RFID 13,56MHz Template: Release February 25th, 2020

TEST REPORT

N°: 166516-749304-B **Version : 01**

Subject	**Radio spectrum matters tests according to standards: 47 CFR Part 15.225 & RSS 210 Issue 10 & RSS-Gen Issue 5**
Issued to	**BIOLOG ID 1 rue du commandant Robert Malrait 27300-BERNAY FRANCE**
Apparatus under test	
Product	**SMART STORAGE REFRIGERATOR HIGH DENSITY (SST-R HD with 450mm tray)**
Trade mark	**BIOLOG ID**
Manufacturer	**BIOLOG ID**
Model under test	**PRD 7170100A**
Serial number	**01BI2009000001**
FCC ID	**2AKUFSSTHD45**
IC	**23919-SSTHD45**
Conclusion	See Test Program chapter
Test date	: June 25, 2020 to June 30, 2020
Test location	Fontenay Aux Roses & Ecuelles
Test Site	6230B-1
Sample receipt date	June 23, 2020
Composition of document	44 pages
Document issued on	June 30, 2020

Written by :
Laurent DENEUX
Tests operator

Approved by :
Arnaud LAFAYETTE
Technical Manager

PUBLICATION HISTORY

Version	Date	Author	Modification
01	June 30th, 2020	Laurent DENEUX	Creation of the document

Each new edition of this test report replaces and cancels the previous edition. The control of the old editions of report is under responsibility of client.

SUMMARY

1. TEST PROGRAM

References

- **47 CFR Part 15.225 (2020)**
- **RSS 210 Issue 10**
- **RSS Gen Issue 5**
- **ANSI C63.10 (2013)**

Radio requirement:

Clause (47CFR Part 15.225 & RSS-210 Issue 10 & RSS-Gen Issue 5) Test Description	Test result - Comments			
Occupied Bandwidth	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
AC Power Line Conducted Emission	☑ PASS	☐ FAIL	☐ NA(2)	☐ NP(1)
Frequency Tolerance	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Field strength within the band 13.110-14.010MHz	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Field strength outside of the bands 13.110-14.010 MHz	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Receiver Radiated Emissions	☑ PASS (3)	☐ FAIL	☐ NA	☐ NP(1)
This table is a summary of test report, see conclusion of each clause of this test report for detail.				

(1): Limited program
(2): EUT not directly or indirectly connected to the AC Power Public Network
(3)Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

PASS: EUT complies with standard's requirement
FAIL: EUT does not comply with standard's requirement
NA: Not Applicable
NP: Test Not Performed

2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
BIOLOG ID PRD 7170100A **Serial Number: 01BI2009000001**



Equipment Under Test

Power supply:
During all the tests, EUT is supplied by V_{nom}: 15.00VDC
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	☑ AC ☐ DC ☐ Battery	100-240v ; 50-60Hz		

Voltage table used (for Power Line Conducted Emissions):

Type	Measurement performed:	
☑ AC	☑ 120VAC/60Hz	☑ 240VAC/50Hz
☐ DC	☐ + VDC	☐ -....VDC
☐ Battery	☐ + VDC	☐ -....VDC
☐ USB (Laptop auxiliary)	☐ 120VAC/60Hz (Laptop auxiliary)	☐ 240VAC/50Hz(Laptop auxiliary)

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Power supply	-	2	☑	☐	☑	-
Ethernet cable	RJ45	10	☐	☑	☑	-
CAN BUS cable	-	2	☑	☐	☑	-

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Power supply	TR9KG6000LCP-IM(R6B)		GLOBTECH
Laptop	-	-	Use to set the EUT
Ethernet switch	-	-	Use to set the EUT

Equipment information:

Type:	☑ **RFID**			
Frequency band:	[13.553 to 13.567] MHz			
Number of Channel:	1			
Antenna Type:	☑ Integral	☐ External	☐ Dedicated	
Transmit chains:	1			
Receiver chains	1			
Type of equipment:	☑ Stand-alone	☐ Plug-in	☐ Combined	
Equipment arrangement:	☐ Tabletop	☑ Floor-standing	☐ Multiple orientations	
Equipment type:	☑ Production model	☐ Pre-production model		
Operating temperature range:	Tmin:	☐ -20°C	☐ 0°C	☑ -30°C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☐ 50°C	☑ 55°C
Type of power source:	☑ AC power supply	☑ DC power supply	☐ Battery	
Operating voltage:	Vmin:	☐ 102V/60Hz	☑ 11.50Vdc	
	Vnom:	☑ 120V/60Hz	☑ 15.00Vdc	
	Vmax:	☐ 138V/60Hz	☑ 16.00Vdc	

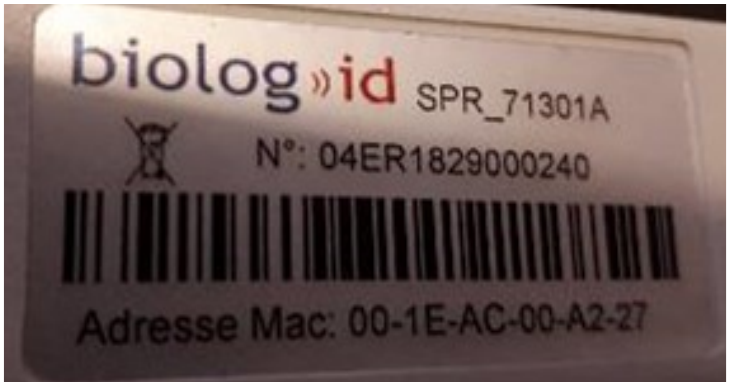
Hardware information		
Software (if applicable):	**V. :**	**Not provided**

2.2. RUNNING MODE

Test mode	Description of test mode
Test mode 1	Permanent emission with modulation on a fixed channel in the data rate that produced the highest power

Test	Running mode	
Occupied Bandwidth	☑ Test mode 1 (1)	☐ Alternative test mode()
Frequency Tolerance	☑ Test mode 1 (1)	☐ Alternative test mode()
AC Power Line Conducted Emission	☑ Test mode 1 (1)	☐ Alternative test mode()
Field strength within the band 13.110-14.010MHz	☑ Test mode 1 (1)	☐ Alternative test mode()
Field strength outside of the bands 13.110-14.010 MHz	☑ Test mode 1 (1)	☐ Alternative test mode()

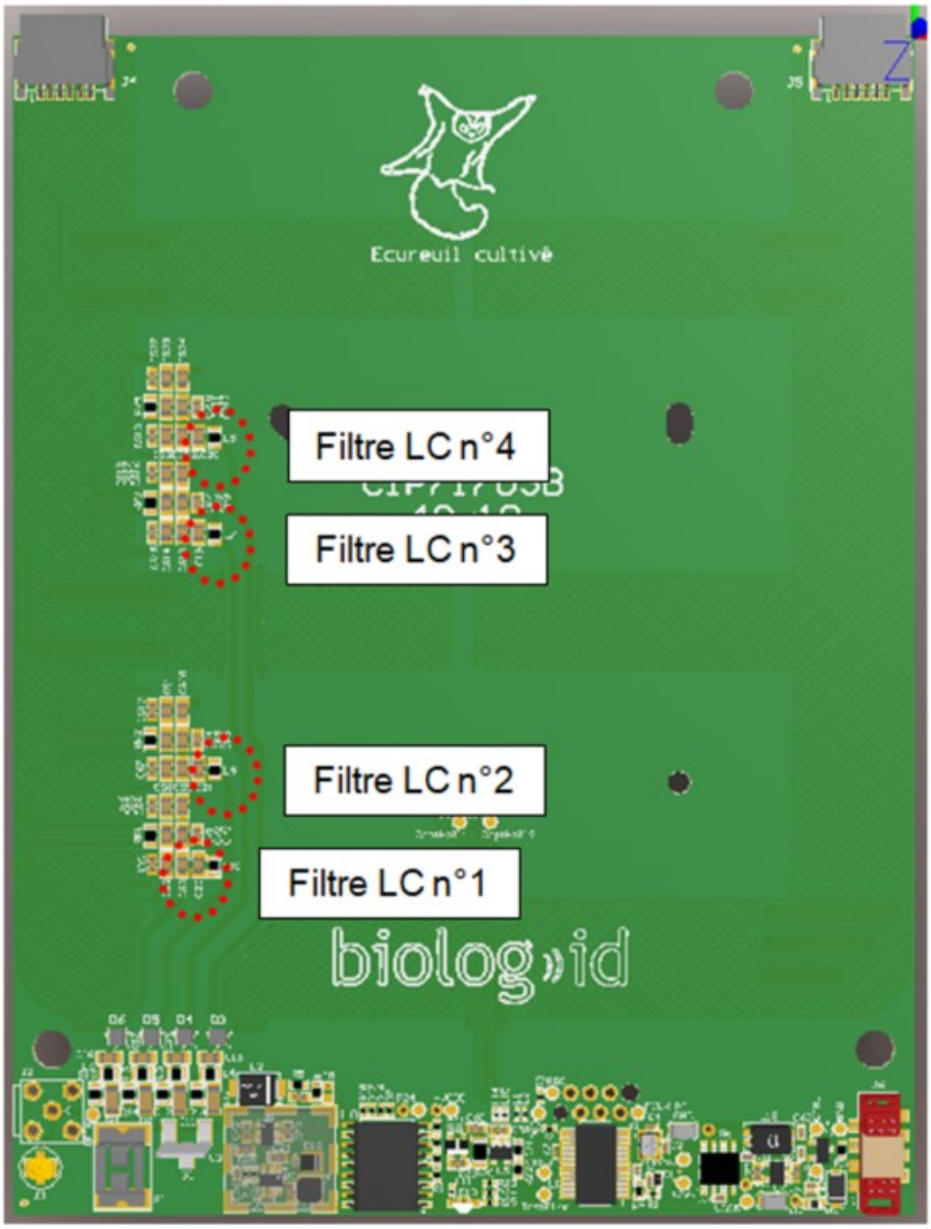
2.3. EQUIPMENT LABELLING



2.4. EQUIPMENT MODIFICATION

☐ None ☑ Modification:

-Add 4 LC filter on CAR 717 03A for PRD_7170100A (SST-R HD with 450mm tray)



2.5. *FIELD STRENGTH CALCULATION*

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

FS = RA + AF + CF – AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.
FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m
The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(32dBµV/m)/20] = 39.8 µV/m.

2.6. *CALIBRATION DATE*

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

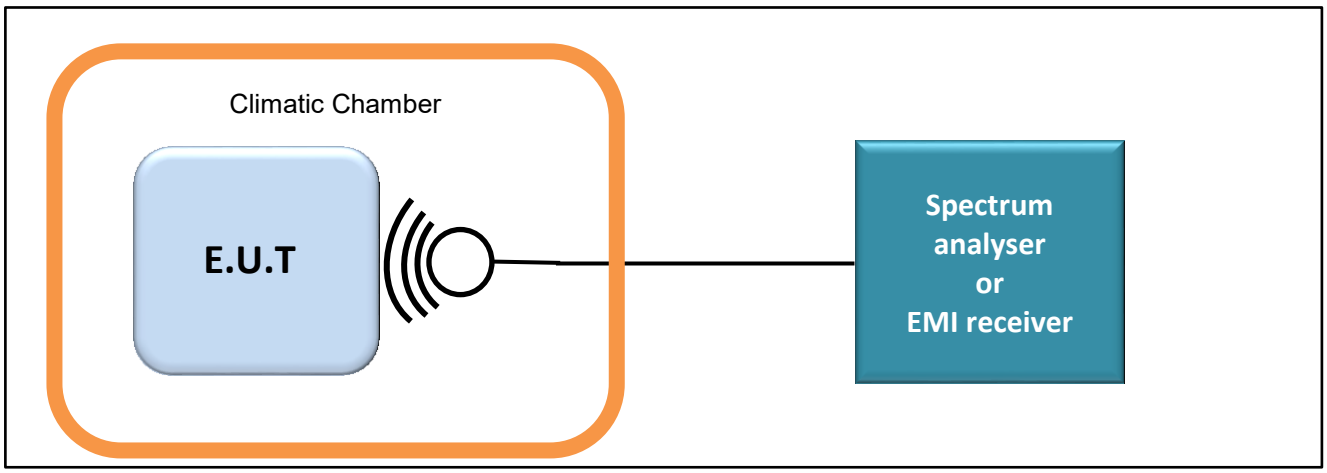
Test performed by	: Armand MAHOUNGOU
Date of test	: June 25, 2020
Ambient temperature	: 23°C
Relative humidity	: 44%

3.2. TEST SETUP

- The Equipment Under Test is installed:
☐ On a table
☑ In a climatic chamber
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☐ Conducted Method
☑ Radiated Method
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

- Test Procedure:
☑ RSS-Gen Issue 5 § 6.7
  - RBW used in the range of 1% to 5% of the anticipated emission bandwidth
  - Set the video bandwidth (VBW) ≥ 3 x RBW.
  - Detector = Peak.
  - Trace mode = Max Hold.
  - Sweep = Auto couple.
  - Allow the trace to stabilize.
  - OBW 99% function of spectrum analyzer used



Test set up of Occupied Bandwidth

Photograph for Occupied bandwidth

3.3. LIMIT

None

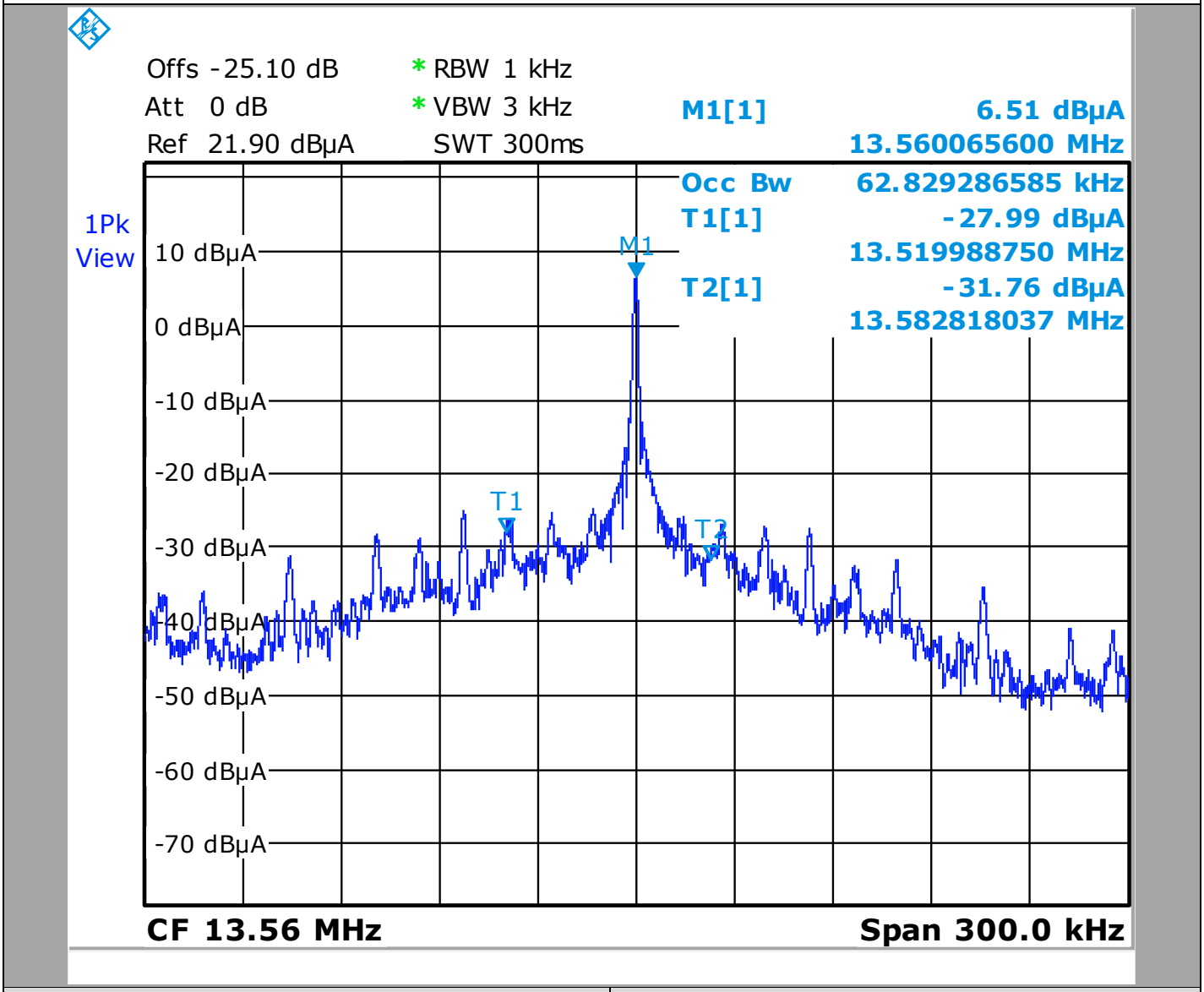
3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Climatic chamber	SECASI Technologies	-	D1025025	See cal with Thermometer	See cal with Thermometer
Thermometer	EUROTHERM 92	Climats Sapratin	D1025025	2019/08	2021/08
Spectrum analyzer	ROHDE & SCHWARZ	FSL6	A4060032	2020/01	2022/01
Multimeter	KEITHLEY	2000	A1242090	2019/05	2021/05
Programmable AC/DC power supply	KIKUSUI	PCR500M	A7040079	See cal with Multi-meter	See cal with Multi-meter
Cable	CABLES & CONNECTIQUES	2.9MD/CSU440AA/2.9MD/2000	A5329353	See cal with Spectrum analyser	See cal with Spectrum analyser
Cable	CABLES & CONNECTIQUES	-	A5329422	See cal with Spectrum analyser	See cal with Spectrum analyser

Note: In our quality system, the test equipment calibration due is more & less 2 months

3.5. RESULTS

Occupied Bandwidth
13.56MHz



Frequency(MHz)	Occupied Bandwidth (KHz)
13.56MHz	**62,829**

3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **BIOLOG ID PRD 7170100A**, SN: **01BI2009000001**, in configuration and description presented in this test report, show levels **compliant** to the **RSS-GEN** limits.

4. FREQUENCY TOLERANCE

4.1. TEST CONDITIONS

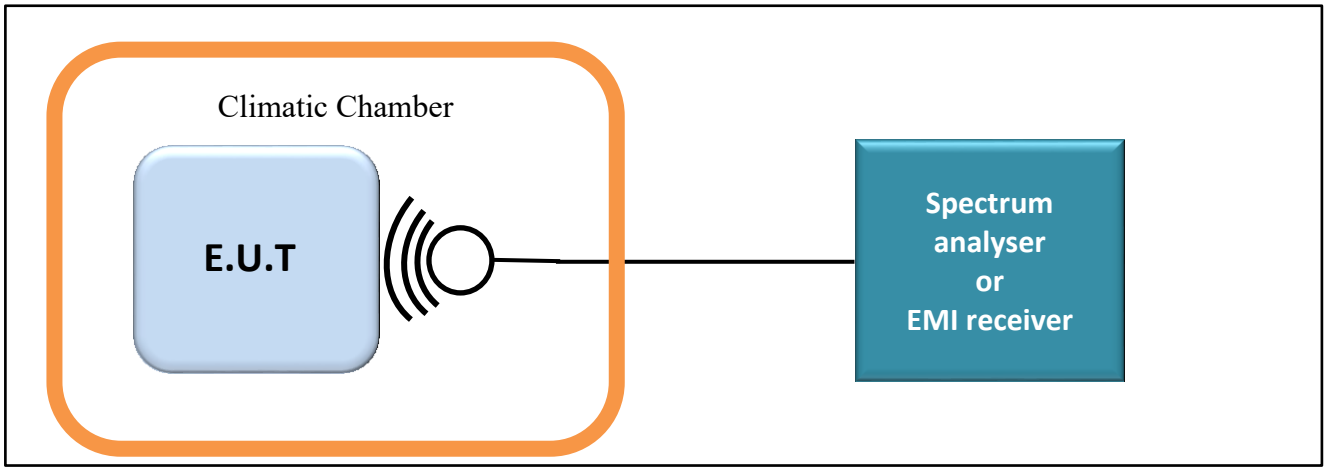
Test performed by	: Armand MAHOUNGOU
Date of test	: June 25, 2020
Ambient temperature	: 23°C
Relative humidity	: 44%

4.2. TEST SETUP

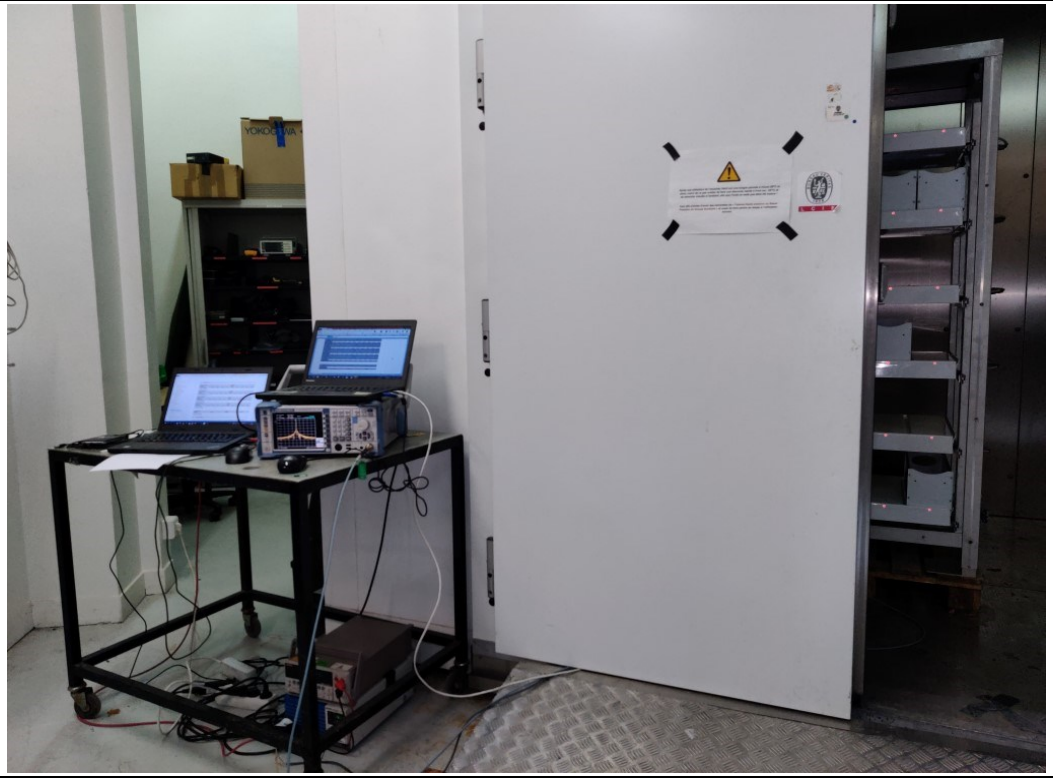
- The Equipment Under Test is installed:
☐ On a tableS
☑ In a climatic chamber
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☐ Conducted Method
☑ Radiated Method

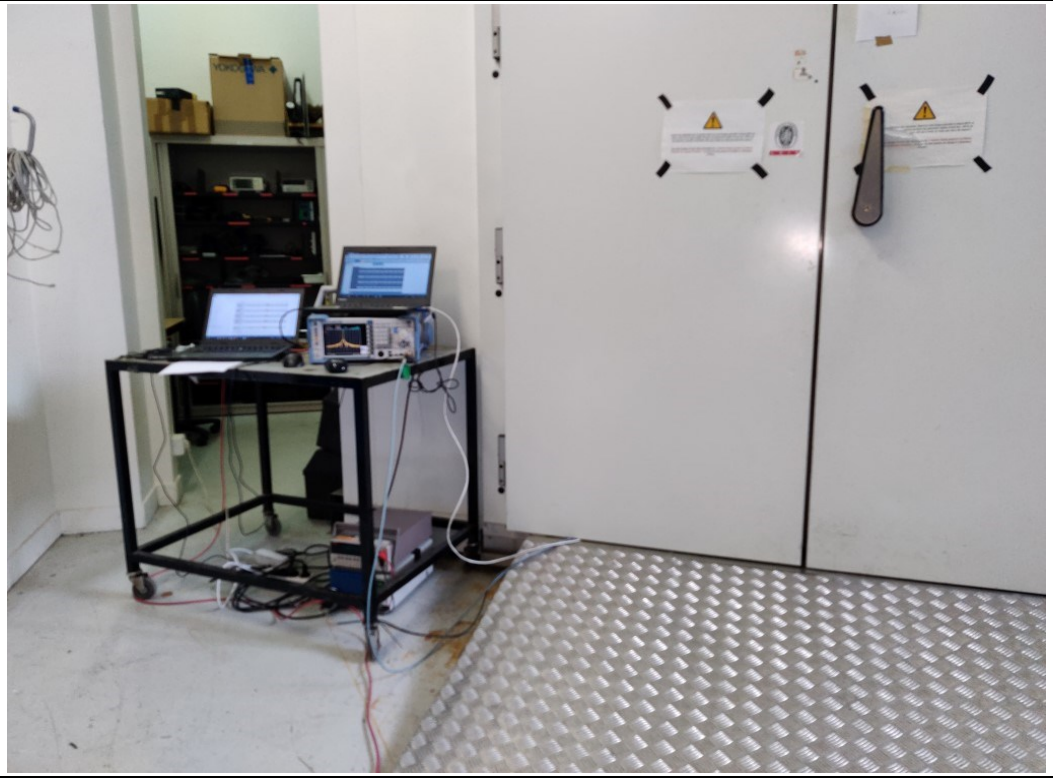
- Test Procedure:
☑ ANSI C63.10 § 6.8



Test set up of Occupied Bandwidth



Photograph for Frequency Tolerance in normal test condition



Photograph for Frequency Tolerance in extreme test condition

4.3. LIMIT

±0.01% (± 100ppm)

4.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Climatic chamber	SECASI Technologies	-	D1025025	See cal with Thermometer	See cal with Thermometer
Thermometer	EUROTHERM 92	Climats Sapratin	D1025025	2019/08	2021/08
Spectrum analyzer	ROHDE & SCHWARZ	FSL6	A4060032	2020/01	2022/01
Multimeter	KEITHLEY	2000	A1242090	2019/05	2021/05
Programmable AC/DC power supply	KIKUSUI	PCR500M	A7040079	See cal with Multi-meter	See cal with Multi-meter
Cable	CABLES & CONNECTIQUES	2.9MD/CSU440AA/2.9MD/2000	A5329353	See cal with Spectrum analyser	See cal with Spectrum analyser
Cable	CABLES & CONNECTIQUES	-	A5329422	See cal with Spectrum analyser	See cal with Spectrum analyser

Note: In our quality system, the test equipment calibration due is more & less 2 months

4.5. RESULTS

EUT activation:	Startup								
Voltage:	Vnom								
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13,5601937	13,5601594	13,5601219	13,560075	13,5600562	13,5600187	13,5600234	13,5599813	13,5599766
Frequency Drift (%)	0,0014	0,0012	0,0009	0,0006	0,0004	0,0001	0,0002	-0,0001	-0,0002
EUT activation:	2min								
Voltage:	Vnom								
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13,5602935	13,5601594	13,5601312	13,560075	13,5600562	13,5600187	13,5600187	13,5599813	13,5599859
Frequency Drift (%)	0,0022	0,0012	0,0010	0,0006	0,0004	0,0001	0,0001	-0,0001	-0,0001
EUT activation:	5min								
Voltage:	Vnom								
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13,5601937	13,5601594	13,5601312	13,560075	13,5600562	13,5600187	13,5600187	13,5599813	13,5599766
Frequency Drift (%)	0,0014	0,0012	0,0010	0,0006	0,0004	0,0001	0,0001	-0,0001	-0,0002
EUT activation:	10min								
Voltage:	Vnom								
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13,5601937	13,5601594	13,5601219	13,5600844	13,5600562	13,5600187	13,5600187	13,5599813	13,5599859
Frequency Drift (%)	0,0014	0,0012	0,0009	0,0006	0,0004	0,0001	0,0001	-0,0001	-0,0001

Temperature	Tnom		
Voltage:	Vmin	Vnom	Vmax
Frequency (MHz)	13,5602232	13,5601234	13,5601406
Frequency Drift (%)	0,0016	0,0009	0,0010

4.6. CONCLUSION

Frequency tolerance measurement performed on the sample of the product **BIOLOG ID PRD 7170100A**, SN: **01BI2009000001**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

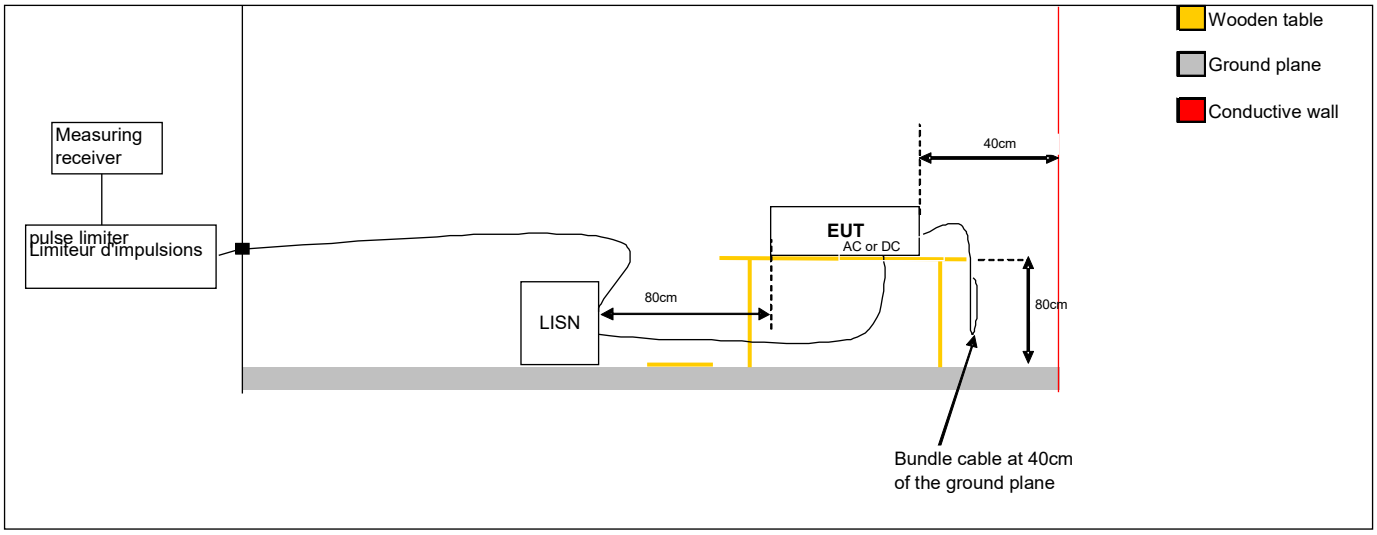
5. AC POWER LINE CONDUCTED EMISSIONS

5.1. TEST CONDITIONS

Test performed by	: Laurent DENEUX
Date of test	: June 30, 2020
Ambient temperature	: 21 °C
Relative humidity	: 50 %

5.2. TEST SETUP

The product has been tested according to ANSI C63.10 method. The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm. Auxiliaries are powered by another LISN. The cable has been shorted to 1meter length. The EUT is powered through the LISN. Measurement is made with a receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50µH. Interconnecting cables and equipment's were moved to position that maximized emission.



Test set up of AC Power Line Conducted Emissions

Photograph for AC Power Line Conducted Emissions (Front view)

Photograph for AC Power Line Conducted Emissions (Rear view)

5.3. LIMIT

Frequency range	Level	Detector
0,15kHz to 0,5MHz	66dBµV to 56µV*	QPeak
	56dBµV to 46µV*	Average
0,5MHz to 5MHz	56dBµV	QPeak
	46dBµV	Average
5MHz to 30MHz	60BµV	QPeak
	50dBµV	Average

*Decreases with the logarithm of the frequency

5.4. TEST EQUIPMENT LIST

Test equipment used					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Calibration date**	**Calibration due date**
Open test site	LCIE	-	F2000400	2019/06	2020/06
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2018/10	2020/10
V ISLN	ROHDE & SCHWARZ	ESH2-Z5	C2322002	2019/08	2020/08
Pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	A2649008	2020/05	2021/05
Cable	-	-	A5329417	2019/12	2020/12
absorber	LCIE	-	A5329589	2019/10	2020/10
Reference ground plan 2 x 3m	L.C.I.E.	-	-	-	-

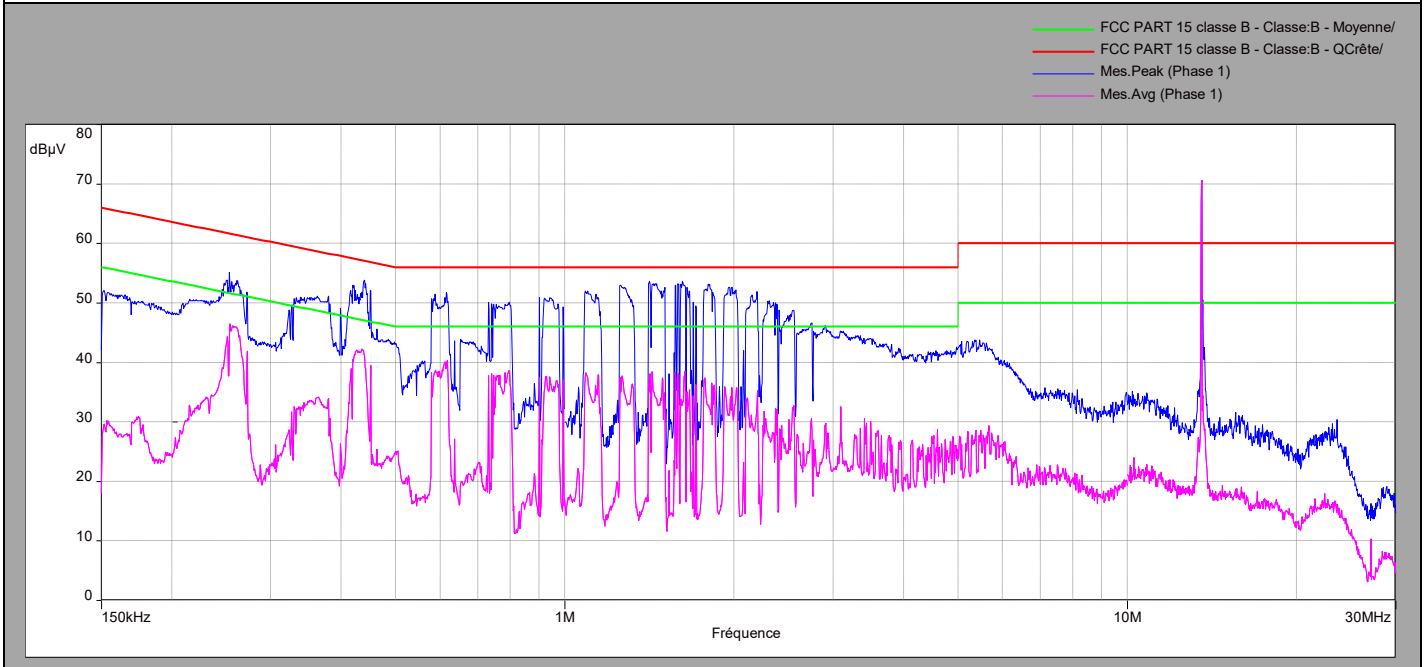
5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

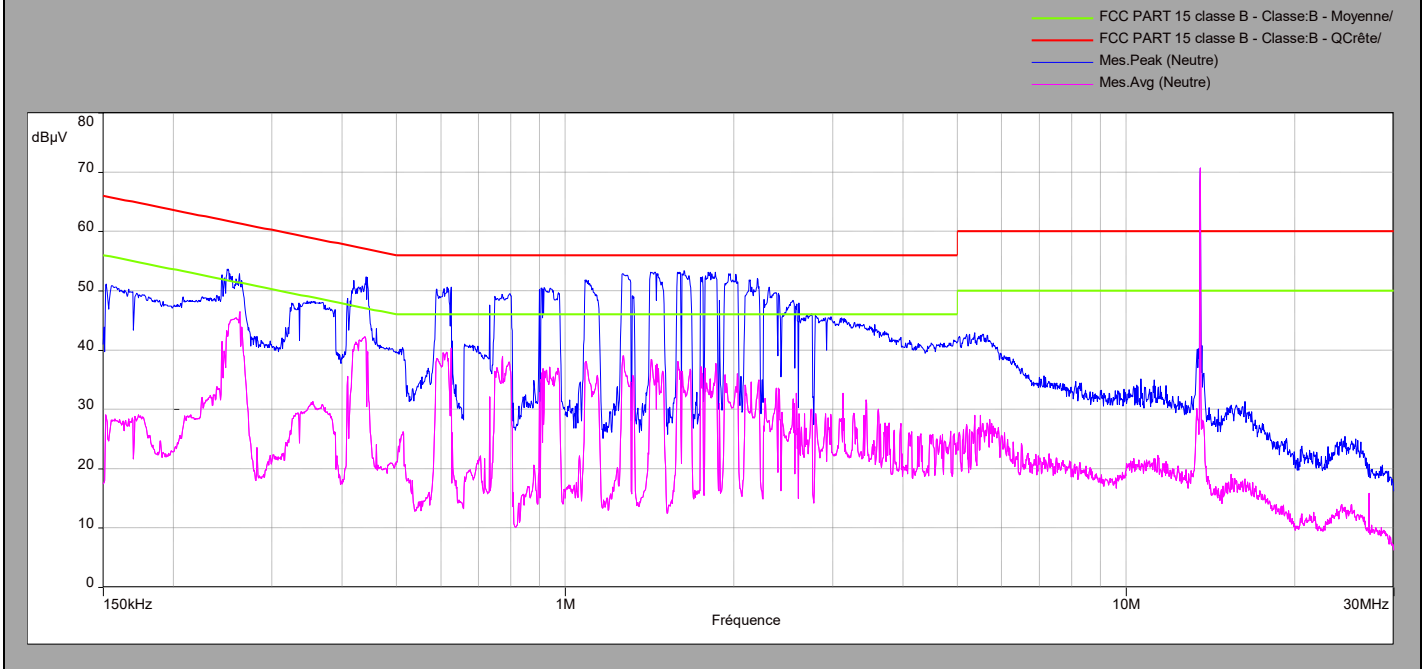
5.6. RESULTS

AC Power Line Conducted Emission 240V-50Hz

Phase



Line

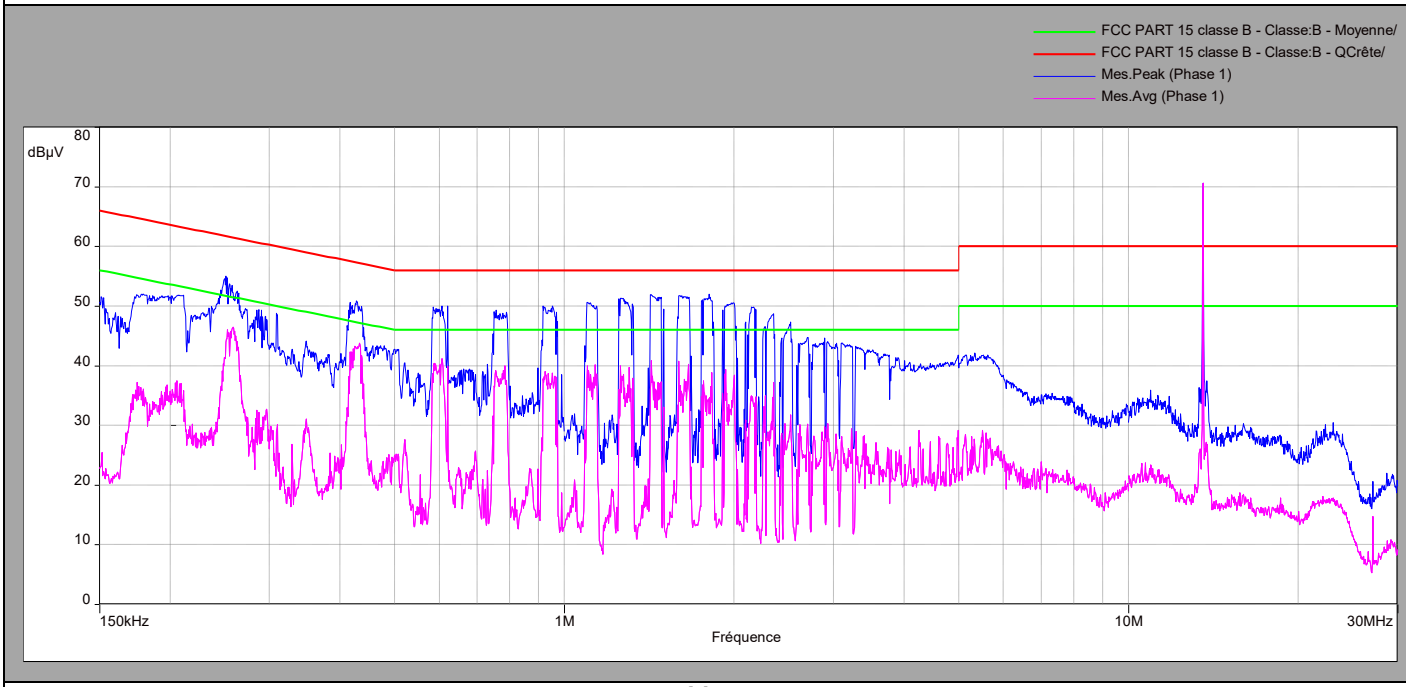


Phase Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,261	53	-	61,3	8,3	46,2	51,3	5,1
0,617	51,4	-	56	4,6	40,2	46	5,8
1,63	52,8	-	56	3,2	38,5	46	7,5
13,56	70,5	-	60	-10,5	69,5	50	-19,5
22,41	28,2	-	60	31,8	18	50	32

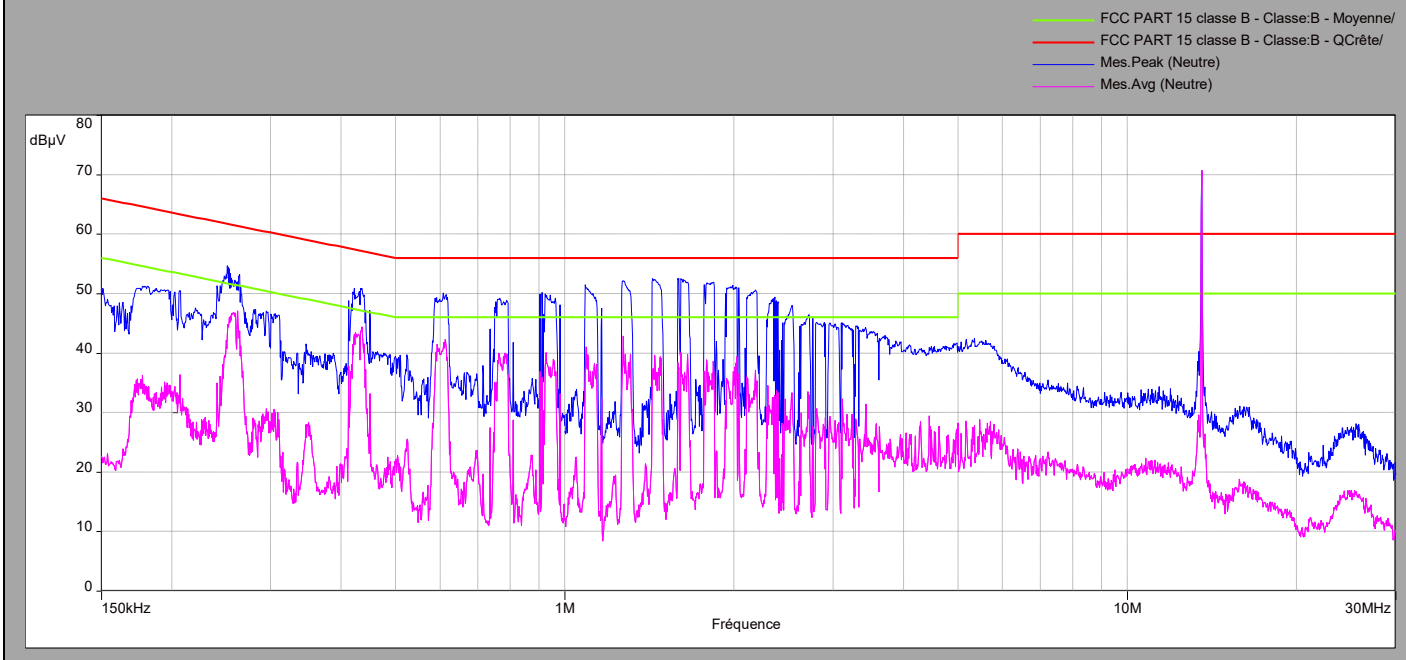
Neutral Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,262	52,8	-	61,3	8,5	46,3	51,3	5
0,616	50,6	-	56	5,4	39,6	46	6,4
1,26	52,8	-	56	3,2	39	46	7
13,56	70	-	60	-10	69,2	50	-19,2
25,24	23,4	-	60	36,6	13,8	50	36,2

AC Power Line Conducted Emission 120V-60Hz

Phase



Line

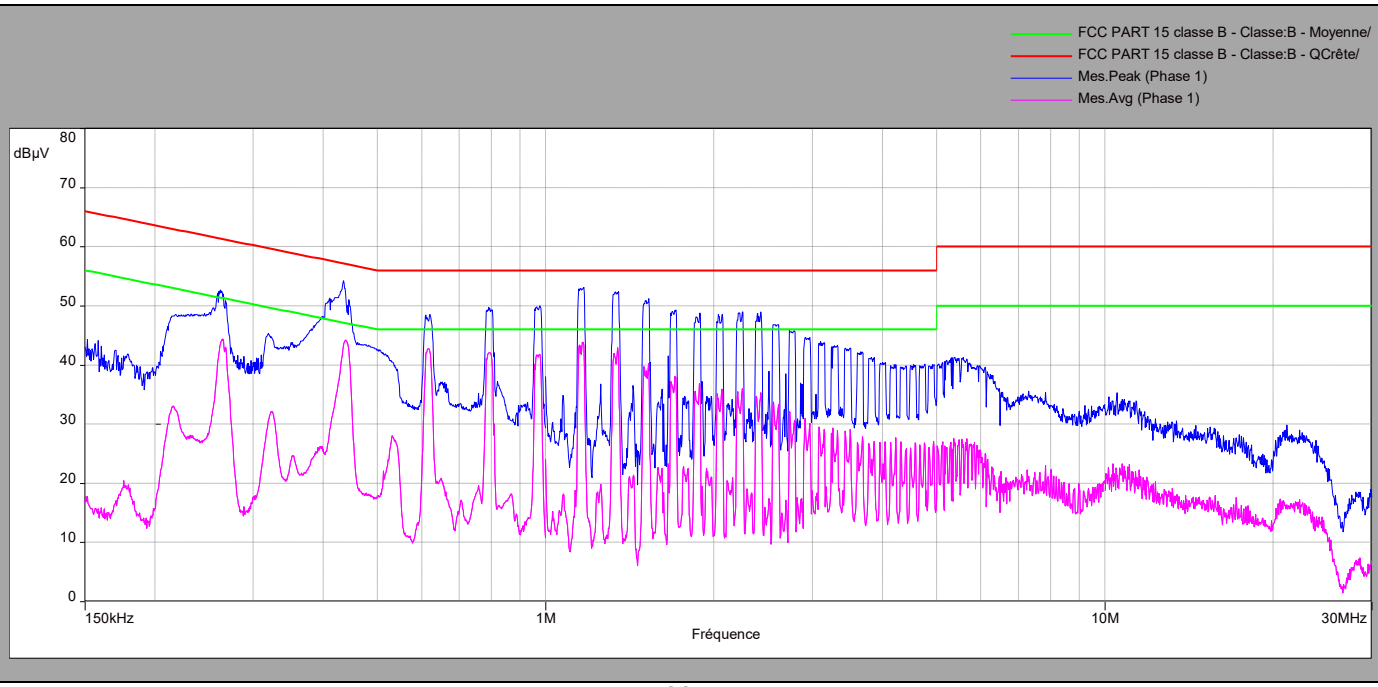


Phase Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,257	53,4	-	61,5	8,1	46,2	51,5	5,3
0,606	50	-	56	6	41,2	46	4,8
1,56	51,7	-	56	4,3	41,7	46	4,3
13,56	70,5	-	60	-10,5	70,2	50	-20,2
23	30,4	-	60	29,6	17,8	50	32,2

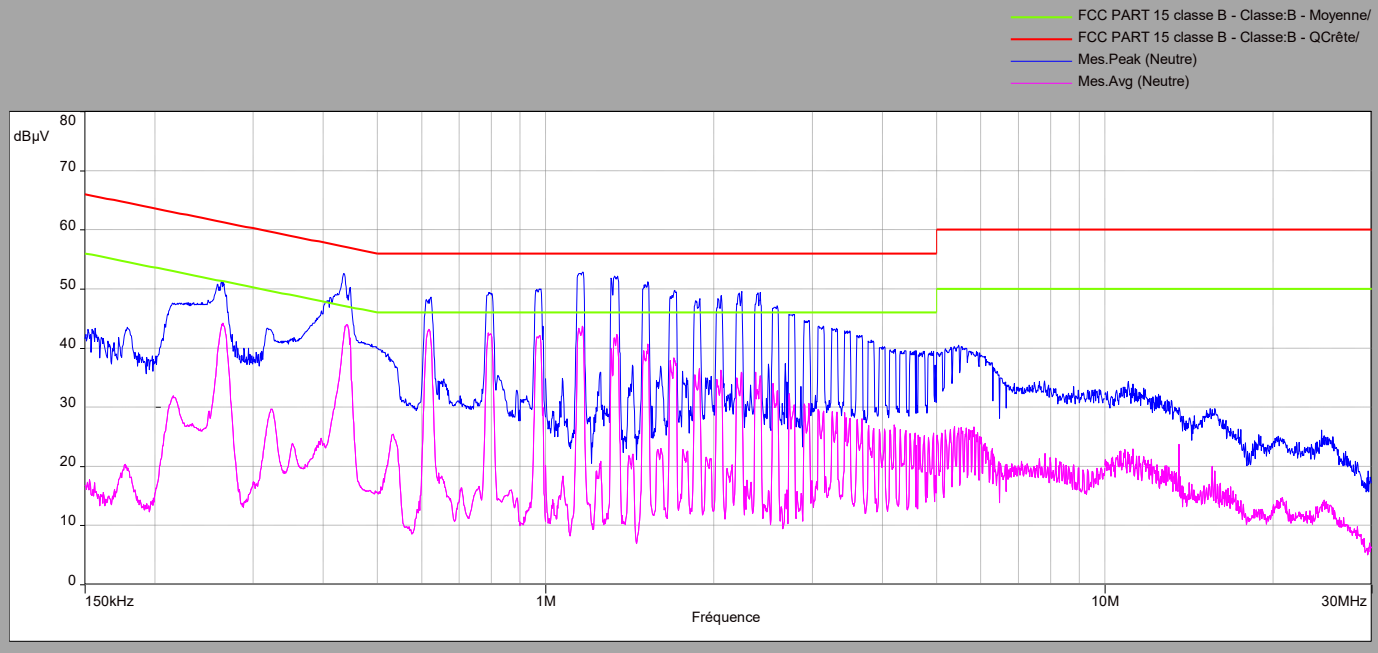
Neutral Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,257	52,2	-	61,5	9,3	46,5	51,5	5
0,613	49,6	-	56	6,4	42,3	46	3,7
1,27	52,2	-	56	3,8	42,8	46	3,2
13,55	70,6	-	60	-10,6	66,2	50	-16,2
25,22	24,4	-	60	35,6	16	50	34

AC Power Line Conducted Emission 240V-50Hz without antenna

Phase



Line

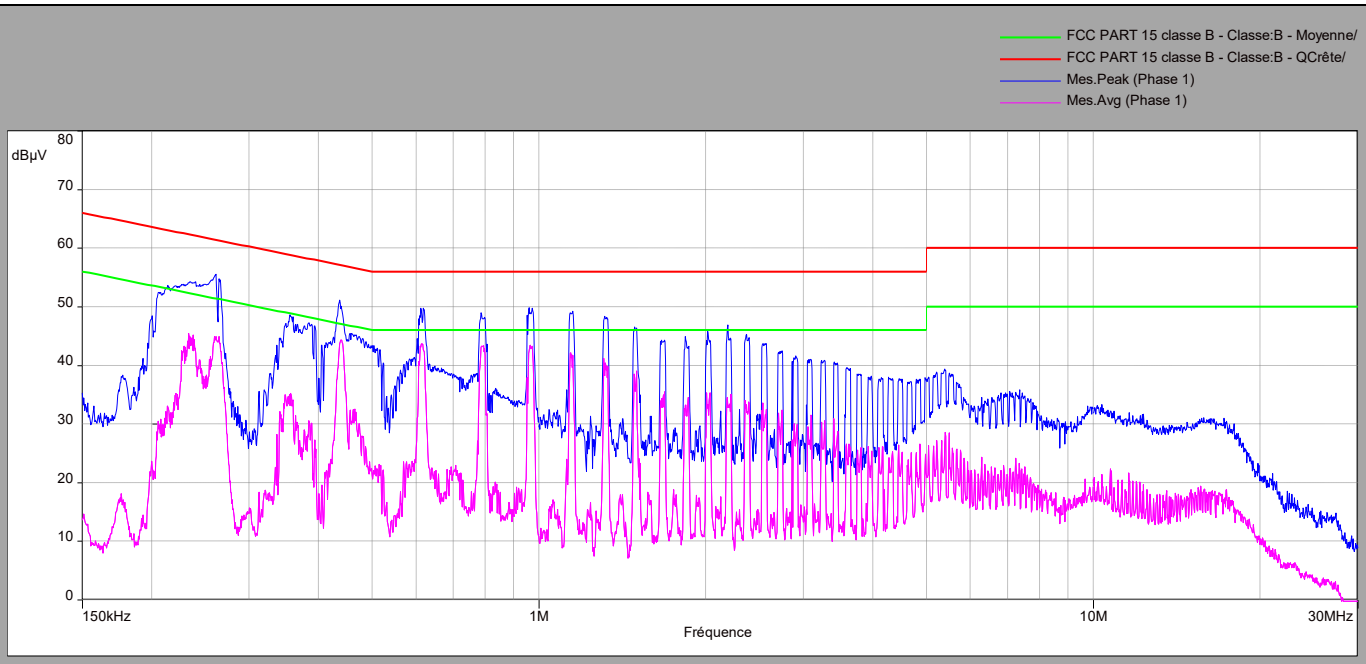


Phase Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,265	52,1	-	61,2	9,1	44,4	51,3	6,9
0,435	53,9	-	57,1	3,2	44,2	47,1	2,9
1,16	53	-	56	3	43,7	46	2,3
5,37	41	-	60	19	26,7	50	23,3
10,51	35,3	-	60	24,7	21,3	50	28,7

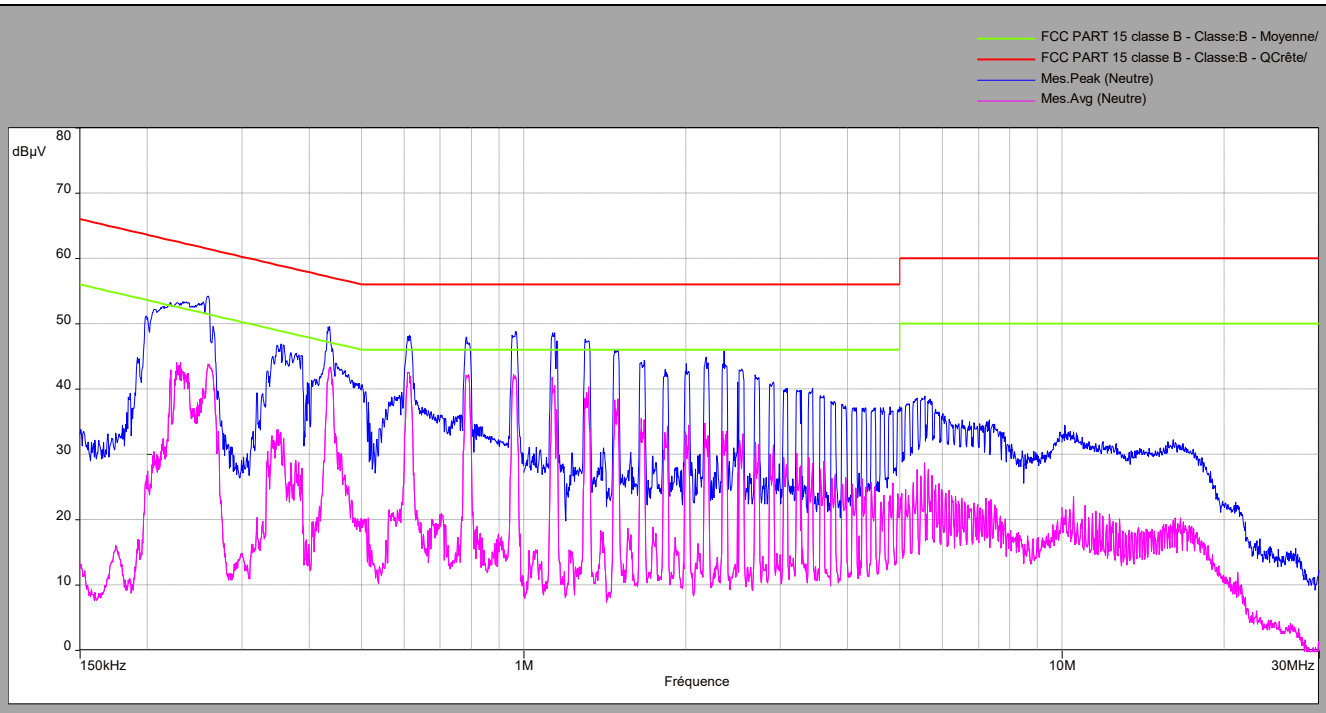
Neutral Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,265	50,5	-	61,2	10,7	44	51,2	7,2
0,446	52,5	-	56,9	4,4	44	46,9	2,9
0,621	48	-	56	8	43,2	46	2,8
5,38	40,2	-	60	19,8	26,7	50	23,3
13,56	30	-	60	30	23,6	50	26,4

AC Power Line Conducted Emission 120V-60Hz without antenna

Phase



Line



Phase Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,261	55,5	-	61,4	5,9	45	51,4	6,4
0,436	51	-	57,16	6,16	44,2	47,16	2,96
0,617	49,7	-	56	6,3	43,5	46	2,5
1,13	49	-	56	7	42	46	4
5,49	38,6	-	60	21,4	28,5	50	21,5

Neutral Line							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0,26	54,1	-	61,4	7,3	43,6	51,4	7,8
0,436	49,6	-	57,16	7,56	43,3	47,16	3,86
1,13	48,2	-	56	7,8	41,4	46	4,6
5,55	38,4	-	60	21,6	28,6	50	21,4
10,51	33,4	-	60	26,6	23,5	50	26,5

5.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product BIOLOG ID PRD 7170100A, SN: 01BI2009000001, in configuration and description presented in this test report, show levels compliant to the 47 CFR PART 15.225 & RSS Gen limits.

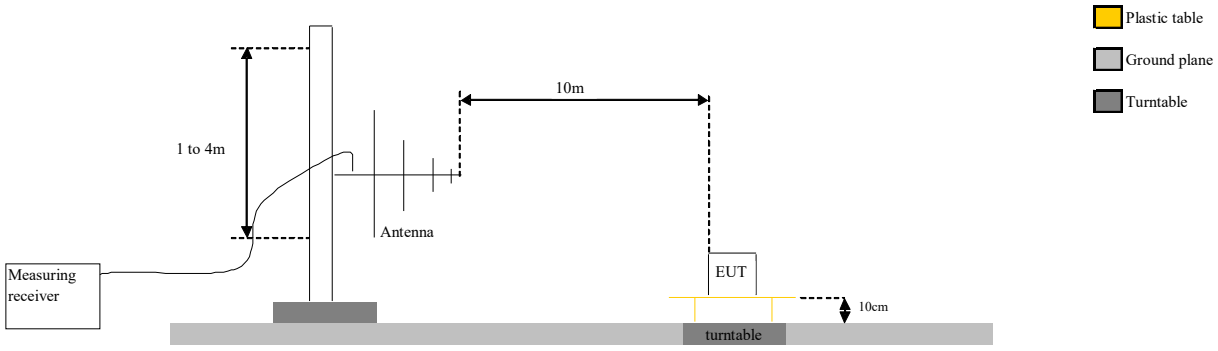
6. FIELD STRENGTH OUTSIDE OF THE BANDS 13.110-14.010 MHz

6.1. TEST CONDITIONS

Test performed by	: Laurent DENEUX
Date of test	: June 30, 2020
Ambient temperature	: 21 to 22°C
Relative humidity	: 47 to 49 %

6.2. TEST SETUP

The product has been tested according to ANSI C63.10 and FCC part 15 subpart C.
Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz. Measurement bandwidth was 200Hz below 150kHz and 9kHz between 150kHz & 30MHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. Antenna height was 1m. The EUT is placed **on an open area test site**. Distance between measuring antenna and the EUT is **3m**.
Test is performed in horizontal (H) and vertical (V) polarization with **bilog** between 30MHz & 1GHz. Measurement bandwidth was 120kHz below 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. The EUT is place at 0.8m high under 1GHz. The EUT is placed **on an open area test site** from 30MHz to 1GHz. Distance between measuring antenna and the EUT is **10m**.
The height antenna is varied from 1m to 4m from 30MHz to 1GHz.



Test Set up for radiated measurement in open area test site

Photograph for Field strength outside of the bands 13.110-14.010 MHz

Photograph for Field strength outside of the bands 13.110-14.010 MHz

6.3. LIMIT

Measure at 300m		
Frequency range	**Level**	**Detector**
9kHz-490kHz	67.6dBµV/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	**Level**	**Detector**
490kHz-1.705MHz	87.6dBµV/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dBµV/m	QPeak
Measure at 10m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	29.5dBµV/m	QPeak
88MHz to 216MHz	33dBµV/m	QPeak
216MHz to 960MHz	35.5BµV/m	QPeak
960MHz to 1000MHz	43.5dBµV/m	QPeak
Above 1000MHz	63.5dBµV/m	Peak
	43.5dBµV/m	Average
Measure at 3m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	40dBµV/m	QPeak
88MHz to 216MHz	43.5dBµV/m	QPeak
216MHz to 960MHz	46BµV/m	QPeak
960MHz to 1000MHz	54dBµV/m	QPeak
Above 1000MHz	74dBµV/m	Peak
	54dBµV/m	Average

6.4. TEST EQUIPMENT LIST

Test equipment used					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Calibration date**	**Calibration due date**
Open test site	LCIE	-	F2000400	2019-06	2020-06
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2018-10	2020-10
Cable	-	-	A5329444	2019-12	2020-12
Bilog antenna	CHASE	CBL 6112A	C2040040	2020-05	2021-05
Cable	-	-	A5329442	2019-129	2020-12
Cable	-	-	A5329876	2019-12	2020-12
Cable	-	-	A5329542	2019-08	2020-08
Preamplifier	HEWLETT PACKARD	8449B	A4069002	2018-04	2020-04
Horn	EMCO	3115	C2042016	2019-06	2020-06
loop antenna	SCHWARZBECK	FMZB1513	C2040209	2018-03	2020-06
Cable	-	-	A5329416	2019-12	2020-12

Note: In our quality system, the test equipment calibration due is more & less 3 months

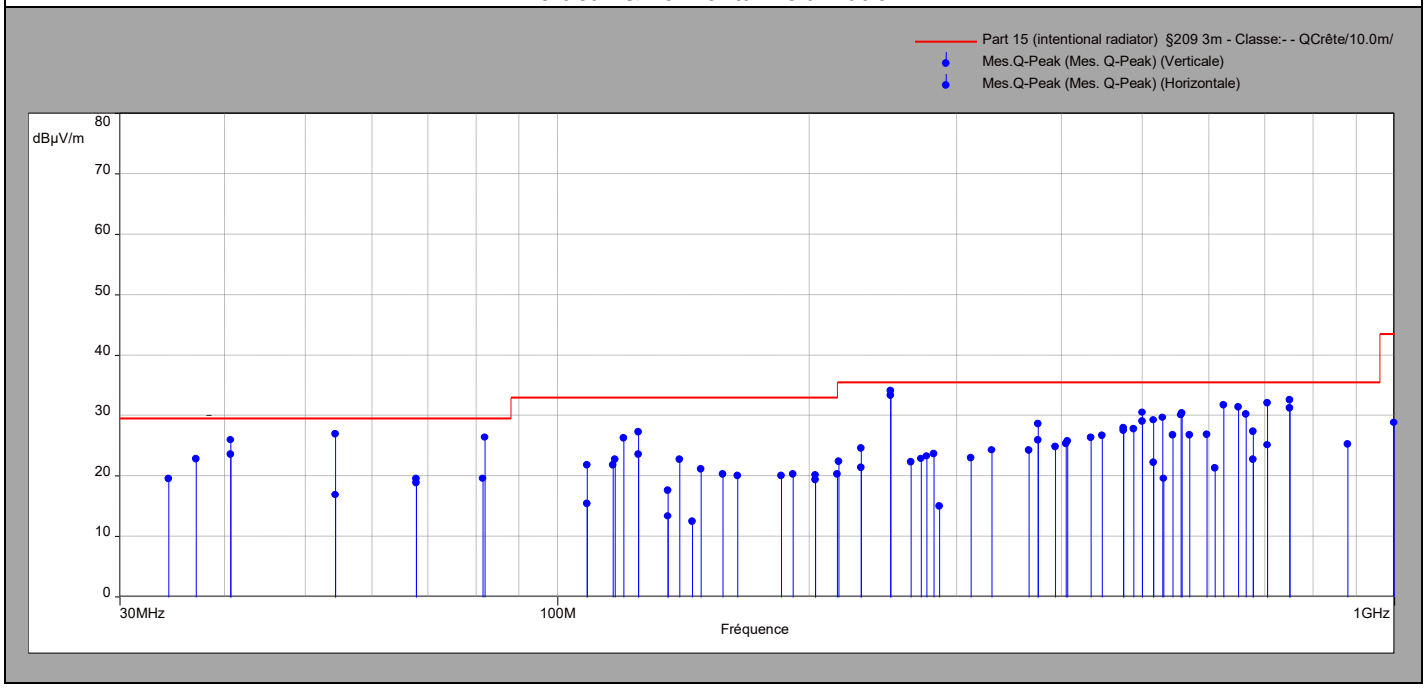
6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

6.6. RESULTS

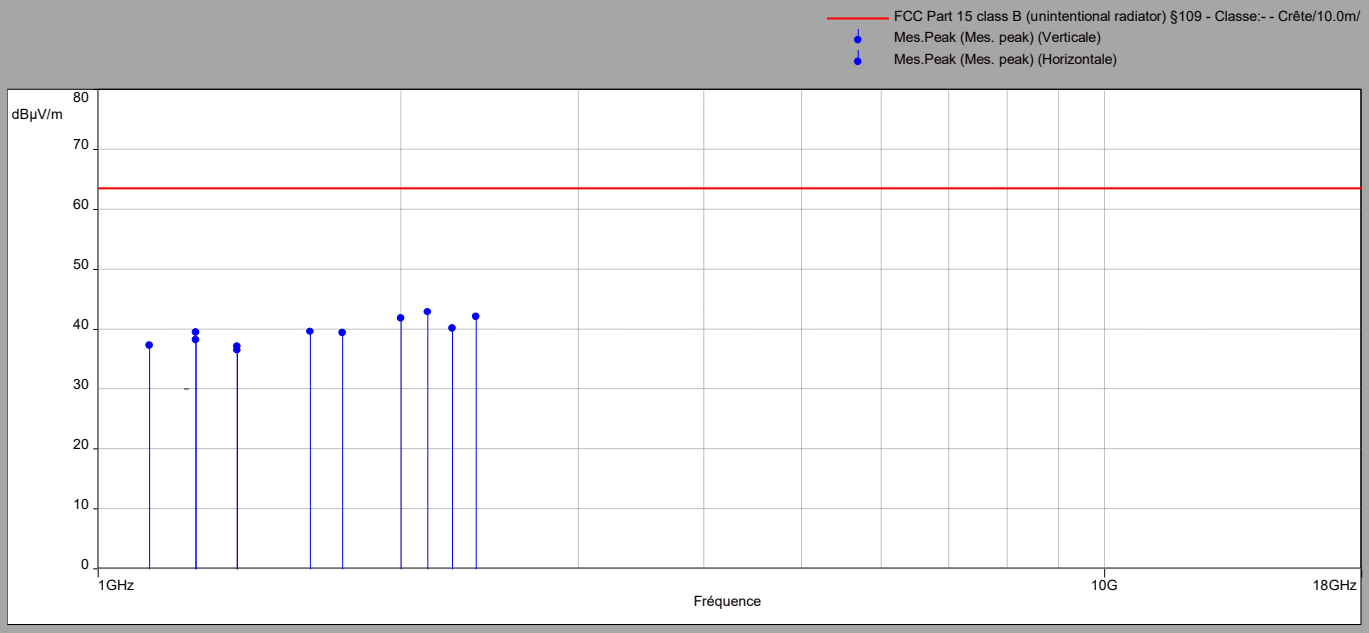
30MHz to 1GHz

Vertical & horizontal Polarization

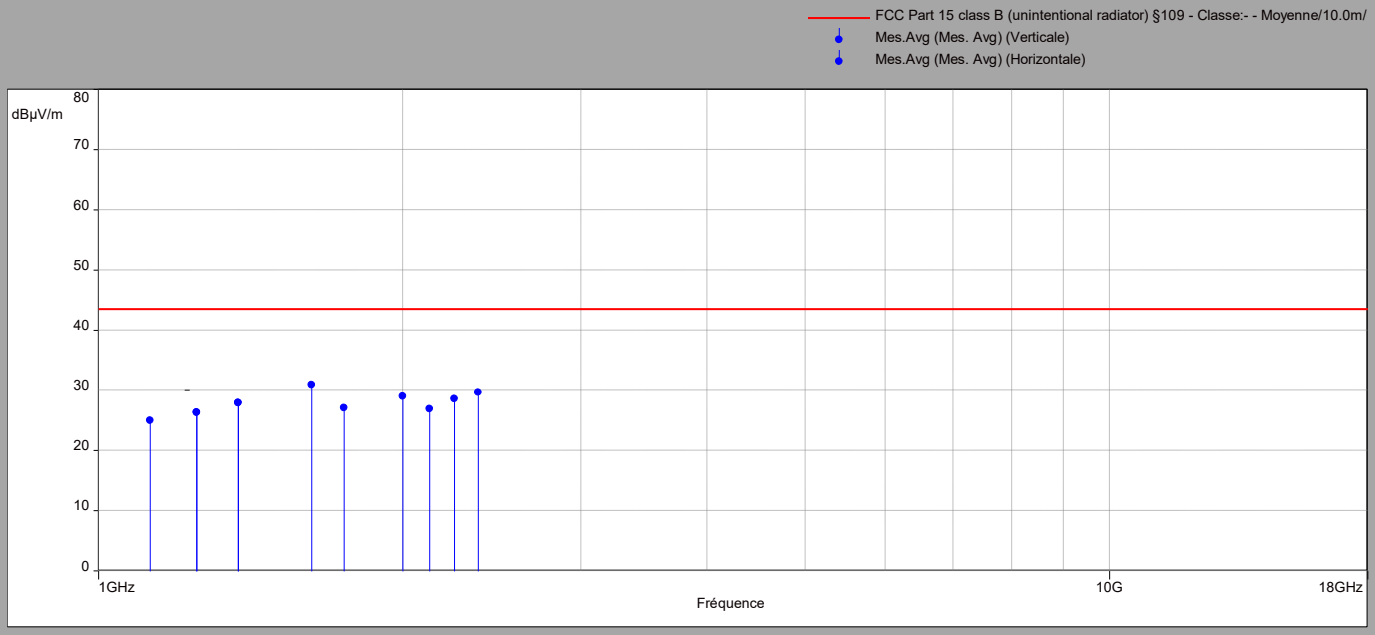


Above 1GHz

Vertical & horizontal Polarization (peak measurement)



Vertical & Horizontal polarization(average value)



9kHz to 30MHz					
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**	**Margin QPeak (dBµV/m)**
Perpendicular	0.346	-	40.44	96.8	56,36
Perpendicular	0.516	-	38.88	73.4	34,52
Perpendicular	0.695	-	36.32	70.8	34,48
Perpendicular	0.877	-	30.85	68.7	37,85
Perpendicular	1.044	-	34.75	67.2	32,45
Perpendicular	1.2	-	34.63	66.0	31,37
Perpendicular	1.388	-	30.37	64.8	34,43
Perpendicular	1.564	-	31.11	63.7	32,59
Perpendicular	1.734	-	31.62	69.5	37,88
Perpendicular	1.888	-	29.27	69.5	40,23
Perpendicular	2.096	-	37.23	69.5	32,27
Perpendicular	2.254	-	30.64	69.5	38,86
Perpendicular	2.432	-	32.4	69.5	37,1
Perpendicular	2.62	-	34.12	69.5	35,38
Perpendicular	2.79	-	33.29	69.5	36,21
Perpendicular	2.964		32.36	69.5	37,14
Perpendicular	3.122		31.99	69.5	37,51
Perpendicular	5.482		26.5	69.5	43
Perpendicular	27.12		22.6	69.5	46,9
Parallel	0.354	-	42.93	96.6	53,67
Parallel	0.52	-	38.61	73.3	34,69
Parallel	0.694	-	33.81	70.8	36,99
Parallel	0.767	-	29.4	69.9	40,5
Parallel	0.865	-	32.6	68.9	36,3
Parallel	0.954		33.91	68.0	34,09
Parallel	1.04	-	32.3	67.3	35
Parallel	1.134	-	34.46	66.5	32,04
Parallel	1.19		32.94	66.1	33,16
Parallel	1.374		31.97	64.8	32,83
Parallel	1.732	-	33.64	69.5	35,86
Parallel	2.032	-	28.27	69.5	41,23
Parallel	2.386	-	34.05	69.5	35,45
Parallel	2.784	-	23.54	69.5	45,96
Parallel	5.482	-	27.51	69.5	41,99
Parallel	27.12	-	25.12	69.5	44,38

30MHz to 1GHz					
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**	**Margin QPeak (dBµV/m)**
Vertical	54.33	-	26.91	29.5	2.59
Vertical	81.9	-	26.39	29.5	3.11
Vertical	125	-	27.25	33	5.75
Vertical	500	-	29	35.5	6.5
Vertical	515.3	-	29.31	35.5	6.19
Vertical	557.4	-	30.36	35.5	5.14
Vertical	650.9	-	31.4	35.5	4.1
Vertical	664.4	-	30.22	35.5	5.28
Vertical	750	-	31.23	35.5	4.27
Horizontal	40.7	-	23.58	29.5	5.92
Horizontal	125	-	23.58	33	9.42
Horizontal	250	-	33.33	35.5	2.17
Horizontal	500	-	30.54	35.5	4.96
Horizontal	528.8	-	29.67	35.5	5.83
Horizontal	555.4	-	30.16	35.5	5.34
Horizontal	625	-	31.74	35.5	3.76
Horizontal	705.1	-	32.08	35.5	3.42
Horizontal	750	-	32.54	35.5	2.96

Above 1GHz								
Polarization	**Frequency (MHz)**	**Duty cycle correction (dB)**	**Average Level (dBµV/m)**	**Average Limit (dBµV/m)**	**Margin Average (dBµV/m)**	**Peak Level (dBµV/m)**	**Peak Limit (dBµV/m)**	**Margin Peak (dBµV/m)**
Vertical	1625	-	27.92	43.5	15.58	39.65	63.5	23.85
Vertical	1750	-	27.94	43.5	15.56	39.38	63.5	24.12
Vertical	2125	-	30.88	43.5	12.62	42.94	63.5	20.56
Horizontal	1250	-	29.01	43.5	14.49	39.47	63.5	24.03
Horizontal	2000	-	28.63	43.5	14.87	41.8	63.5	21.7
Horizontal	2375	-	29.7	43.5	13.8	42.11	63.5	21.39

6.7. CONCLUSION

Field strength outside of the bands 13.110-14.010 MHz measurement performed on the sample of the product **BIOLOG ID PRD 7170100A**, SN: **01BI2009000001**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS-Gen limits.

7. FIELD STRENGTH WITHIN THE BAND 13.110-14.010MHz

7.1. TEST CONDITIONS

Test performed by	: Laurent DENEUX
Date of test	: June 30, 2020
Ambient temperature	: 21 °C
Relative humidity	: 47 %

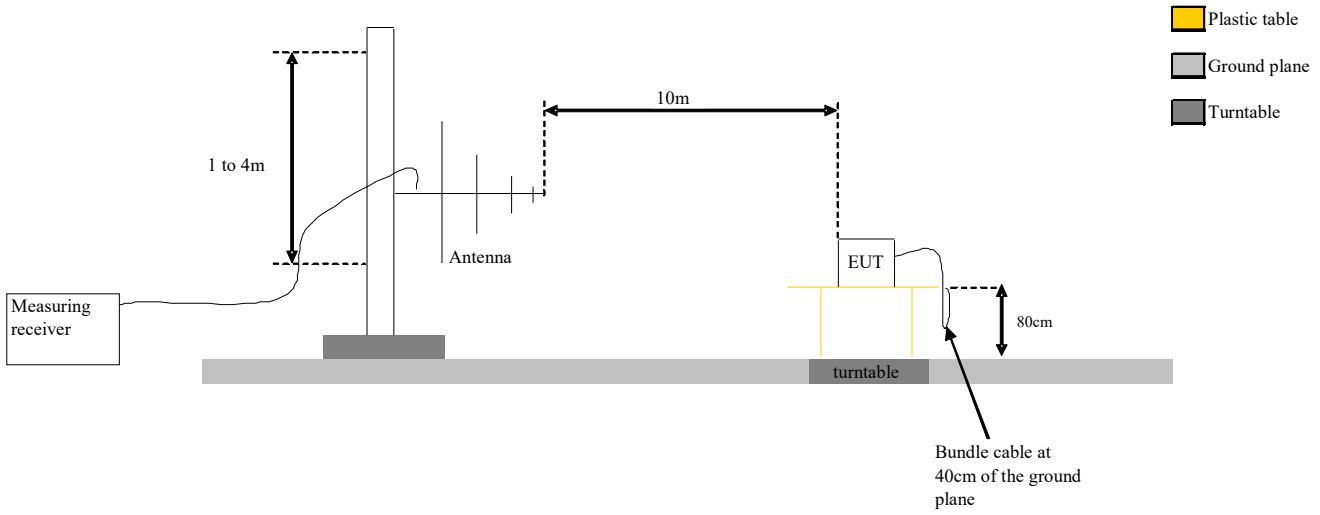
7.2. TEST SETUP

Measurement procedure:

☑ Open Area Test Site

☐ Open Area Test Site + Test fixture in climatic chamber

The product has been tested according to ANSI C63.10.
The EUT is placed **on an open area test site**. Distance between measuring antenna and the EUT is **Distance**.
Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz.
Measurement bandwidth was 9kHz between 150kHz & 30MHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. Antenna height search was performed from 1 to 4m. The EUT is place at 0.8m.



Test Set up for radiated measurement in open area test site

For measurement with test fixture is used, the power level calibration of the spectrum analyzer shall then be related to the power level or field strength measured with temperature during OATS measure taking in consideration in climatic chamber. The calculation will be used to calculate the absolute level of the sideband power.

Frequency band 13.110-14.010MHz
Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector. The graphs are obtained with a measuring receiver.
Frequency band 13.553-13.567MHz
Following plots show radiated emission level in the frequency band 13.55.-13.567MHz with a RBW of 1kHz. The graphs are obtained with a measuring receiver.

Photograph for Field strength within the band 13.110-14.010MHz

7.3. LIMIT

Frequency (MHz)	Field strength (µV/m) @30m	Field strength (dBµV/m) @30m	Field strength (dBµV/m) @3m
13.553-13.567	15 848	84.0	124.0
13.410-13.553 13.567-13.710	334.0	50.5	90.5
13.110-13.410 13.710-14.010	106.0	40.5	80.5
Below 13.110MHz Above 14.010MHz	30.0	29.5	69.5

7.4. TEST EQUIPMENT LIST

Test equipment used					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Calibration date**	**Calibration due date**
Open test site	LCIE	-	F2000400	2019-06	2020-06
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2018-10	2020-10
Cable	-	-	A5329444	2019-12	2020-12
loop antenna	SCHWARZBECK	FMZB1513	C2040209	2018-03	2020-06
Cable	-	-	A5329416	2019-12	2020-12

Note: In our quality system, the test equipment calibration due is more & less 3 months

7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

7.6. RESULTS

Parallel Axis			
Frequency (MHz)	**Peak Level (dBµV/m) (3m)**	**QPeak Level (dBµV/m) (3m)**	**Limit (dBµV/m) (3m)**
Below 13.110	-	33.5	69.5
13.110 to 13.410	-	35.4	80.5
13.410 to 13.553	-	38.7	90.5
13.553 to 13.567	-	78	124
13.567 to 13.710	-	41.3	90.5
13.710 to 14.010	-	37.6	80.5
Above 14.010	-	35.7	69.5

Ground Parallel Axis			
Frequency (MHz)	**Peak Level (dBµV/m) (3m)**	**QPeak Level (dBµV/m) (3m)**	**Limit (dBµV/m) (3m)**
Below 13.110	-	29.68	69.5
13.110 to 13.410	-	32.9	80.5
13.410 to 13.553	-	37.2	90.5
13.553 to 13.567	-	62.3	124
13.567 to 13.710	-	36.7	90.5
13.710 to 14.010	-	33.4	80.5
Above 14.010	-	31.1	69.5

Perpendicular Axis			
Frequency (MHz)	**Peak Level (dBµV/m) (3m)**	**QPeak Level (dBµV/m) (3m)**	**Limit (dBµV/m) (3m)**
Below 13.110	-	32.9	69.5
13.110 to 13.410	-	36.7	80.5
13.410 to 13.553	-	37.9	90.5
13.553 to 13.567	-	71.8	124
13.567 to 13.710	-	42.3	90.5
13.710 to 14.010	-	37.9	80.5
Above 14.010	-	35.4	69.5

7.7. CONCLUSION

Field strength within the band 13.110-14.010MHz measurement performed on the sample of the product **BIOLOG ID PRD 7170100A**, SN: **01BI2009000001**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

8. UNCERTAINTIES CHART

47 CFR Part 15.209 & 15.207 Kind of test	Wide uncertainty laboratory (k=2) ±x(dB) / (Hz)/ ms	Uncertainty limit
Measurement of conducted disturbances in voltage on the AC power port (9 kHz – 150 kHz)	2,67	3.8
Measurement of conducted disturbances in voltage on the AC power port (150 kHz – 30 MHz)	2,67	3.4
Measurement of conducted disturbances in voltage on the telecommunication port. (AAN)	3,67	5.0
Measurement of conducted disturbances in current (current clamp)	2,73	2.9
Measurement of disturbance power	2,67	4.5
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC V01	4,48	/
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC C01	4,48	/
Measurement of radiated electric field from 30 to 1000MHz in horizontal position on the OATS (Ecuelles)	4,88	6.3
Measurement of radiated electric field from 1 to 18GHz on the Ecuelles site	5.16	/
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the OATS (Ecuelles)	4,99	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC C01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC C01	5,16	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC V01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC V01	5,15	6.3
Measurement of radiated electric field from 1 to 6 GHz C01	5,1	5.2
Measurement of radiated electric field from 1 to 6 GHz V01	4,85	5.2
Measurement of radiated magnetic field from 10kHz to 30MHz on the OATS (Ecuelles)	4,48	/

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report