Accreditation
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# TEST REPORT

**N°:** 157205 - 726502 **Version : 02**

| | |
|---|---|
| **Subject** | **Electromagnetic compatibility (EMC) :**<br>**Publication CFR 47 PART 15 of 2013 & ICES-003 of 2016** |
| **Issued to** | **SAGEMCOM BROADBAND SAS**<br>**250 Route de l' Empereur**<br>**92500 – RUEIL MALMAISON**<br>**FRANCE** |
| **Apparatus under test** | |
| Product | **Sound Box** |
| Trade mark | **Sagemcom®** |
| Manufacturer | **SAGEMCOM** |
| Model under test | **Sound Box SBDV01** |
| Serial number | **253770742** |
| **Test date** | September 24, 2018 to September 25, 2018 |
| **Test location** | LCIE, Fontenay Aux Roses |
| **Test performed by** | **Steve Bogler** |
| **Composition of document** | 20 pages |
| **Document issued on** | November 19, 2018 |

**Written by :**
**Steve Bogler**
**Tests operator**

**Approved by**
**Arnaud Favette**
**Technical manager**

## PUBLICATION HISTORY

| Version | Date | Author | Modification |
|---|---|---|---|
| 01 | October 9, 2018 | **Steve Bogler** | Creation of the document |
| 02 | November 19, 2018 | **Steve Bogler** | Customer request withdraw all picture of the EUT from test report.<br>Add measurement above 6GHz and test set up picture |

# SUMMARY

# 1. Test Program

**References**

- ✓ **CFR 47 Part 15 Subpart B - Radio frequency devices - Unintentional radiators October 2013**
- ✓ **ICES -003 of 2016**
- ✓ **ANSI 63.4 of 2014**

**Emission tests:**

| Test Description | Main characteristics | Test result - Comments |
|---|---|---|
| **Measurement of radiated electric field in shielded room**<br>15.109 (a) & (c) | ☐ **Class A**<br>☑ **Class B** | ☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP (Limited Program)** |
| **Measurement of radiated electric field in open space** | ☐ **Class A**<br>☐ **Class B** | ☐ **PASS** ☐ **FAIL** ☑ **NA** ☐ **NP (Limited Program)** |
| **Measurement of conducted disturbance on the AC main power port**<br>15.107 (a) (c) (d) | ☐ **Class A**<br>☑ **Class B** | ☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP (Limited Program)** |

**The product is compliant according to CFR 47 Part 15 Subpart B - Radio frequency devices - Unintentional radiators October 2013 & ICES -003 of 2016 standards.**

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):** **Sound Box SBDV01** **Serial Number:** 253770742
**Power supply : NBC80A200400M2**

**Inputs/outputs - Cable:**

| Access | Inputs / Outputs | Type | Length used (m) | Declared <3m | Shielded | Under test | Comments |
|---|---|---|---|---|---|---|---|
| Main power supply | Input | L1-N | - | - | ☐ | ☑ | - |
| Network | Input | RJ45 | - | - | ☐ | ☑ | - |

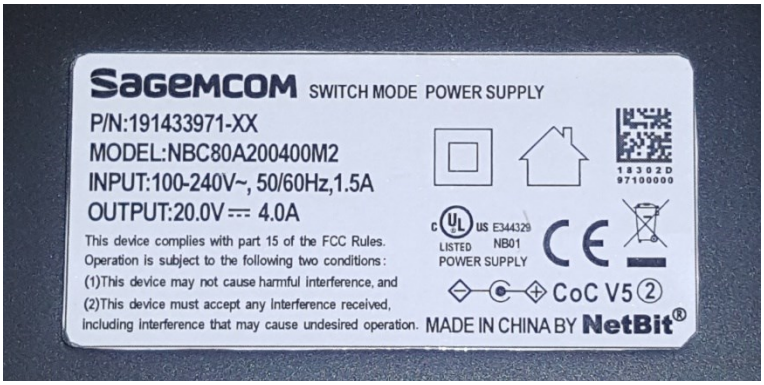
**Auxiliary equipment used during test:**

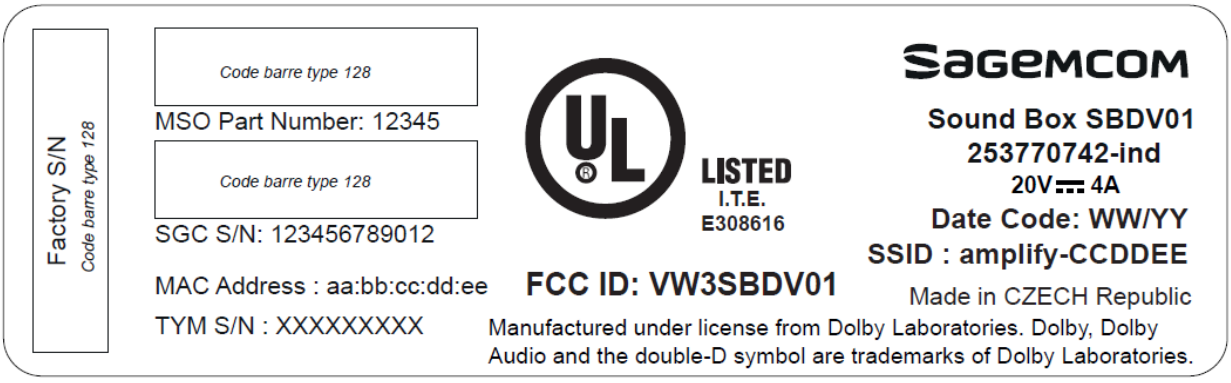
| Type | Reference | Sn | Comments |
|---|---|---|---|
| LAPTOP | - | - | - |

**Equipment information:** (Declared by provider)

| Apparatus Description | EUT Description | | | |
|---|---|---|---|---|
| Type of power source: | ☑ AC power supply | ☐ DC power supply | ☐ Battery (Select Type) | |
| Test source voltage: | Vmin-Vmax: | ☐ 100 - 240 V / 50 - 60 Hz | | ☐ Vnom VDc |
| Operating Modes | Mode 1 | ON | | |

## 2.2. EQUIPMENT LABELLING




Equipment Labelling

## 2.3. EQUIPMENT MODIFICATIONS

☑ None ☐ Modification:

# 3. Measurement of radiated emissions

## 3.1. ENVIRONMENTAL CONDITIONS

Test performed by : **Steve Bogler**
Date of test : September 25, 2018
Ambient temperature : 20°C
Relative humidity : 38%

## 3.2. TEST SETUP

**Specifications:**

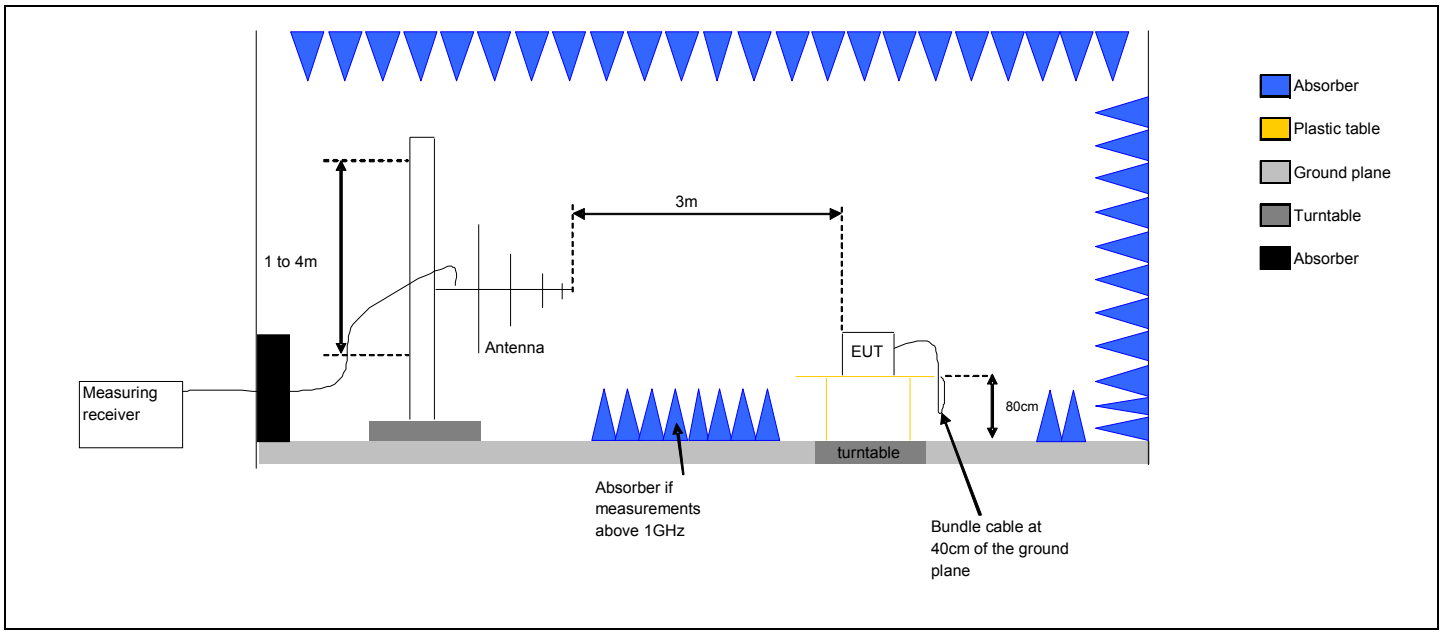
| | | |
|---|---|---|
| Frequency | 30 – 1000 MHz | RBW 120 kHz |
| | 1-40GHz | RBW 1MHz |
| Detector | Peak and Quasi-Peak | |

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

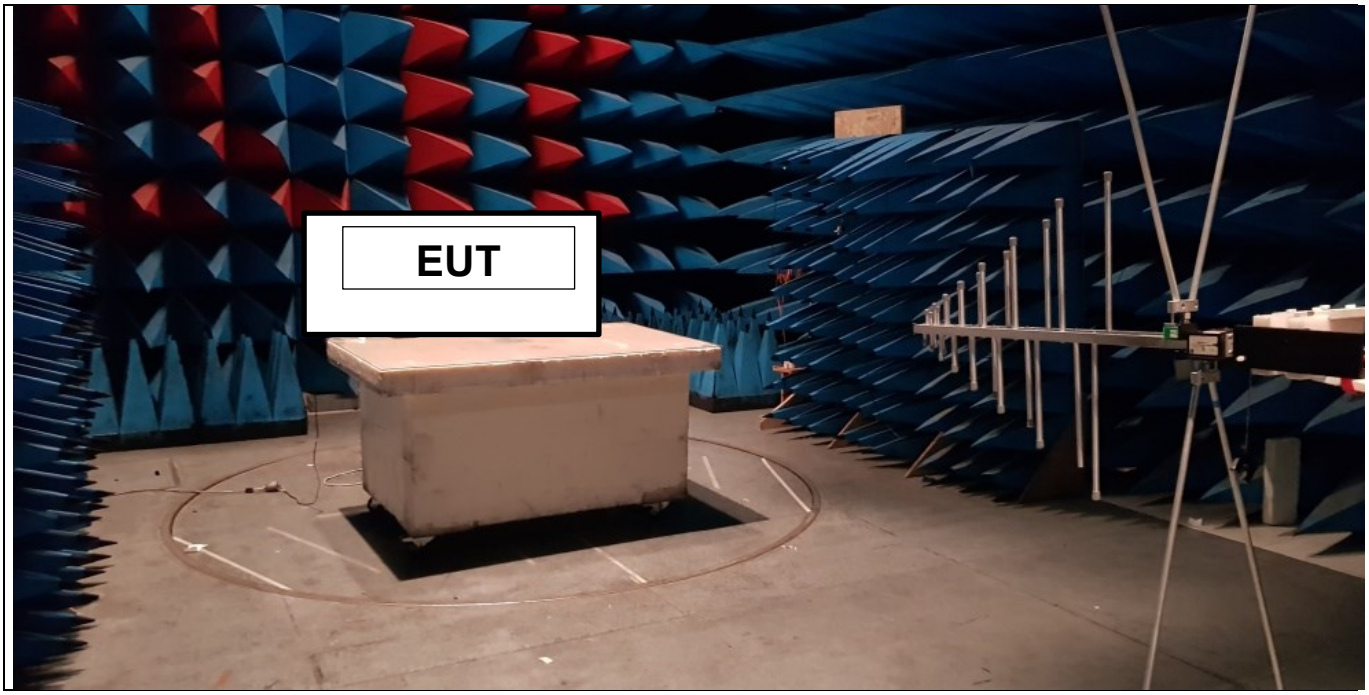
**Operating conditions:**

- 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

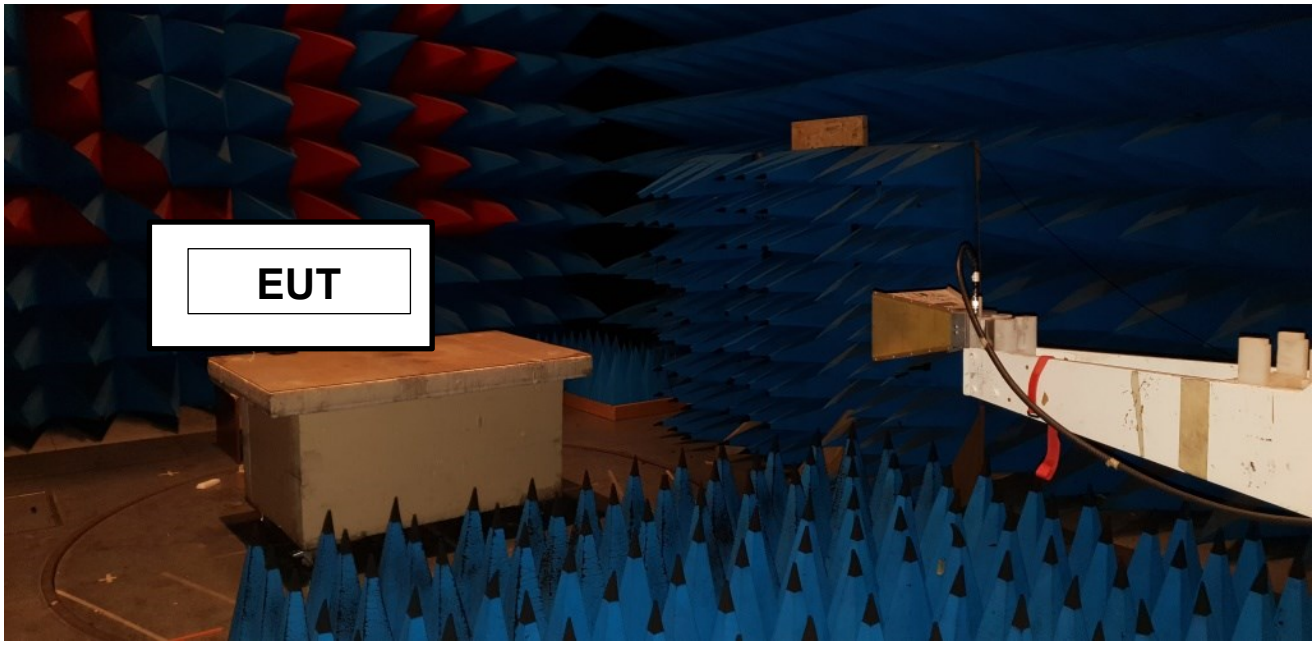
**Operating mode:**
☑ Mode 1 ☐ Mode 2 ☐ Mode 3 …




Test Set up for radiated measurement in semi anechoic chamber




Measurement of radiated disturbances.




Measurement of radiated disturbances.

## 3.3. LIMIT

☐ at 3m Class A

| Frequency Bands/frequencies | dB (µV/m) quasi-peak | dB (µV/m) peak | dB (µV/m) average |
|---|---|---|---|
| 30-88MHz | 49.5 | - | - |
| 88 – 216MHz | 53.9 | - | - |
| 216 – 960 MHz | 56.9 | - | - |
| 960 – 1000 MHz | 60 | - | - |
| 1000-40000MHz | - | 80 | 60 |

☑ at 3m Class B

| 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 | - | - |
| 1000-40000MHz | - | 73.9 | 53.9 |

☐ at 10m Class A

| Frequency Bands/frequencies | dB (µV/m) quasi-peak | dB (µV/m) peak | dB (µV/m) average |
|---|---|---|---|
| 30-88MHz | 39.5 | - | - |
| 88 – 216MHz | 43.9 | - | - |
| 216 – 960 MHz | 46.9 | - | - |
| 960 – 1000 MHz | 50 | - | - |
| 1000-40000MHz | - | 70 | 50 |

☐ at 10m Class B

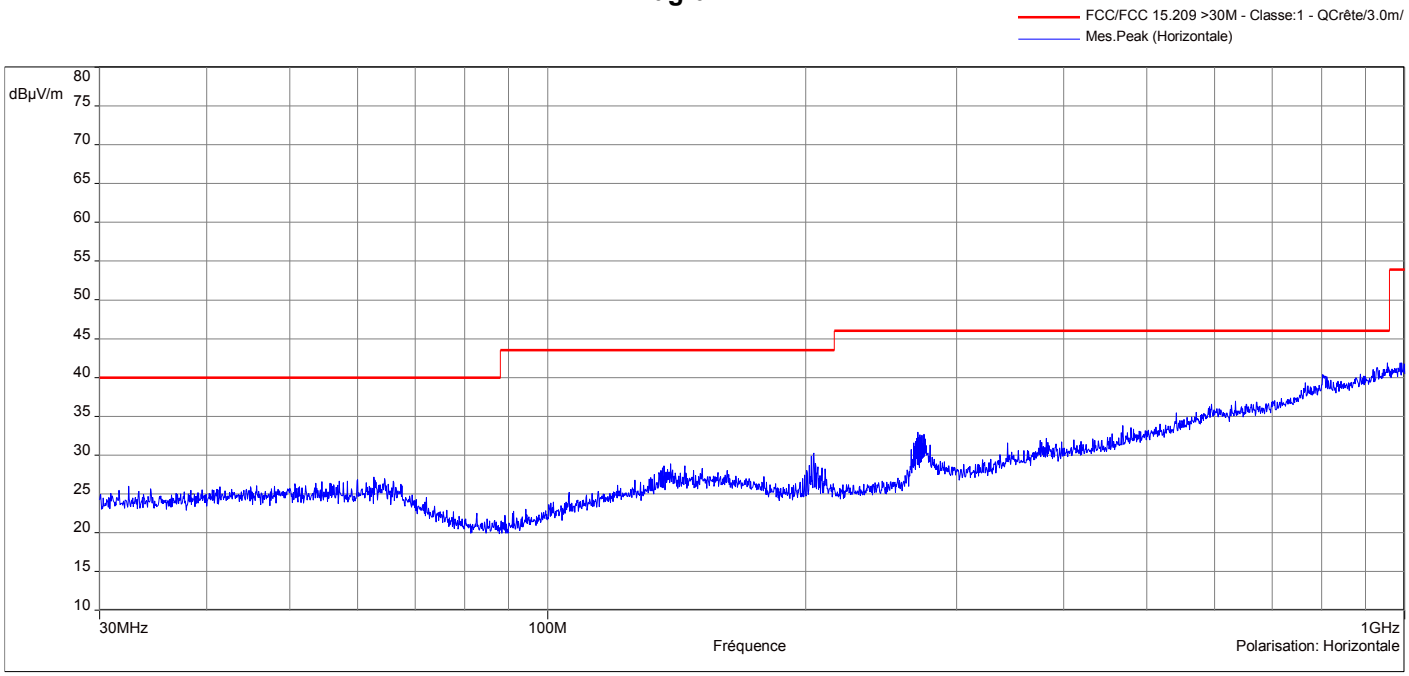
| Frequency Bands/frequencies | dB (µV/m) quasi-peak | dB (µV/m) peak | dB (µV/m) average |
|---|---|---|---|
| 30-88MHz | 30 | - | - |
| 88 – 216MHz | 33.5 | - | - |
| 216 – 960 MHz | 36 | - | - |
| 960 – 1000 MHz | 43.9 | - | - |
| 1000-40000MHz | - | 63.9 | 43.9 |

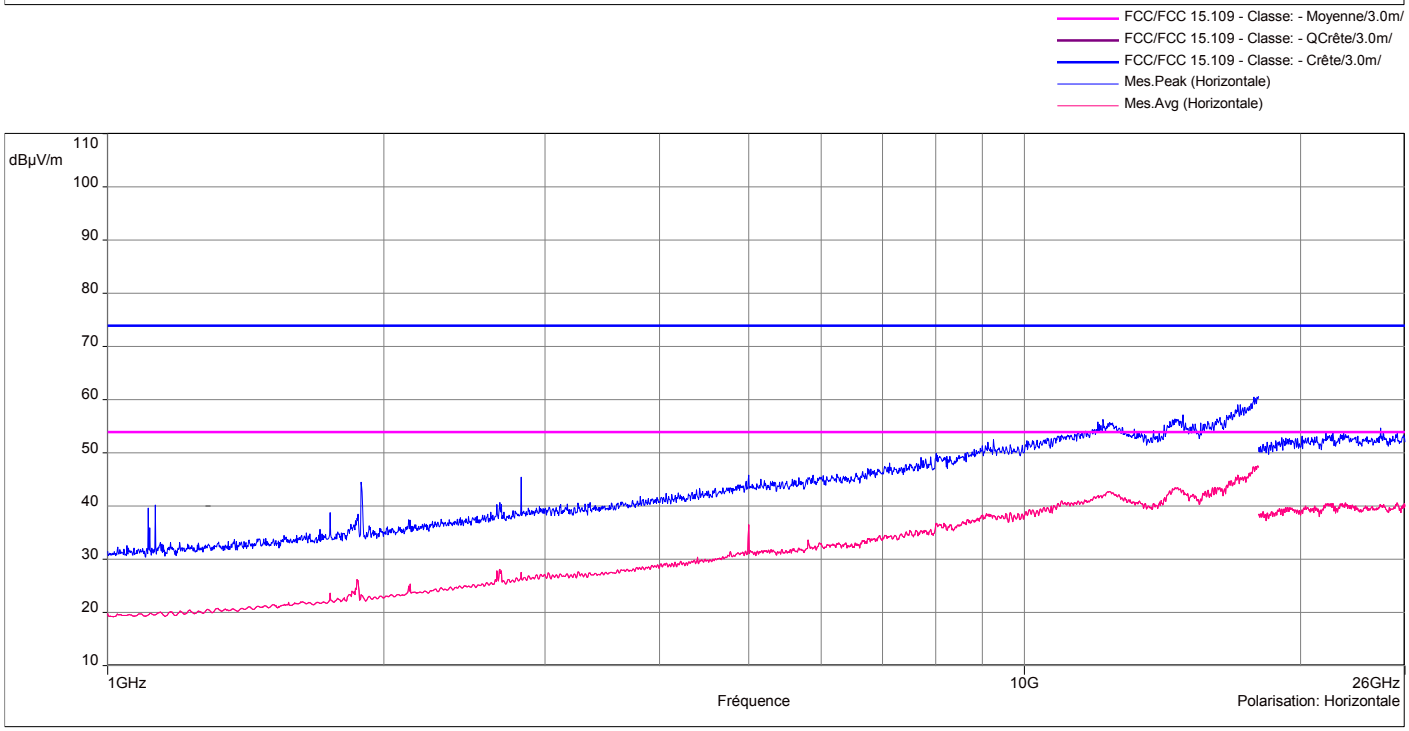
## 3.4. TEST EQUIPMENT LIST

| Description | Constructor | Model | N° | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Bilog antenna | SCHWARZBECK | VULB9160 | C2040150 | 2018/04 | 2019/04 |
| Cable | - | - | A5329711 | 2017/06 | 2018/07* |
| Horn antenna | A-infoMW | Broadband 1-18 | C2042056 | 2016/07 | 2018/07 |
| Horn antenna (18-26,5GHz) | PASTERNACK | PE9852/2F-20 | C2042049 | 2017/12 | 2019/12 |
| Horn antenna (26,5-40GHz) | PASTERNACK | PE9852/2F-20 | C2042052 | 2018/03 | 2020/03 |
| SEMI ANECHOIC CHAMBER | SIEPEL | ANE | D3044008 | 2014/09 | 2018/09 |
| EMI Receiver | ROHDE & SCHWARZ | ESU26 | A2642018 | 2016/10 | 2018/10 |
| EMI receiver | ROHDE & SCHWARZ | ESI40 1088 740K40 | A2642010 | 2016/07 | 2018/07* |
| Preamplifier | LCIE | - | A7086012 | 2018/03 | 2019/03 |
| Preamplifier | LCIE | LCIE-ALB-001 | A7080073 | 2018/08 | 2020/08 |
| Cable | - | - | A5329360 | - | - |
| AC power supply | ADAPTIVE POWER SYSTEM | FC210 | A7360017 | - | - |
| *Note : In our quality system, the test equipment calibration due is more or less 2 month | | | | | |

## 3.5. RESULTS

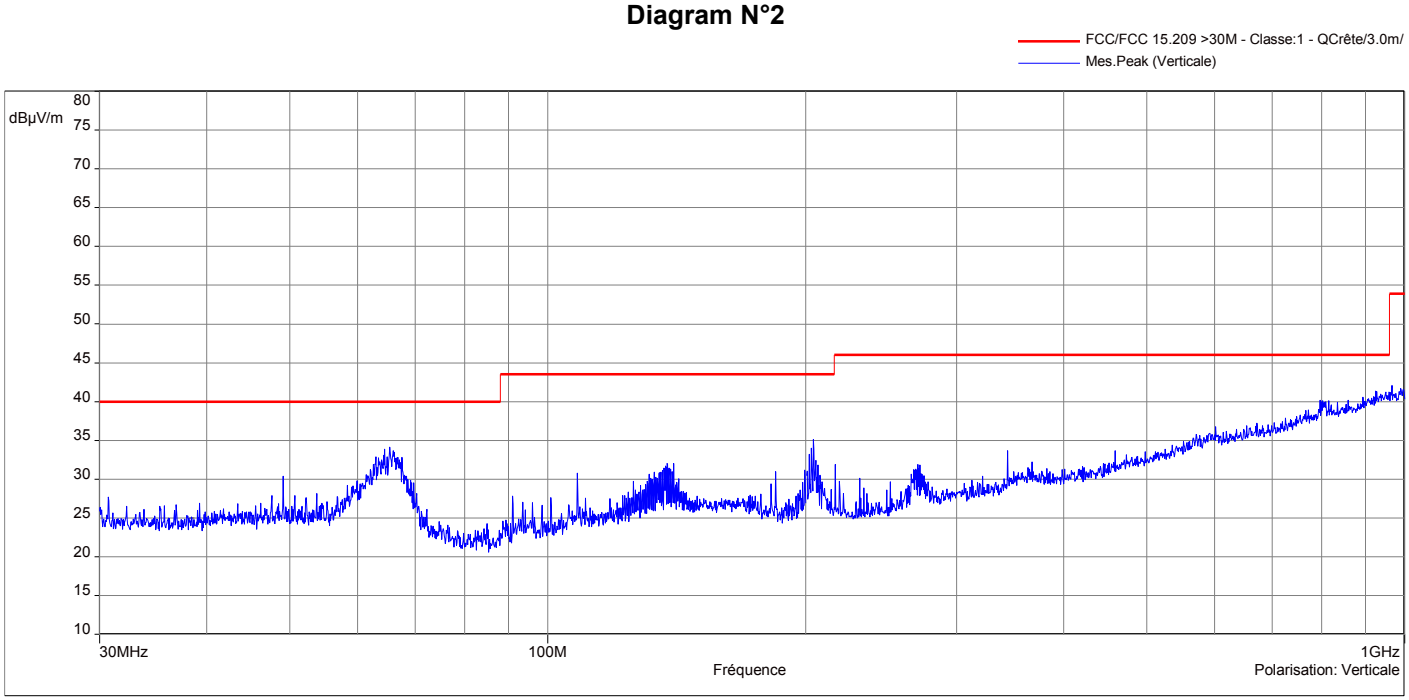
**Diagram N°1**

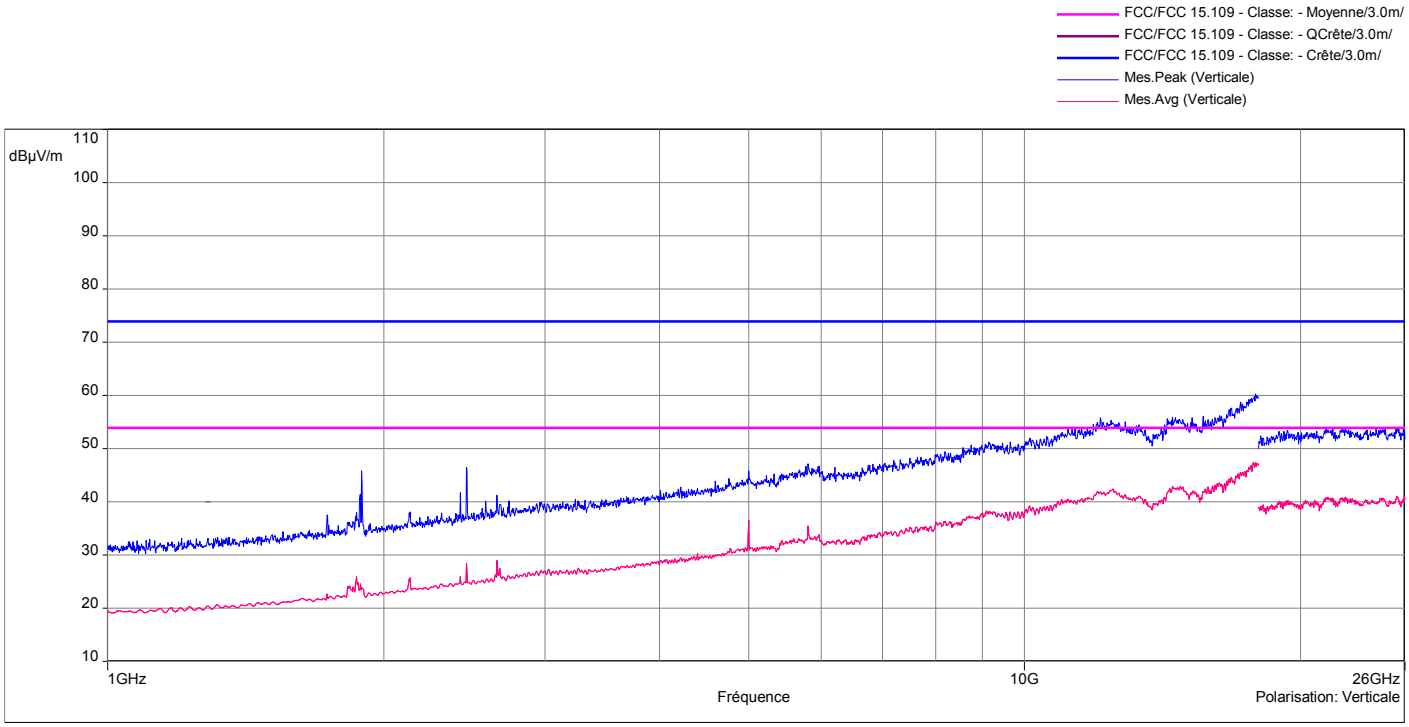



**No significant spurious has been observed between 26GHz to 40GHz**
**Horizontal Polarization (30MHz-40GHz)**

**Diagram N°2**




**No significant spurious has been observed between 26GHz to 40GHz**
**Vertical Polarization (30MHz-40GHz)**

## 3.6. CONCLUSION

Measures of Radiated Emission, performed on the sample of the product **Sound Box SBDV01**, SN: 253770742, in configuration and description presented in this test report, show levels conform to the FCC part 15 & ICES -003 limits.

# 4. Measurement of conducted disturbance

## 4.1. ENVIRONMENTAL CONDITIONS

Test performed by : **Steve Bogler**
Date of test : September 25, 2018
Ambient temperature : 20°C
Relative humidity : 38%

## 4.2. TEST SETUP

**Specifications:**

| | | |
|---|---|---|
| Frequency | 0.15 – 30 MHz | RBW 9 kHz |
| Detector | Peak , Quasi Peak and average | |

The measurement is performed on power supply with a LISN and telecommunication lines with RSI or current clamp for shielded cables.

**Operating conditions:**

- Deviation method:

☐ Yes

☑ No

-Product installation:

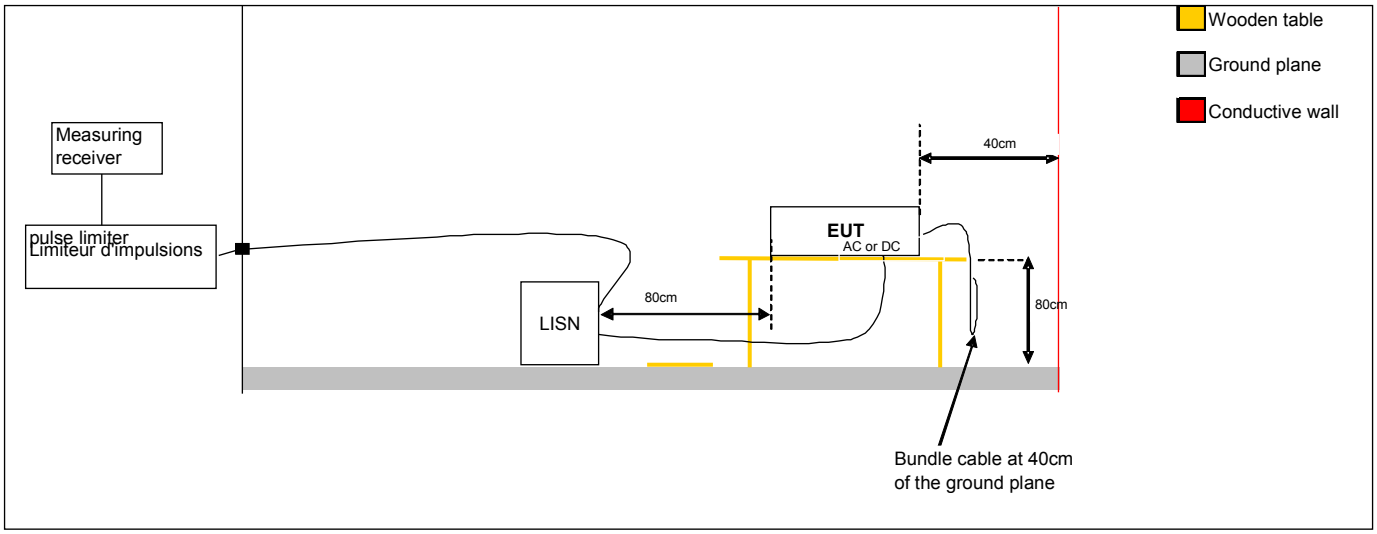
☑ The EUT is installed on a wooden table 80 cm above the reference plane, at 80cm of the LISN and at 40cm of the vertical conductive wall

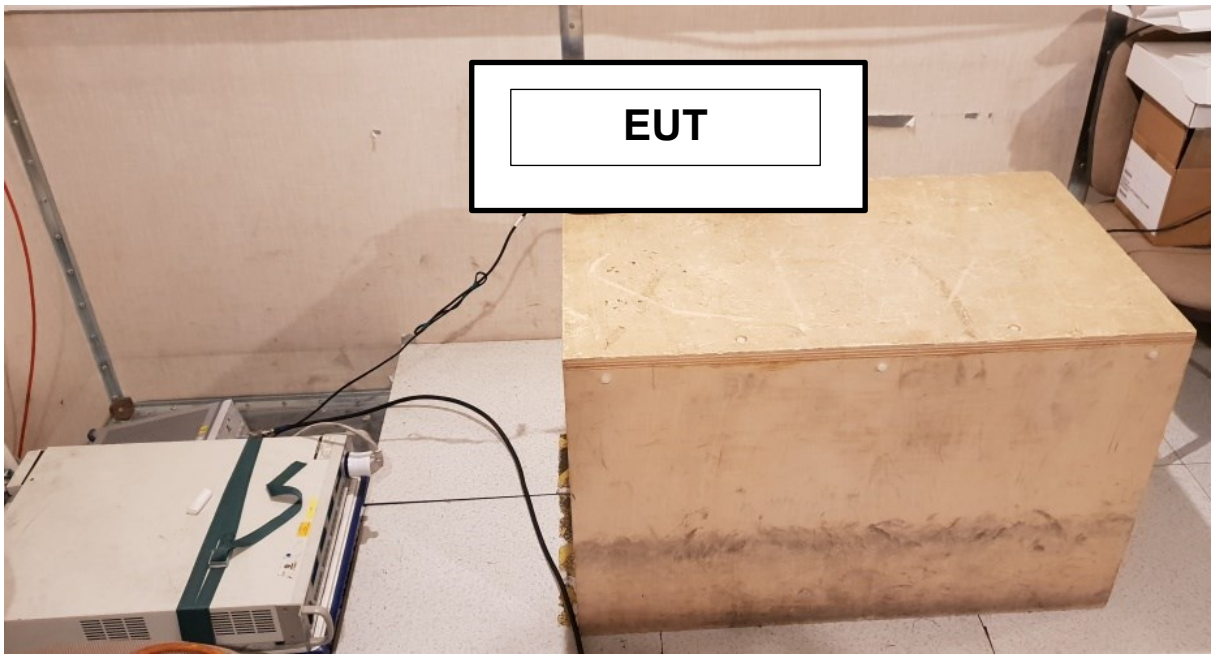
☐ The EUT is installed on a wooden table 40 cm above the reference plane, at 80cm of the LISN.

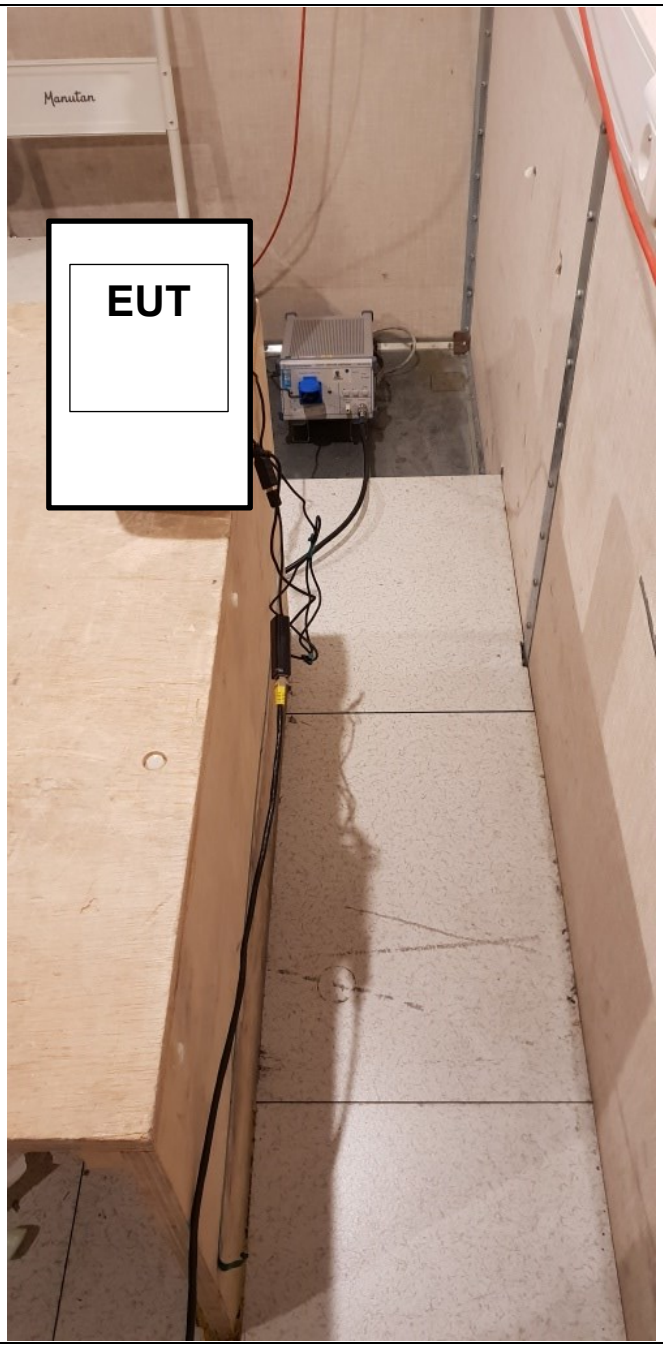
☐ The EUT is installed 10 cm above the reference plane, at 80cm of the LISN..

**Operating mode:**

☑ Mode 1 ☐ Mode 2 ☐ Mode 3 …


Wooden table
Ground plane
Conductive wall
Measuring receiver
pulse limiter
Limiteur d'impulsions
LISN
80cm
EUT
AC or DC
40cm
80cm
Bundle cable at 40cm of the ground plane


EUT




Test set up of conducted emission on power supply

## 4.3. LIMIT

☐ Power supply Class A

| Frequency Bands/frequencies | dB (µV/m) quasi-peak | dB (µV/m) average |
|---|---|---|
| 0.15-0.5MHz | 79 | 66 |
| 0.5-30 MHz | 73 | 60 |

☑ Power supply Class B

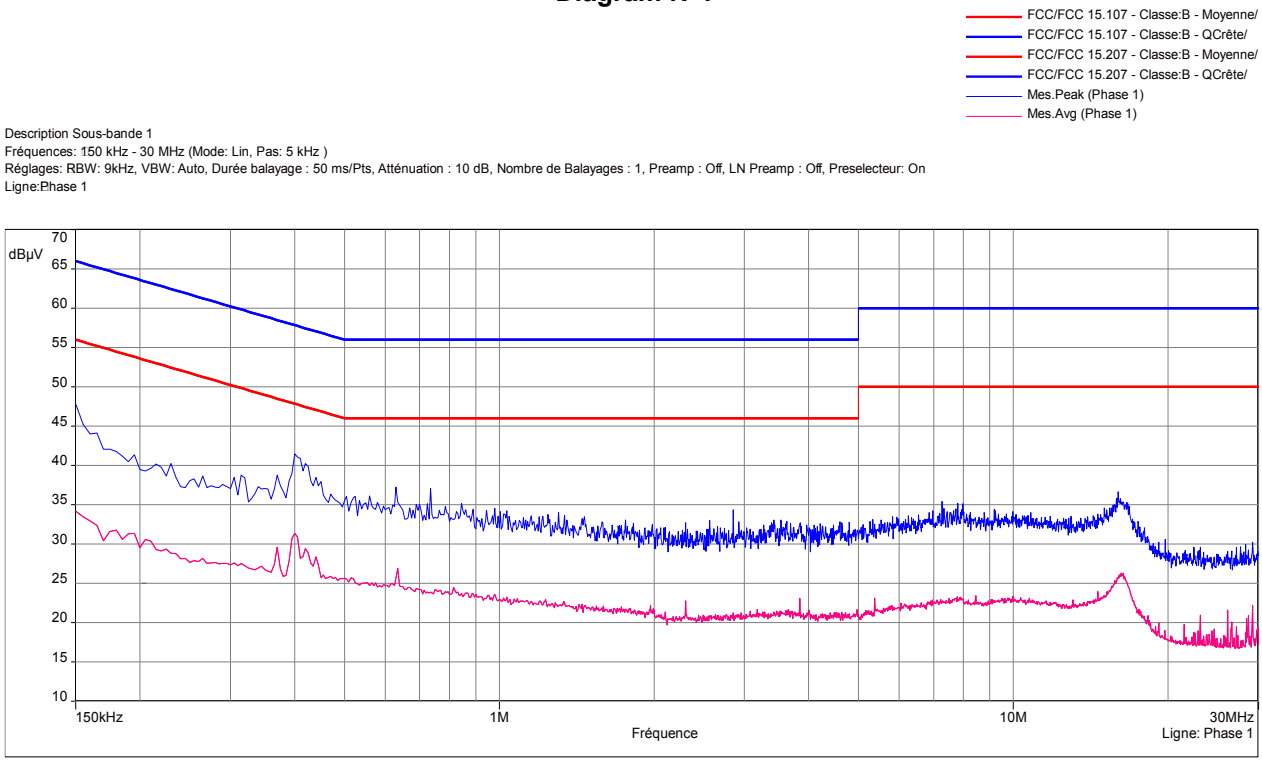
| Frequency Bands/frequencies | dB (µV/m) quasi-peak | dB (µV/m) average |
|---|---|---|
| 0.15-0.5MHz | 66-56 | 56-46 |
| 0.5-5 MHz | 56 | 46 |
| 5-30 MHz | 60 | 50 |

## 4.4. TEST EQUIPMENT LIST

| Description | Constructor | Model | N° | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| EMI Receiver | ROHDE & SCHWARZ | ESU26 | A2642018 | 2016/10 | 2018/10 |
| RSIL | ROHDE & SCHWARZ | ENV215 | C2320162 | 2018/01 | 2019/01 |
| AC power supply | ADAPTIVE POWER SYSTEM | FC210 | A7360017 | - | - |
| Cable | - | - | A5329712 | 2018/03 | 2019/03 |

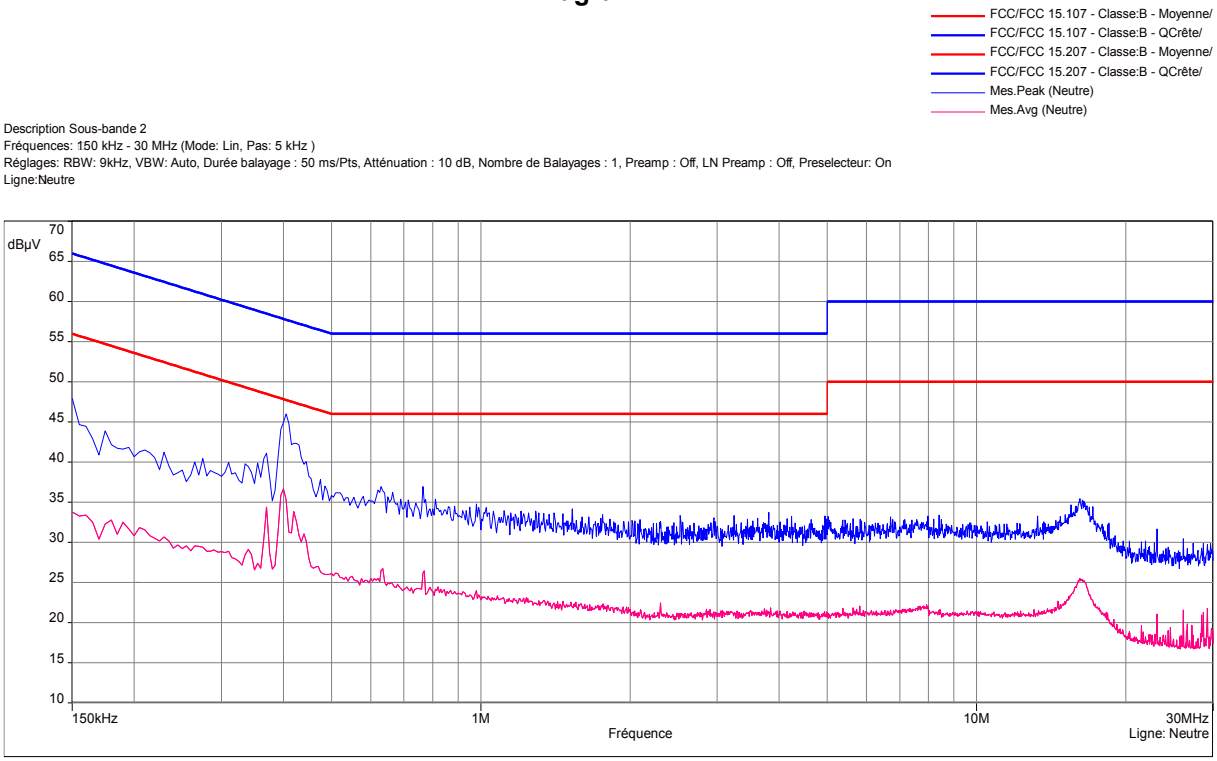
## 4.5. RESULTS

### Diagram N°1




**Phase**

### Diagram N°2




**Neutral**

## 4.6. CONCLUSION

Measures of Conducted Emission, performed on the sample of the product **Sound Box SBDV01**, SN: 253770742, in configuration and description presented in this test report, show levels conform to the FCC part 15 & ICES -003 limits.

## 5. 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 (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 | / |

End of test report