TEST REPORT

N°: 135376-672302CCR2015-10-07

Subject	Electromagnetic compatibility (EMC) : Publication CFR 47 Part 15 of 2013 Subpart C - Radio frequency devices - Intentional radiators standards (15.231)
FCC Registration Number	166175
Issued to	**BodyCap** **6, Rue de la girafe** **14000 Caen** **FRANCE**
Apparatus under test	
Product	**Capsule**
Trade mark	**BodyCap**
Manufacturer	**BodyCap**
Model under test	**Anipill / 01101**
Serial number	-
Test date	**May 7th, 2015 to May 26th, 2015**
Test location	**Fontenay Aux Roses**
Test performed by	**Fostoki MEDJOUDJ & Stéphane PHOUDIAH**
Composition of document	**20 pages**
Document issued on	**August 3rd, 2015**
Document issued on	**October 07th, 2015**

Written by :
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Tests operator

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SUMMARY

1. Test Program

References

- ✓ **CFR 47 Part 15 Subpart C - Radio frequency devices - Intentional radiators standards (15.231 & 15.205 & 15.207 & 15.209)**
- ✓ **ANSI C63.10 (2009)**
- ✓ **CISPR 16-4-2**

Emission tests:

Test Description	Main characteristics	Test result - Comments
FCC Part 15.207	AC Power Line Conducted Emissions	☑ PASS ☐ FAIL ☐ NA ☐ NP (Limited Program)
FCC Part 15.231 (a) (1) (2) (3) (4) (5)	Periodic operation	☑ PASS ☐ FAIL ☐ NA ☐ NP (Limited Program)
FCC Part 15.231 (b) (1) (2) (3) FCC Part 15.205 FCC Part 15.209	Field strength of fundamental & spurious emission	☐ PASS ☐ FAIL ☑ NA ☐ NP (Limited Program)
FCC Part 15.231 (c)	20dB Bandwidth	☑ PASS ☐ FAIL ☐ NA ☐ NP (Limited Program)
FCC Part 15.231 (d)	Frequency tolerance	☐ PASS ☐ FAIL ☑ NA ☐ NP (Limited Program)
FCC Part 15.231 (b) (1) (2) (3) (e) & FCC Part 15.205 FCC Part 15.209	Field strength of fundamental & spurious emission & Limiting operation	☑ PASS ☐ FAIL ☐ NA ☐ NP (Limited Program)

The product is Compliant according to CFR 47 Part 15 of 2013 Subpart C - Radio frequency devices - Intentional radiators standards (15.231)

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 Description (declared by provider)

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT): Anipill / 01101 Serial Number: -

Equipment Under Test

Inputs/outputs - Cable:
No input output

Auxiliary equipment used during test:
Personal computer

Equipment information: (Declared by provider)

<table>
<tr><td>Apparatus Description</td><td colspan="3">The device is composed of an ingestible capsule, swallowed by the animal, which uses wireless telemetry to detect and transmit the animal’s core body temperature to an external monitor (which is also provided).
 
<table>
<tr><th>Frequency (MHz)</th><th>Description</th></tr>
<tr><td>Cmin:433.22 MHz</td><td rowspan="8">RF Communication</td></tr>
<tr><td>433.42 MHz</td></tr>
<tr><td>433.62 MHz</td></tr>
<tr><td>433.82 MHz</td></tr>
<tr><td>Cnom:434.02 MHz</td></tr>
<tr><td>434.22 MHz</td></tr>
<tr><td>434.42 MHz</td></tr>
<tr><td>Cmax:434.62 MHz</td></tr>
<tr><td colspan="2"></td></tr>
</table></td></tr>
<tr><td>Type of power source:</td><td>☐ AC power supply</td><td>☐ DC power supply</td><td>☑ Battery</td></tr>
<tr><td>Test source voltage:</td><td>Vmin-Vmax:</td><td>☐ 120V -60Hz</td><td>☑ 3Vdc</td></tr>
<tr><td rowspan="2">Operating Modes</td><td>Mode 1</td><td colspan="2">Permanent emission</td></tr>
<tr><td>Mode 2</td><td colspan="2">Permanent emission-reception</td></tr>
</table>

2.2. EQUIPMENT LABELLING

No marking plate

2.3. EQUIPMENT MODIFICATIONS

☑ None ☐ Modification:

3. Field strength of fundamental & Field strength of spurious emission

3.1. ENVIRONMENTAL CONDITIONS

Test performed by : Fostoki MEDJOUDJ
Date of test : 2015/05/07
Ambient temperature : 20°C
Relative humidity : 38%

3.2. TEST SETUP

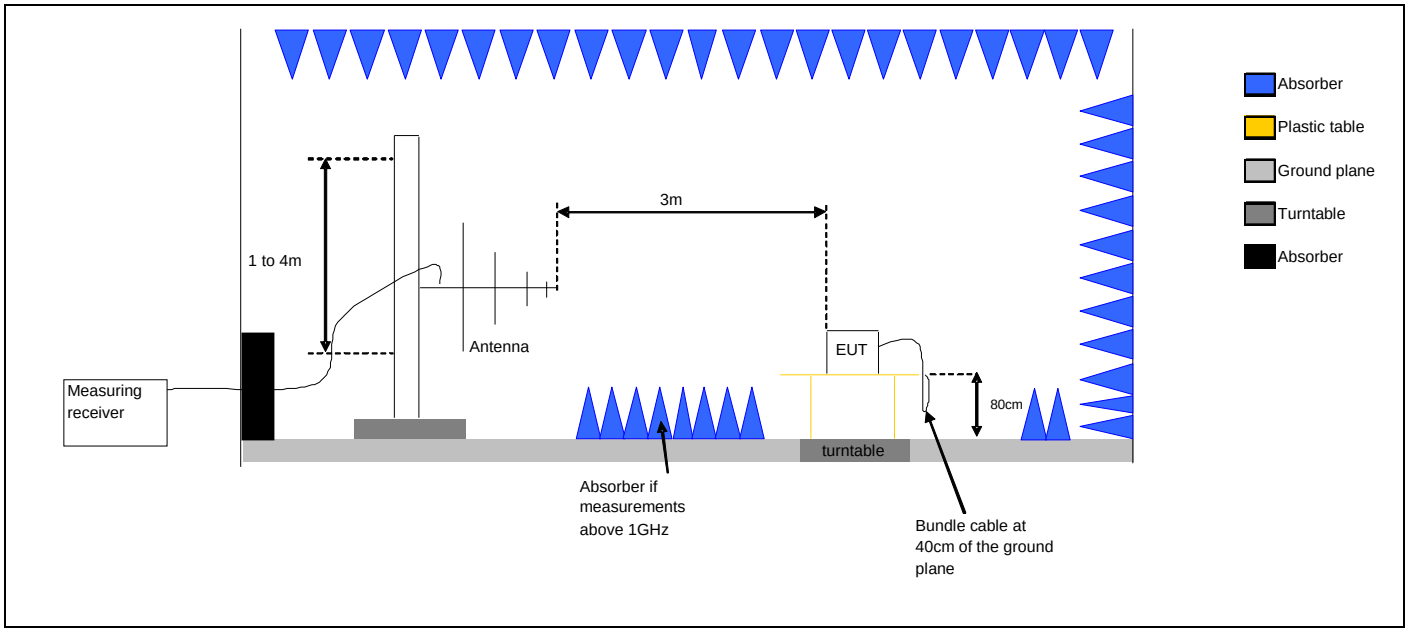
Specifications:

Frequency	30 – 1000 MHz	RBW 120 kHz
	1-6GHz	RBW 1MHz
Detector	Peak and Quasi-Peak	

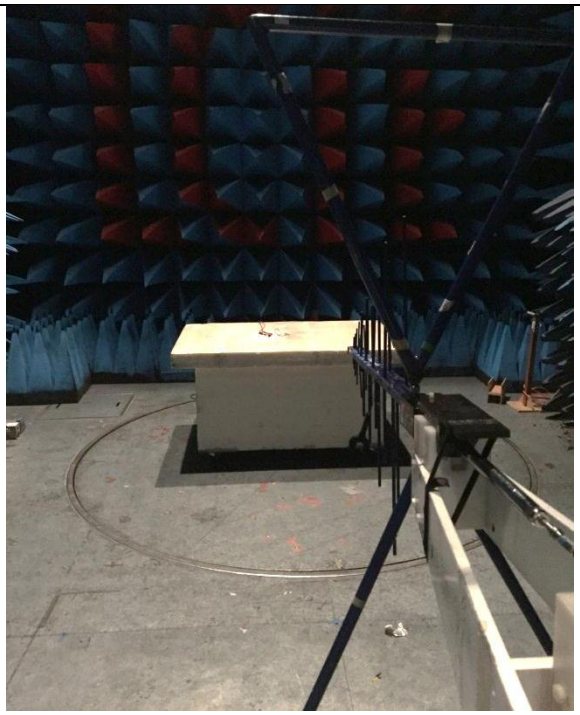
Pre characterization in semi anechoic room is performed to define the critical frequencies

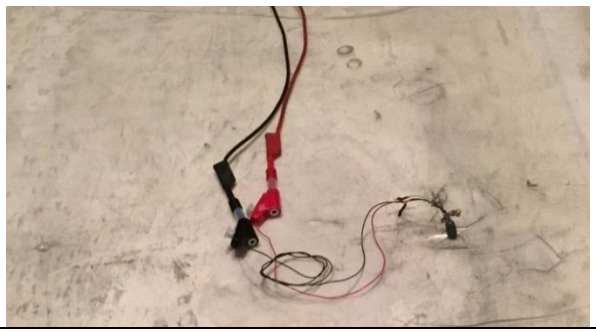
Operating conditions:
- The Equipment under Test is installed:
☑ Measure in semi anechoic room
☐ Measure in open area site
- Measuring distance:
☑ 3m
☐ 10m
- Deviation method:
☐ Yes
☑ No
-Product installation:
☑ The EUT was tested as a tabletop equipment and was placed on a non-conducting platform the top of which is 0.8m above the metal ground plane.
☐ The EUT is at 10cm height from reference plane

Operating mode:
☑ Mode 1



Test Set up for radiated measurement in semi anechoic chamber





Measurement of radiated disturbances.

3.3. LIMIT

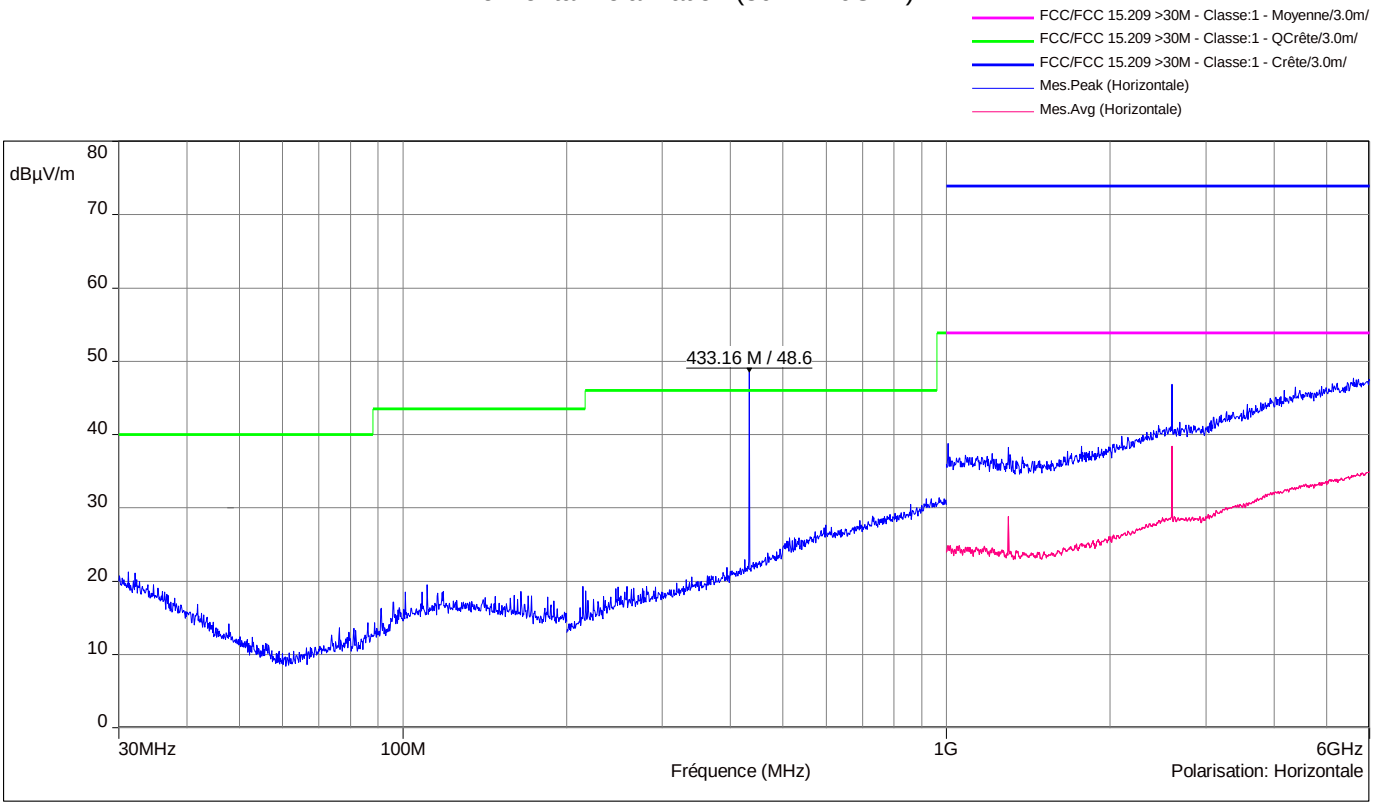
Frequency Bands/frequencies	dB (µV/m) quasi-peak	dB (µV/m) peak	dB (µV/m) average
30-88MHz	40	-	-
88 – 216MHz	43.5	-	-
216 – 960 MHz	46	-	-
960 – 1000 MHz	53.9	-	-
1000-6000MHz	-	73.9	53.9

3.4. TEST EQUIPMENT LIST

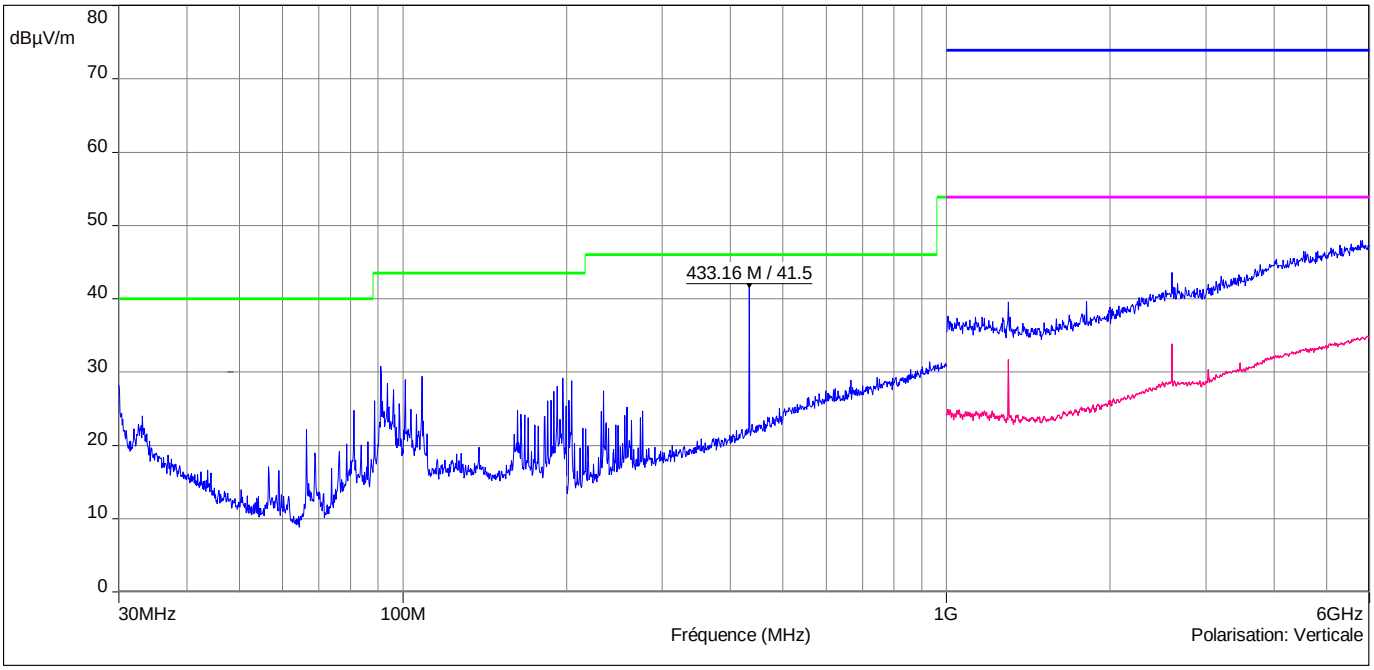
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi anechoic chamber 11,8x8,1x9,5m	SIEPEL	C01	D3044008	2014/09	2015/09
Bilog antenna	CHASE	CBL6111C	C2040124	2014/09	2015/09
Spectrum analyzer	ROHDE & SCHWARZ	ESIB26	A2642021	2015/01	2016/01
Horn antenna	EMCO	3115	C2042018	2015/05	2016/05
Preamplifier	LCIE	-	A7086012	2015/05	2016/05
Cable	CABLES & CONNECTIQUES	3.5MD/CSU528AA/3.5MD/4000	A5329374	2014/06	2015/06
Cable	CABLES & CONNECTIQUES	3.5MD/CSU528AA-TDINOX/3.5MD/7000	A5329459	2014/06	2015/06
Cable	-	-	A5329261	2014/06	2015/06
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2015/03	2016/03

3.5. RESULTS

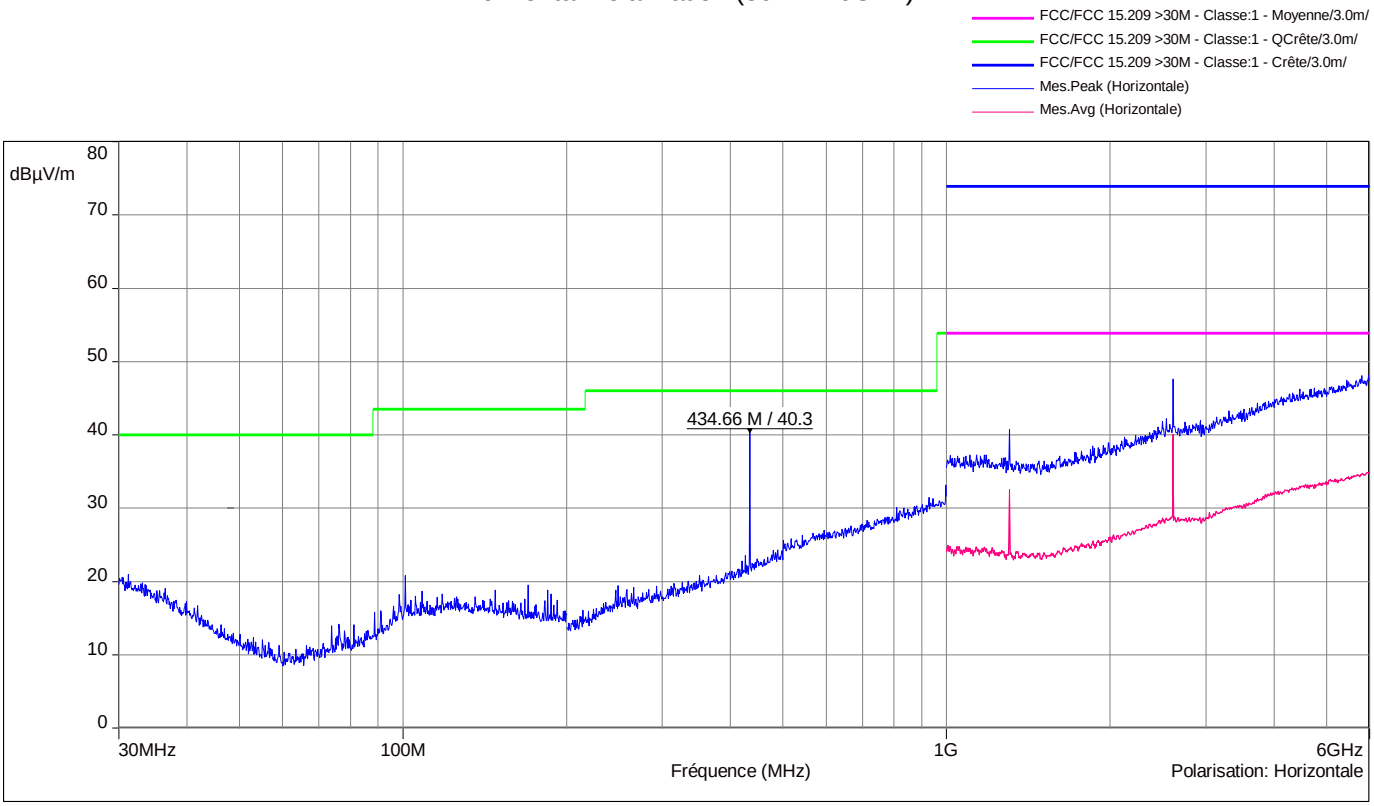
Cmin
Horizontal Polarization (30MHz-6GHz)



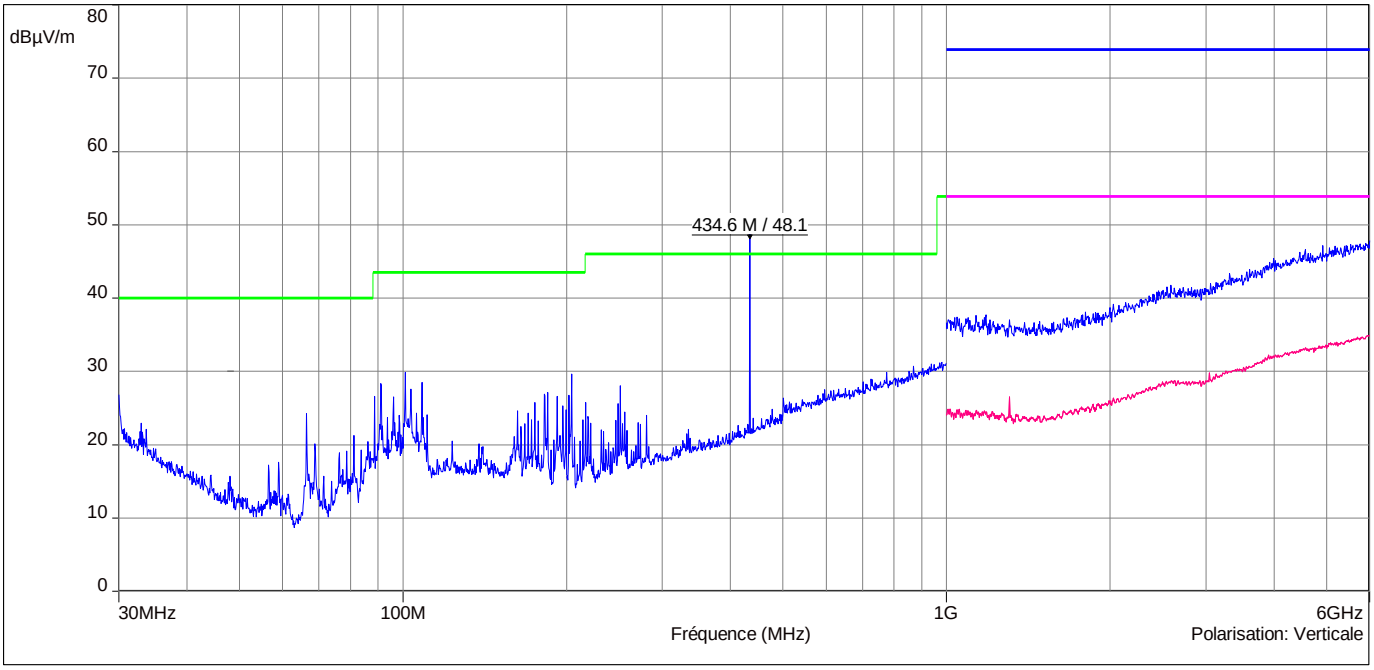
Cmin
Vertical Polarization (30MHz-6GHz)



Cmax
Horizontal Polarization (30MHz-6GHz)



Cmax
Vertical Polarization (30MHz-6GHz)



Polarisation	Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	Limit (dBµV/m)
Vertical	66.4	25.3	-	40
Vertical	100.9	29.8	-	43.5
Vertical	251.1	28	-	46
Horizontal	280.6	24.1	-	46
Horizontal	859.7	30.5	-	46
Horizontal	995.7	33.2	-	53.9

Channel	Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)	Average Limit (dBµV/m)
Cmin	433.22	48.6	-	72.8
Cmax	434.62	48.1	-	72.8

3.6. CONCLUSION.

Measures of Field strength of fundamental & spurious domain, performed on the sample of the product Anipill / 01101, SN: -, in configuration and description presented in this test report, show levels conform to the FCC part 15.231e limits.

4. EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Stéphane PHOUDIAH
Date of test : 2015/05/06
Ambient temperature : 22°C
Relative humidity : 42%

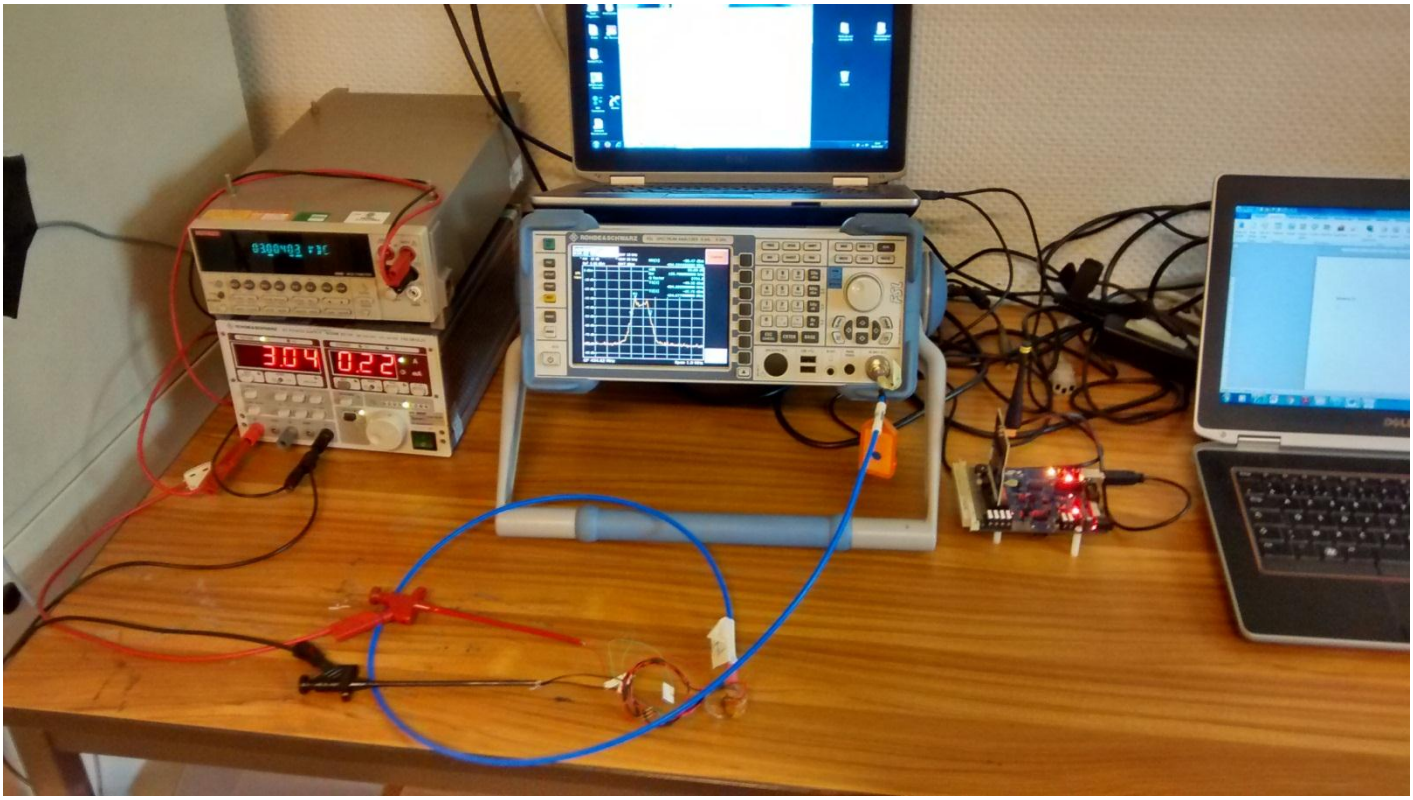
4.2. TEST SETUP

- The Equipment under Test is installed:
☒ In the climatic chamber
☐ On a table
☐ In an anechoic chamber

-Measurement is performed with a spectrum analyzer
☐ On the EUT conducted access
☒ With a test fixture

The spectrum analyzer is used to find the emission bandwidth.
Detector peak

Operating mode:
☑ Mode 1



Photograph for Emission Bandwidth

4.3. LIMIT

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

4.4. TEST EQUIPMENT LIST

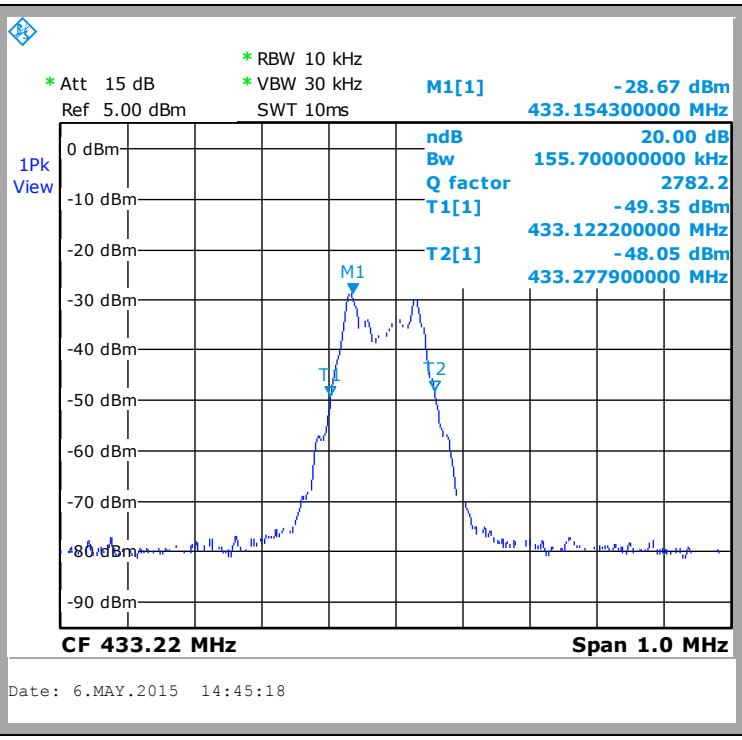
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Multi-meter	KEITHLEY	2000	A1241084	2015/02	2016/02
Spectrum analyzer	ROHDE & SCHWARZ	FSL6	A4060032	2015/04	2017/04
DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	Verified with calibrated Multimeter	Verified with calibrated Multimeter
RF cable & Attenuator	Télédyne & MINI CIRCUITS	920-0202-024 & FW-20+	A5329675	2014/10	2015/10

4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

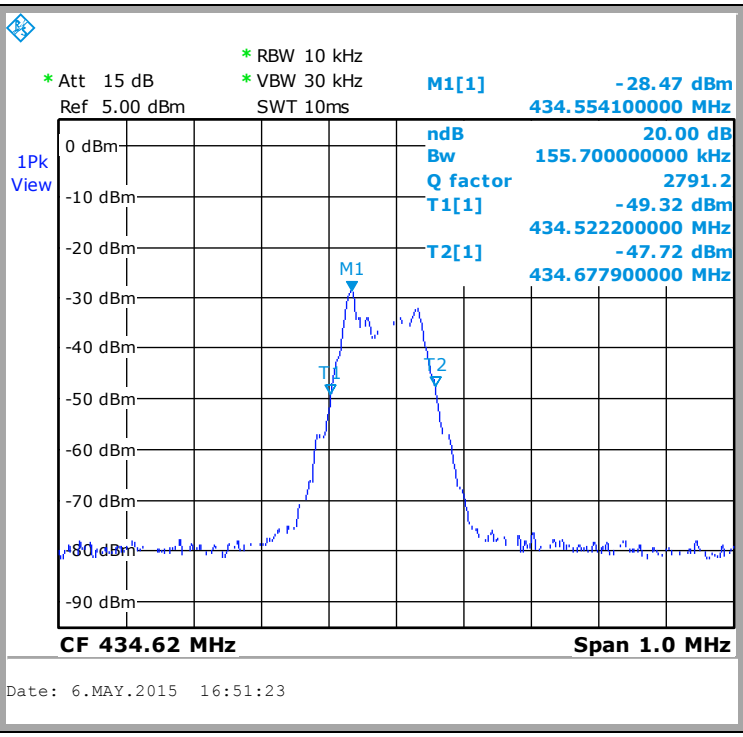
☒None ☐Divergence:

4.6. GRAPHICS & RESULTS

Tnom
Vnom
Cmin



Cmax



Temperature	Tnom	
Voltage	Vnom	
Channel	Cmin	Cmax
Emission bandwidth (kHz)	155,7	155,7
Limit (kHz)	1083,05	1086,55

4.7. CONCLUSION

Emission bandwidth measurement performed on the sample of the product Anipill / 01101, SN: -, in configuration and description presented in this test report, show levels conform to the FCC part 15.231d limits.

5. LIMITING OPERATION

5.1. TEST CONDITIONS

Test performed by : Stéphane PHOUDIAH
Date of test : 2015/07/07
Ambient temperature : 24°C
Relative humidity : 47%

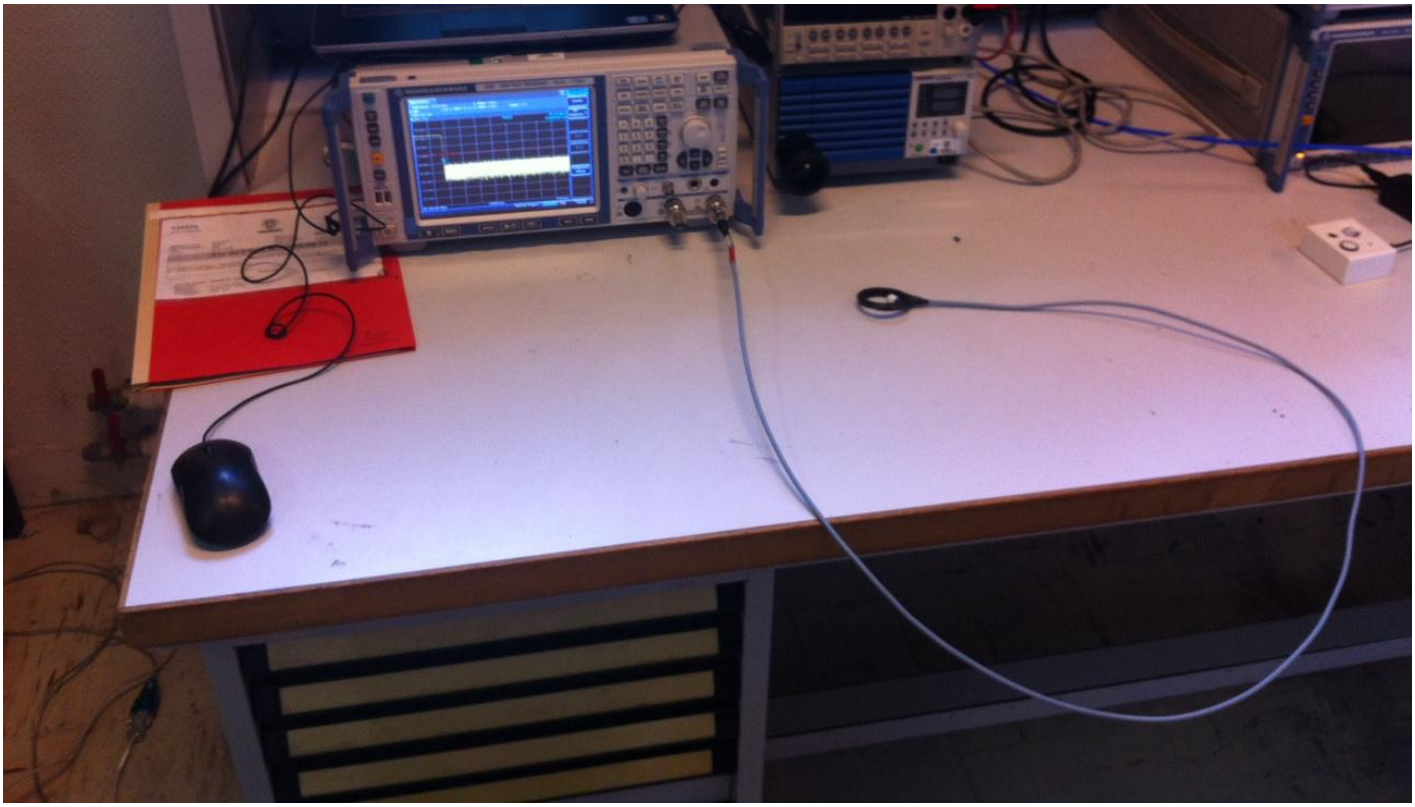
5.2. TEST SETUP

- The Equipment under Test is installed:
☐ In the climatic chamber
☒ On a table
☐ In an anechoic chamber

-Measurement is performed with a spectrum analyzer
☐ On the EUT conducted access
☒ With a test fixture

The spectrum analyzer is used in span 0 to find the limiting operation.
Detector peak

Operating mode:
☑ Mode 2



Photograph for Limited Operation

5.3. LIMIT

Devices shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

5.4. TEST EQUIPMENT LIST

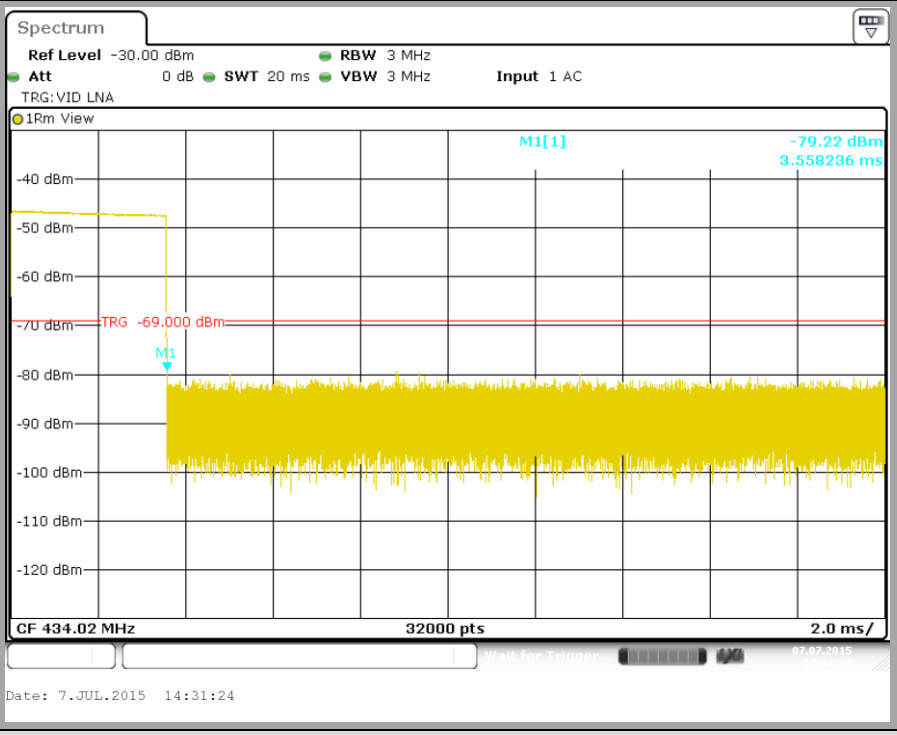
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2015/03	2016/03

5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

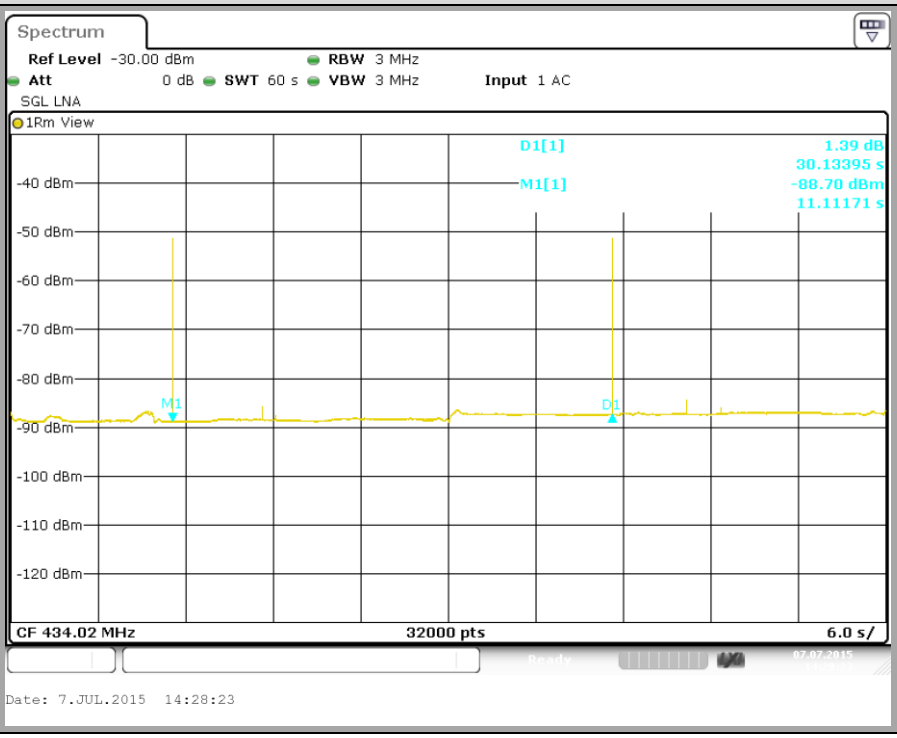
☒None ☐Divergence:

5.6. GRAPHICS & RESULTS

Tnom
Vnom
Cnom
Transmitting time



Silent time



Temperature	Tnom
Voltage	Vnom
Channel	Cnom
Transmitting time (s)	0,00355
Silent time (s)	30,13

5.7. CONCLUSION

Limiting operation measurement performed on the sample of the product Anipill / 01101, SN: -, in configuration and description presented in this test report, show levels conform to the FCC part 15.231e limits.

6. Uncertainties Chart

Kind of measurement	Wide uncertainty laboratory (k=2) ±x(dB)	CISPR uncertainty limit ±y(dB)
Measurement of conducted disturbances in voltage on the AC power port on the Fontenay-aux-Roses site.	3.51	3.6
Measurement of discontinuous conducted disturbances in voltage on the AC power port on the Fontenay-aux-Roses site. (S48 room)	3.45	3.6
Measurement of conducted disturbances in voltage on the AC power port on the Ecuelles site.	3.86	3.6
In Situ measurement of conducted disturbances in voltage on the AC power port with ESH2 receiver	3.51	3.6
Measurement of conducted disturbances in voltage on the DC power port on the Fontenay-aux-Roses site.	3.49	3.6
Measurement of conducted disturbances in voltage on the DC power port on the Ecuelles site.	3.72	3.6
Measurement of conducted disturbances in voltage on the telecommunication port.	3.26	Under consideration
Measurement of conducted disturbances in voltage on the telecommunication port at Ecuelles Site.	3.45	Under consideration
Measurement of conducted disturbances in current	3.09	Under consideration
Measurement of radiated electric field from 30 to 200MHz on the Fontenay-aux-Roses site (with EATON 96002 antenna)	5.2	5.2
Measurement of radiated electric field from 200 to 1000MHz on the Fontenay-aux-Roses site	5.3	5.2
Measurement of radiated electric field from 1 to 18GHz on the Fontenay-aux-Roses site	4.8	Under consideration
Measurement of radiated electric field from 30 to 80MHz in horizontal position on the Ecuelles site (dipole antenna)	3.77	5.2
Measurement of radiated electric field from 30 to 80MHz in vertical position on the Ecuelles site (dipole antenna)	4.12	5.2
Measurement of radiated electric field from 80 to 1000MHz in horizontal position on the Ecuelles site (R&S HL023 A2 logper antenna)	4.19	5.2
Measurement of radiated electric field from 80 to 1000MHz in vertical position on the Ecuelles site (R&S HL023 A2 logper antenna)	4.50	5.2
Measurement of radiated electric field from 30 to 1000MHz in horizontal position on the Ecuelles site (CBL6112 bilog antenna)	4.24	5.2
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the Ecuelles site (CBL6112 bilog antenna)	4.55	5.2
Measurement of radiated electric field from 1 to 18GHz on the Ecuelles site	5.16	Under consideration
Measurement of current harmonics	11.11%	/
Flicker measurement	9.26%	/
Measurement of disturbance power	3.32	4.5
Immunity to conducted disturbances, induced by radio-frequency fields	2.36	/
Immunity to conducted disturbances, induced by radio-frequency fields with injection clamp	2.76	/
Immunity to radiated electromagnetic field	2.64	/
EMF measurement according to EN62233 from 10KHz to 400KHz	23,51%	/

Unless otherwise specified, the decision of conformity takes into account the uncertainly of measures.

End of test report