



LCIE

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

TEST REPORT

N°: 166516-749303-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 600mm tray)
Trade mark BIOLOG ID
Manufacturer BIOLOG ID
Model under test PRD 7170200A
Serial number 01BI2009000001
FCC ID 2AKUFSSTHD60
IC 23919-SSTHD60

Conclusion

See Test Program chapter

Test date

: June 26, 2020 to June 29, 2020

Test location

Fontenay Aux Roses & Ecuelles

Test Site

6230B-1

Sample receipt date

June 23, 2020

Composition of document

43 pages

Document issued on

January 13, 2021

Written by :
Laurent DENEUX
Tests operator

Approved by :
Arnaud FAYETTE
Technical manager



This document shall not be reproduced, except in full, without the written approval of the LCIE. This document contains results related only to the items tested. It does not imply the conformity of the whole production to the items tested. Unless otherwise specified or rule defined by the test method, the decision of conformity doesn't take into account the uncertainty of measures. This document doesn't anticipate any certification decision.

LCIE

Laboratoire Central des Industries Electriques
Une société de Bureau Veritas

33, Av du Général Leclerc
92266 Fontenay Aux Roses
FRANCE

Tél : +33 1 40 95 60 60
contact@lcie.fr
www.lcie.fr



PUBLICATION HISTORY

Version	Date	Author	Modification
01	January 13th, 2021	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	4
2.	EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)	5
3.	OCCUPIED BANDWIDTH.....	11
4.	FREQUENCY TOLERANCE	14
5.	AC POWER LINE CONDUCTED EMISSIONS.....	18
6.	FIELD STRENGTH OUTSIDE OF THE BANDS 13.110-14.010 MHZ	30
7.	FIELD STRENGTH WITHIN THE BAND 13.110-14.010MHZ.....	39
8.	UNCERTAINTIES CHART	43

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 P	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
AC Power Line Conducted Emission P	☒ PASS	☐ FAIL	☐ NA(2)	☐ NP(1)
Frequency Tolerance P	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Field strength within the band 13.110-14.010MHz P	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Field strength outside of the bands 13.110-14.010 MHz P	☒ PASS	☐ FAIL	☐ NA	☐ NP(1)
Receiver Radiated Emissions P	☒ 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 7170200A

Serial Number: 01BI2009000001



Equipment Under Test

Power supply:

During all the tests, EUT is supplied by V_{nom} : 15VDC

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	☐ +15.00VDC	☐ -....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()

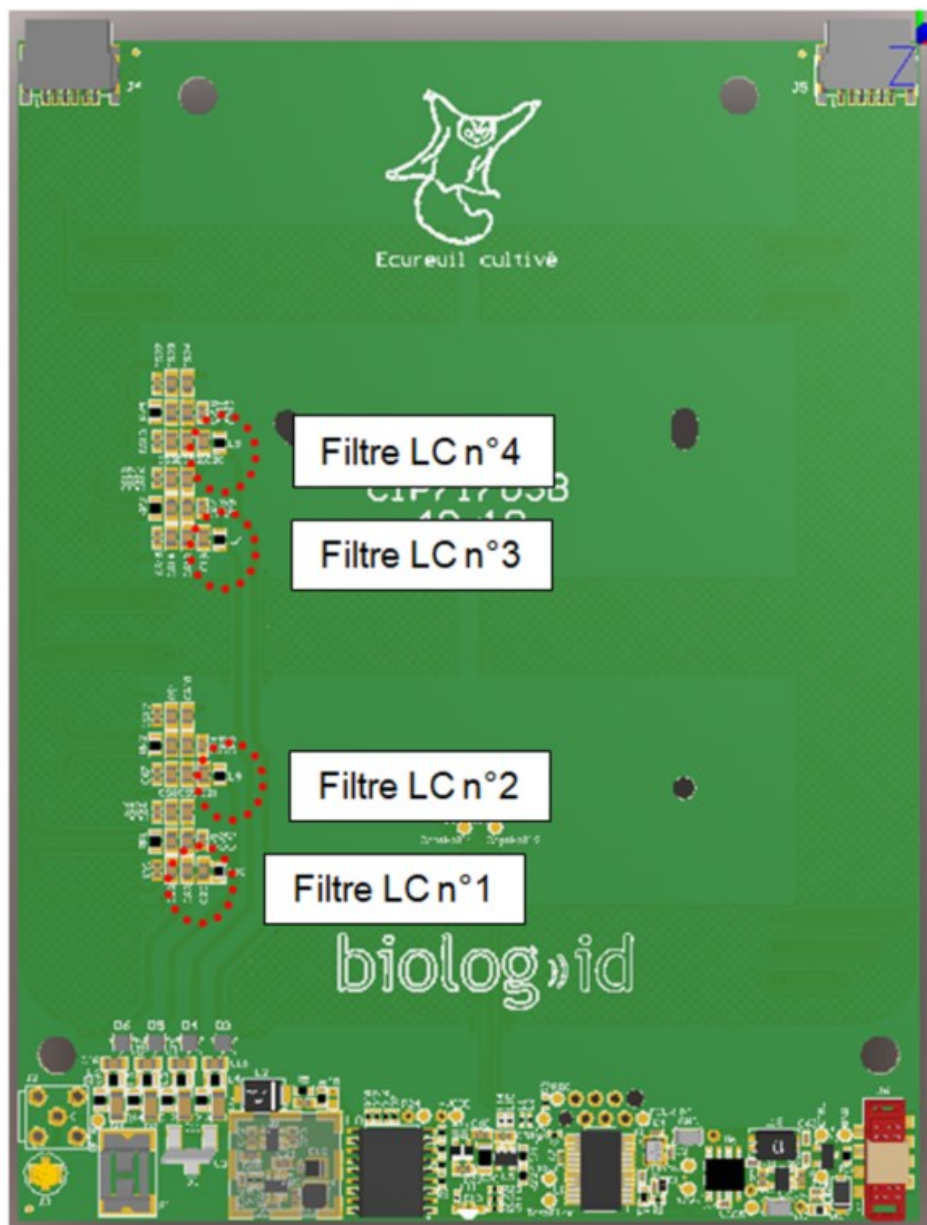
2.3. EQUIPMENT LABELLING



2.4. EQUIPMENT MODIFICATION

☐ None ☒ Modification:

- Add 4 LC filter on CAR 717 02A for PRD_7170200A (SST-R HD with 600mm 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 52.5dB μ V 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 dB μ V/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}.$$

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 MAHOUGOU
Date of test : June 29, 2020
Ambient temperature : 26°C
Relative humidity : 47%

3.2. TEST SETUP

- The Equipment Under Test is installed:

- ☐ On a table
- ☒ In a climatic chamber
- ☐ In an anechoic chamber

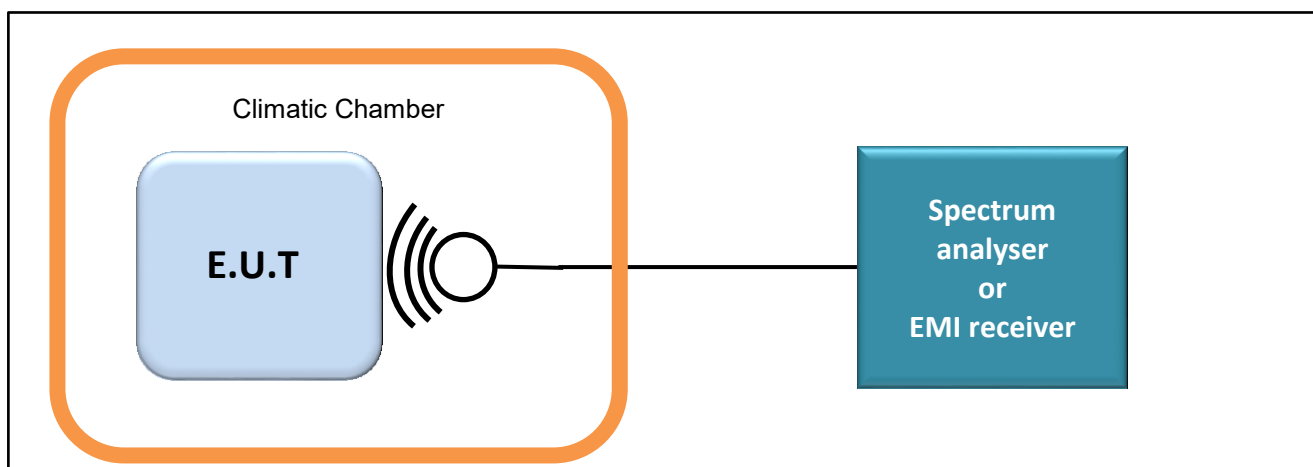
- Measurement is performed with a spectrum analyzer in:

- ☐ 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) $\geq 3 \times$ 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

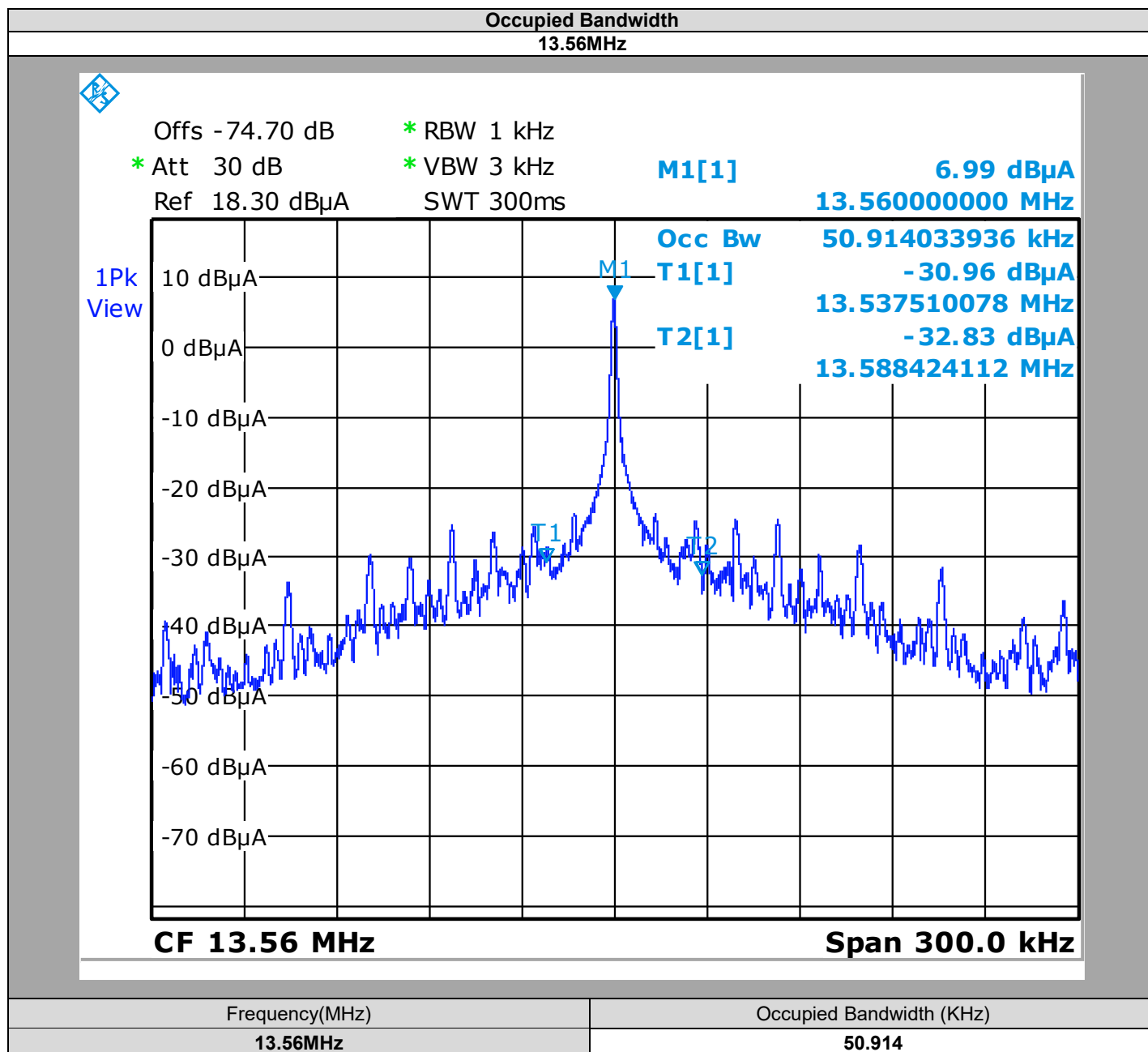
None

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
Attenuator 10dB	MINI CIRCUITS	BW-S10W2+	A7122230	2019/06	2021/06
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



3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **BIOLOG ID PRD 7170200A**, 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 MAHOUGOU
Date of test : June 29, 2020
Ambient temperature : 26°C
Relative humidity : 47%

4.2. TEST SETUP

- The Equipment Under Test is installed:

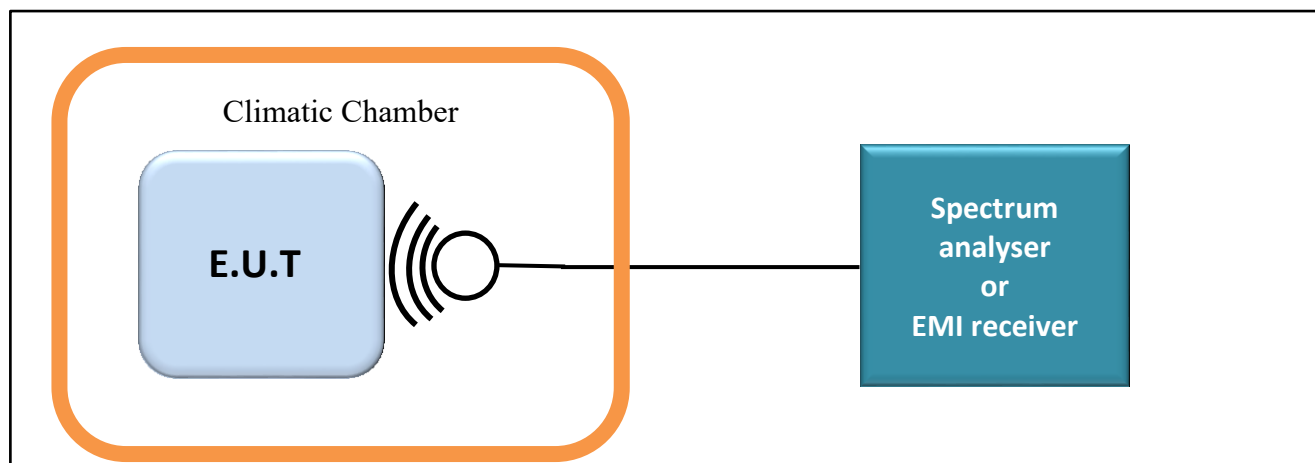
- ☐ On a table
- ☒ In a climatic chamber
- ☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- ☐ Conducted Method
- ☒ Radiated Method

- Test Procedure:

- ☒ ANSI C63.10 § 6.8



Test set up of Occupied Bandwidth



Photograph for Frequency Tolerance in the normal test condition



Photograph for Frequency Tolerance in the extreme test condition

4.3. LIMIT

$\pm 0.01\%$ ($\pm 100\text{ppm}$)

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
Attenuator 10dB	MINI CIRCUITS	BW-S10W2+	A7122230	2019/06	2021/06
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)	13,5601406	13,5601453	13,5601266	13,5601078	13,5600891	13,5600328	13,5599813	13,5600047	13,5602994
Frequency Drift (%)	0,0010	0,0011	0,0009	0,0008	0,0007	0,0002	-0,0001	0,0000	0,0022
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)	13,5601406	13,5601453	13,5601266	13,5601078	13,5600891	13,5600328	13,5599859	13,5599813	13,56
Frequency Drift (%)	0,0010	0,0011	0,0009	0,0008	0,0007	0,0002	-0,0001	-0,0001	0,0000
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)	13,5601406	13,5601453	13,5601266	13,5601078	13,560075	13,5600375	13,5599813	13,5599859	13,5602994
Frequency Drift (%)	0,0010	0,0011	0,0009	0,0008	0,0006	0,0003	-0,0001	-0,0001	0,0022
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)	13,5601406	13,5601453	13,5601266	13,5601078	13,560075	13,5600375	13,5599859	13,5599859	13,5597006
Frequency Drift (%)	0,0010	0,0011	0,0009	0,0008	0,0006	0,0003	-0,0001	-0,0001	-0,0022

Temperature	Tnom		
Voltage:	Vmin	Vnom	Vmax
Frequency (MHz)	13,5600187	13,5600187	13,5600187
Frequency Drift (%)	0,0001	0,0001	0,0001

4.6. CONCLUSION

Frequency tolerance measurement performed on the sample of the product **BIOLOG ID PRD 7170200A**, SN: **01BI2009000001**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

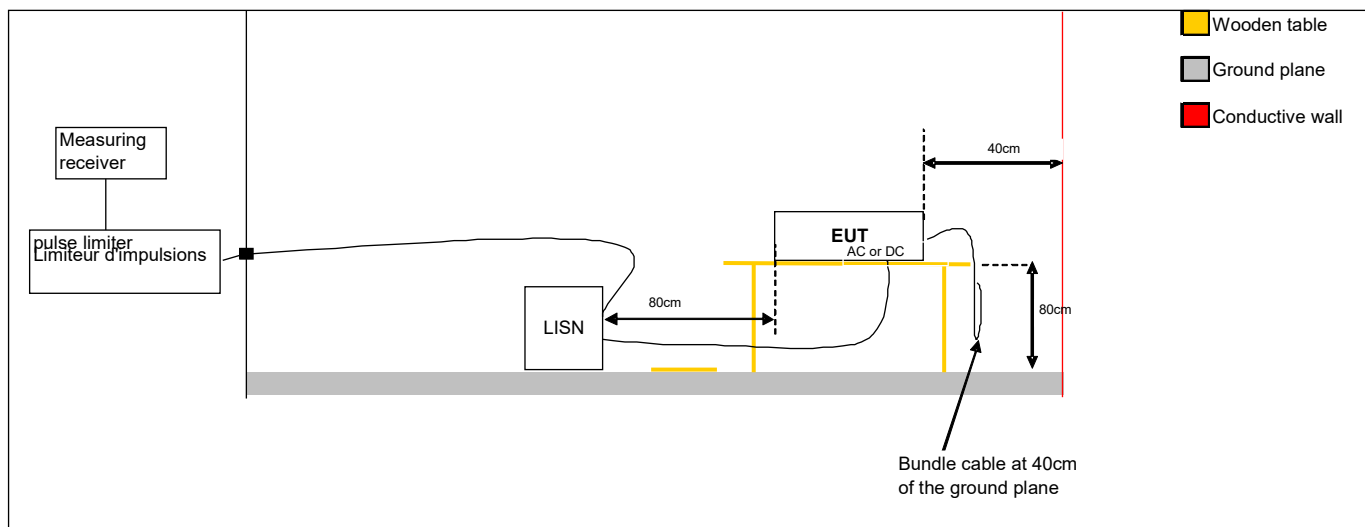
5. AC POWER LINE CONDUCTED EMISSIONS

5.1. TEST CONDITIONS

Test performed by : Laurent DENEUX
 Date of test : June 26, 2020
 Ambient temperature : 21 °C
 Relative humidity : 48 %

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 $50\Omega / 50\mu\text{H}$. 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	66dB μ V to 56 μ V*	QPeak
	56dB μ V to 46 μ V*	Average
0,5MHz to 5MHz	56dB μ V	QPeak
	46dB μ V	Average
5MHz to 30MHz	60B μ V	QPeak
	50dB μ V	Average

*Decreases with the logarithm of the frequency

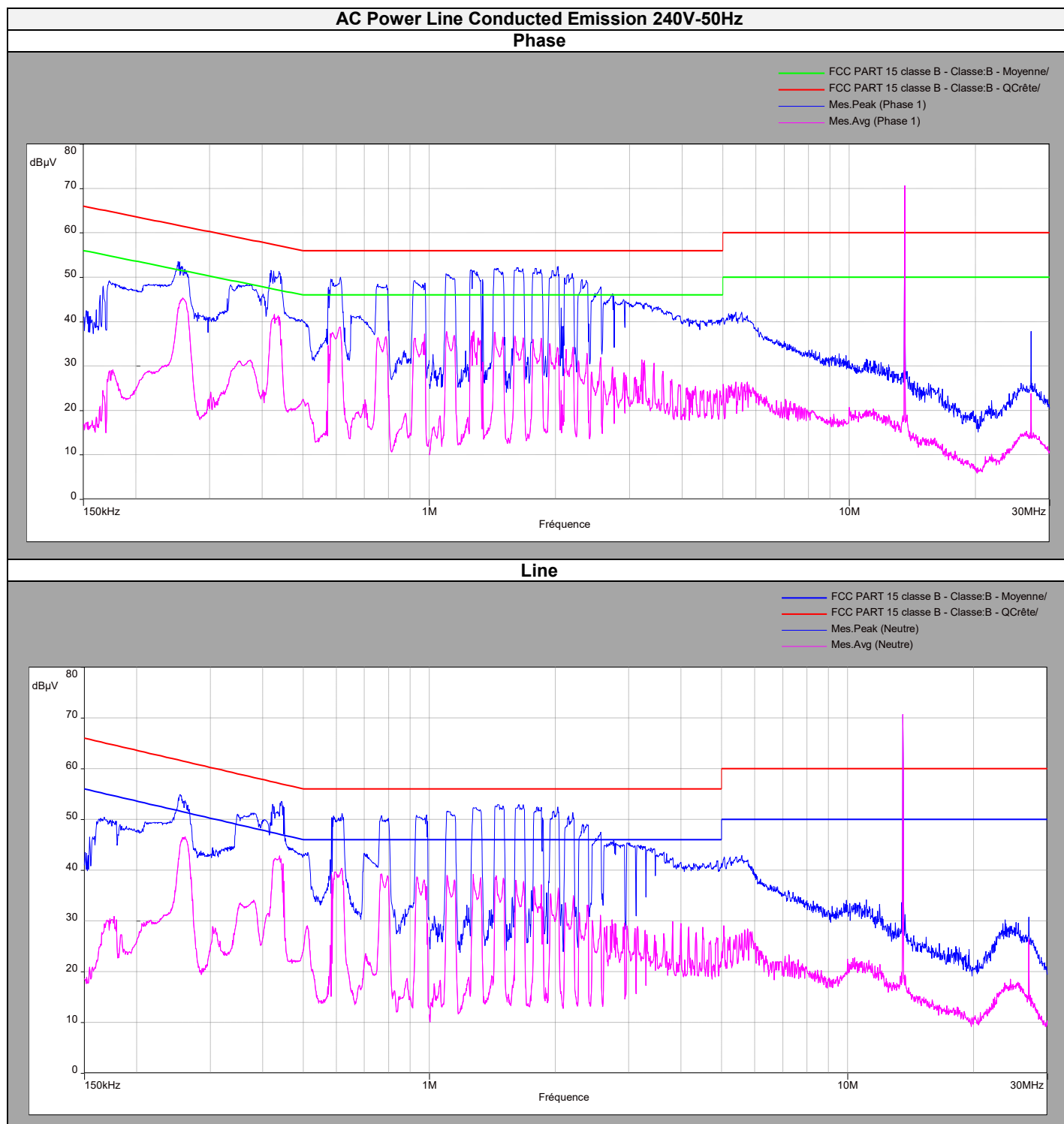
5.4. TEST EQUIPMENT LIST

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

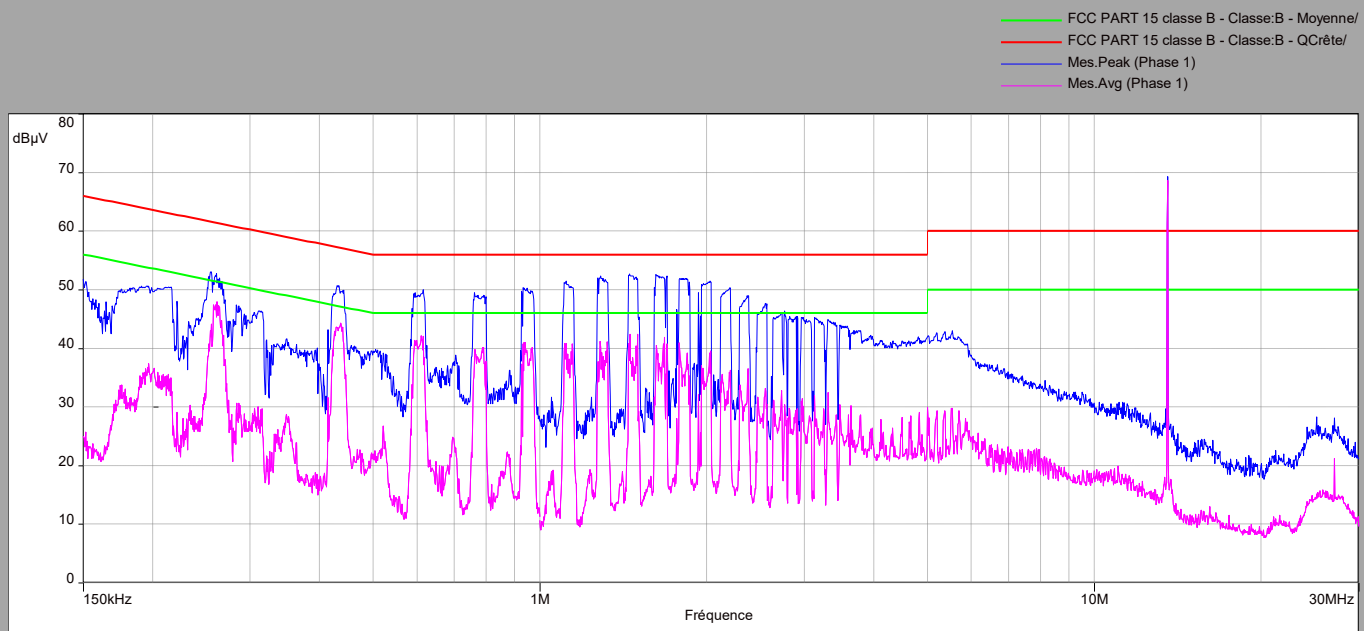


Phase Line							
Frequency (MHz)	Peak Level (dBμV)	Quasi-Peak Level (dBμV)	Quasi-Peak Limit (dBμV)	Margin Quasi-Peak (dBμV)	Average Level (dBμV)	Average Limit (dBμV)	Margin Average (dBμV)
0,262	51,5	-	61,5	10	44	51,5	7,5
0,613	49,7	-	56	6,3	38,7	46	7,3
1,27	51,5	-	56	4,5	37,8	46	8,2
1,84	51	-	56	5	36,3	46	9,7
13,56	70,5	-	60	-10,5	70,5	50	-20,5

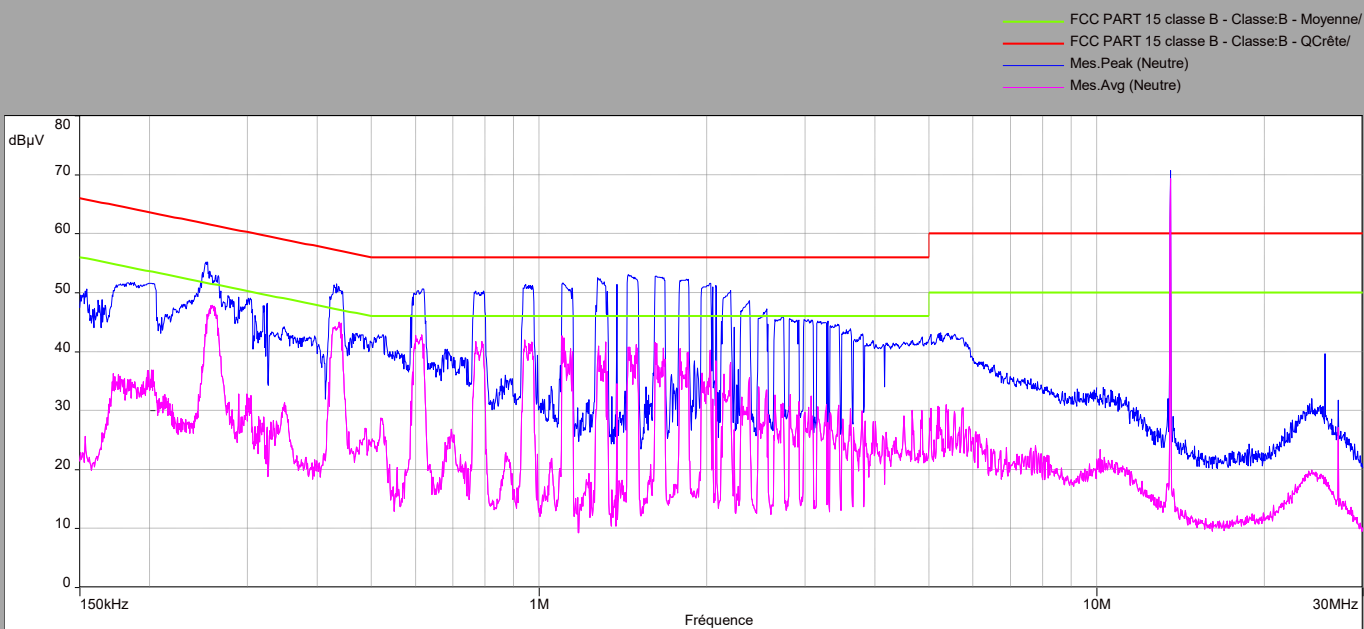
Neutral Line							
Frequency (MHz)	Peak Level (dBμV)	Quasi-Peak Level (dBμV)	Quasi-Peak Limit (dBμV)	Margin Quasi-Peak (dBμV)	Average Level (dBμV)	Average Limit (dBμV)	Margin Average (dBμV)
0,262	53,3	-	61,5	8,2	46	51,5	5,5
0,618	50,5	-	56	5,5	40,2	46	5,8
1,44	52,6	-	56	3,4	38,8	46	7,2
13,56	70,6	-	60	-10,6	70,2	50	-20,2
27,12	30,7	-	60	29,3	27,3	50	22,7

AC Power Line Conducted Emission 120V-60Hz

Phase



Line

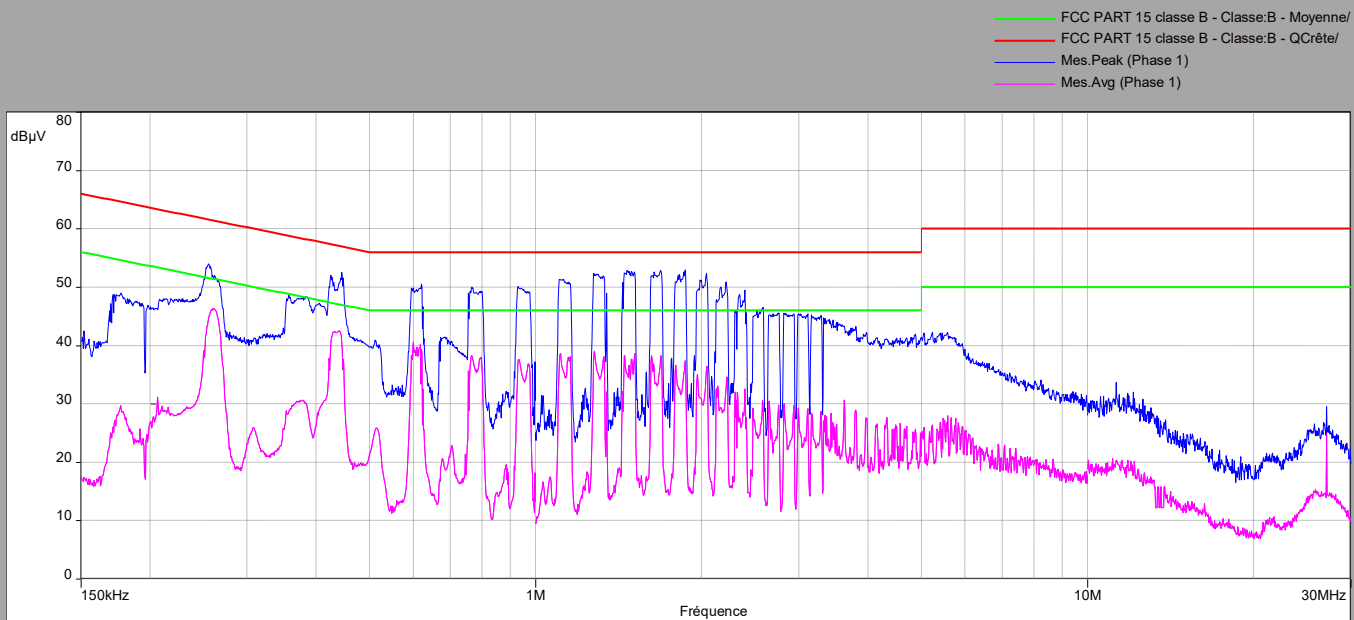


Phase Line							
Frequency (MHz)	Peak Level (dBμV)	Quasi-Peak Level (dBμV)	Quasi-Peak Limit (dBμV)	Margin Quasi-Peak (dBμV)	Average Level (dBμV)	Average Limit (dBμV)	Margin Average (dBμV)
0,26	52,4	-	61,4	9	47,4	51,4	4
0,61	50	-	56	6	42	46	4
1,67	52	-	56	4	42	46	4
13,56	69,3	-	60	-9,3	68,6	50	-18,6
27,12	28,2	-	60	31,8	21,2	50	28,8

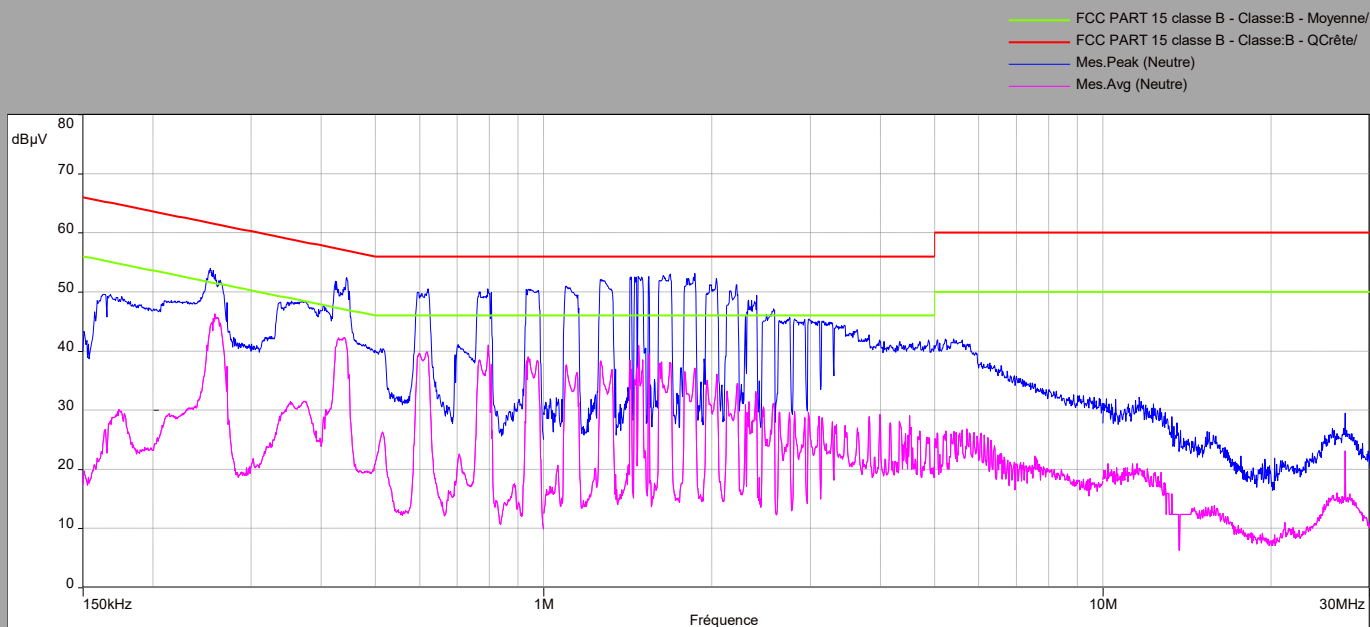
Neutral Line							
Frequency (MHz)	Peak Level (dBμV)	Quasi-Peak Level (dBμV)	Quasi-Peak Limit (dBμV)	Margin Quasi-Peak (dBμV)	Average Level (dBμV)	Average Limit (dBμV)	Margin Average (dBμV)
0,26	52,7	-	61,4	8,7	47,8	51,4	3,6
0,61	50,6	-	56	5,4	40,1	46	5,9
1,62	52,7	-	56	3,3	41,4	46	4,6
13,56	70,6	-	60	-10,6	69,3	50	-19,3
27,12	31,7	-	60	28,3	26,4	50	23,6

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

Phase



Line

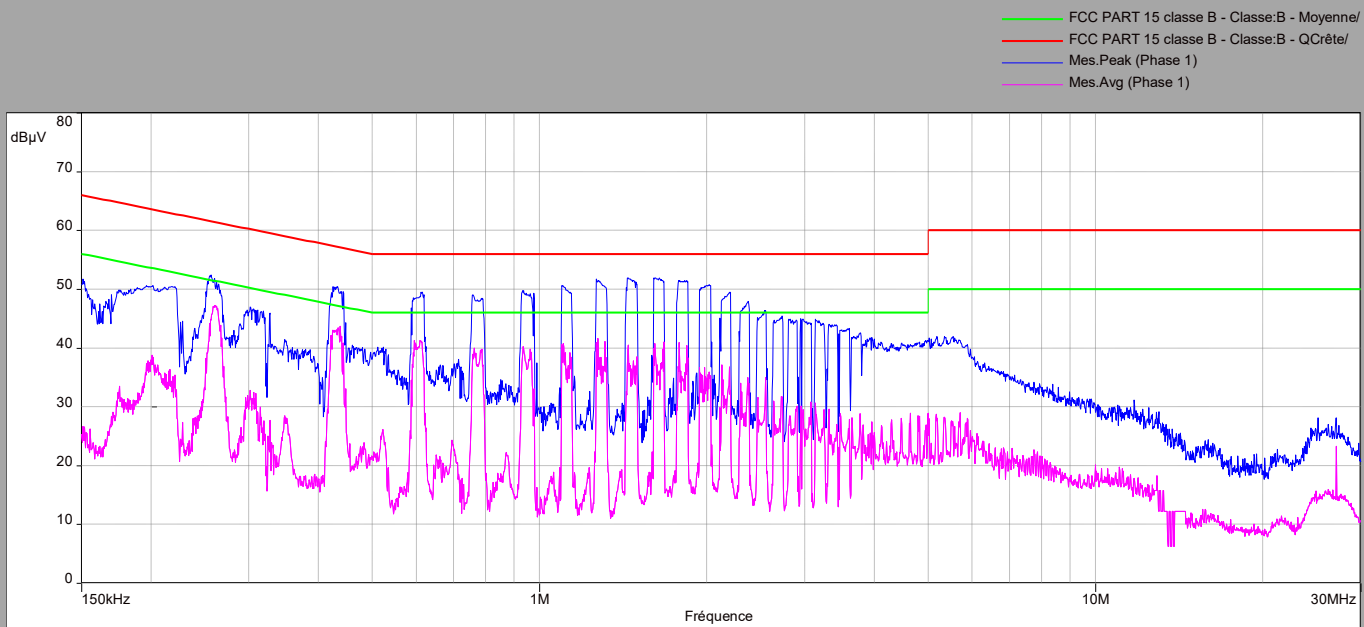


Phase Line							
Frequency (MHz)	Peak Level (dBμV)	Quasi-Peak Level (dBμV)	Quasi-Peak Limit (dBμV)	Margin Quasi-Peak (dBμV)	Average Level (dBμV)	Average Limit (dBμV)	Margin Average (dBμV)
0,262	52	-	61,5	9,5	46,3	51,5	5,2
0,613	49,3	-	56	6,7	40,3	46	5,7
1,28	52	-	56	4	38,5	46	7,5
2	51,1	-	56	4,9	36,4	46	9,6
3,62	43,2	-	56	12,8	30,6	46	15,4

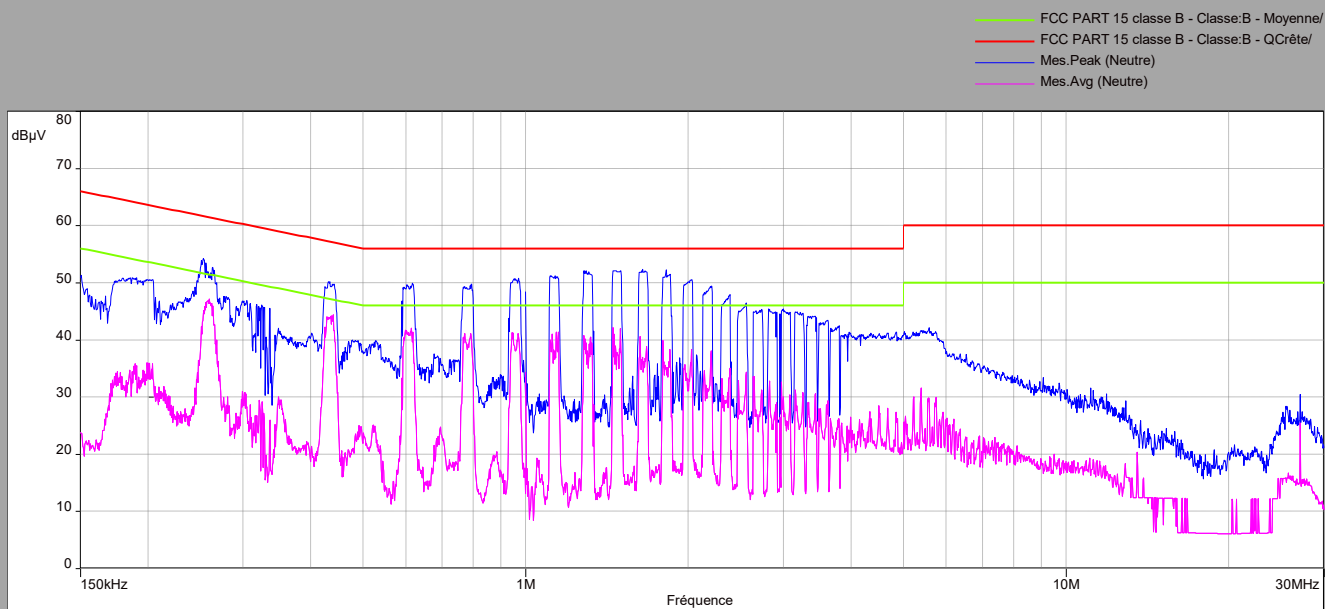
Neutral Line							
Frequency (MHz)	Peak Level (dBμV)	Quasi-Peak Level (dBμV)	Quasi-Peak Limit (dBμV)	Margin Quasi-Peak (dBμV)	Average Level (dBμV)	Average Limit (dBμV)	Margin Average (dBμV)
0,262	53,4	-	61,5	8,1	45,5	51,5	6
0,618	50,5	-	56	5,5	39,2	46	6,8
0,972	50	-	56	6	37,8	46	8,2
1,48	52,5	-	56	3,5	40,9	46	5,1
2,97	45	-	56	11	29	46	17

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)
0,26	51,5	-	61,3	9,8	47	51,3	4,3
0,61	49,4	-	56	6,6	41,1	46	4,9
0,93	49,3	-	56	6,7	40,3	46	5,7
1,78	51,3	-	56	4,7	40,9	46	5,1
5,71	41,1	-	60	18,9	29	50	21

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	52,5	-	61,4	8,9	45,6	51,4	5,8
0,61	49,4	-	56	6,6	42	46	4
1,45	52	-	56	4	42	46	4
2,02	50,5	-	56	5,5	38,3	46	7,7
5,4	41,6	-	60	18,4	31,3	50	18,7

5.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product BIOLOG ID PRD 7170200A, 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 26, 2020 to June 29, 2020
 Ambient temperature : 21 to 22°C
 Relative humidity : 47 to 49 %

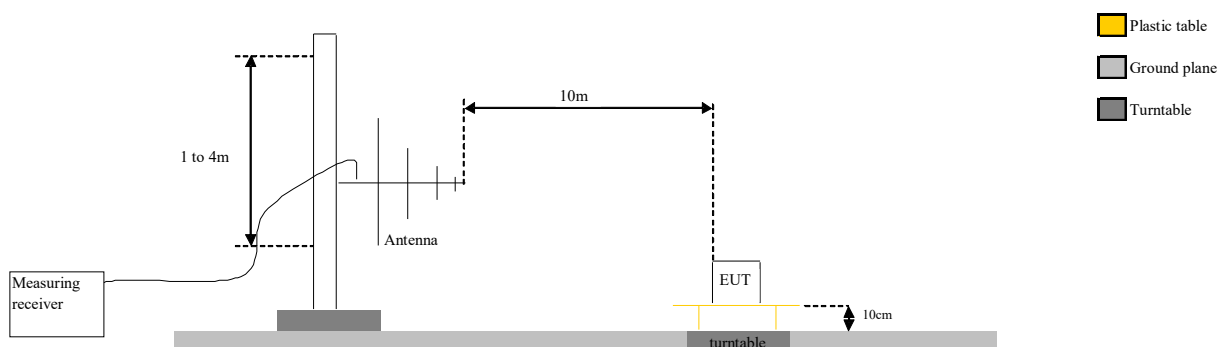
6.2. TEST SETUP

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 placed 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	67.6dB μ V/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	Level	Detector
490kHz-1.705MHz	87.6dB μ V/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dB μ V/m	QPeak
Measure at 10m		
Frequency range	Level	Detector
30MHz to 88MHz	29.5dB μ V/m	QPeak
88MHz to 216MHz	33dB μ V/m	QPeak
216MHz to 960MHz	35.5dB μ V/m	QPeak
960MHz to 1000MHz	43.5dB μ V/m	QPeak
Above 1000MHz	63.5dB μ V/m	Peak
	43.5dB μ V/m	Average
Measure at 3m		
Frequency range	Level	Detector
30MHz to 88MHz	40dB μ V/m	QPeak
88MHz to 216MHz	43.5dB μ V/m	QPeak
216MHz to 960MHz	46B μ V/m	QPeak
960MHz to 1000MHz	54dB μ V/m	QPeak
Above 1000MHz	74dB μ V/m	Peak
	54dB μ V/m	Average

6.4. TEST EQUIPMENT LIST

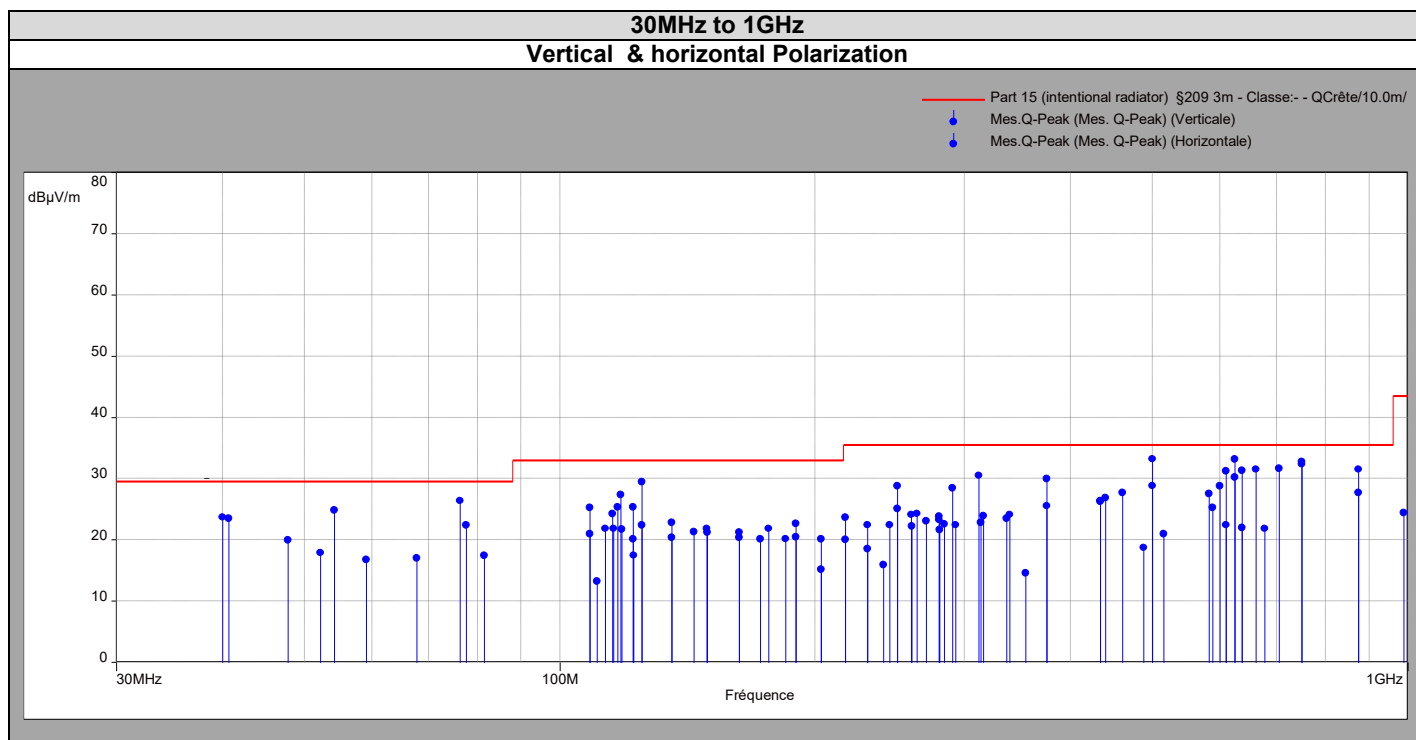
Test equipment used					
Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
Open test site	LCIE	-	F2000400	2019-06	2020-06
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2018-10	2020-10
Cable	-	-	A5329444	2019-12	2020-12
Bilog antenna	CHASE	CBL 6112A	C2040040	2020-05	2021-05
Cable	-	-	A5329442	2019-12	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 2 months

6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

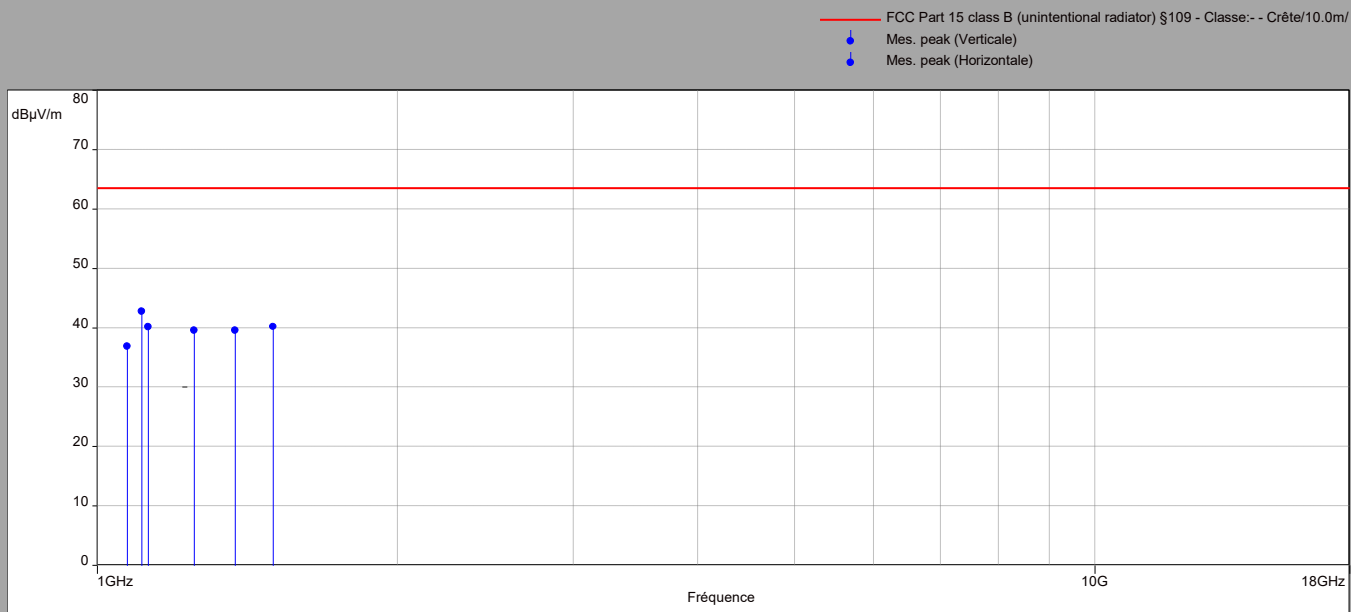
☒ None ☐ Divergence:

6.6. RESULTS

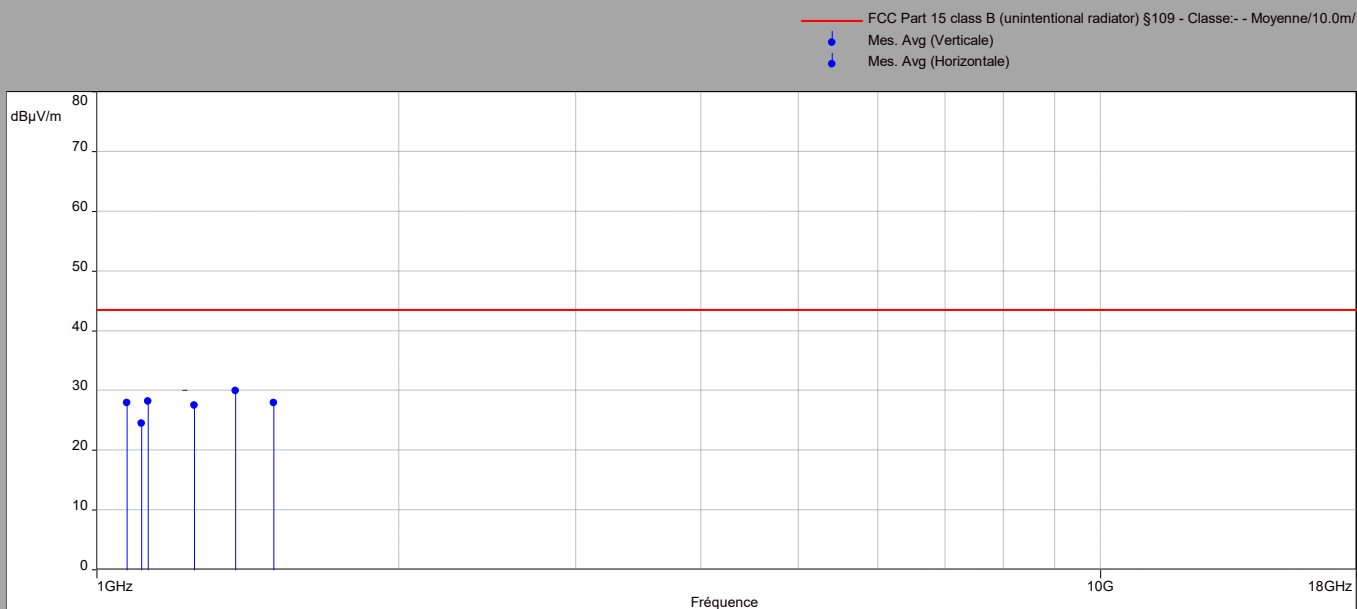


Above 1GHz

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)
Parallel	0.4835	-	36.93	73.9	36,97
Parallel	0.6035	-	34.91	72.0	37,09
Parallel	1.086	-	37.78	66.9	29,12
Parallel	1.26	-	28.09	65.6	37,51
Parallel	1.424	-	24.48	64.5	40,02
Parallel	1.588	-	25.86	63.6	37,74
Parallel	1.8	-	22.24	69.5	47,26
Parallel	1.966	-	21.45	69.5	48,05
Parallel	2.158	-	26.55	69.5	42,95
Parallel	2.334	-	21.43	69.5	48,07
Parallel	2.512	-	21.05	69.5	48,45
Parallel	2.694	-	21.78	69.5	47,72
Perpendicular	0.418	-	39.39	95.2	55,81
Perpendicular	0.436	-	47.16	94.8	47,64
Perpendicular	0.511	-	34.79	73.4	38,61
Perpendicular	0.6	-	32.34	72.0	39,66
Perpendicular	0.7685	-	32.57	69.9	37,33
Perpendicular	0.943	-	32.75	68.1	35,35
Perpendicular	1.114	-	30.6	66.7	36,1
Perpendicular	1.284	-	29.37	65.4	36,03
Perpendicular	1.464	-	28.79	64.3	35,51
Perpendicular	1.628	-	24.86	63.4	38,54
Perpendicular	1.78	-	23.19	69.5	46,31
Perpendicular	1.96	-	22.98	69.5	46,52
Perpendicular	2.144	-	21.26	69.5	48,24
Perpendicular	2.342	-	21.14	69.5	48,36
Perpendicular	2.512	-	22.38	69.5	47,12
Perpendicular	2.662	-	23.28	69.5	46,22
Perpendicular	4.6	-	23.15	69.5	46,35
Perpendicular	27.12	-	19.8	69.5	49,7

30MHz to 1GHz					
Polarization	Frequency (MHz)	Peak Level (dBμV/m)	QPeak Level (dBμV/m)	Limit (dBμV/m)	Margin QPeak (dBμV/m)
Vertical	122	-	25.35	33	7.65
Vertical	125	-	29.44	33	3.56
Vertical	500	-	33.24	35.5	2.26
Vertical	610.2	-	31.2	35.5	4.3
Vertical	625	-	30.21	35.5	5.29
Vertical	662.2	-	31.59	35.5	3.91
Vertical	750	-	32.79	35.5	2.71
Vertical	875	-	27.71	35.5	7.79
Horizontal	311.9	-	30.58	35.5	4.92
Horizontal	625	-	33.13	35.5	2.37
Horizontal	750	-	32.42	35.5	3.08
Horizontal	875	-	31.59	35.5	3.91

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	1071.2		27.94	43.5	15.56	36.81	63.5	26.69
Vertical	1107.6		24.46	43.5	19.04	42.75	63.5	20.75
Vertical	1250		27.48	43.5	16.02	39.57	63.5	23.93
Horizontal	1125		28.17	43.5	15.33	40.13	63.5	23.37
Horizontal	1375		29.96	43.5	13.54	39.51	63.5	23.99
Horizontal	1500		27.91	43.5	15.59	40.24	63.5	23.26

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 7170200A**, 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 29, 2020
 Ambient temperature : 21 °C
 Relative humidity : 47 %

7.2. TEST SETUP

Measurement procedure:

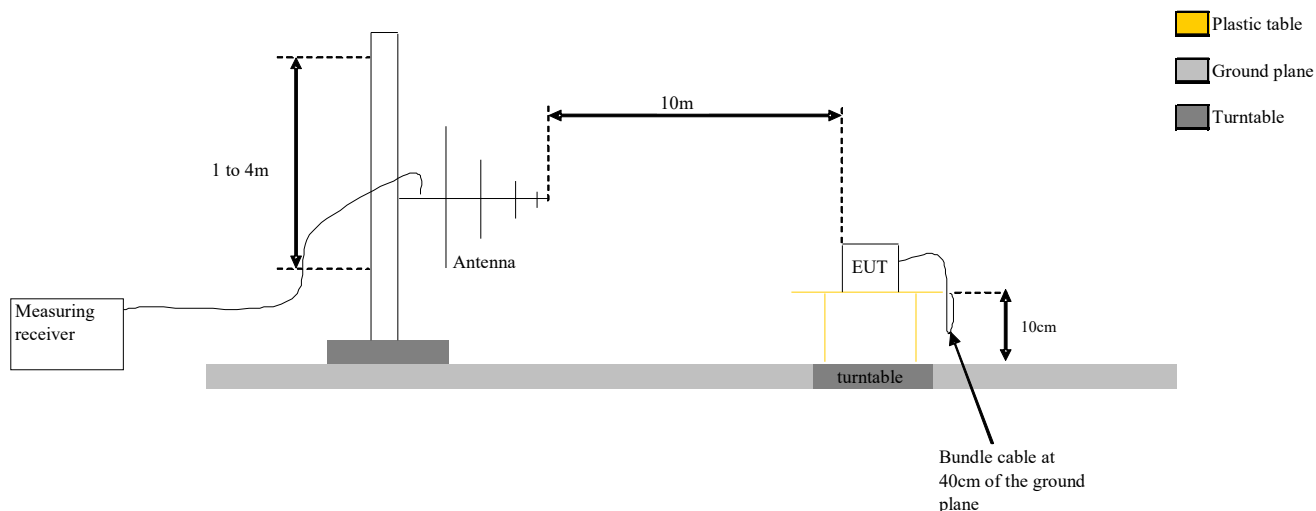
- ☒ Open Area Test Site
- ☐ Open Area Test Site + Test fixture in climatic chamber

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 ($\mu\text{V/m}$) @30m	Field strength (dB $\mu\text{V/m}$) @30m	Field strength (dB $\mu\text{V/m}$) @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	-	34.2	69.5
13.110 to 13.410	-	36.7	80.5
13.410 to 13.553	-	41.3	90.5
13.553 to 13.567	-	77.2	124
13.567 to 13.710	-	42.4	90.5
13.710 to 14.010	-	37.9	80.5
Above 14.010	-	36.4	69.5

Ground Parallel Axis			
Frequency (MHz)	Peak Level (dBµV/m) (3m)	QPeak Level (dBµV/m) (3m)	Limit (dBµV/m) (3m)
Below 13.110	-	28.8	69.5
13.110 to 13.410	-	32.3	80.5
13.410 to 13.553	-	36.4	90.5
13.553 to 13.567	-	28.9	124
13.567 to 13.710	-	35.2	90.5
13.710 to 14.010	-	32.1	80.5
Above 14.010	-	29.2	69.5

Perpendicular Axis			
Frequency (MHz)	Peak Level (dBµV/m) (3m)	QPeak Level (dBµV/m) (3m)	Limit (dBµV/m) (3m)
Below 13.110	-	32.4	69.5
13.110 to 13.410	-	35.9	80.5
13.410 to 13.553	-	39.7	90.5
13.553 to 13.567	--	68.9	124
13.567 to 13.710	-	40.2	90.5
13.710 to 14.010	-	36.7	80.5
Above 14.010	-	33.6	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 7170200A**, 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) $\pm x(\text{dB}) / (\text{Hz}) / \text{ms}$	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