



LCIE

902MHz-928MHz Template: Release August 08th, 2017

TEST REPORT

N°: 149480-706243

Version : 01

Subject

Radio spectrum matters
tests according to standards:
47 CFR Part 15.247 & RSS-247 Issue 2 & RSS-Gen Issue 4 [\[link\]](#)

Issued to

VELUX America Inc. 1418 Evans Pond Road, Greenwood, SC 29649, USA	VELUX Canada Inc 2740 Sherwood Heights, Drive, Oakville, Ontario L6J7V5, CANADA
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Apparatus under test

- ↳ Product
- ↳ Trade mark
- ↳ Manufacturer
- ↳ Model under test
- ↳ Serial number
- ↳ FCC ID
- ↳ IC ID
- ↳ Industry Canada Number

VELUX ACTIVE Indoor Climate Control

VELUX ACTIVE with NETATMO

VELUX A/S

NXG01S

-

XSG-831591

8642A-831591

6230B(FAR) & 6230B-1(Euelles)

Test date

: November 16, 2017 to November 29, 2017

Test location

Fontenay Aux Roses

Composition of document

41 pages

Document issued on

December 21, 2017

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	November 30, 2017	Armand MAHOUNGOU	Creation of the document



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1. TEST PROGRAM

References

- 47 CFR Part 15.247
- RSS 247 Issue 2
- RSS Gen Issue 4
- KDB 558074 D01 DTS Meas Guidance v04
- ANSI C63.10-2013

Radio requirement:

Clause (47CFR Part 15.247 & RSS-247 Issue 2 & RSS-Gen Issue 4) Test Description	Test result - Comments			
Occupied Bandwidth	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
6dB Bandwidth	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA()	<input type="checkbox"/> NP(1)
Duty Cycle	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Maximum Conducted Output Power	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Power Spectral Density	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Conducted Spurious Emission at the Band Edge	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA()	<input type="checkbox"/> NP(1)
Unwanted Emissions into Non-Restricted Frequency Bands	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA()	<input type="checkbox"/> NP(1)
AC Power Line Conducted Emission	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA(2)	<input type="checkbox"/> NP(1)
Unwanted Emissions into Restricted Frequency Bands	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Receiver Radiated emissions	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> 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

PASS: EUT complies with standard's requirement

FAIL: EUT does not comply with standard's requirement

NA: Not Applicable

NP: Test Not Performed



L C I E

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

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

VELUX ACTIVE with NETATMO NXG01S

Serial Number: -



Equipment Under Test

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Power supply	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop	-	-	-
Isolation transformer	-	-	-



L C I E

Equipment information:

Frequency band:	[902 – 928] MHz		
Number of Channel:	2		
Antenna Type:	<input checked="" type="checkbox"/> Integral	<input type="checkbox"/> External	<input type="checkbox"/> Dedicated
Antenna connector:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Temporary for test
Transmit chains:	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	
Receiver chains	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	
Type of equipment:	<input checked="" type="checkbox"/> Stand-alone	<input type="checkbox"/> Plug-in	<input type="checkbox"/> Combined
Duty cycle:	<input checked="" type="checkbox"/> Continuous duty	<input type="checkbox"/> Intermittent duty	<input type="checkbox"/> 100% duty
Equipment type:	<input checked="" type="checkbox"/> Production model		<input type="checkbox"/> Pre-production model
Operating temperature range:	Tmin:	<input type="checkbox"/> -20°C	<input checked="" type="checkbox"/> 0°C
	Tnom:	20°C	
	Tmax:	<input type="checkbox"/> 35°C	<input checked="" type="checkbox"/> 55°C
Type of power source:	<input checked="" type="checkbox"/> AC power supply	<input type="checkbox"/> DC power supply	<input type="checkbox"/> Battery
Operating voltage range:	Vnom:	<input checked="" type="checkbox"/> 120V/60Hz	<input type="checkbox"/> 4.5 Vdc

Antenna Characteristic

Antenna assembly	Gain (dBi)	Frequency Band (MHz)	Impedance(Ω)
1	1.97	922.2	50

CHANNEL PLAN

Channel	Frequency (MHz)
Cmin	922.2
Cmax	922.6

Modulation Type**Worst Case Modulation**

GFSK	<input checked="" type="checkbox"/>
------	-------------------------------------

2.2. RUNNING MODE

The EUT is set in the following modes during tests:

- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
- Permanent reception



L C I E

2.3. EQUIPMENT LABELLING



2.4. EQUIPMENT MODIFICATION

None

Modification:



L C I E

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 29, 2017
Ambient temperature : 24 °C
Relative humidity : 44 %

3.2. TEST SETUP

- The Equipment Under Test is installed:

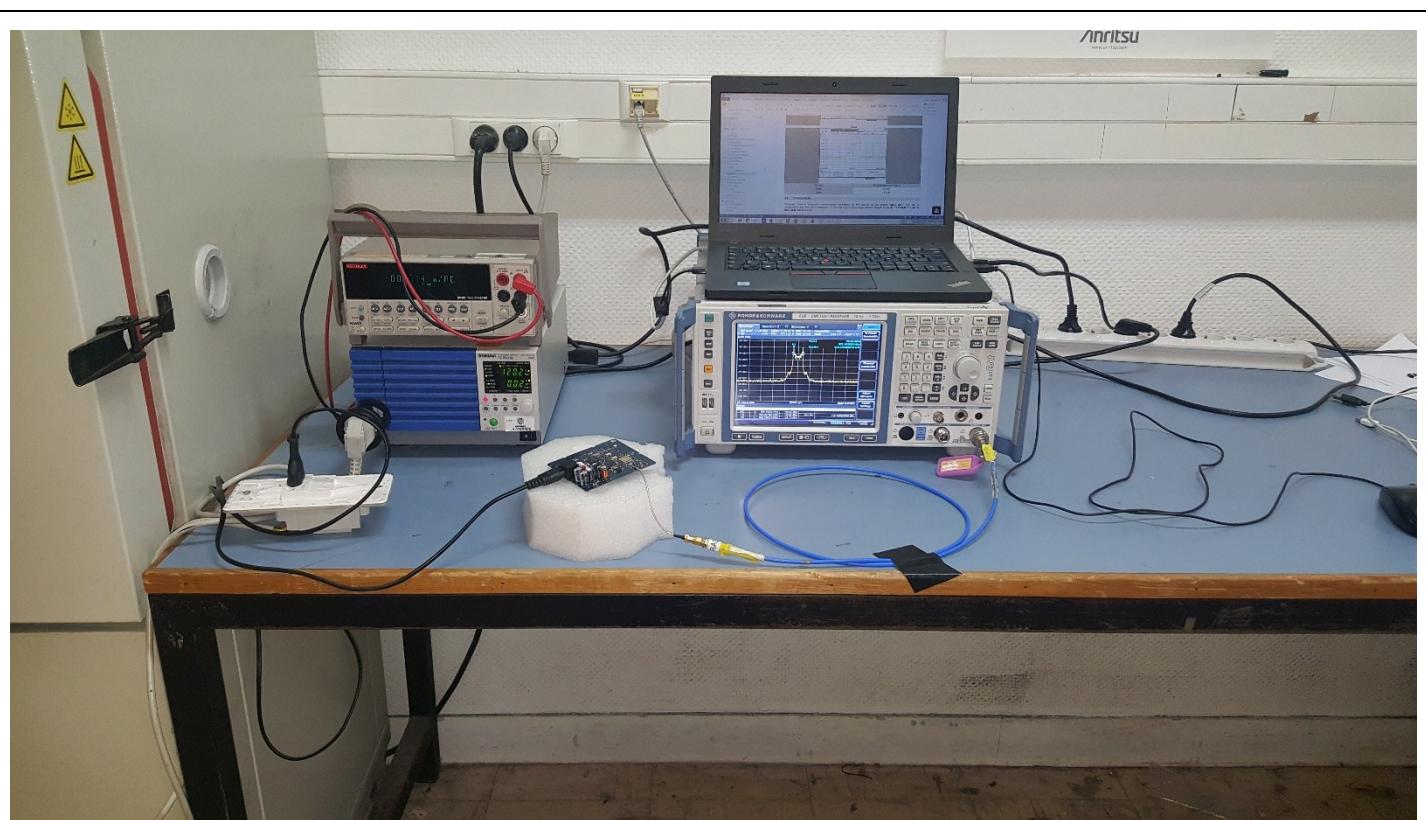
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- RSS-Gen Issue 4 § 6.6
- ANSI C63.10 § 6.9.2



Photograph for Occupied bandwidth



3.1. LIMIT

None

3.2. TEST EQUIPMENT LIST

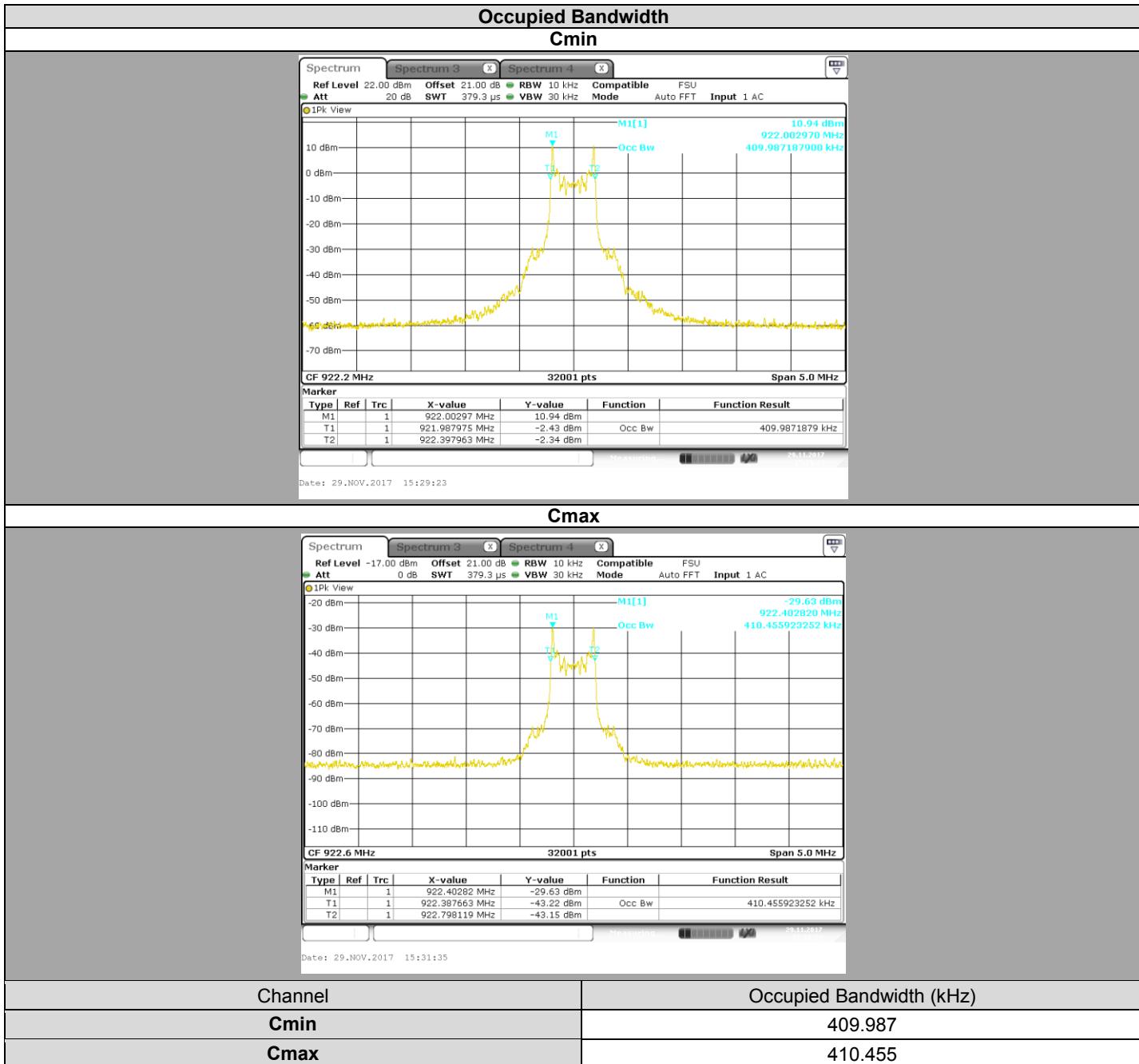
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2018/09
Multi-meter	KEITHLEY	2000	A1242090	2016/06	2018/06
RF cable & 20 dB attenuator	Télédynne	920-0202-048	A5329661	2017/09	2018/09
Programmable DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	2016/06	2018/06

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



L C I E

3.3. RESULTS



3.1. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS-GEN ISSUE 4** limits.



L C I E

4. 6dB EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 29, 2017
Ambient temperature : 24 °C
Relative humidity : 44 %

4.2. TEST SETUP

- The Equipment Under Test is installed:

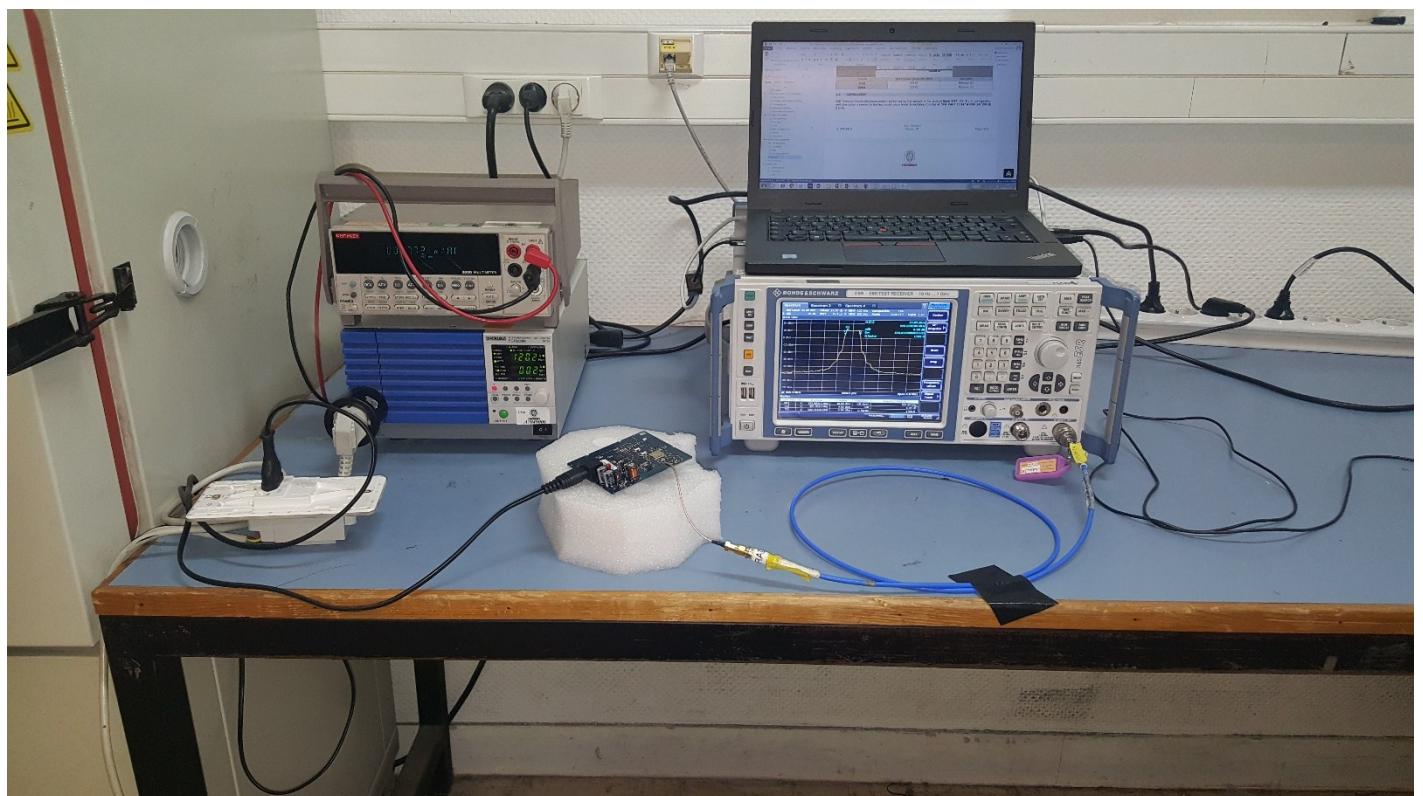
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v04 § 8.1
- KDB 558074 D01 DTS Meas Guidance v04 § 8.2



Photograph for 6dB emission bandwidth



4.3. LIMIT

The 6dB bandwidth shall be at least 500kHz

4.4. TEST EQUIPMENT LIST

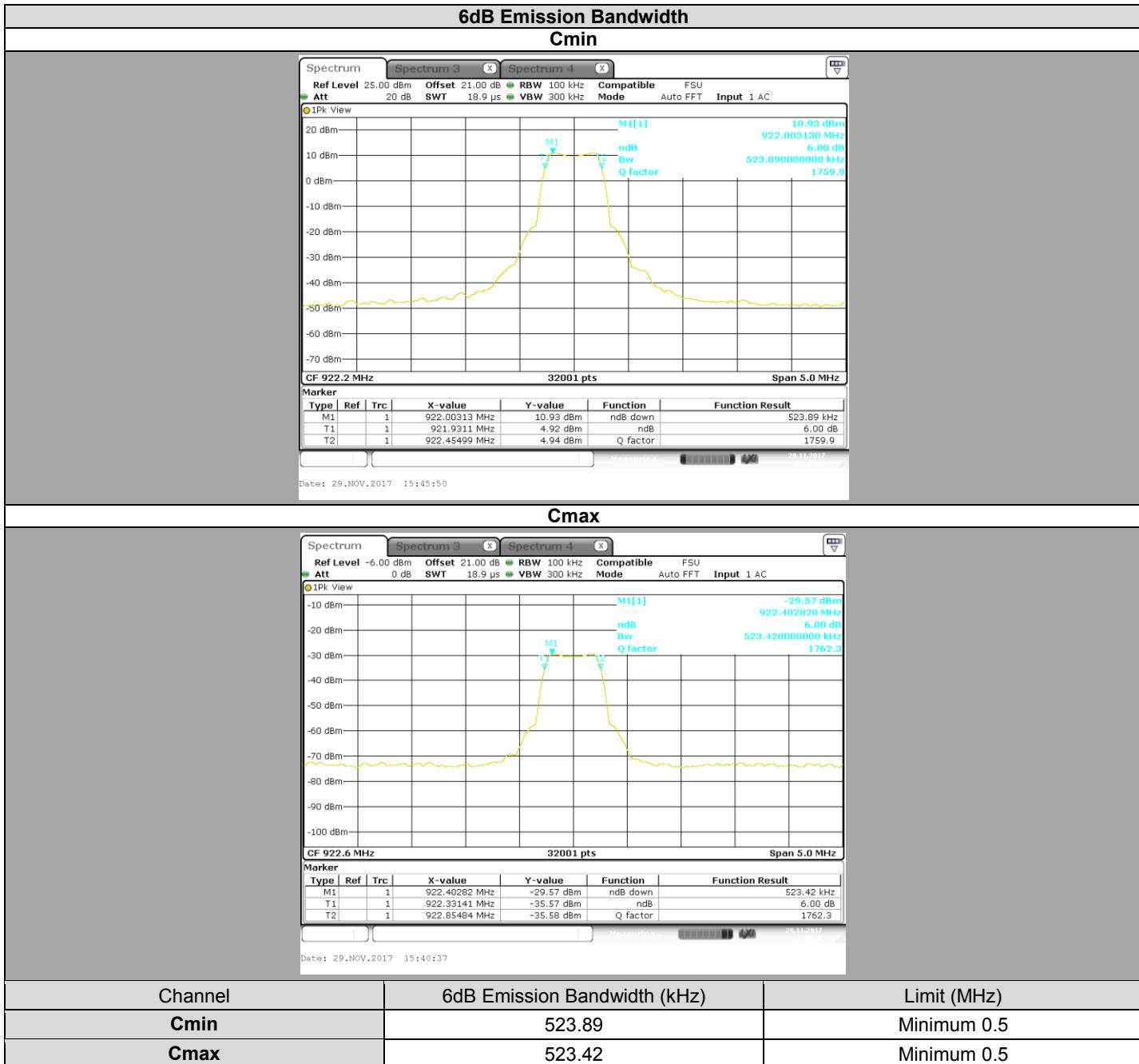
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2018/09
Multi-meter	KEITHLEY	2000	A1242090	2016/06	2018/06
RF cable & 20 dB attenuator	Télédynne	920-0202-048	A5329661	2017/09	2018/09
Programmable DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	2016/06	2018/06

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



L C I E

4.5. RESULTS



4.6. CONCLUSION

6dB Emission Bandwidth measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.



5. DUTY CYCLE

5.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 29, 2017
Ambient temperature : 24 °C
Relative humidity : 44 %

5.2. TEST SETUP

- The Equipment Under Test is installed:

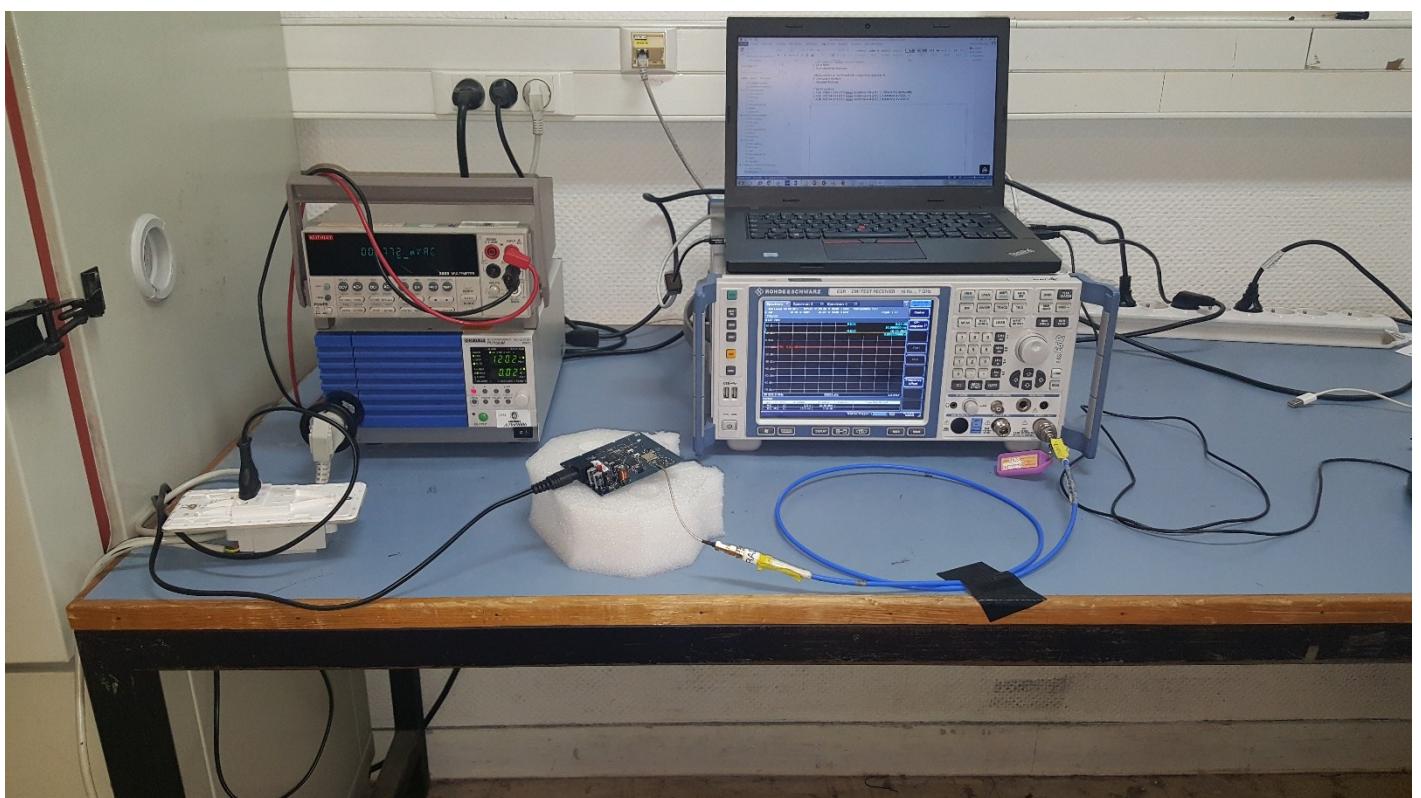
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v04 § 6.0 b)



Photograph for Duty Cycle



L C I E

5.3. LIMIT

None

5.4. TEST EQUIPMENT LIST

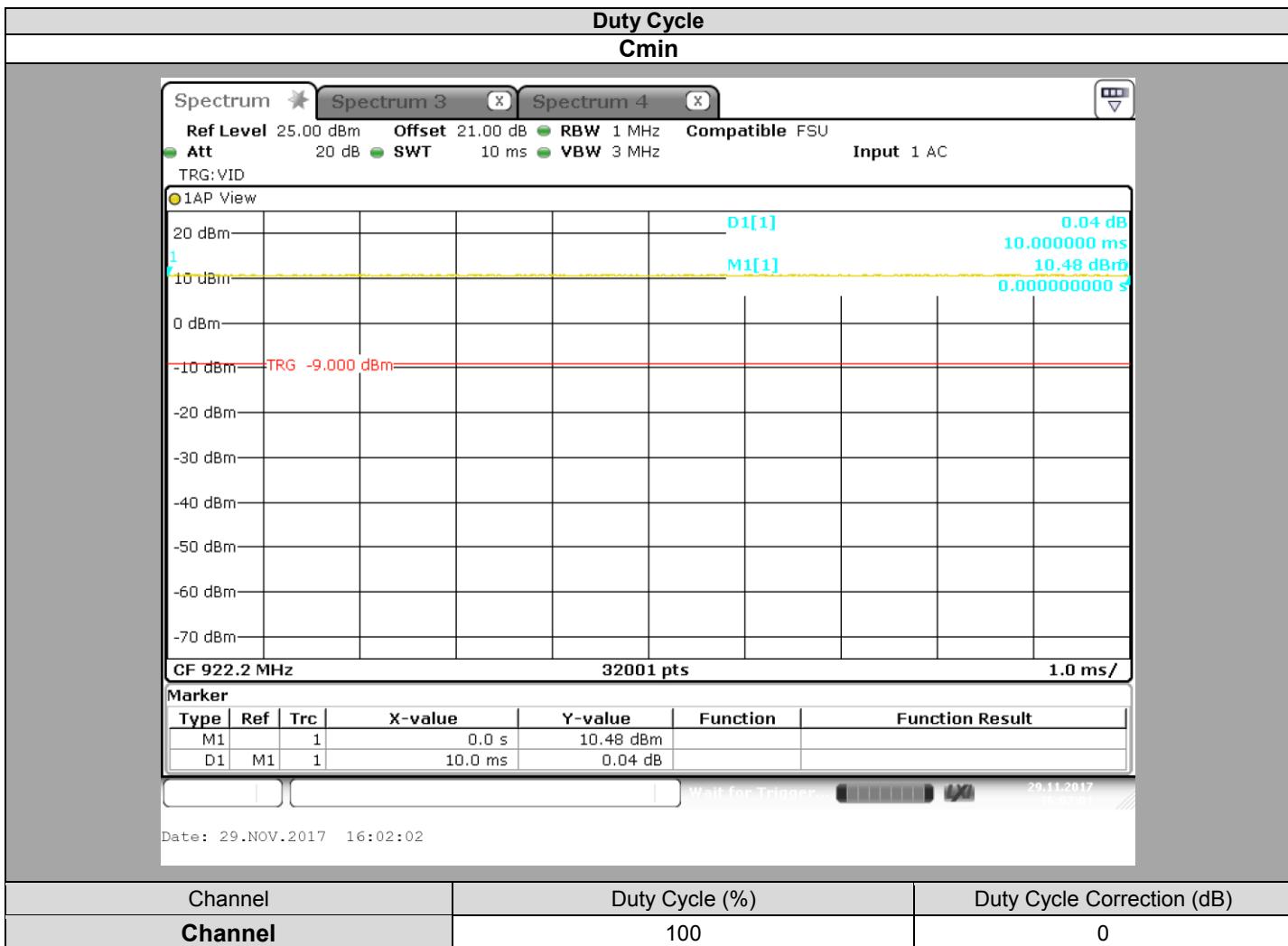
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2018/09
Multi-meter	KEITHLEY	2000	A1242090	2016/06	2018/06
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329661	2017/09	2018/09
Programmable DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	2016/06	2018/06

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



L C I E

5.5. RESULTS



5.6. CONCLUSION

Duty Cycle measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.



L C I E

6. MAXIMUM CONDUCTED OUTPUT POWER

6.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 29, 2017
Ambient temperature : 24 °C
Relative humidity : 44 %

6.2. TEST SETUP

- The Equipment Under Test is installed:

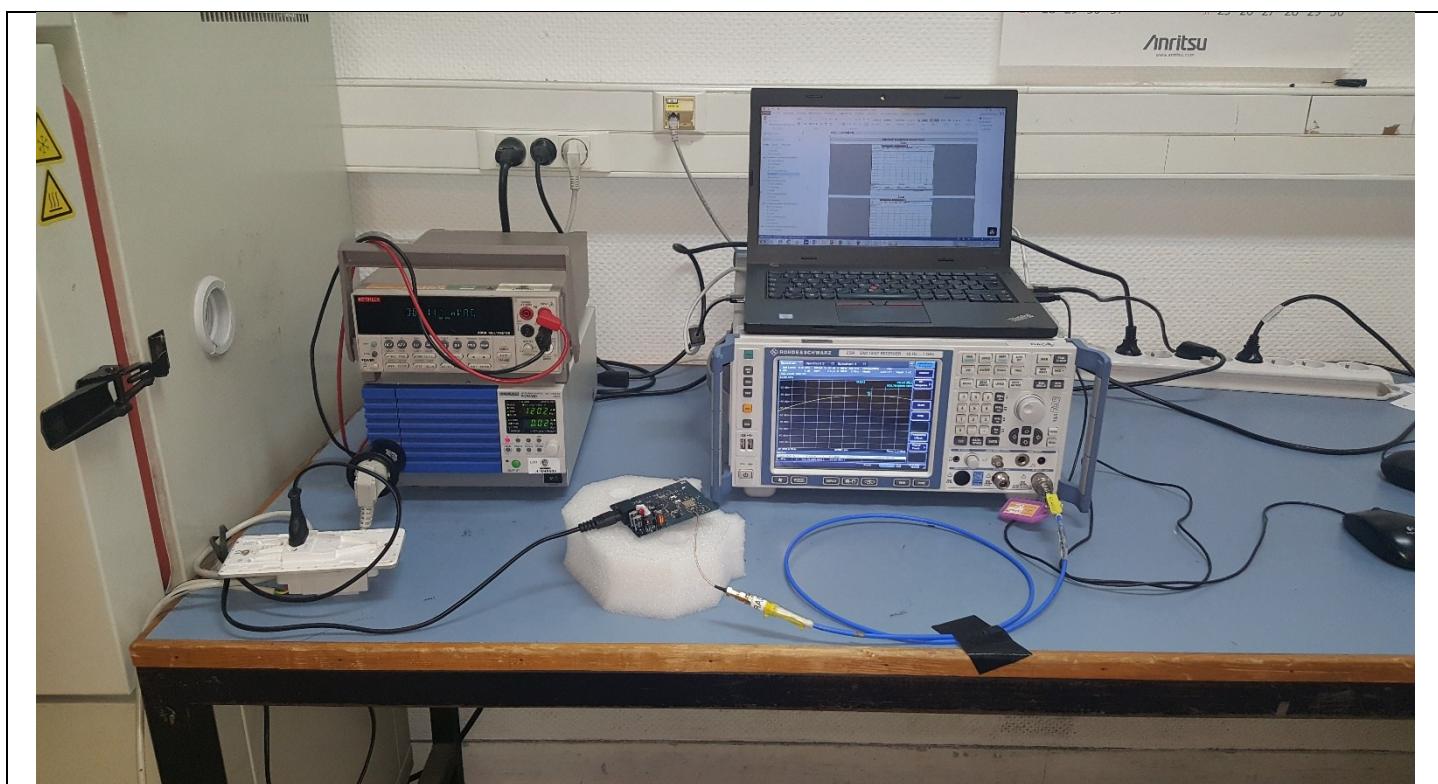
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v04 § 9.1.1 (RBW \geq DTS bandwidth)
- KDB 558074 D01 DTS Meas Guidance v04 § 9.2.2.2 (Method AVGSA-1)
- KDB 558074 D01 DTS Meas Guidance v04 § 9.2.2.4 (Method AVGSA-2)



Photograph for Maximum Conducted Output Power



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6.3. LIMIT

Maximum Conducted Output power:

2400MHz-2483.5MHz: Shall not exceed 30dBm

Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

6.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2018/09
Multi-meter	KEITHLEY	2000	A1242090	2016/06	2018/06
RF cable & 20 dB attenuator	Télédynne	920-0202-048	A5329661	2017/09	2018/09
Programmable DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	2016/06	2018/06

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



L C I E

6.5. RESULTS



6.6. CONCLUSION

Maximum Conducted Output Power measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.



L C I E

7. POWER SPECTRAL DENSITY

7.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 29, 2017
Ambient temperature : 24 °C
Relative humidity : 44 %

7.2. TEST SETUP

- The Equipment Under Test is installed:

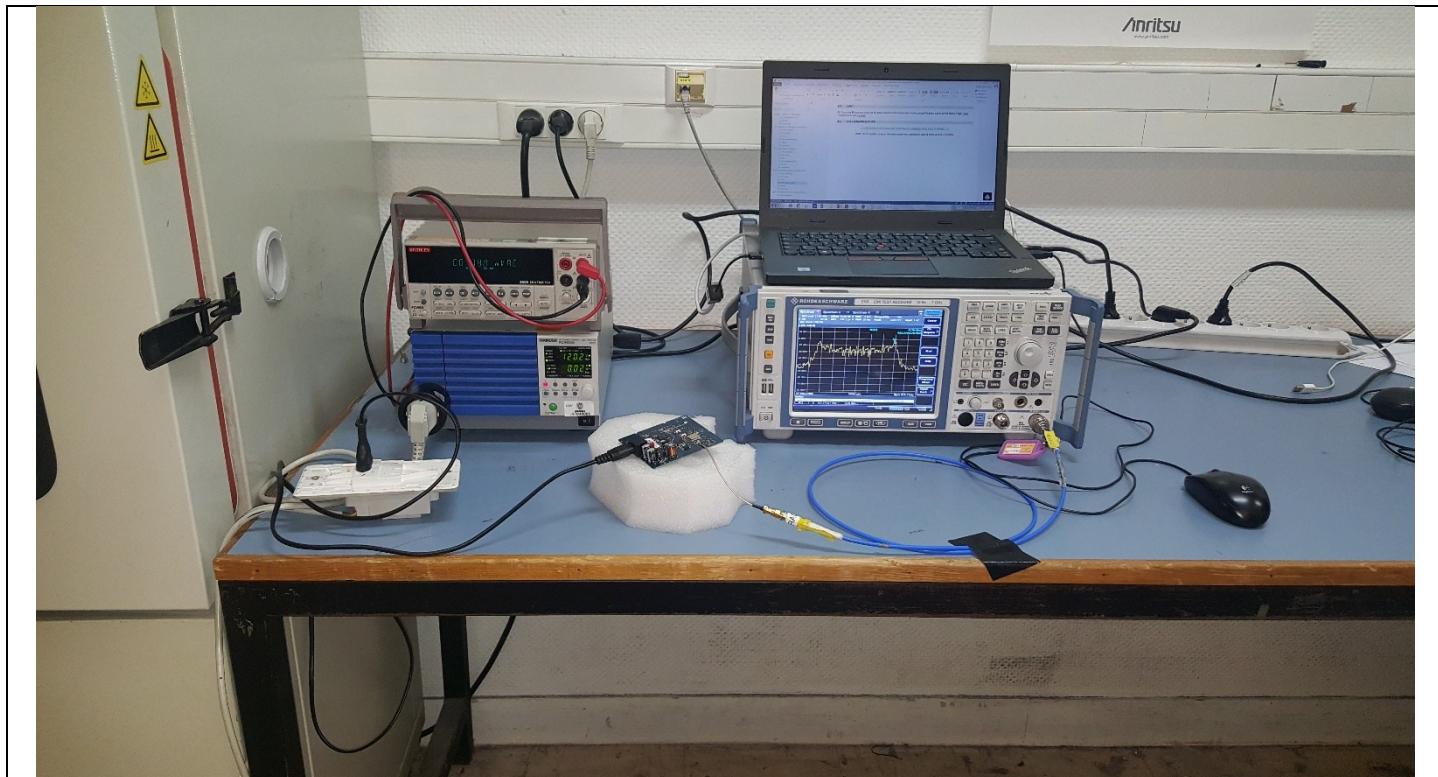
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v04 § 10.2 (Method PKPSD)
- KDB 558074 D01 DTS Meas Guidance v04 § 10.3 (Method AVGPSD-1)



Photograph for Power Spectral Density



L C I E

7.3. LIMIT

Power Spectral Density:

2400MHz-2483.5MHz: Shall not exceed 8dBm/3kHz

Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

7.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2018/09
Multi-meter	KEITHLEY	2000	A1242090	2016/06	2018/06
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329661	2017/09	2018/09
Programmable DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	2016/06	2018/06

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



L C I E

7.5. RESULTS



7.6. CONCLUSION

Power Spectral Density measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.



8. UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS AT THE BAND EDGE

8.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 29, 2017
Ambient temperature : 24 °C
Relative humidity : 44 %

8.2. TEST SETUP

- The Equipment Under Test is installed:

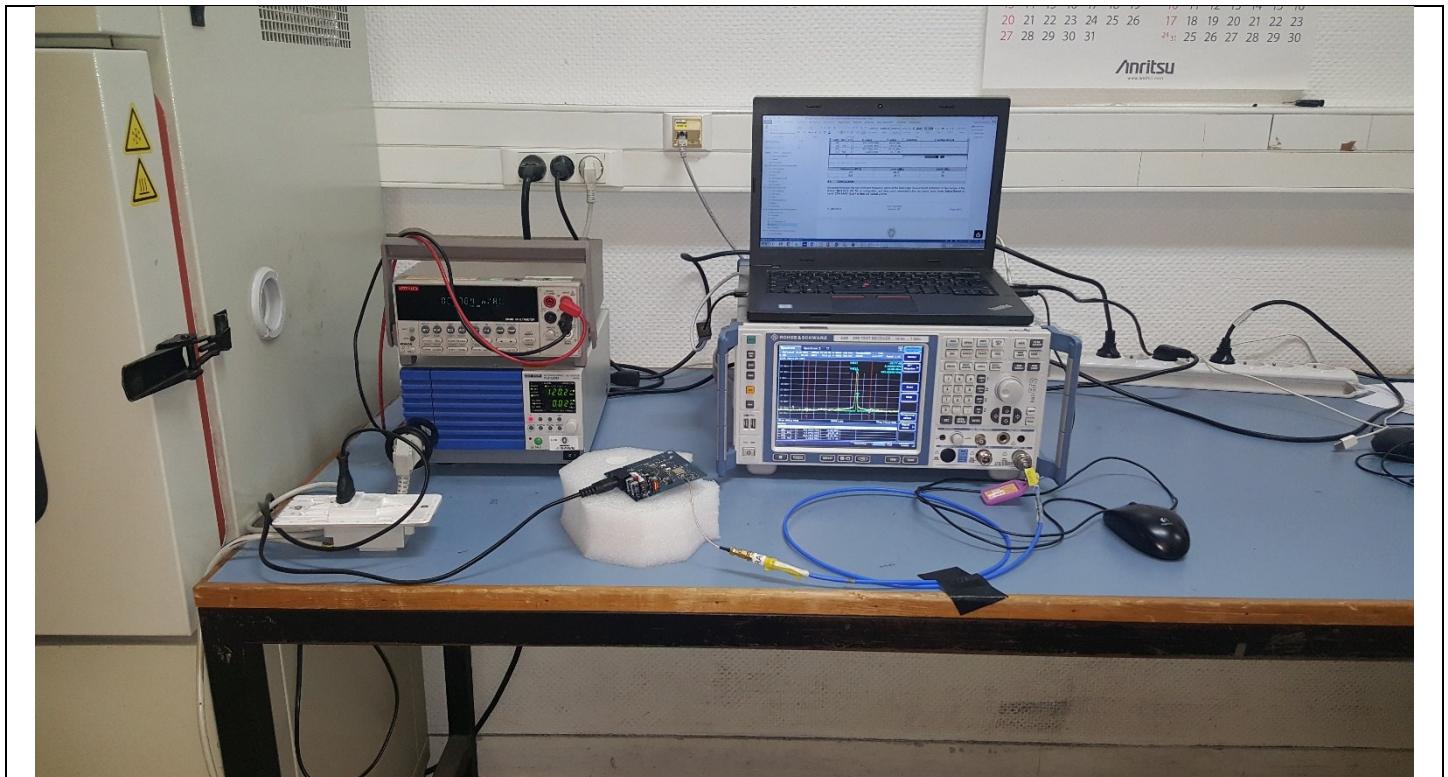
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v04 § 11



Photograph for Unwanted Emission into non-restricted frequency bands at the band edge



8.3. LIMIT

All Spurious Emissions must be at least 30dB (Average Conducted Power) below the Fundamental Radiator Level at the Band Edge Edge "2400MHz & 2483,5MHz"

8.4. TEST EQUIPMENT LIST

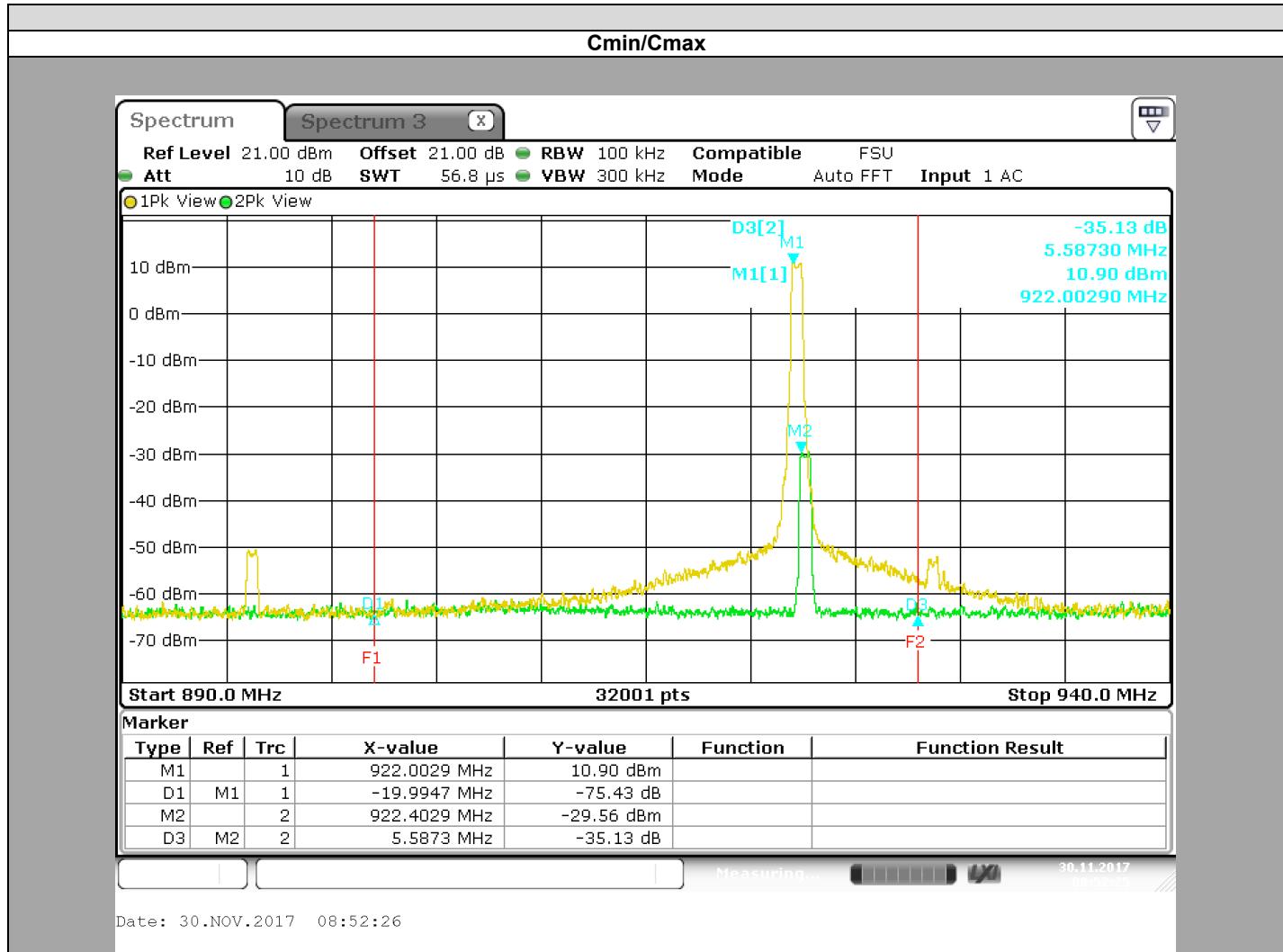
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2016/09	2018/09
Multi-meter	KEITHLEY	2000	A1242090	2016/06	2018/06
RF cable & 20 dB attenuator	Télédyne	920-0202-048	A5329661	2017/09	2018/09
Programmable DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	2016/06	2018/06

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



L C I E

8.5. RESULTS



Frequency (MHz)	Level (dBc)	Limit (dBc)
902	-75.43	30
928	-35.13	30

8.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands at the band edge measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.



L C I E

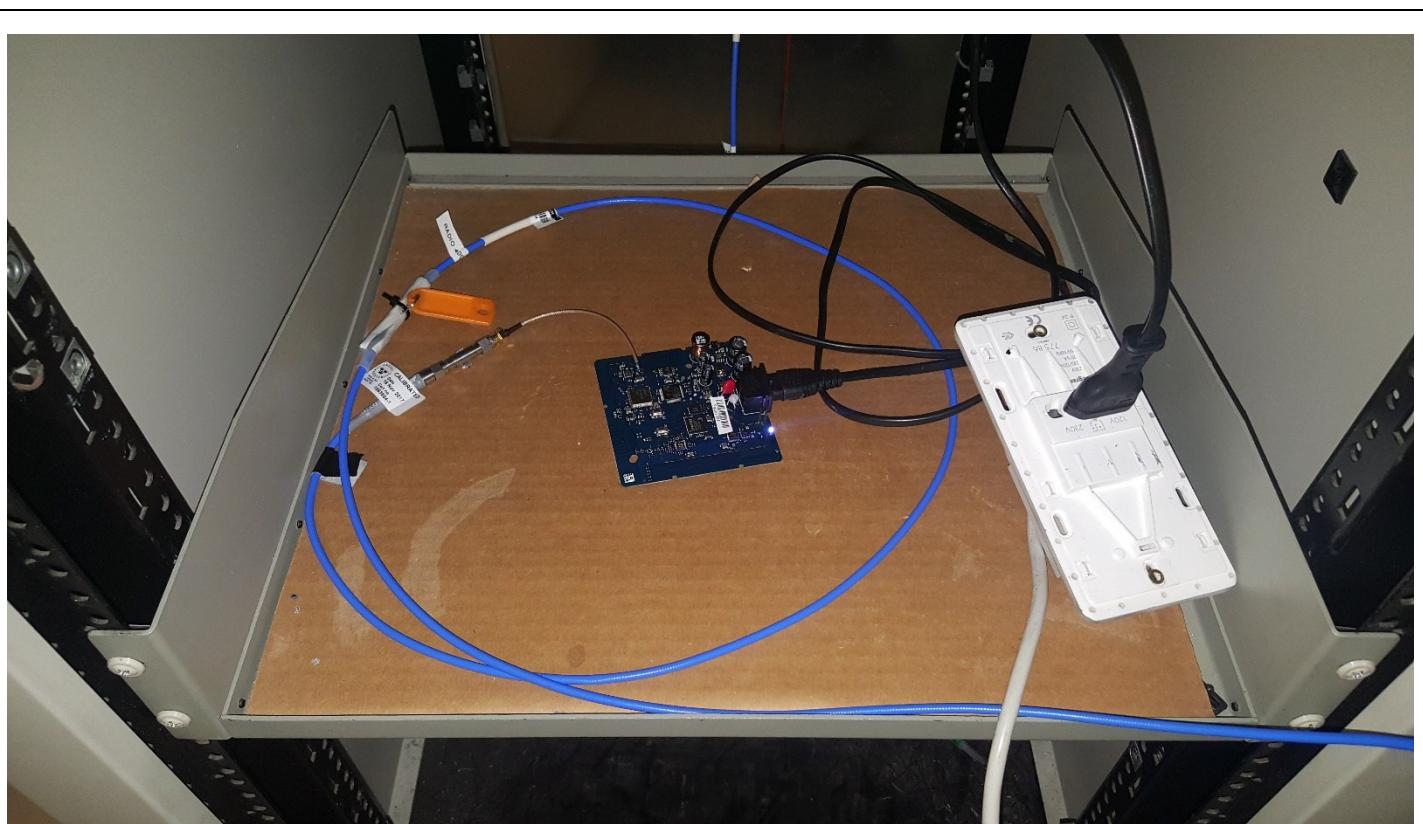
9. UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS

9.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 29, 2017
Ambient temperature : 24 °C
Relative humidity : 44 %

9.2. TEST SETUP

- The Equipment Under Test is installed:
 On a table
 In an anechoic chamber
- Measurement is performed with a spectrum analyzer in:
 Conducted Method
 Radiated Method
- Test Procedure:
 KDB 558074 D01 DTS Meas Guidance v04 § 11



Photograph for Unwanted Emission into non-restricted frequency bands



L C I E



Photograph for Unwanted Emission into non-restricted frequency bands

9.3. LIMIT

All Spurious Emissions must be at least 30dB (Average Conducted Power) below the Fundamental Radiator Level



L C I E

9.4. TEST EQUIPMENT LIST

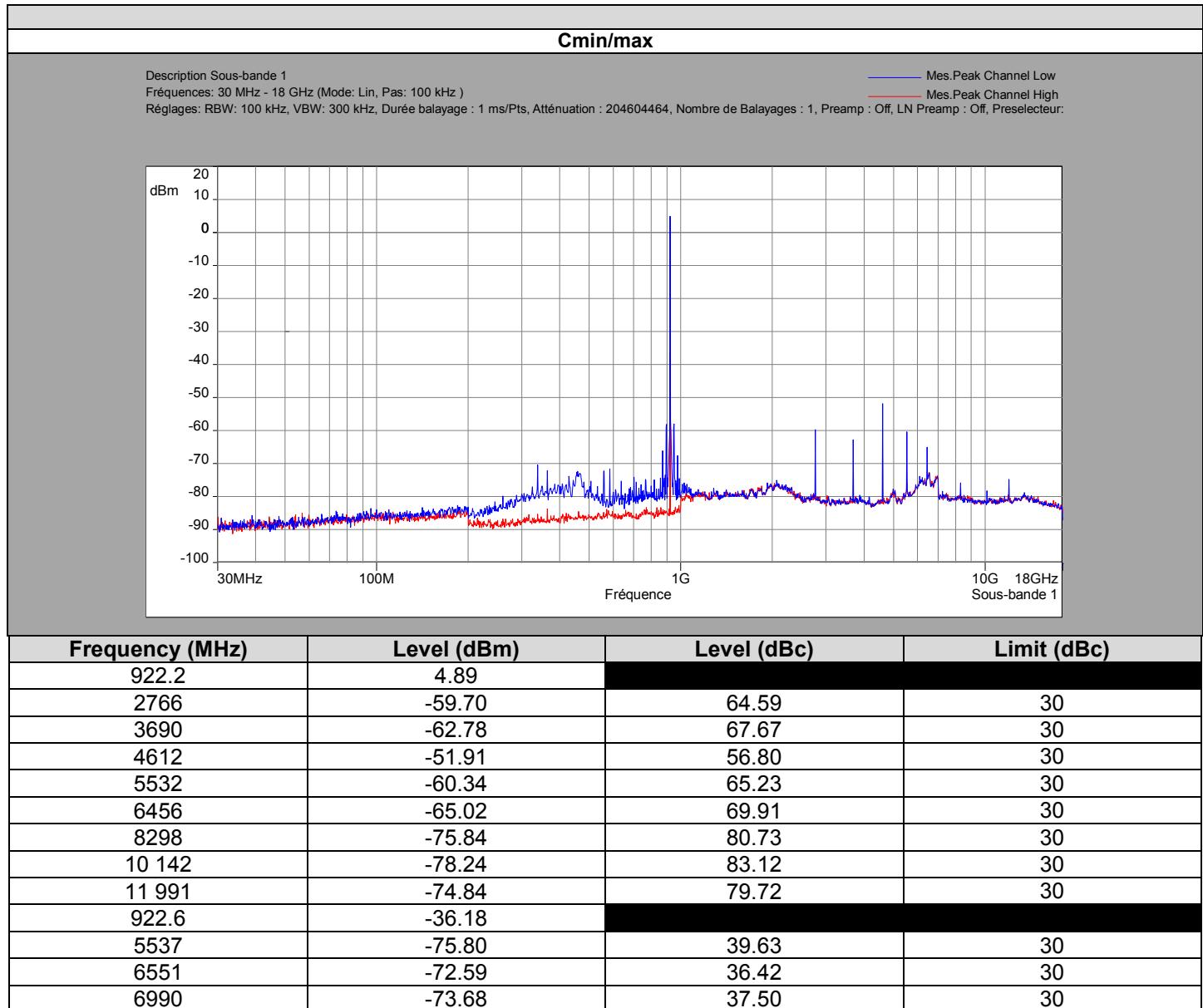
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESI40 1088 740K40	A2642010	2017/07	2018/07
Multi-meter	KEITHLEY	2000	A1242090	2016/06	2018/06
Programmable DC power supply	ROHDE & SCHWARZ	NGSM32/10	A7040074	2016/06	2018/06
High pass filter 1,6GHz	TRILITHIC	3HC1850/13G-3-KK	A7484044	2016/12	2017/12
cable	Télédyne	084-0555-2MTR	A5329758	2017/10	2018/10
Attenuator 3dB	WEINSCHEL	WA54-3-12	A7122223	2017/10	2018/10

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



L C I E

9.5. RESULTS



9.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.



10. AC POWER LINE CONDUCTED EMISSIONS

10.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 16, 2017 to November 22, 2017
Ambient temperature : 27 °C & 24 °C
Relative humidity : 46 % & 44 %

10.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013) 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.



Photograph for AC Power Line Conducted Emissions (Front view)



L C I E



Photograph for AC Power Line Conducted Emissions (Rear view)

10.1. LIMIT

Quasi-Peak

0,15kHz to 0,5MHz: 66dB μ V to 56dB μ V*

0,5MHz to 5MHz: 56dB μ V

5MHz to 30MHz: 60dB μ V

Average

0,15kHz to 0,5MHz: 56dB μ V to 46dB μ V*

0,5MHz to 5MHz: 46dB μ V

5MHz to 30MHz: 50dB μ V

*Decreases with the logarithm of the frequency



LCIE

10.2. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Semi anechoic chamber	SIEPEL	-	D3044008	2016/06	2017/06
V LISN	ROHDE & SCHWARZ	ESH3-Z5	C2322003	2016/08	2017/08
pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	A2649004	2016/03	2017/03
Cable	-	-	A5329531	2017/02	2018/02

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

10.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

Divergence:



L C I E

10.4. RESULTS

Phase

Description Sous-bande 1

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

RégLAGes: RBW: 9 kHz, VBW: Auto, Durée balayage : 50 ms/Pts, Atténuation : 153640544, Nombre de Balayages : 1, Preamp : Off, LN Preampli: Off, Mes. Avg (Phase 1)

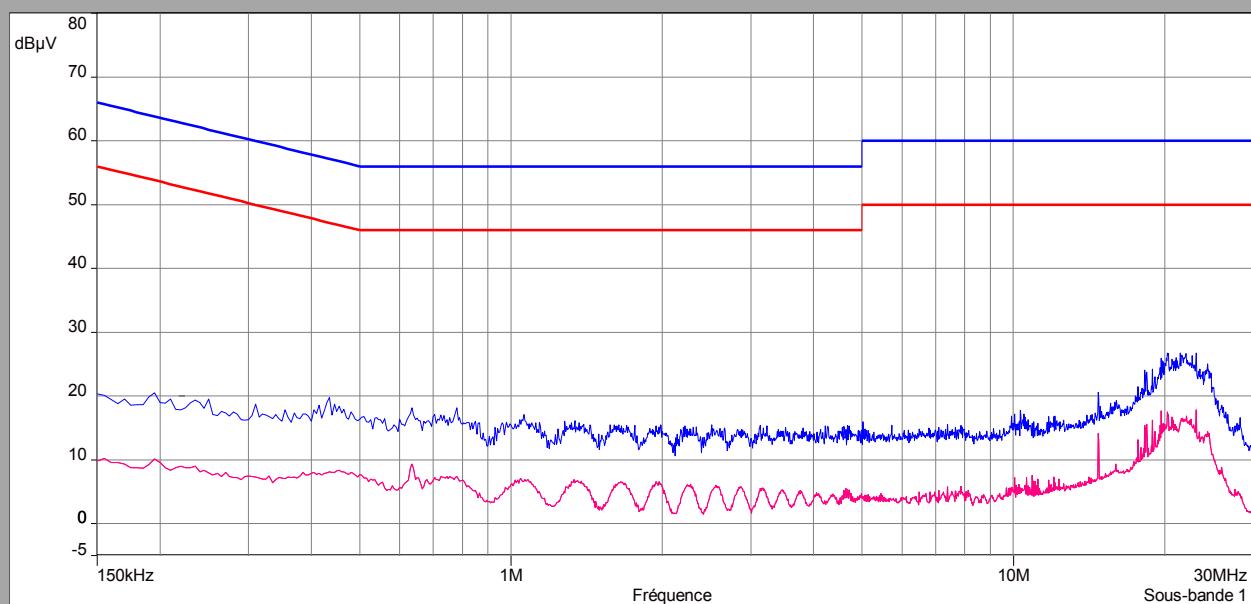
Ligne:Phase 1

FCC/FCC 15.107 - Classe:B - Moyenne/

FCC/FCC 15.107 - Classe:B - QCréte/

Mes. Avg (Phase 1)

Mes.Avg (Phase 1)



Line

Description Sous-bande 2

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

RégLAGes: RBW: 9 kHz, VBW: Auto, Durée balayage : 50 ms/Pts, Atténuation : 153581248, Nombre de Balayages : 1, Preamp : Off, LN Preampli: Off, Mes. Avg (Neutre)

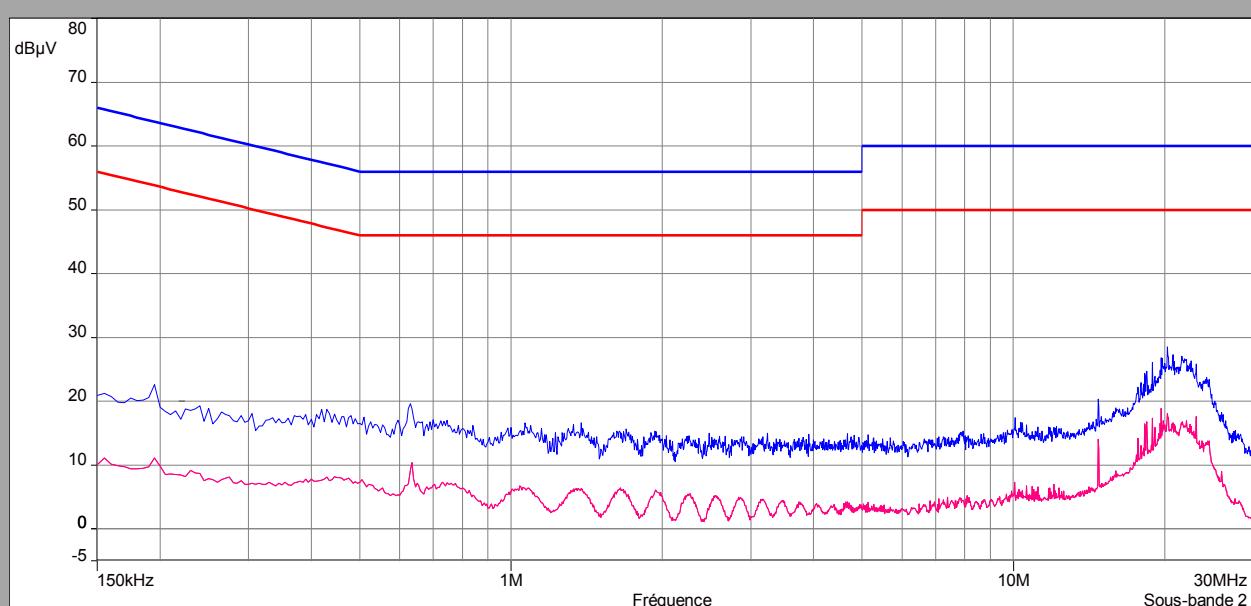
Ligne:Neutre

FCC/FCC 15.107 - Classe:B - Moyenne/

FCC/FCC 15.107 - Classe:B - QCréte/

Mes. Avg (Neutre)

Mes.Avg (Neutre)





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Phase Line

Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Peak Margin (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Average Margin (dB μ V)
0.635	18.22	-	56	37.78	9.33	46	36.67
14.76	20.69	-	60	39.31	14.15	50	35.85
19.70	24.19	-	60	35.81	16.15	50	33.85
23.12	26.75	-	60	33.25	17.85	50	32.15

Neutral Line

Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Peak Margin (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Average Margin (dB μ V)
0.635	19.69	-	56	36.31	10.29	46	35.71
14.76	20.45	-	60	39.55	13.99	50	36.01
20.26	28.59	-	60	31.41	18.76	50	31.24
23.13	24.99	-	60	35.01	18.11	50	31.89

10.5. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the 47 CFR PART 15.247 & RSS 247 ISSUE 2 limits.



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11. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS

11.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : November 16, 2017 to November 22, 2017
Ambient temperature : 27 °C & 24 °C
Relative humidity : 46 % & 44 %

11.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013). The EUT is placed in a semi-anechoic chamber. Distance between measuring antenna and the EUT is 3m. Test is performed in horizontal (H) and vertical (V) polarization with bilog antenna below 1GHz and with a horn antenna above 1GHz. Measurement bandwidth was 120kHz below 1GHz and 1MHz above 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on the 3 axis of EUT. Antenna height search was performed from 1 to 4m. The EUT is place at 1.5m high above 1GHz and at 0.8m high under 1GHz.



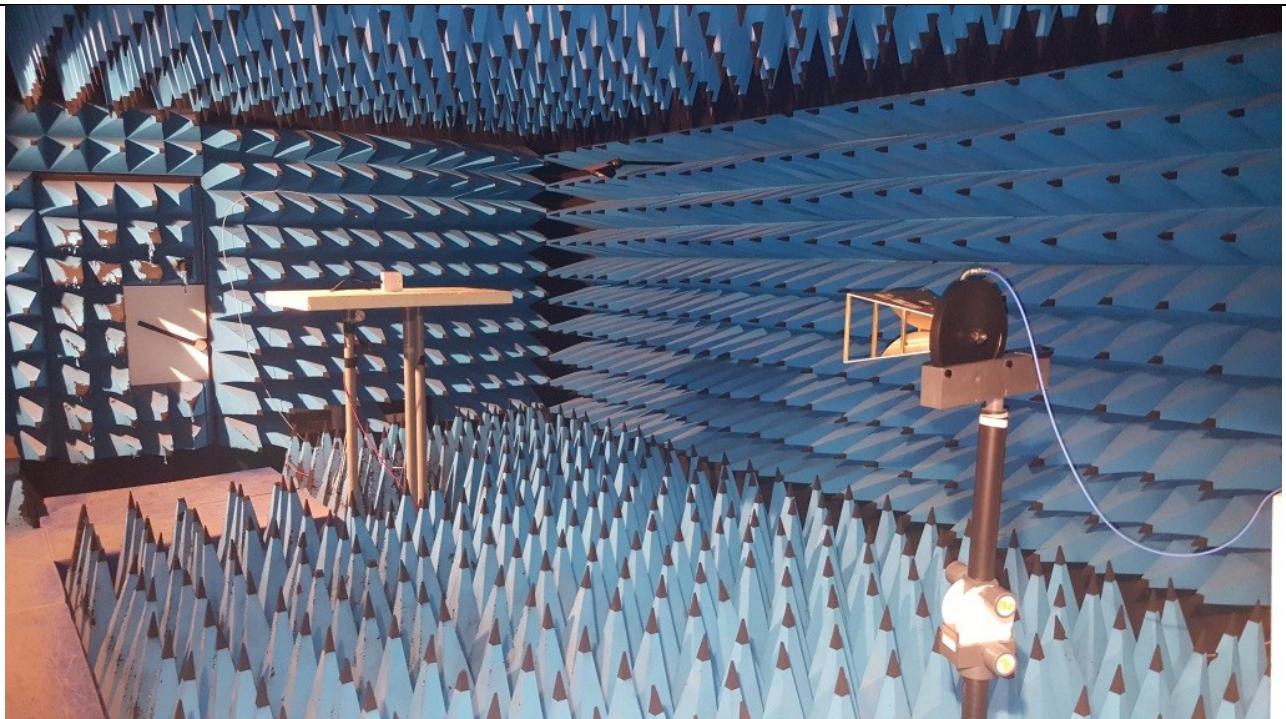
Photograph for Unwanted Emission in restricted frequency bands



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Photograph for Unwanted Emission in restricted frequency bands



Photograph for Unwanted Emission in restricted frequency bands



11.3. LIMIT

Limit at 3m:

30MHz to 88MHz: 40dB μ V/m QPeak
88MHz to 216MHz: 43,5dB μ V/m QPeak
216MHz to 960MHz: 46dB μ V/m QPeak
960MHz to 1000MHz: 54dB μ V/m QPeak
Above 1000MHz: 74dB μ V/m Peak
54dB μ V/m Average

Limit at 10m:

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: 63.5B μ V/m Peak
43.5B μ V/m Average

11.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Semi anechoic chamber	SIEPEL	-	D3044008	2017/06	2018/06
EMI receiver	ROHDE & SCHWARZ	ESU26	A2642018	2017/10	2018/10
Bilog antenna	SCHWARZBECK	VULB 9160	C2040150	2017/03	2018/03
RF cable	RADIALL; CDI	30990-7M	A5329711	2017/03	2018/03
Cable	CABLES & CONNECTIQUES	3.5MD/CSU528AA/3.5MC/4000	A5329436	2017/03	2018/03
Full anechoic chamber	SIEPEL	-	D3044019	2014/10	2018/10
Preamplifier	LCIE; LCIE	LCIE-ALB-001	A7080073	2016/08	2018/08
Horn antenna	AH SYSTEMS	SAS 571	C2042041	2017/04	2018/04
High pass filter 1,6GHz	TRILITHIC	3HC1850/13G-3-KK	A7484044	2016/12	2017/12
EMI receiver	ROHDE & SCHWARZ	ESI40 1088 740K40	A2642010	2016/07	2018/07
cable	Télédynne	084-0505-1MTR	A5329757	2017/03	2018/03
cable	Télédynne	084-0555-3MTR	A5329760	2017/03	2018/03
cable	Télédynne	084-555-1.5MTR	A5329759	2017/03	2018/03

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

11.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

Divergence:



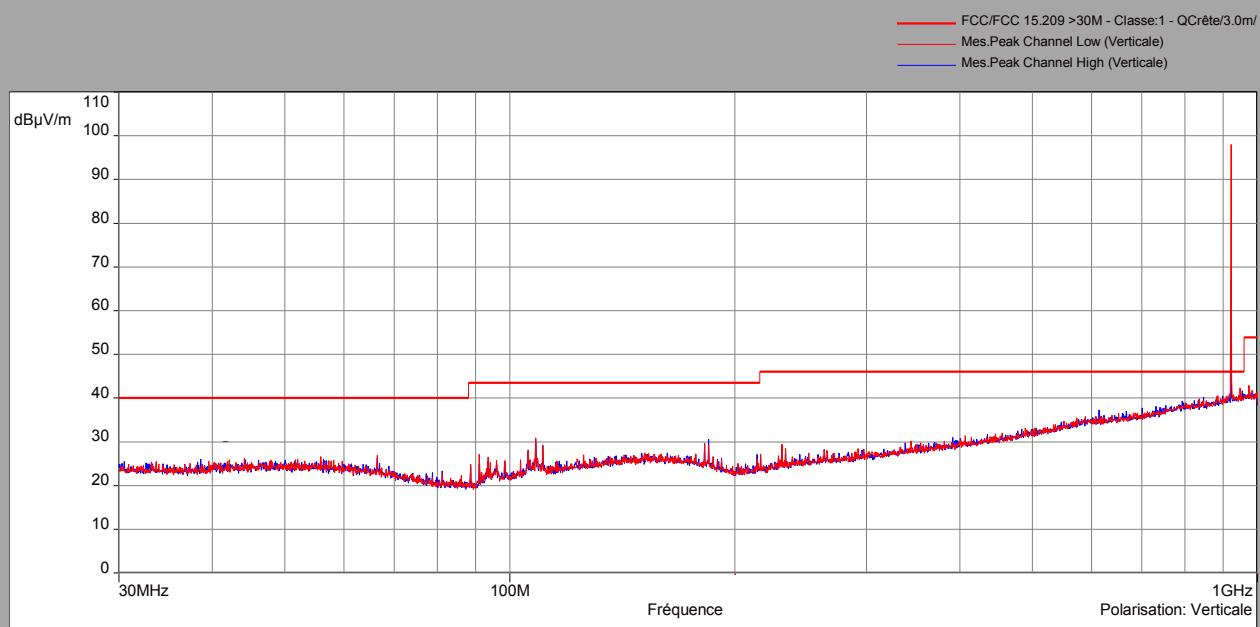
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11.6. RESULTS

Below 1GHz

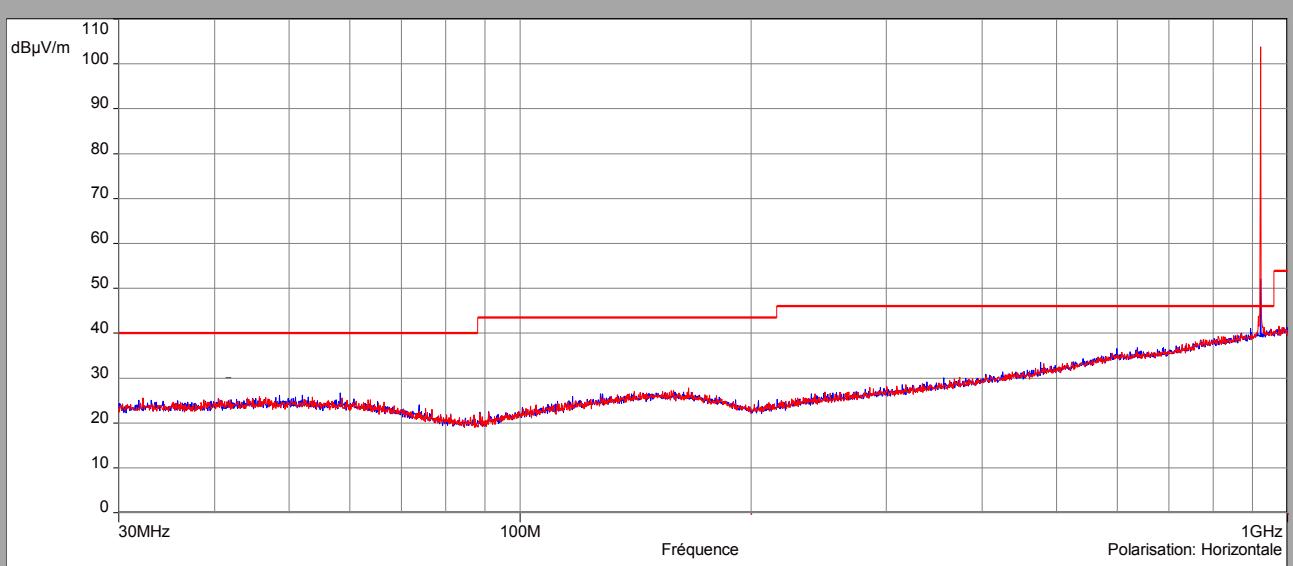
Cmin/Cmax

Vertical Polarization



Horizontal polarization

— FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
— Mes.Peak Channel Low (Horizontale)
— Mes.Peak Channel High (Horizontale)





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Above 1GHz

Cmin/Cmax

Vertical Polarization

Description Sous-bande 2

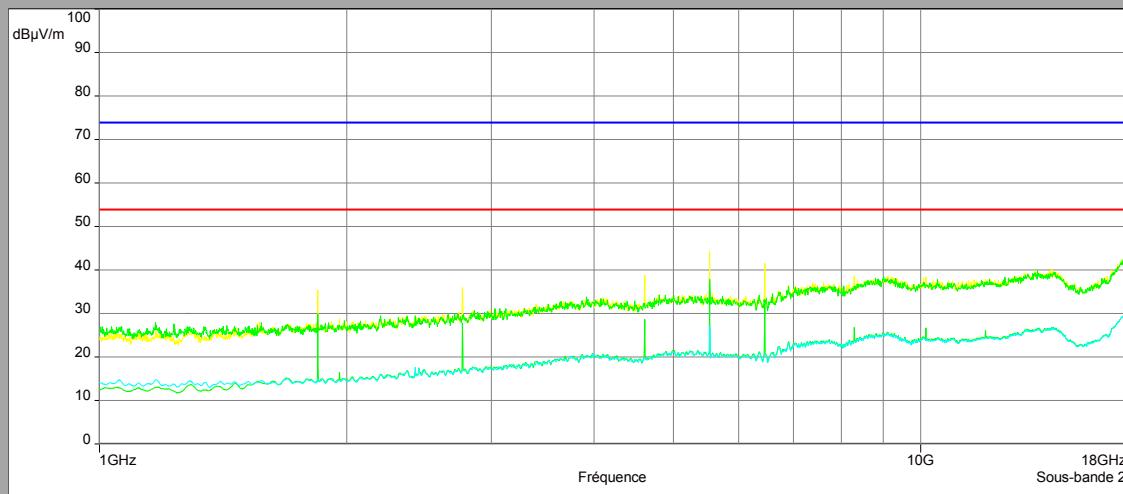
Fréquences: 1 GHz - 18 GHz (Mode: Lin, Pas: 500 kHz)

Réglages: RBW: 1 MHz, VBW: Auto, Durée balayage : 10 ms/Pts, Atténuation : 151476600, Nombre de Balayages : 1, Preamp : On: 20 dB, LN Preamp : Off, Préselecteur: Off

Polarisation: Verticale

Distance: 3 m

FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
FCC/FCC 15.109 - Classe: - Crête/3.0m/
Mes.Avg Channel High (Verticale)
Mes.Peak Channel High (Verticale)
Mes.Avg Channel Low (Verticale)
Mes.Peak Channel Low (Verticale)



Horizontal polarization

Description Sous-bande 1

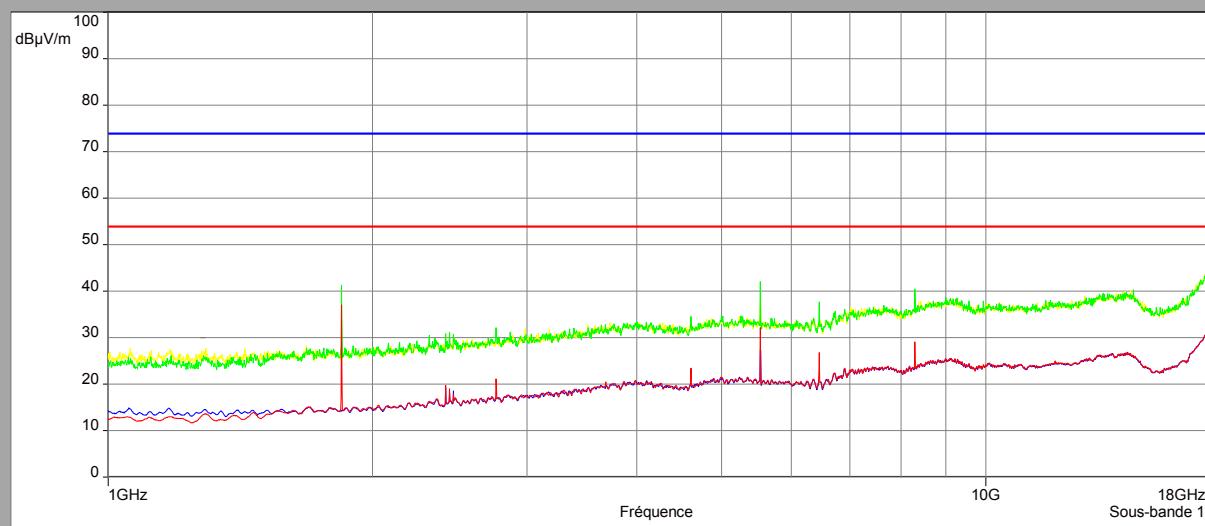
Fréquences: 1 GHz - 18 GHz (Mode: Lin, Pas: 500 kHz)

Réglages: RBW: 1 MHz, VBW: Auto, Durée balayage : 10 ms/Pts, Atténuation : 132377784, Nombre de Balayages : 1, Preamp : On: 20 dB, LN Preamp : Off, Préselecteur: Off

Polarisation: Horizontale

Distance: 3 m

FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
FCC/FCC 15.109 - Classe: - Crête/3.0m/
Mes.Avg Channel Low (Horizontale)
Mes.Peak Channel Low (Horizontale)
Mes.Avg Channel High (Horizontale)
Mes.Peak Channel High (Horizontale)





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Above 1GHz								
Cmin/Cmax								
Polarization	Frequency (MHz)	Duty cycle correction (dB)	Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Average Margin (dB μ V/m)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Margin (dB μ V/m)
Horizontal	1844.5	0	37.05	54	16,95	41.32	74	32,68
Vertical	2766	0	27.77	54	26,23	35.94	74	38,06
Vertical	4610.5	0	28.50	54	25,50	38.79	74	35,21
Vertical	5532	0	36.90	54	17,10	44.21	74	29,79
Vertical	6456	0	33.03	54	20,97	41.53	74	32,47
Horizontal	8301.5	0	29.02	54	24,98	40.43	74	33,57

11.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the product **VELUX ACTIVE with NETATMO NXG01S**, SN: -, in configuration and description presented in this test report, show levels compliant to the 47 CFR PART 15.247 & RSS 247 ISSUE 2 limits.



12. UNCERTAINTIES CHART

47 CFR Part 15.209 & 15.207 Kind of test	Wide uncertainty (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.