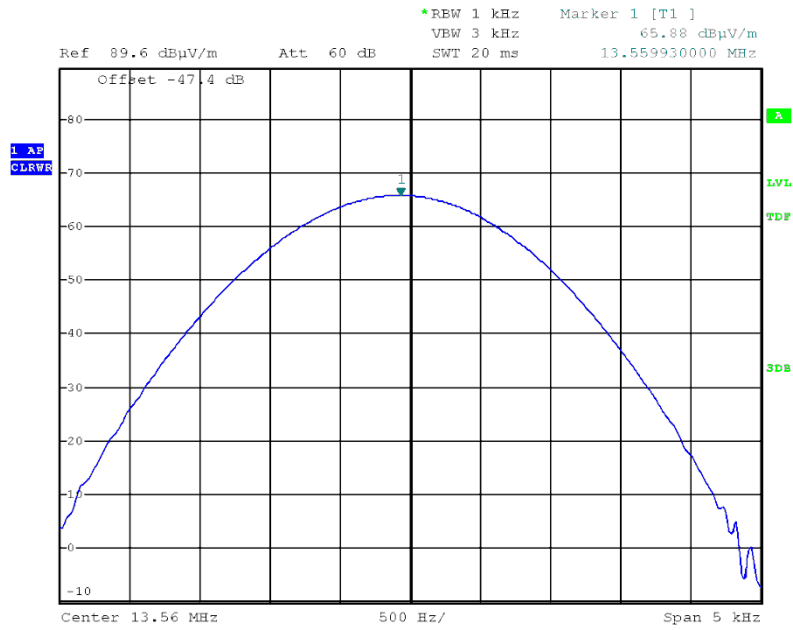
Curve 3



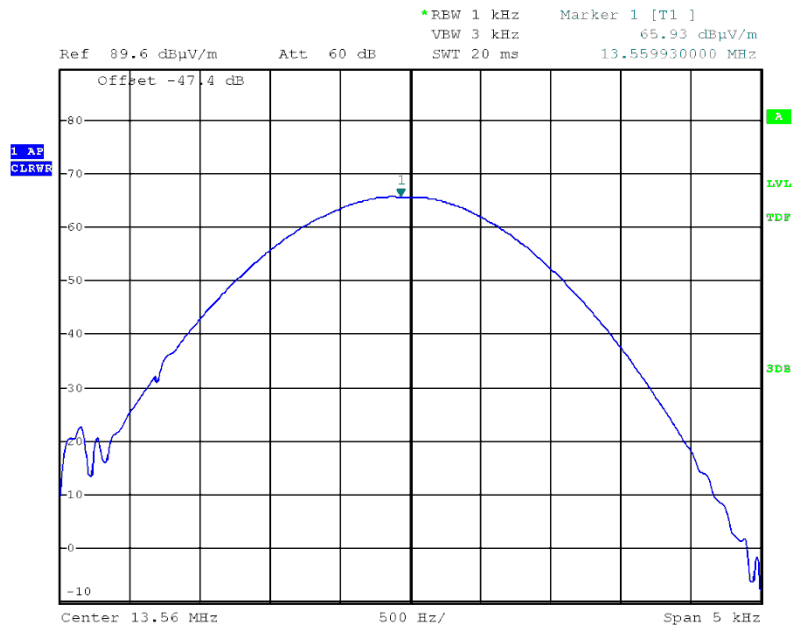
Curve 4



Curve 5



Curve 6



11. 20 dB BANDWIDTH

Standard: FCC 47 CFR Part 15: 2016

Section: 15.215 (c)

Test configuration:

The measure is realized in near field and the results are correlated with the intentional radiated emission at 30 meters.

Test equipment used:

Category	Brand	Type	N° Emitech	Last validity date	Next validity date
Climatic enclosure	Flonic Schlumberger	200P	2694	---	---
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175	01/04/2016	01/06/2018
Tests enclosure	Emitech	LER	12079	---	---

Measurement conditions:

Resolution bandwidth: 1 kHz

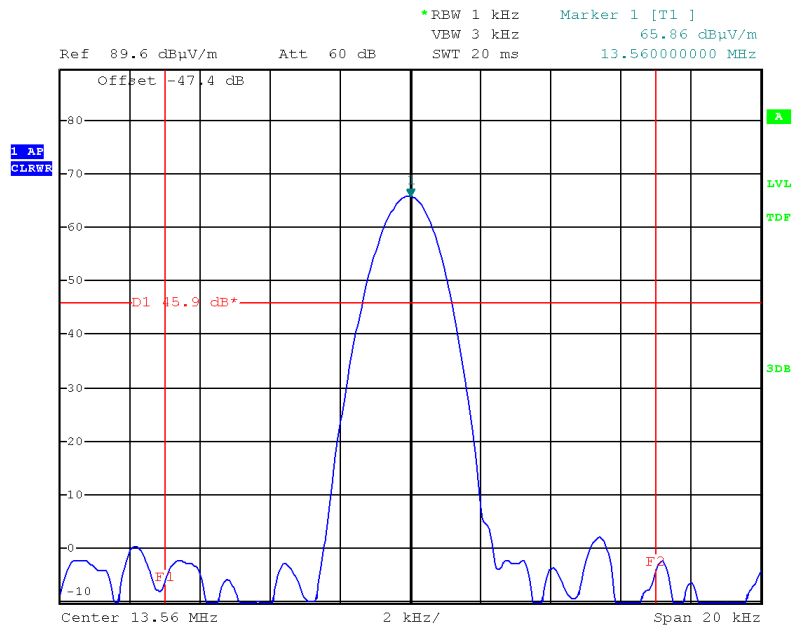
Video bandwidth: 3 kHz

Test operating conditions of the equipment:

The transmitter is in RF ON mode.

Results:

20 dBc point (Low)	20 dBc point (High)	Operating frequency band (MHz)
13.558640 MHz	13.56124 MHz	13.553 to 13.567

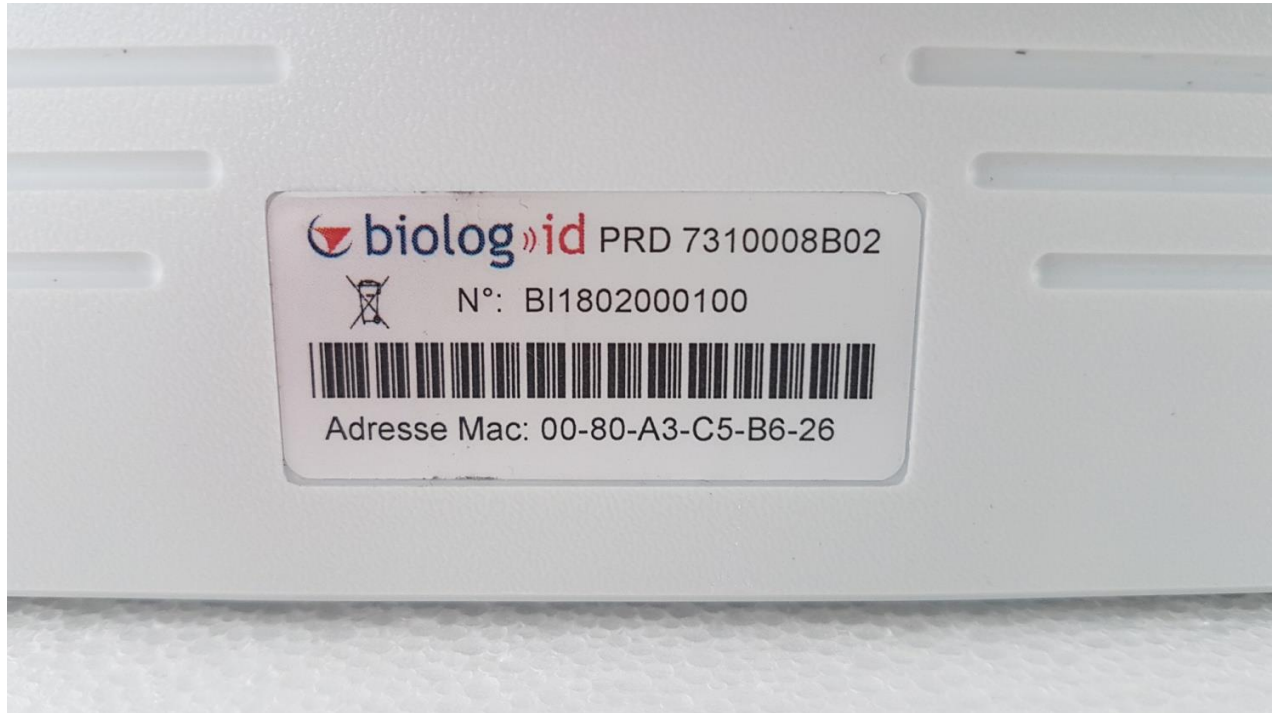


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ANNEX: PHOTOGRAPHS

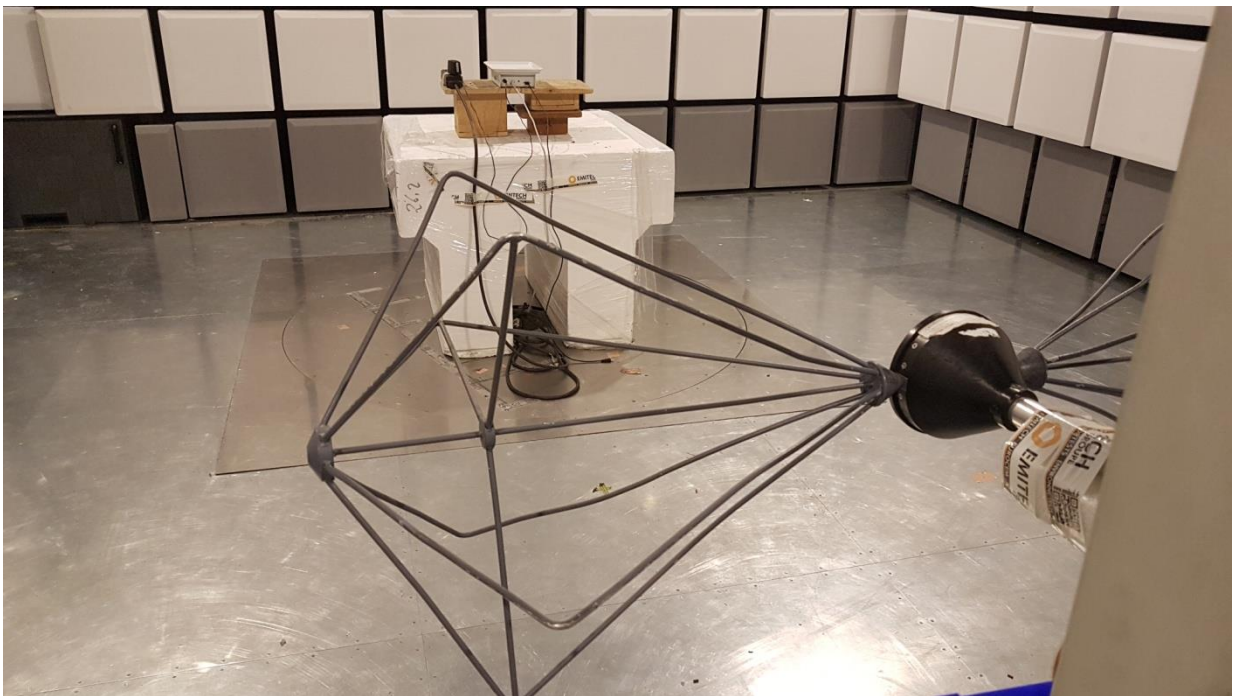
EQUIPMENT UNDER TEST (E.U.T.) PHOTOGRAPHS

E.U.T. Photographs:



E.U.T. Photograph:

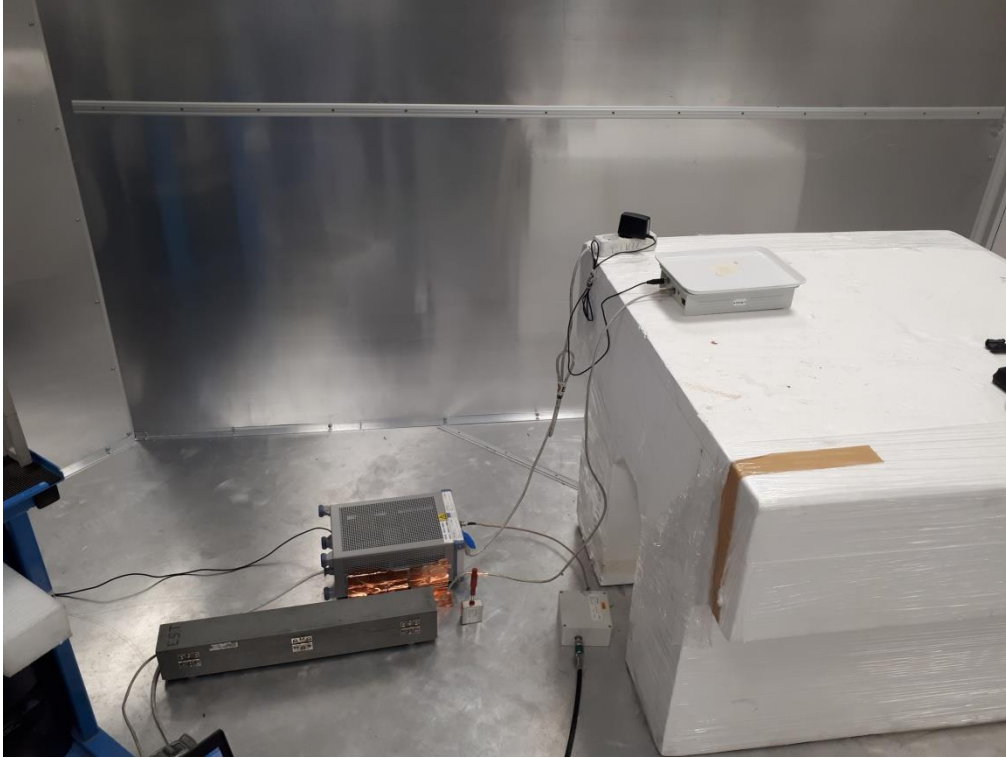








Radiated emission



Conducted emission