



LCIE

Bluetooth Low Energy Template: Release November 03rd, 2020

TEST REPORT

N°: 171347-762086-B (FILE#1055252)

Version : 02

Subject

Radio spectrum matters
tests according to standards:
47 CFR Part 15.247 & RSS-247 Issue 2 & RSS-Gen Issue 5

Issued to

ETISENSE
60A Avenue Rockefeller
69008 - LYON
FRANCE

Apparatus under test

- ↳ Product
- ↳ Trade mark
- ↳ Manufacturer
- ↳ Model under test
- ↳ Serial number
- ↳ FCC ID

Cardiorespiratory monitoring jacket
DECRO
ETISENSE
EMET-HD EMITTER
OEG00083; OEG00081; OEG00085
2A3MD-GC930058

Conclusion

See Test Program chapter

Test date

February 17, 2021 to February 22, 2021

Test location

Moirans

FCC Test site

FR0008

ISED Test Site

FR0008 – 6500A

Test Site

6500A-1 & 6500A-3

Sample receipt date

February 17, 2021

Composition of document

46 pages

Document issued on

March 2, 2022

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	February 22, 2021	Mounir BOUAMARA	Creation of the document
02	March 2, 2022	Mounir BOUAMARA	Adding FCC informations

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

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1. TEST PROGRAM

References

- 47 CFR Part 15.247
- RSS 247 Issue 2
- RSS Gen Issue 5
- KDB 558074 D01 DTS Meas Guidance v05r02
- ANSI C63.10-2013

Radio requirement:

Clause (47CFR Part 15.247 & RSS-247 Issue 2 & RSS-Gen Issue 5) Test Description	Test result - Comments
Occupied Bandwidth	☒ PASS ☐ FAIL ☐ NA ☐ NP(1)
6dB Bandwidth	☒ PASS ☐ FAIL ☐ NA() ☐ NP(1)
Duty Cycle	☐ PASS ☐ FAIL ☒ NA ☐ NP(1)
Maximum Conducted Output Power	☒ PASS ☐ FAIL ☐ NA ☐ NP(1)
Power Spectral Density	☒ PASS ☐ FAIL ☐ NA ☐ NP(1)
Conducted Spurious Emission at the Band Edge	☐ PASS ☐ FAIL ☒ NA() ☐ NP(1)
Unwanted Emissions into Non-Restricted Frequency Bands	☒ PASS ☐ FAIL ☐ NA() ☐ NP(1)
AC Power Line Conducted Emission	☐ PASS ☐ FAIL ☒ NA(2) ☐ NP(1)
Unwanted Emissions into Restricted Frequency Bands	☒ PASS ☐ FAIL ☐ NA ☐ NP(1)
Receiver Radiated emissions	☐ PASS ☐ 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

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):
ETISENSE EMET-HD

Serial Number: OEG00083; **OEG00081; OEG00085**



Equipment Under Test

Power supply:

During all the tests, EUT is supplied by V_{nom} : 3.3VDC/ 1.9VDC
 For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	☐ AC ☐ DC ☒ Battery	3.3		
Supply2	☐ AC ☒ DC ☐ Battery	1.9		

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	USBC	-	☒	☒	☐	Charging the battery
2	DATA		☒	☒	☐	

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop			



Equipment information:

Bluetooth LE Type:	☒ BLE	☐ v4.1	☐ v4.2	☐ v5.0
Frequency band:	[2400 – 2483.5] MHz			
Spectrum Modulation:	☒ DSSS (Tested like it)			
Number of Channel:	40			
Spacing channel:	2MHz			
Channel bandwidth:	☒ 1MHz		☐ 2MHz	
Antenna Type:	☒ Integral	☐ External	☐ Dedicated	
Antenna connector:	☐ Yes	☐ No	☒ Temporary for test	
Transmit chains:	1			
	Single antenna			
	Gain: 0.5dBi			
Type of equipment:	☒ Stand-alone	☐ Plug-in	☐ Combined	
Duty cycle:	☒ Continuous duty	☐ Intermittent duty	☐ 100% duty	
Equipment type:	☒ Production model		☐ Pre-production model	
Operating temperature range:	Tmin:	☐ -20°C	☒ 0°C	☐ °C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☒ 55°C	☐ °C
Type of power source:	☐ AC power supply	☒ DC power supply	☒ Battery	
Operating voltage range:	Vnom:	☒ 3.3Vdc	☒ 1.9Vdc	

CHANNEL PLAN			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
Cmin: 0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
Cmid: 19	2440	Cmax: 39	2480

DATA RATE			
Available	Data Rate (Mbps)	Modulation Type	Worst Case Modulation
☒	1	GFSK	☒
☐	2	GFSK	☐

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 mode 2	Permanent reception
Test	Running mode
Occupied Bandwidth	☒ Test mode 1 (1) ☐ Alternative test mode()
6dB Bandwidth	☒ Test mode 1 (1) ☐ Alternative test mode()
Duty Cycle	☒ Test mode 1 (1) ☐ Alternative test mode()
Maximum Conducted Output Power	☒ Test mode 1 (1) ☐ Alternative test mode()
Power Spectral Density	☒ Test mode 1 (1) ☐ Alternative test mode()
Conducted Spurious Emission at the Band Edge	☒ Test mode 1 (1) ☐ Alternative test mode()
Unwanted Emissions into Non-Restricted Frequency Bands	☒ Test mode 1 (1) ☐ Alternative test mode()
AC Power Line Conducted Emission	☒ Test mode 1 (1) ☐ Alternative test mode()
Unwanted Emissions into Restricted Frequency Bands	☒ Test mode 1 (1) ☐ Alternative test mode()

(1) Following commands with the specific test software “mk-rafiio-1.0” are used to set the product:

Hardware information		
Software (if applicable):	V. :	mk-rafiio-1.0

2.3. EQUIPMENT LABELLING



2.4. EQUIPMENT MODIFICATION

☒ None ☐ Modification:

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : February 17, 2021 to February 19, 2021
Ambient temperature : 25 °C
Relative humidity : 33 %

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:

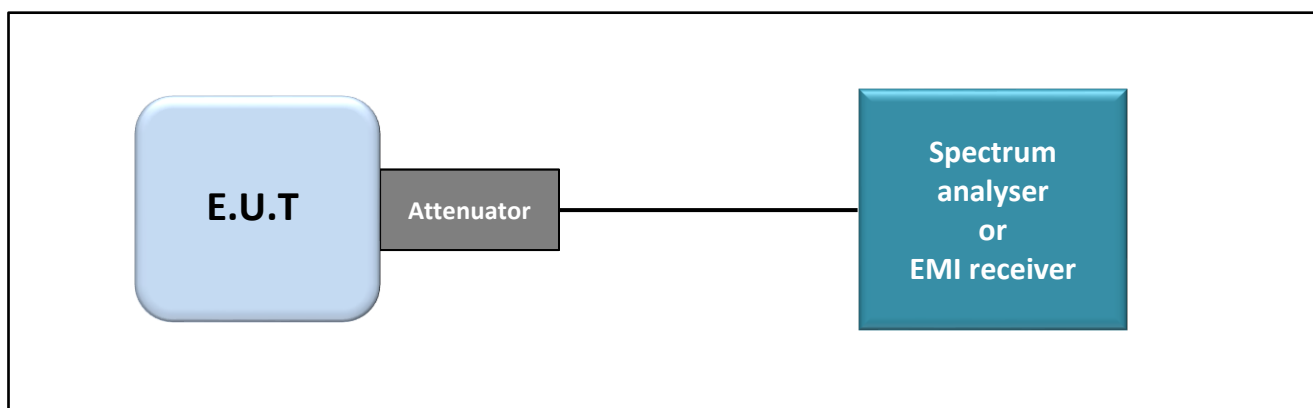
- ☒ Conducted Method
☐ Radiated Method

- Test Procedure:

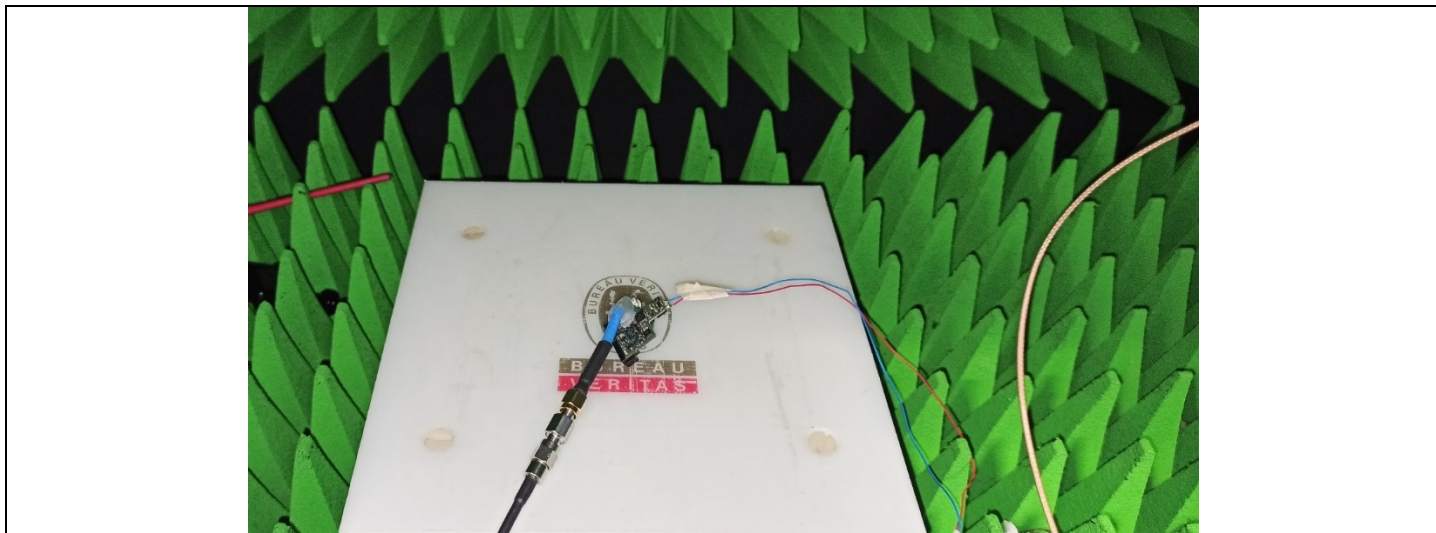
- ☒ RSS-Gen Issue 5 § 6.7
☐ ANSI C63.10 § 6.9.2

Measurement Procedure:

- RBW shall be in the range of 1% to 5% of the anticipated occupied bandwidth
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW
- SPAN = Capture all products of the modulation process
- 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

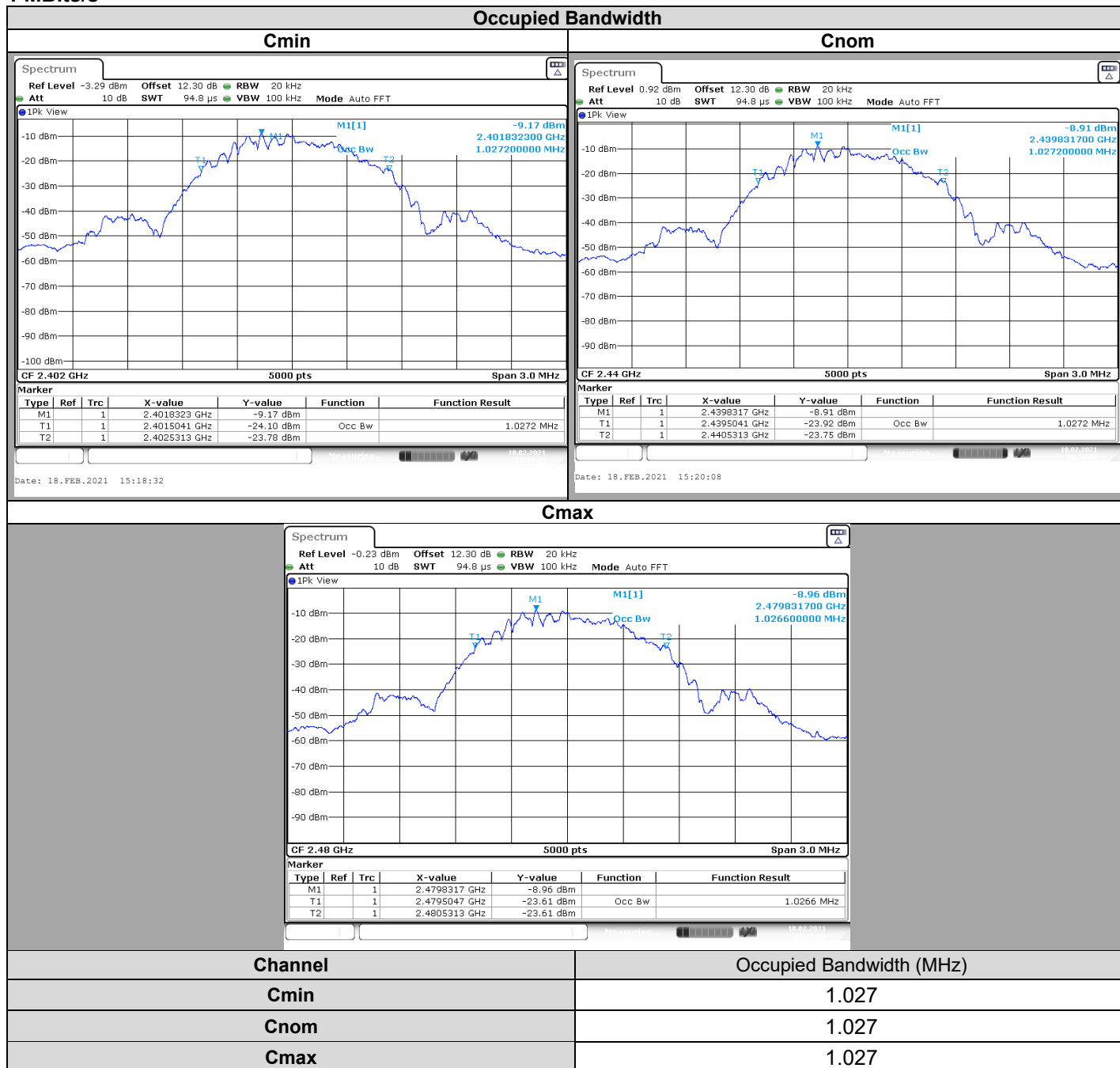
3.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	—	A7122269	09/20	03/22
CABLE SMA 1m	RADIALL	18GHz	A5329862	11/18	03/21
Full Anechoic Room	SIEPEL	—	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
POWER SUPPLY DC 20V	SODILEC	SDRI 205	A7040058		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	11/18	03/21
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/19	05/21
Thermo-hygrometer	TESTO	608-H1	B4204120	12/20	12/22

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

3.5. RESULTS

1 Mbits/s



4. 6dB EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : February 17, 2021 to February 19, 2021
Ambient temperature : 25 °C
Relative humidity : 33 %

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:

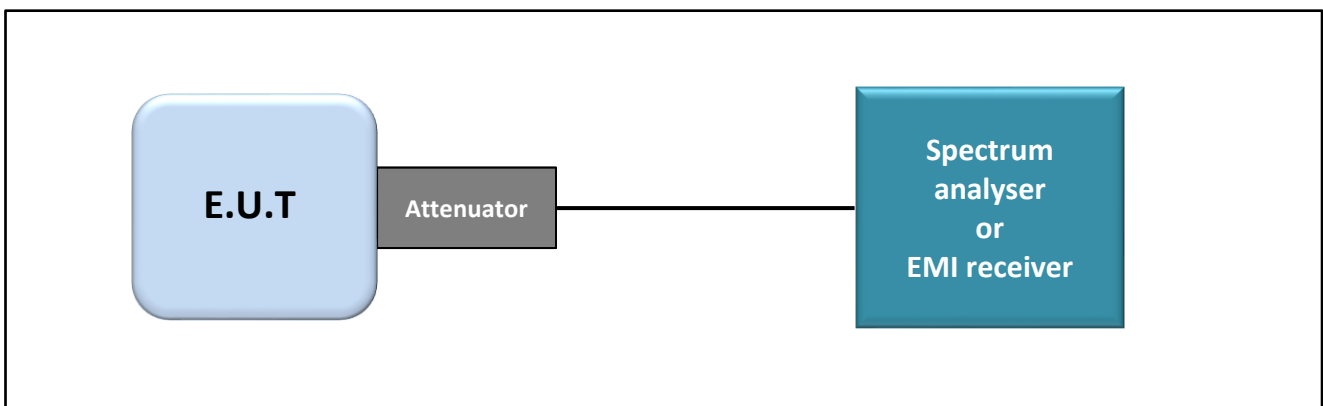
- ☒ Conducted Method
☐ Radiated Method

- Test Procedure:

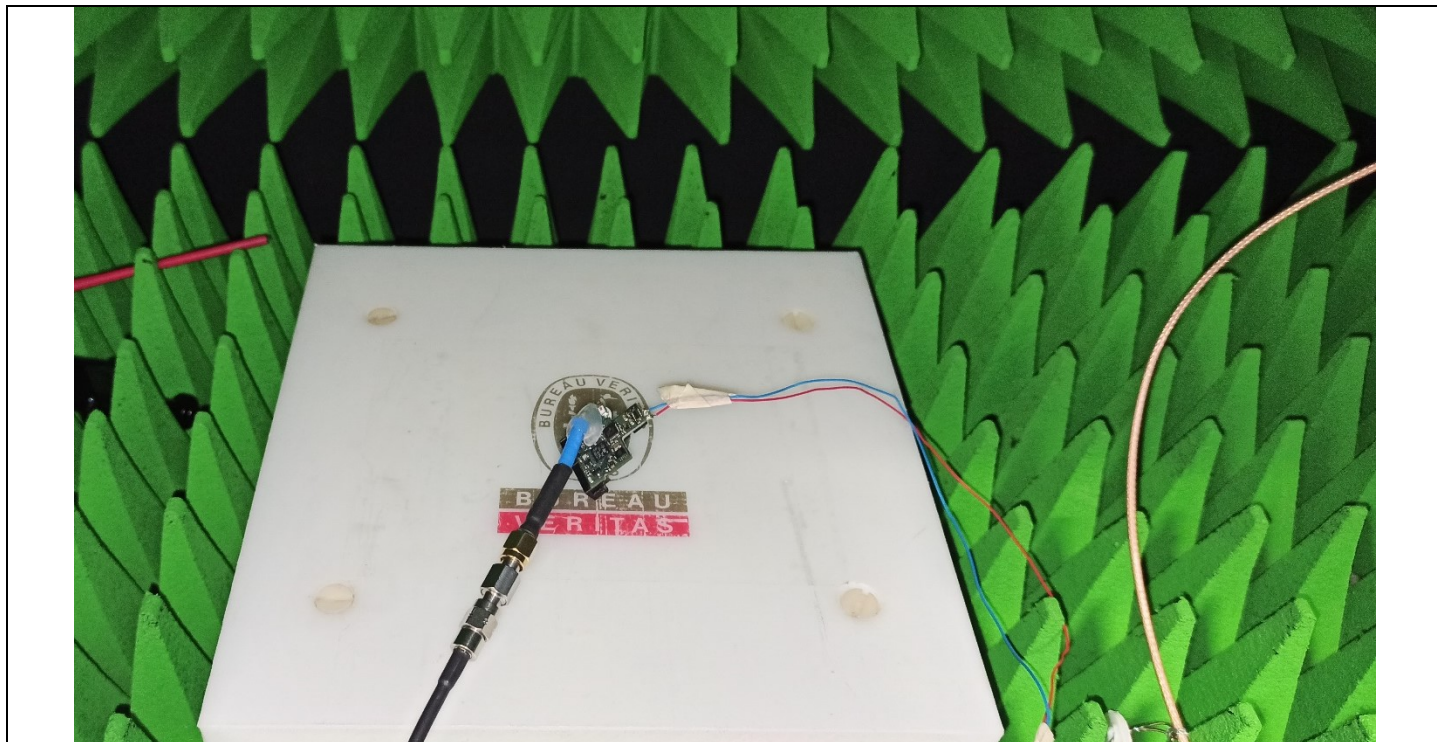
- ☒ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.2

Measurement Procedure:

1. Set resolution bandwidth (RBW) = 100kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer.



Test set up of 6dB Emission Bandwidth



Photograph for 6dB emission bandwidth

4.3. LIMIT

The 6dB bandwidth shall be at least 500kHz

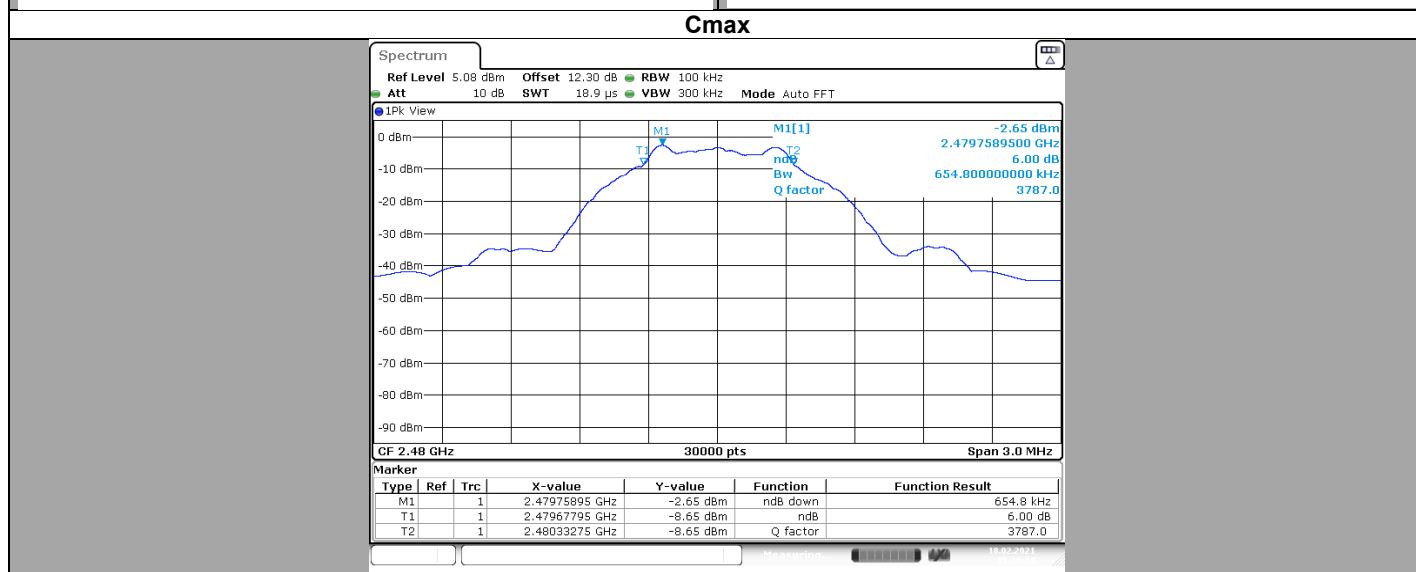
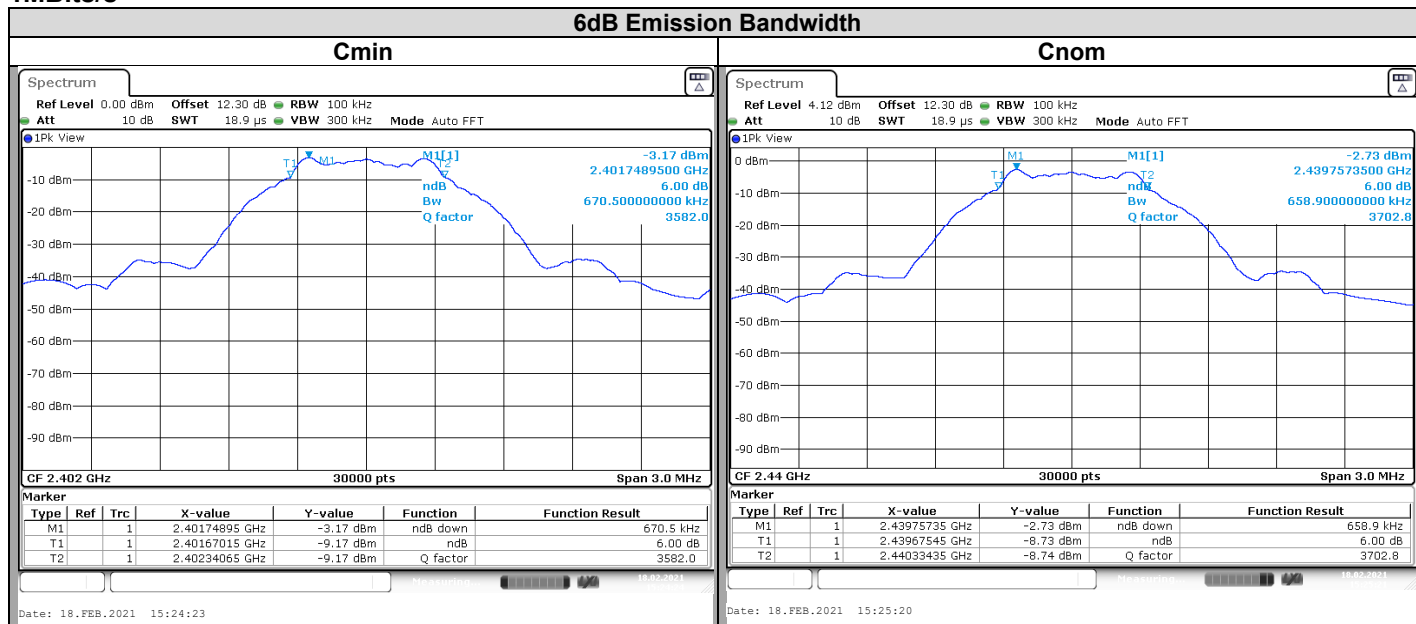
4.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	—	A7122269	09/20	03/22
CABLE SMA 1m	RADIALL	18GHz	A5329862	11/18	03/21
Full Anechoic Room	SIEPEL	—	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
POWER SUPPLY DC 20V	SODILEC	SDRI 205	A7040058		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	11/18	03/21
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/19	05/21
Thermo-hygrometer	TESTO	608-H1	B4204120	12/20	12/22

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

4.5. RESULTS

1Mbits/s



Channel	6dB Emission Bandwidth (MHz)	Limit (MHz)
Cmin	0.671	Minimum 0.5
Cnom	0.659	Minimum 0.5
Cmax	0.655	Minimum 0.5

4.6. CONCLUSION

6dB Emission Bandwidth measurement performed on the sample of the product **ETISENSE EMET-HD SN: OEG00083; OEG00081; OEG00085** 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. MAXIMUM CONDUCTED OUTPUT POWER

5.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : February 17, 2021 to February 19, 2021
Ambient temperature : 25 °C
Relative humidity : 33 %

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 v05r02 § 8.3.1.1

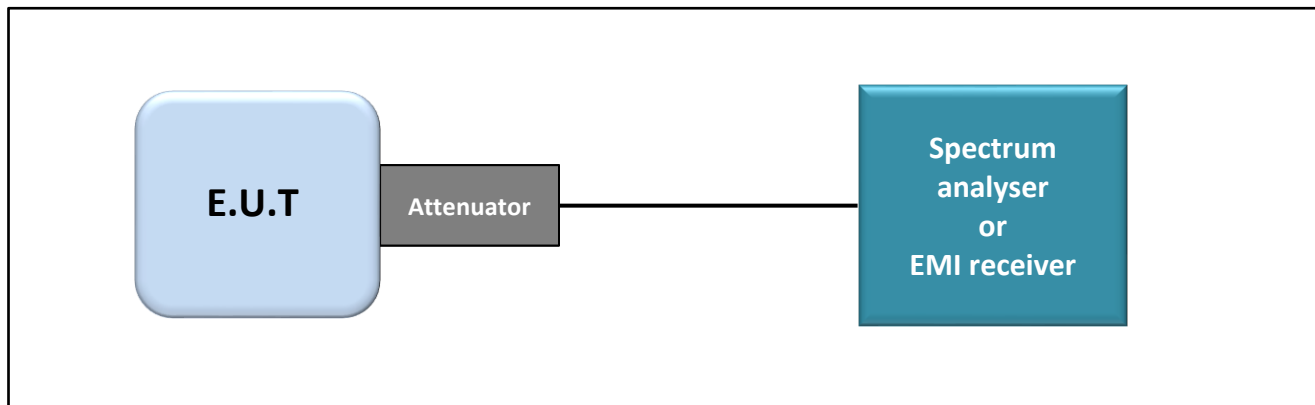
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the RBW $\geq$ DTS bandwidth.
- b) Set VBW $\geq 3 \times$ RBW.
- c) Set span $\geq 3 \times$ RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

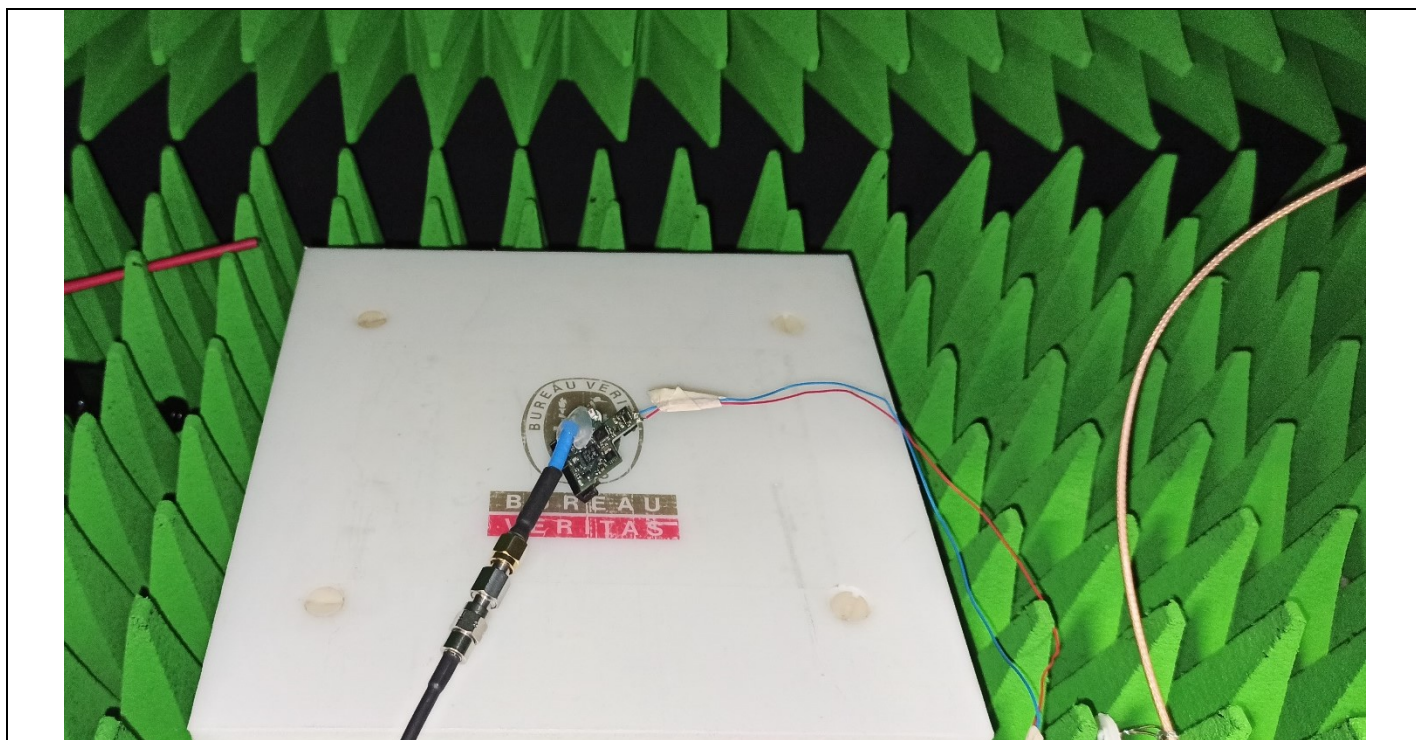
- ☐ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.2

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

- a) Set the RBW = 1 MHz.
- b) Set the VBW $\geq 3 \times$ RBW
- c) Set the span $\geq 1.5 \times$ DTS bandwidth.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges



Test set up of Maximum Conducted Output Power



Photograph for Maximum Conducted Output Power

5.3. LIMIT

Maximum Conducted Output power:

2400MHz-2483.5MHz: Shall not exceed 30dBm

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



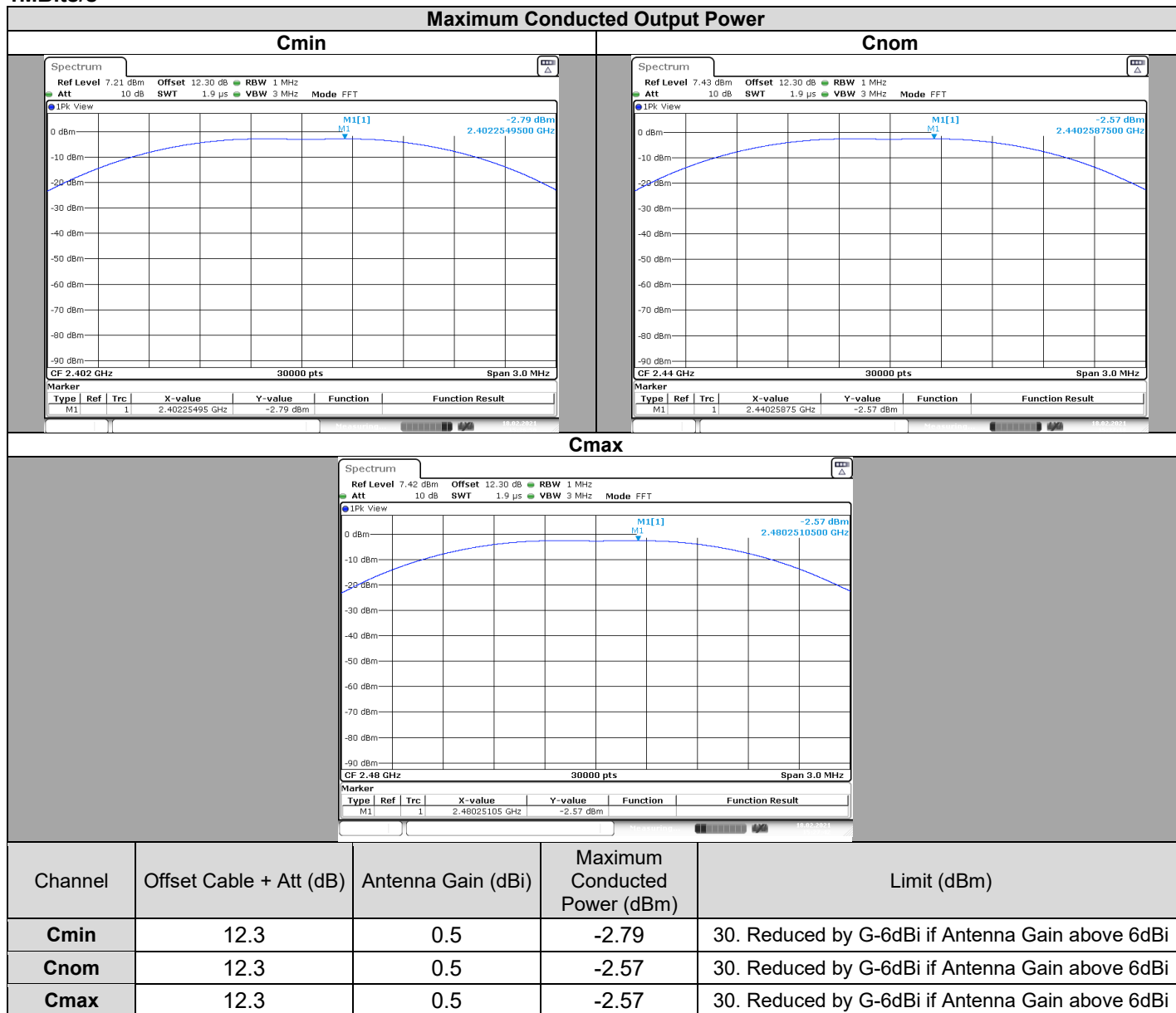
5.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	—	A7122269	09/20	03/22
CABLE SMA 1m	RADIALL	18GHz	A5329862	11/18	03/21
Full Anechoic Room	SIEPEL	—	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
POWER SUPPLY DC 20V	SODILEC	SDRI 205	A7040058		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	11/18	03/21
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/19	05/21
Thermo-hygrometer	TESTO	608-H1	B4204120	12/20	12/22

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

5.5. RESULTS

1Mbits/s



5.6. CONCLUSION

Maximum Conducted Output Power measurement performed on the sample of the product product **ETISENSE EMET-HD SN: OEG00083; OEG00081; OEG00085**, in configuration and description presented in this test report, show levels compliant to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

6. POWER SPECTRAL DENSITY

6.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : February 17, 2021 to February 19, 2021
Ambient temperature : 25 °C
Relative humidity : 33 %

6.2. TEST SETUP

- The Equipment Under Test is installed:

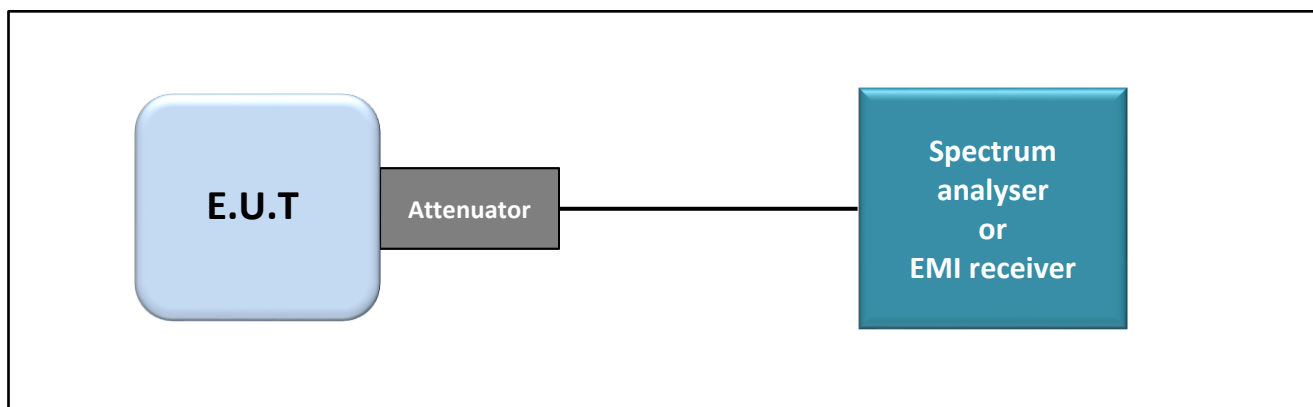
- ☐ On a table
- ☒ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

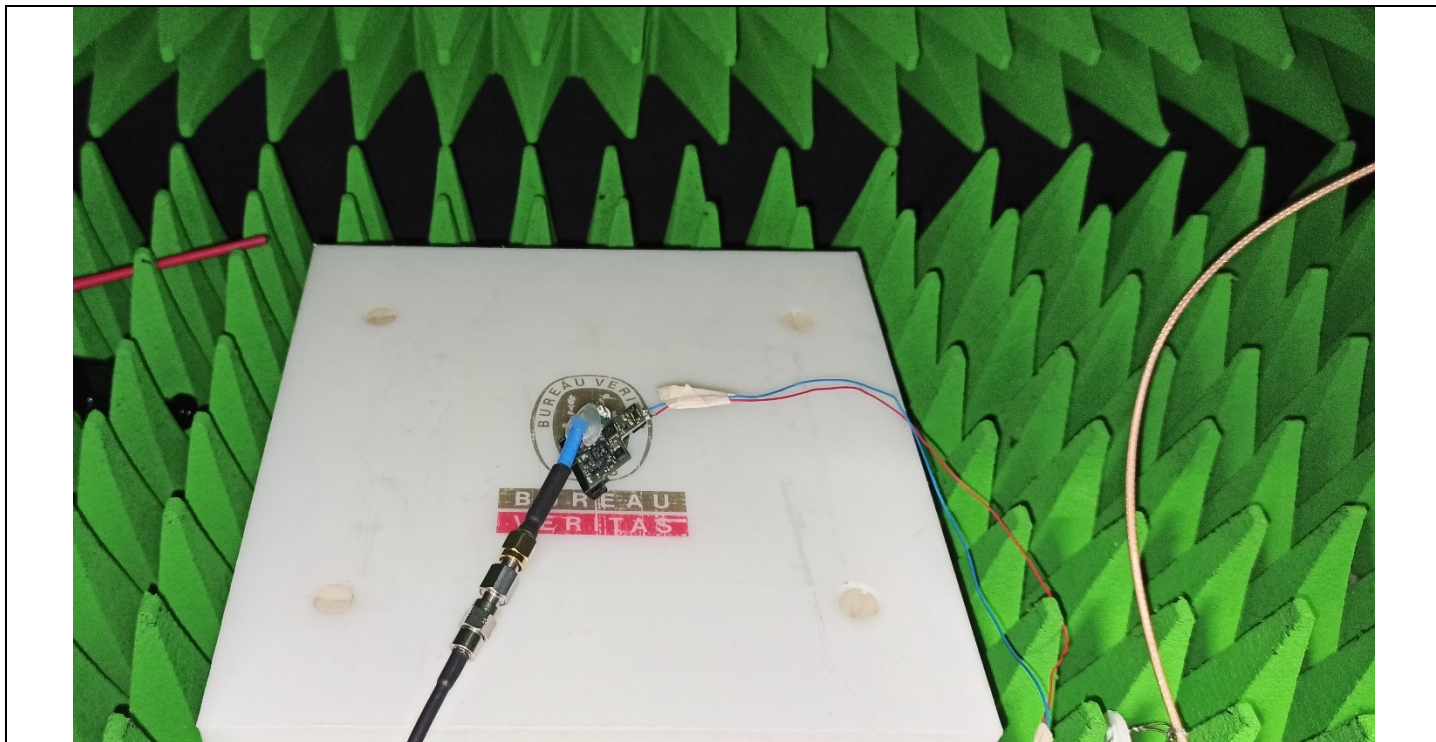
- ☒ Conducted Method
- ☐ Radiated Method

- Test Procedure:

- ☒ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method PKPSD)
 - a) Set analyzer center frequency to DTS channel center frequency.
 - b) Set the span to 1.5 times the DTS bandwidth.
 - c) Set the RBW to: 3 kHz.
 - d) Set the VBW $\geq 3 \times$ RBW.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum amplitude level within the RBW.
 - j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test set up of Power Spectral Density



Photograph for Power Spectral Density

6.3. LIMIT

Power Spectral Density:
 2400MHz-2483.5MHz: Shall not exceed 8dBm/3kHz
 Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

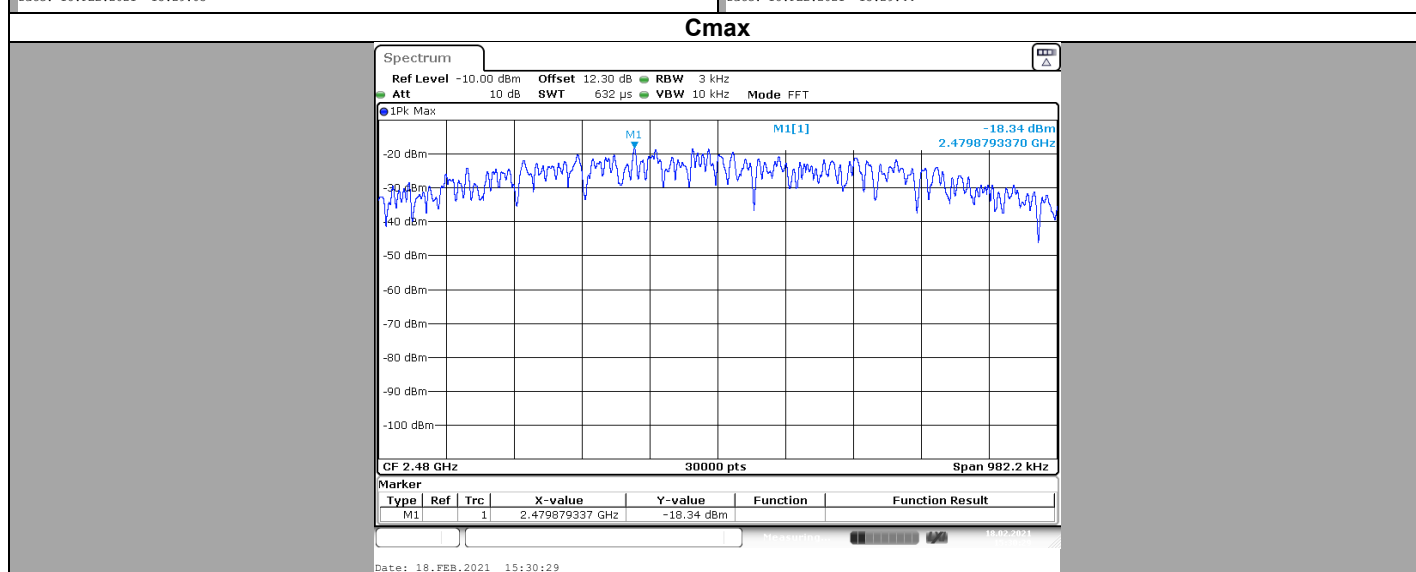
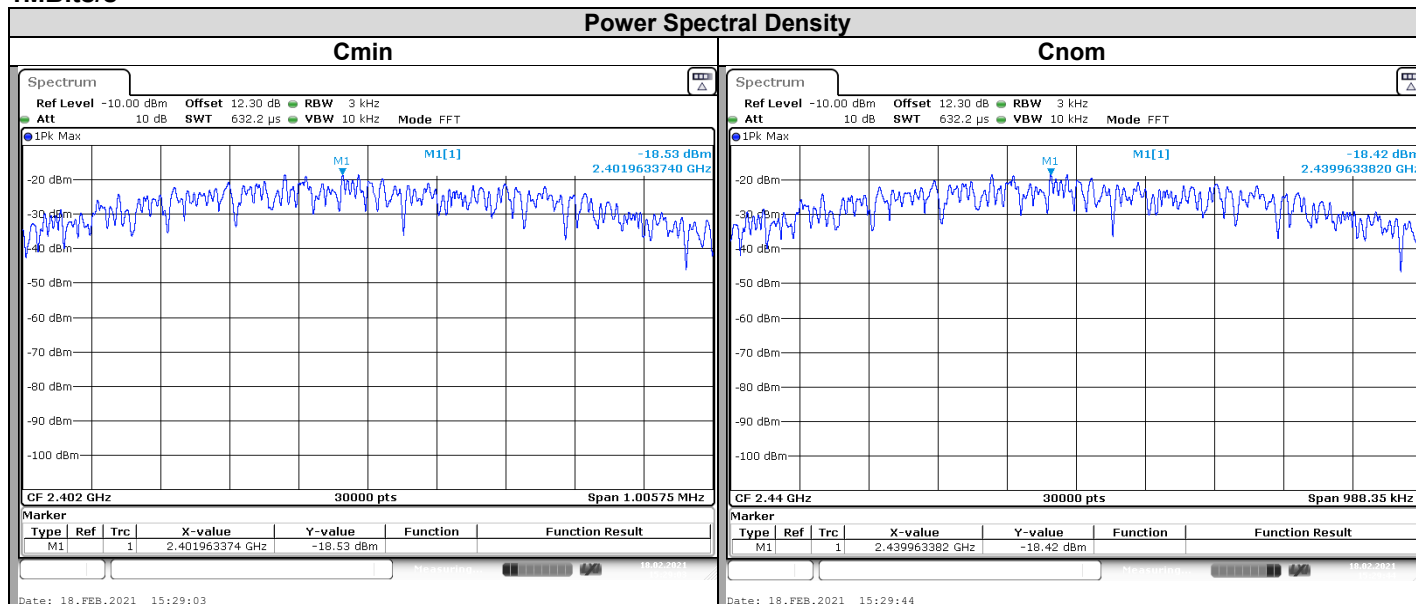
6.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	—	A7122269	09/20	03/22
CABLE SMA 1m	RADIALL	18GHz	A5329862	11/18	03/21
Full Anechoic Room	SIEPEL	—	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
POWER SUPPLY DC 20V	SODILEC	SDRI 205	A7040058		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	11/18	03/21
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/19	05/21
Thermo-hygrometer	TESTO	608-H1	B4204120	12/20	12/22

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

6.5. RESULTS

1Mbits/s



Channel	Offset Cable + Att (dB)	Antenna Gain (dBi)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
Cmin	12.3	0.5	-18.53	8. Reduced by G-6dBi if Antenna Gain above 6dBi
Cnom	12.3	0.5	-18.42	8. Reduced by G-6dBi if Antenna Gain above 6dBi
Cmax	12.3	0.5	-18.34	8. Reduced by G-6dBi if Antenna Gain above 6dBi

6.6. CONCLUSION

Power Spectral Density measurement performed on the sample of the product **ETISENSE EMET-HD SN: OEG00083; OEG00081; OEG00085** in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

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

7.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : February 17, 2021 to February 19, 2021
Ambient temperature : 25 °C
Relative humidity : 33 %

7.2. TEST SETUP

- The Equipment Under Test is installed:

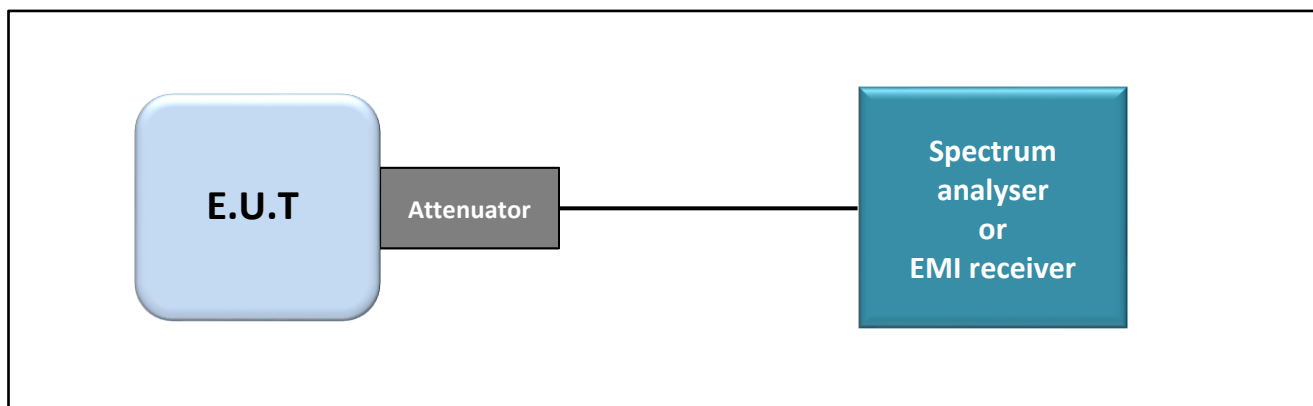
- ☐ On a table
- ☒ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

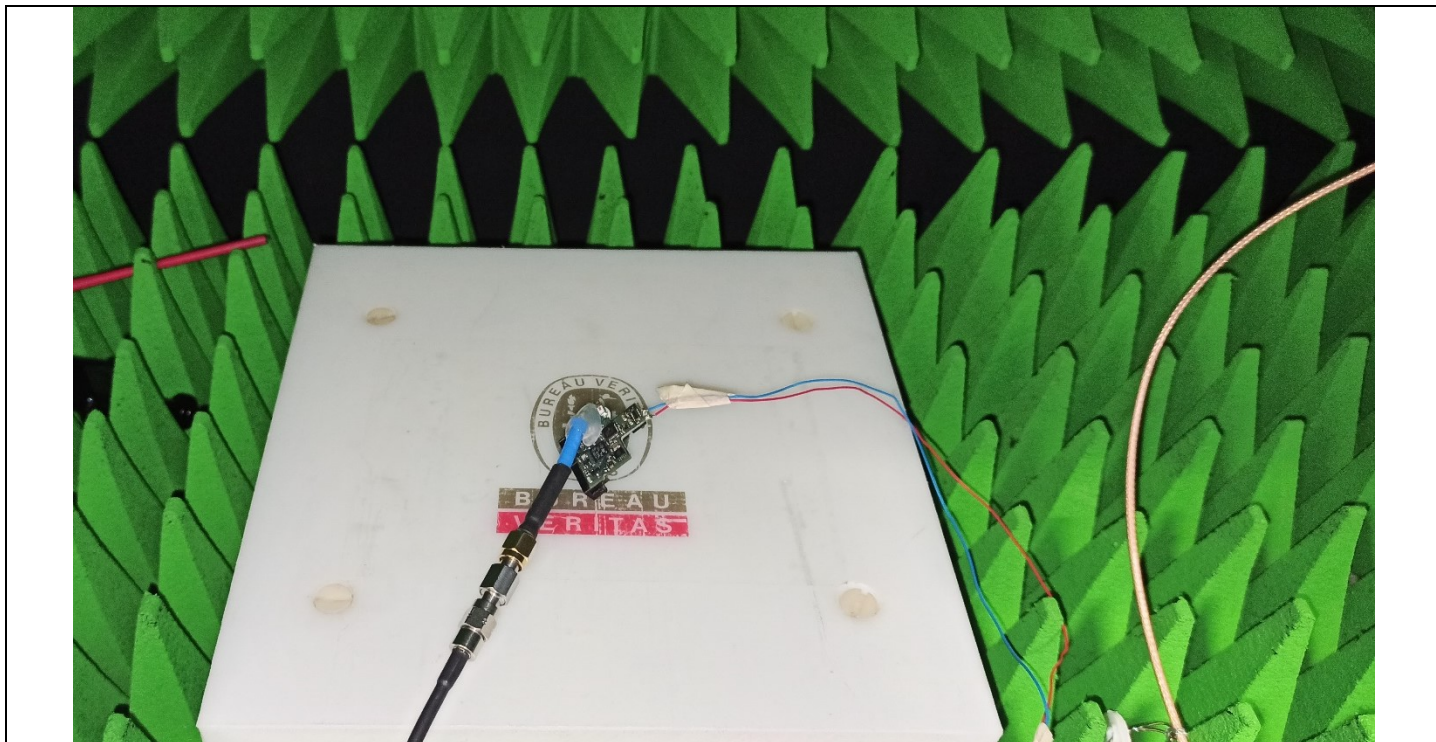
- ☒ Conducted Method
- ☐ Radiated Method

- Test Procedure:

- ☒ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.5



Test set up of Unwanted Emissions into Non-Restricted Frequency Bands at the Band Edge



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

7.3. LIMIT

All Spurious Emissions must be at least 20dB below the Fundamental Radiator Level at the Band Edge “2400MHz & 2483,5MHz”

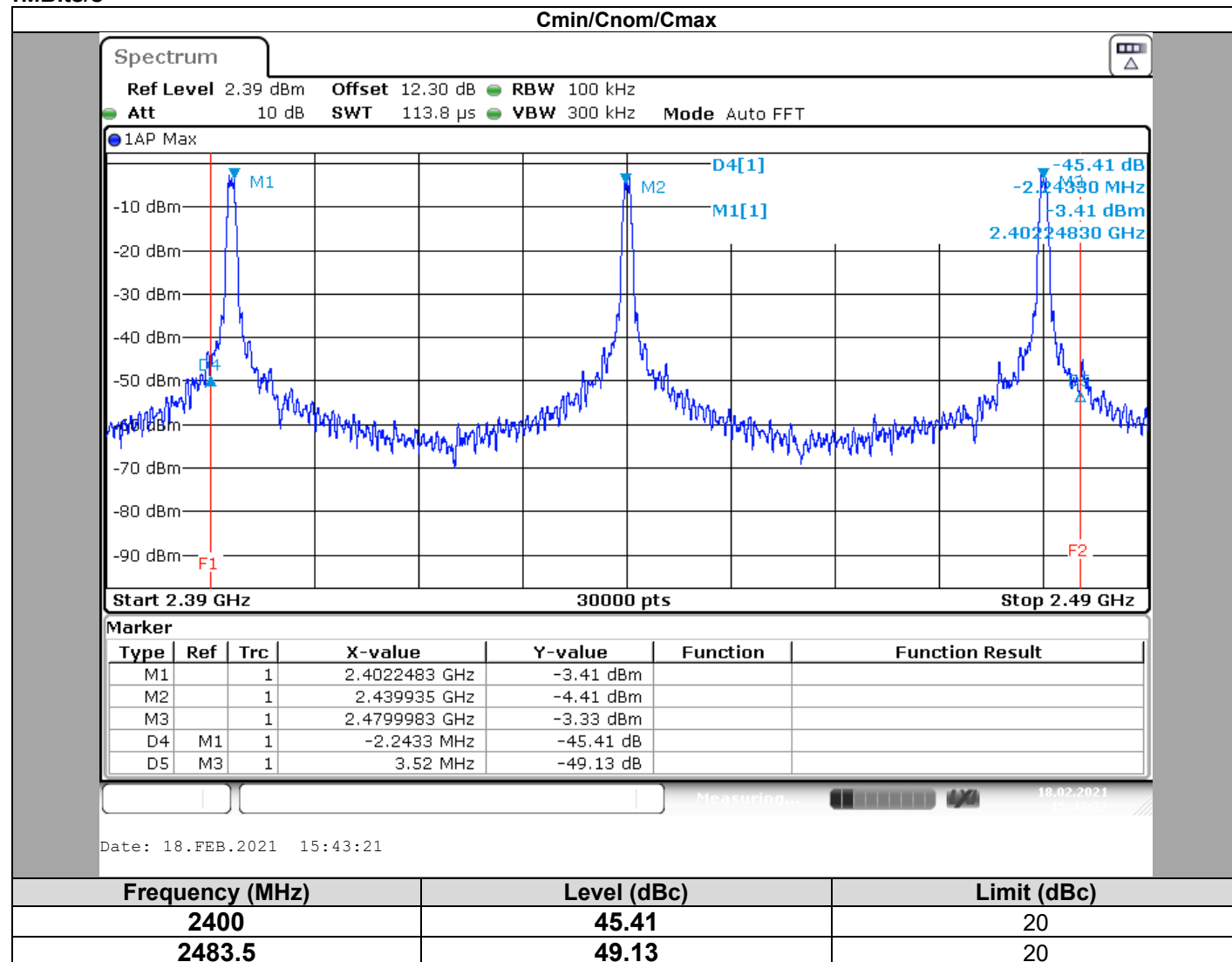
7.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	—	A7122269	09/20	03/22
CABLE SMA 1m	RADIALL	18GHz	A5329862	11/18	03/21
Full Anechoic Room	SIEPEL	—	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
POWER SUPPLY DC 20V	SODILEC	SDRI 205	A7040058		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	11/18	03/21
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/19	05/21
Thermo-hygrometer	TESTO	608-H1	B4204120	12/20	12/22

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

7.5. RESULTS

1Mbits/s



7.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands at the band edge measurement performed on the sample of the product **ETISENSE EMET-HD SN: OEG00083; OEG00081; OEG00085**, 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

8.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : February 17, 2021 to February 19, 2021
Ambient temperature : 25 °C
Relative humidity : 33 %

8.2. TEST SETUP

- The Equipment under Test is installed:

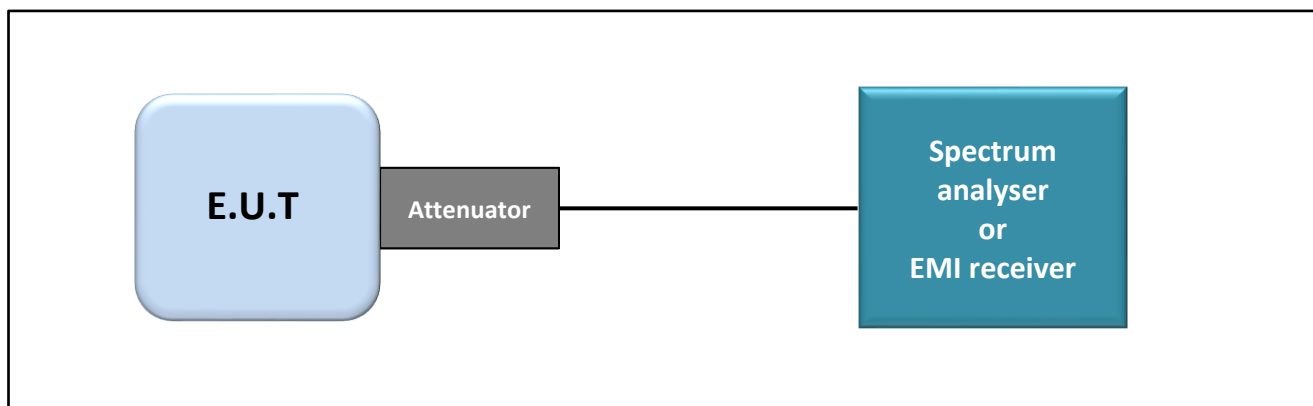
- ☐ On a table
- ☒ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

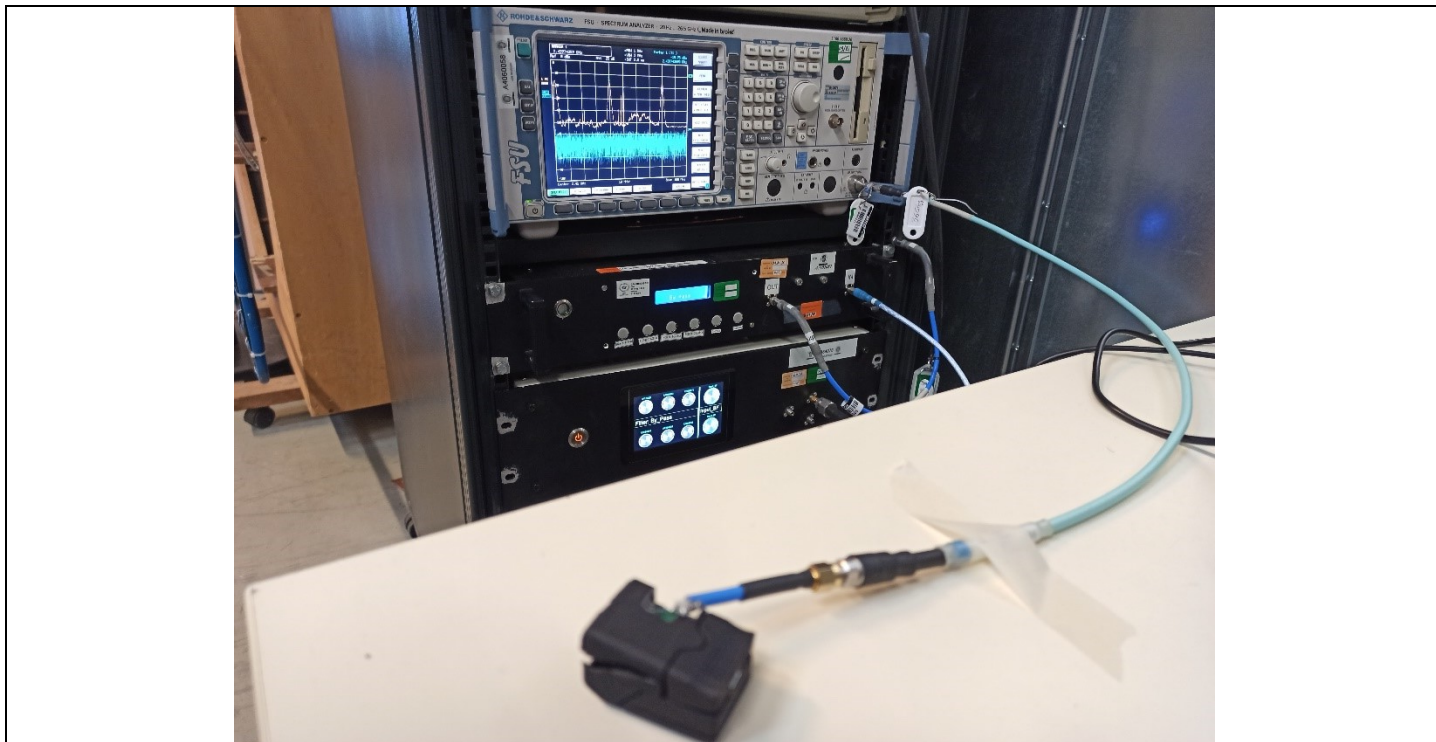
- ☒ Conducted Method
- ☐ Radiated Method

- Test Procedure:

- ☒ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.5



Test set up of Unwanted Emissions into Non-Restricted Frequency Bands



Photograph for Unwanted Emission into non-restricted frequency bands

8.3. LIMIT

All Spurious Emissions must be at least 20 below the Fundamental Radiator Level

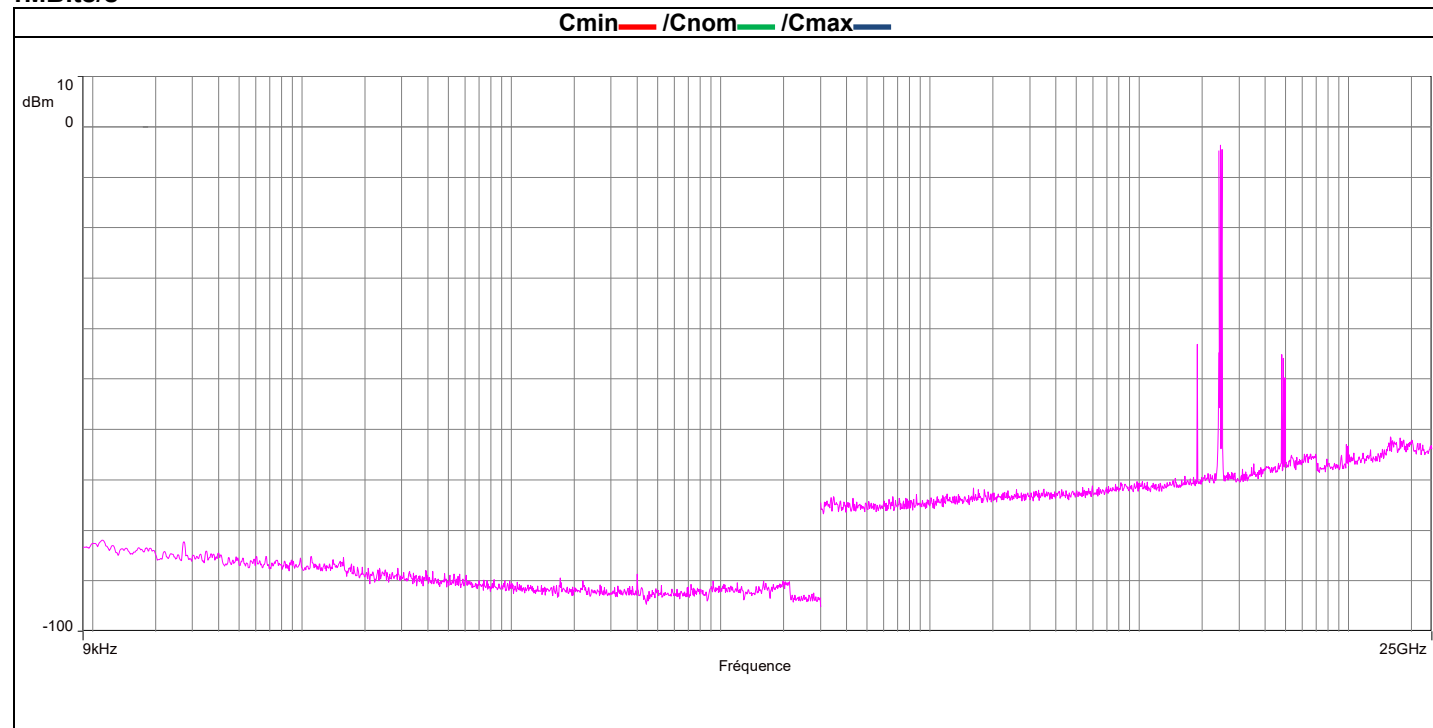
8.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/19	09/21
Multimeter - CEM	FLUKE	87	A1240251	11/19	11/21
Cable Measure	—	36G	A5329604	10/20	10/21
Attenuator 10dB	AEROFLEX	—	A7122269	09/20	03/22

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

8.5. RESULTS

1Mbits/s



Frequency (MHz)	Level (dBm)	Level (dBc)	Limit (dBc)
2402.00	-4.745		
1897.323	-43.171	38.426	20
4.8033733	-45.161	40.416	20
2442.00	-3.645		
4.8796267	-45.947	42.302	20
9.7593333	-62.930	59.285	20
2480.00	-4.475		
4.9594267	-49.752	45.277	20
9.9191867	-63.304	58.829	20

8.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands measurement performed on the sample of the product **EMET-HD EMITTER ETISENSE EMET-HD SN: OEG00083; OEG00081; OEG00085**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

9. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS

9.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
 Date of test : February 17, 2021 to February 19, 2021
 Ambient temperature : 25 °C
 Relative humidity : 33 %

9.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013) and FCC part15 subpart C.

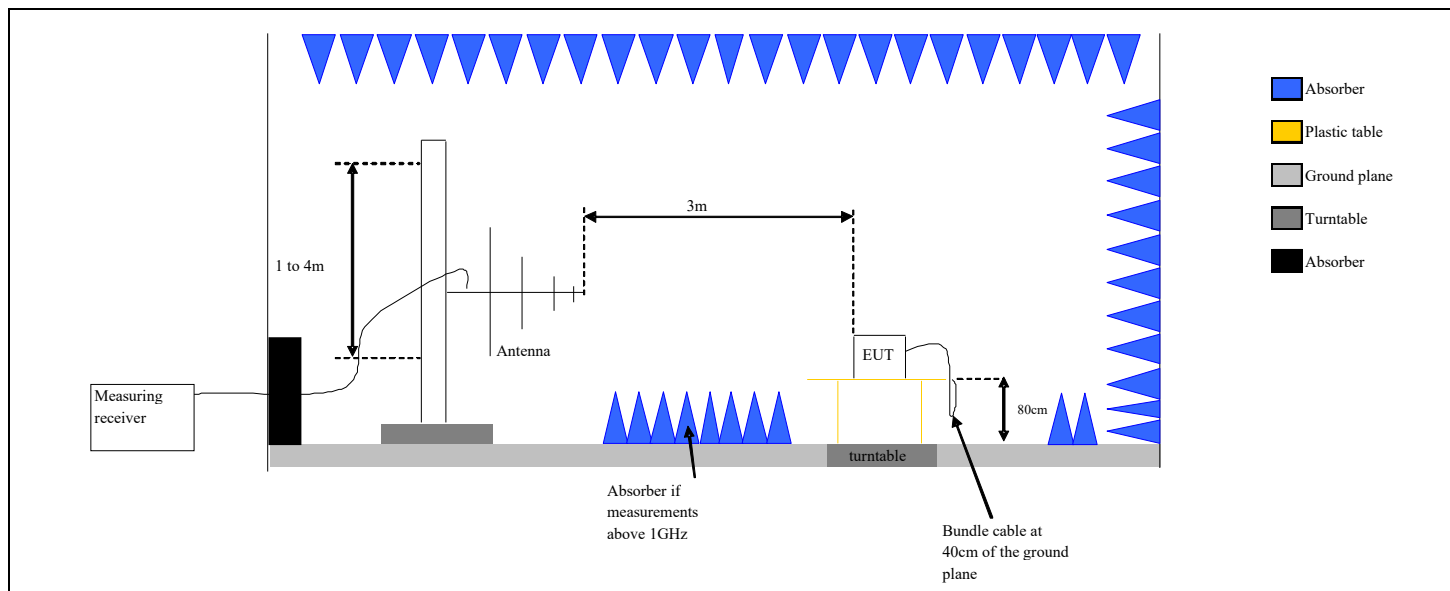
Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz. Measurement bandwidth was 200Hz below 150kHz and 9kHz between 150kHz & 30MHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. Antenna height was 1m. The EUT is placed **in a semi-anechoic chamber**. Distance between measuring antenna and the EUT is **3m**.

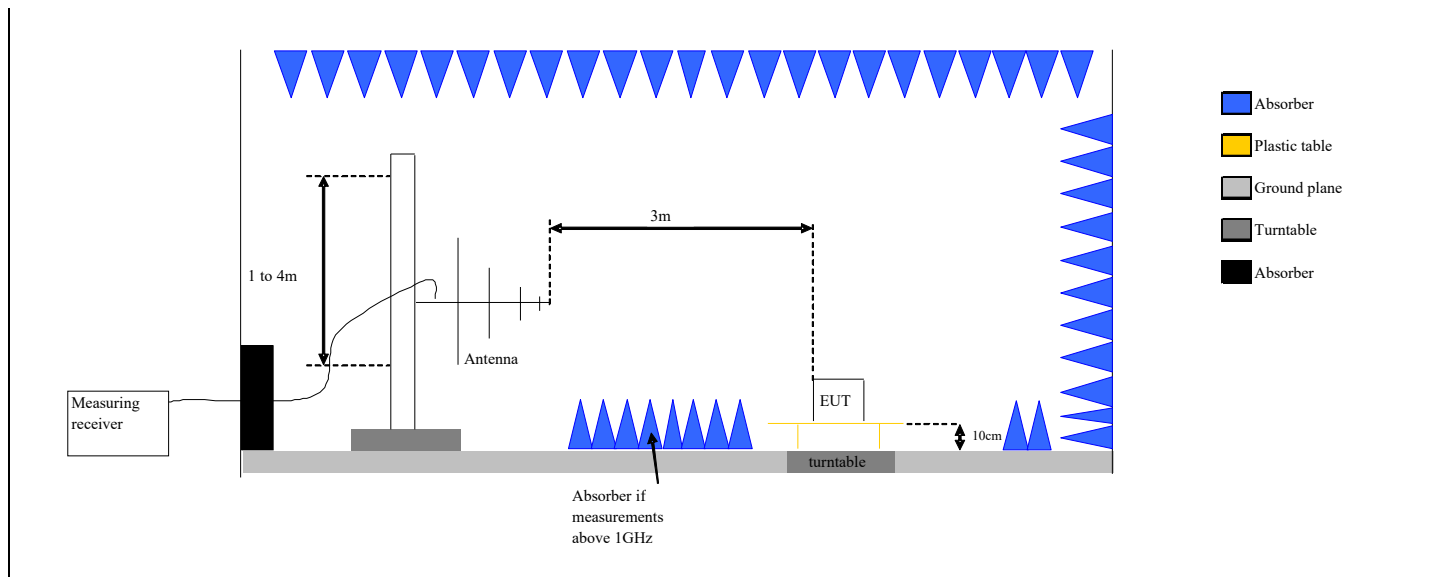
Test is performed in horizontal (H) and vertical (V) polarization with **bilog** between 30MHz & 1GHz and with a horn antenna above 1GHz. Measurement bandwidth was 120kHz below 1GHz and 1MHz above 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. The EUT is placed at 1.5m high above 1GHz and at 0.8m high under 1GHz. The EUT is placed **in a full anechoic chamber** above 1GHz and **on an open area test site** from 30MHz to 1GHz. Distance between measuring antenna and the EUT is **3m**. The height antenna is varied from 1m to 4m from 30MHz to 1GHz and above 1GHz is:

☒ On mast, varied from 1m to 4m

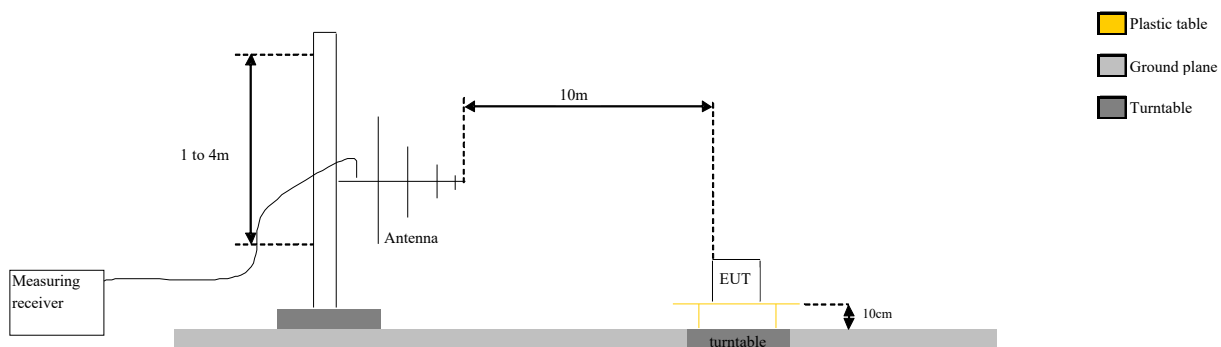
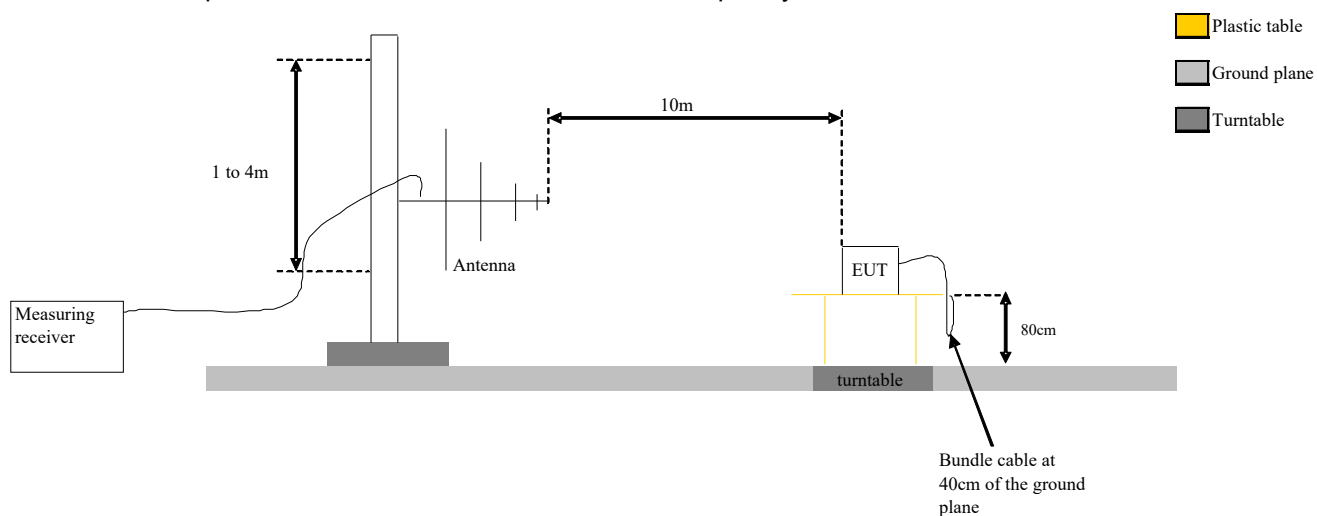
☐ Fixed and centered on the EUT (EUT smaller than the beamwidth of the measurement antenna, ANSI C63.10 §6.6.5)

Frequency list has been created with anechoic chamber pre-scan results.





Test set up of Unwanted Emissions in Restricted Frequency Bands in semi anechoic chamber



Test Set up for radiated measurement in open area test site

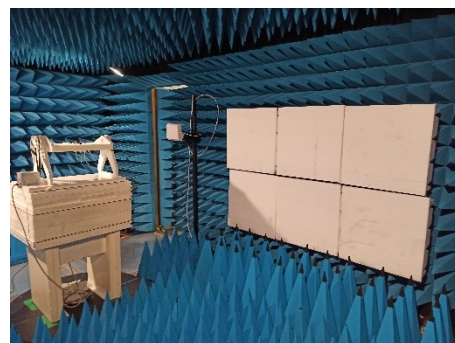
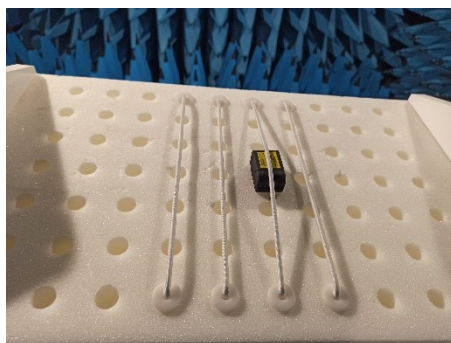
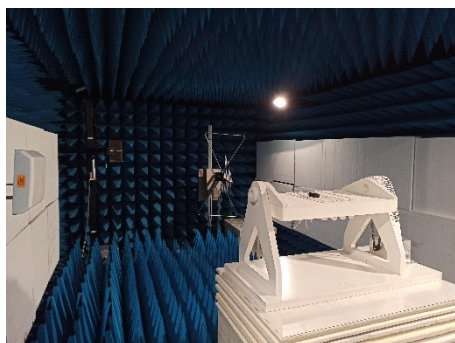


Photo Setup : anechoic chamber (XY axis)

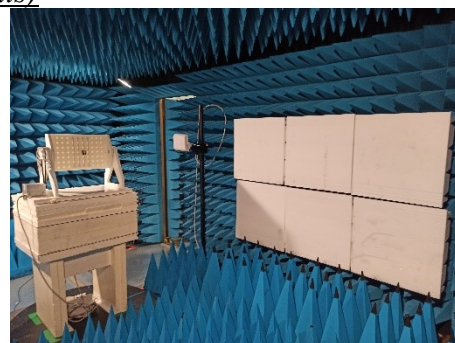
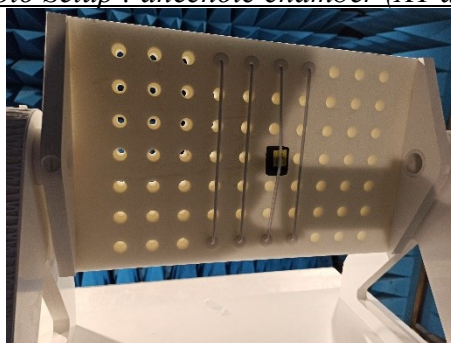


Photo Setup : anechoic chamber (Z axis)



Photo Setup – OATS

Photograph for Unwanted Emission in restricted frequency bands

9.3. 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

9.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Antenna Bi-log	CHASE	CBL6111A	C2040051	06/19	06/21
Antenna Biconic	EMCO	3104C	C2040175	03/20	03/22
Antenna Mat (OATS)	ETS Lingren	2071-2	F2000392		
BAT EMC	NEXIO	v3.19.1.23	L1000115		
Cable (OATS)	—	1GHz	A5329623	05/20	05/21
Emission Cable	SUCOFLEX	6GHz	A5329061	06/20	06/21
OATS	—	—	F2000409	04/20	04/21
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	11/20	11/22
Table C1/OATS	LCIE	—	F2000445		
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		
Amplifier 9kHz - 40GHz	LCIE SUD EST	—	A7102082	06/20	06/21
Antenna Bi-Log	CHASE	UPA6192	C2040221	01/18	01/23
Antenna horn 18GHz	EMCO	3115	C2042029	09/17	02/21
BAT EMC	NEXIO	v3.19.1.23	L1000115		
Cable 1m	HUBER & SUHNER	18GHz	A5329705	02/19	01/21
Comb EMR HF	YORK	CGE01	A3169114		
Emission Cable	—	6GHz	A5329069	02/20	02/21
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	10/20	10/21
Emission Cable (SMA 3.3m)	TELEDYNE	26GHz	A5329875	10/20	10/21
Emission Cable <1GHz (Ampl <-> Cage)	-	18GHz	A5329907	08/20	08/21
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	09/20	09/21
Multimeter - CEM	FLUKE	87	A1240251	11/18	02/21
Power supply DC	METRIX	AX503	A7042308		
Radiated emission comb generator	BARDET	—	A3169050		
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	11/20	11/22
Rehausse Table C3	LCIE	—	F2000507		
Semi-Anechoic chamber #3 (BF)	SIEPEL	—	D3044017 BF	12/19	12/22
Semi-Anechoic chamber #3 (VSWR)	SIEPEL	—	D3044017 VSWR	12/19	12/22
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/19	09/21
Table C3	LCIE	—	F2000461		
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	10/18	02/21
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		

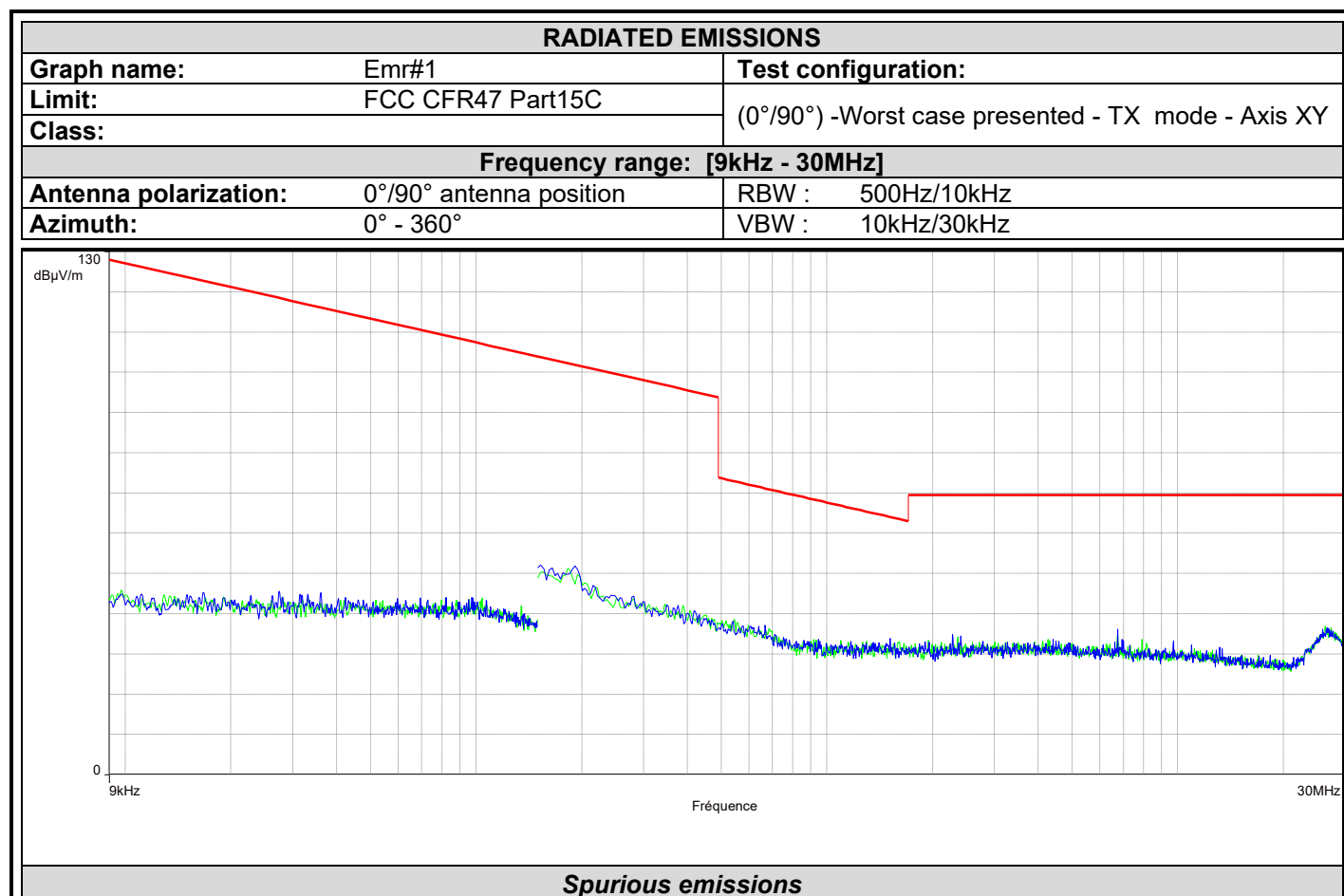
Note: In our quality system, the test equipment calibration due is more & less 2 months

9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

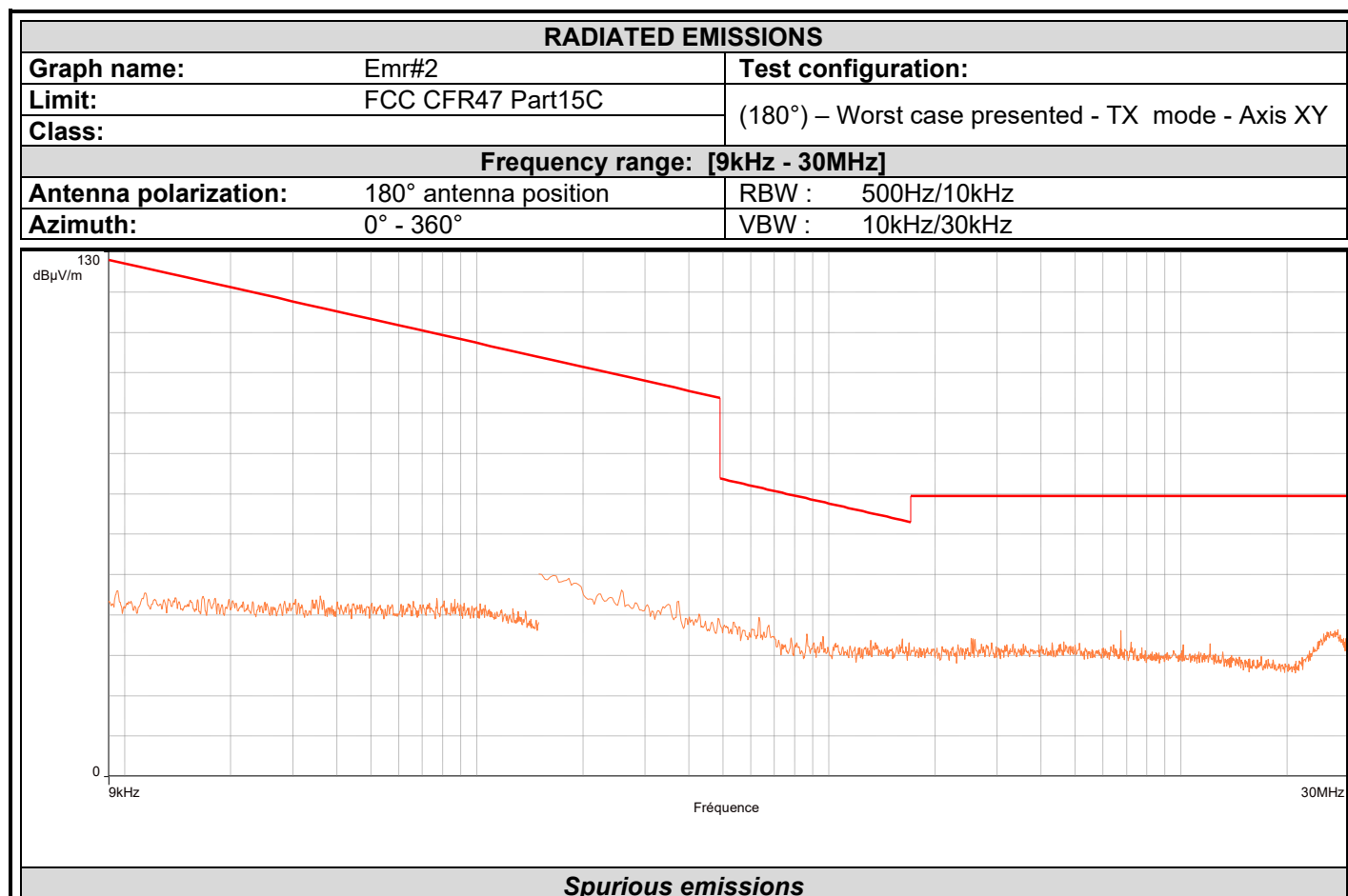
☒ None ☐ Divergence:

9.6. RESULTS

Results in the frequency band [0.009-30] MHz:



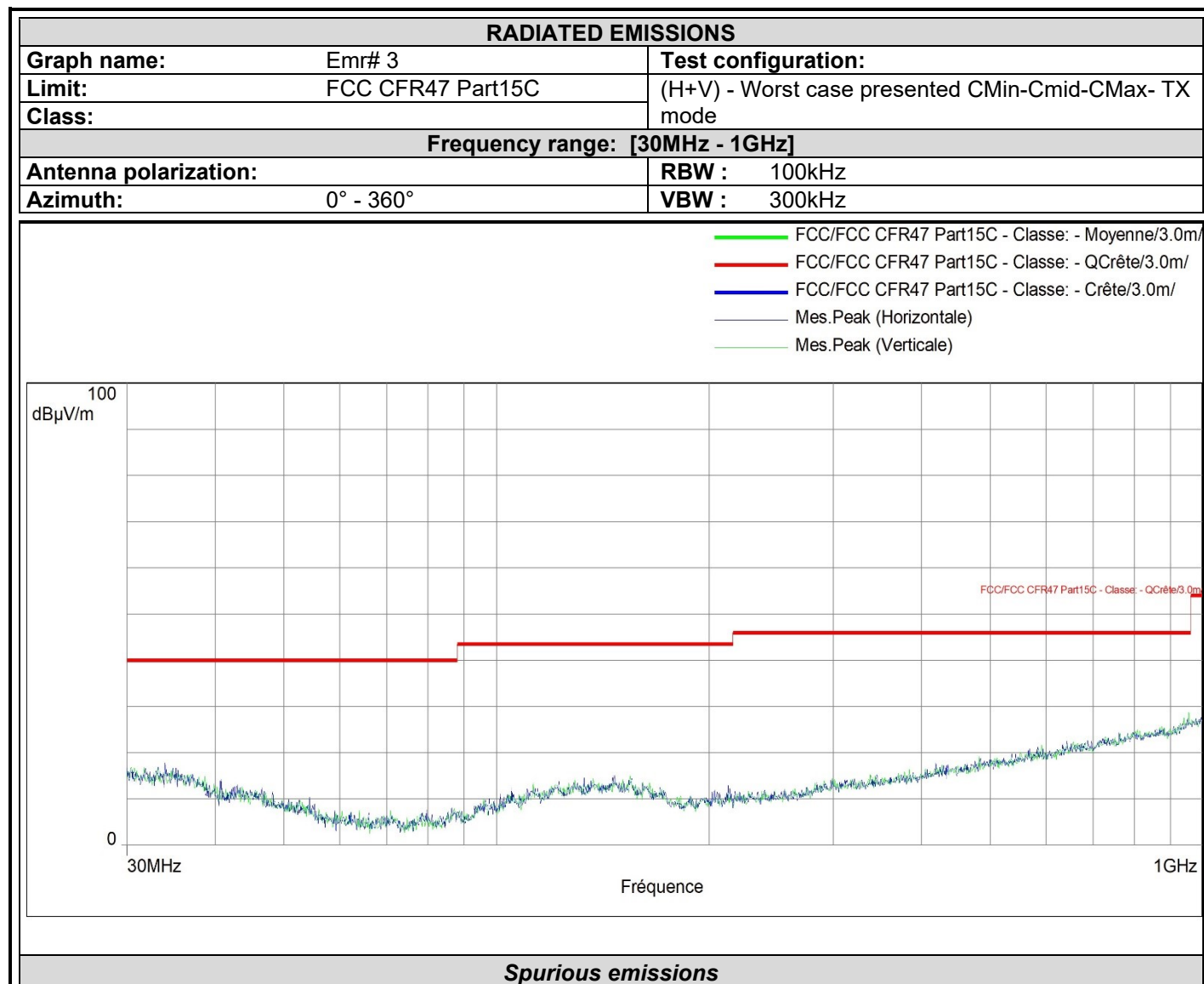
No significative frequency observed



Spurious emissions

No significative frequency observed

Results in the frequency band [30-1000] MHz: Worst case presented see test results in §8.5(Cmin, Cmid or Cmax):
 No significant frequency observed due to RF module (See test results in §8.5).



Spurious emissions

No significative frequency observed

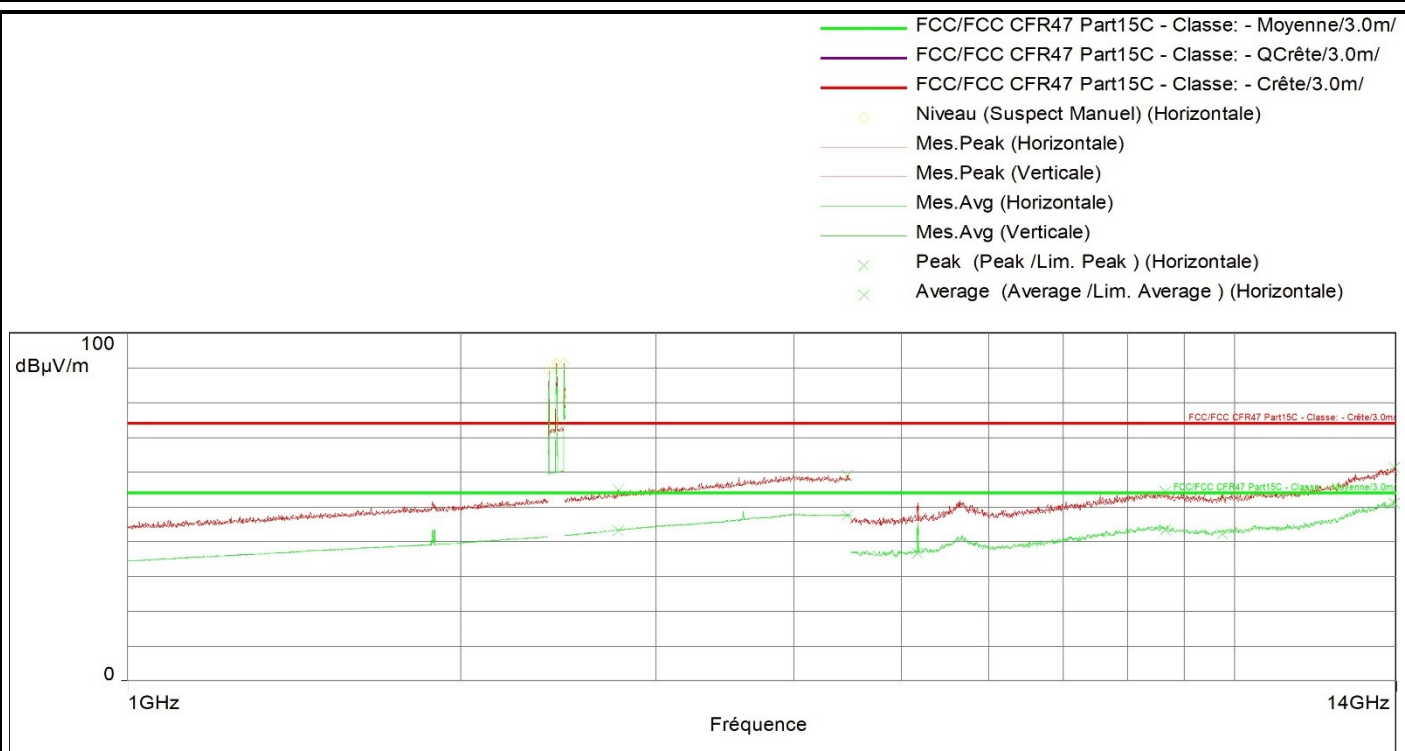
Results in the frequency band [1-25] GHz:

Worst case presented (see §5.5 in Maximum Conducted Output power):

CMIN- CMID- CMAX

RADIATED EMISSIONS

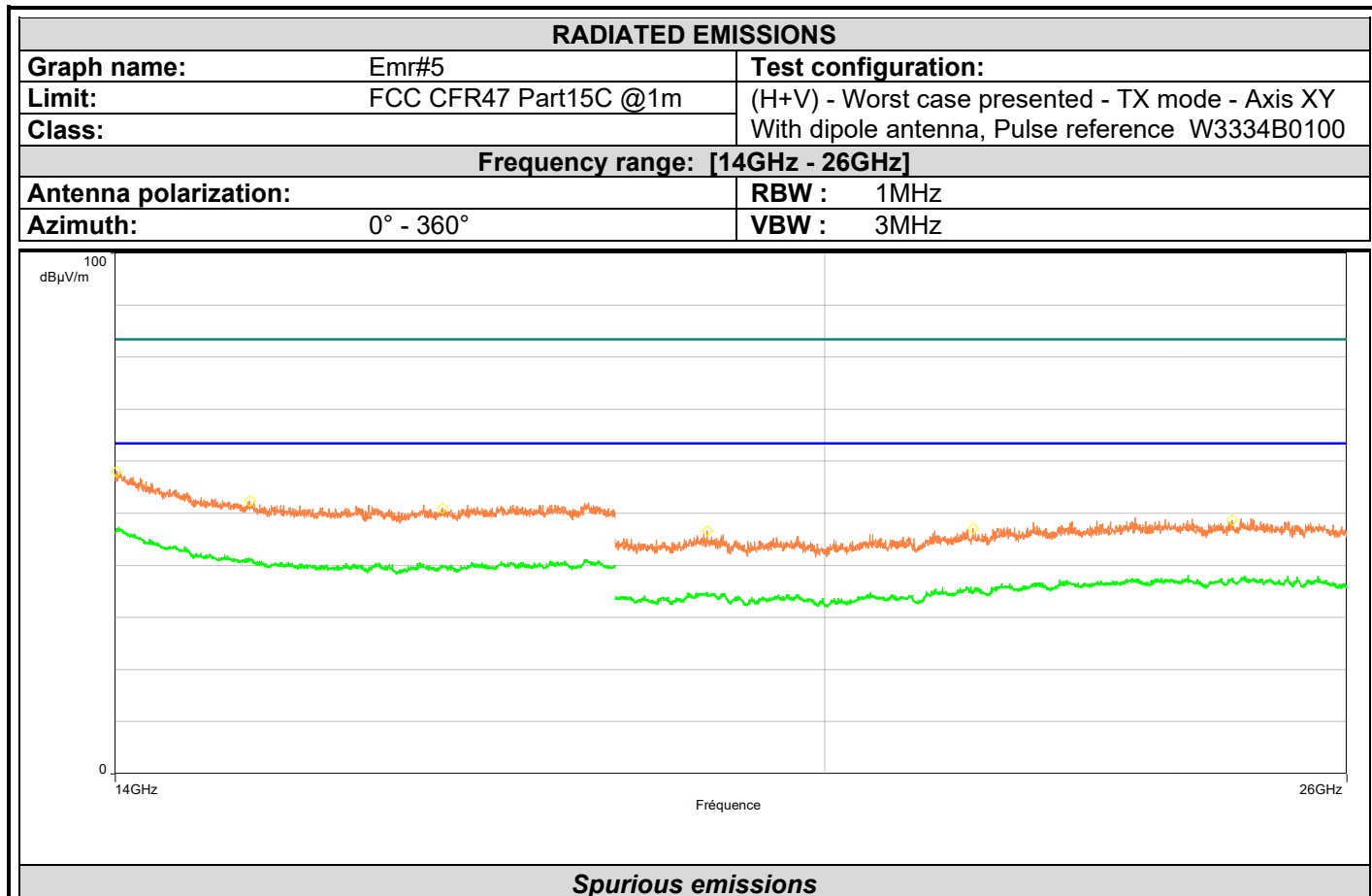
Graph name:	Test configuration:
Limit: FCC CFR47 Part15C	(H+V) –Cmin-Cmid-Cmax - TX mode - Axis Z
Class:	
Frequency range: [1GHz - 14GHz]	
Antenna polarization:	RBW : 1MHz
Azimuth: 0° - 360°	VBW : 3MHz



Spurious emissions

Frequency (MHz)	Average (dBμV/m)	Lim.Average (dBμV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
2775.489	43.2	54.0	-10.8	Horizontal	Horizontal	37.1
4470.156	47.5	54.0	-6.5	Horizontal	Horizontal	40.7
5172.671	36.6	54.0	-17.4	Horizontal	Horizontal	-21.2
8649.317	43.5	54.0	-10.5	Horizontal	Horizontal	-13.9
9740.932	42.1	54.0	-11.9	Horizontal	Horizontal	-15.0
13943.354	51.2	54.0	-2.8	Horizontal	Horizontal	-5.8

Frequency (MHz)	Peak Level (dBμV/m)	Polarization	Correction (dB)
2401.920	89.2	Horizontal	35.4
2439.996	91.2	Horizontal	35.5
2479.993	91.3	Horizontal	35.7



Spurious emissions

Frequency (MHz)	Peak Level (dBμV/m)	Polarization	Correction (dB)
14008.500	58.4	Horizontal	5.6
14982.000	52.1	Horizontal	-0.7
16501.000	51.3	Horizontal	-2.5
18853.000	46.8	Horizontal	-2.0
21543.000	46.7	Horizontal	-1.2
24541.000	48.9	Horizontal	0.0

Worst case from the angles (0°, 30°, 60°, 90°, 120°)

Frequency (MHz)	Average (dBμV/m)	Lim.Average (dBμV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
4803.292	44.7	54.0	-9.3	Horizontal	Horizontal	-18.8
4828.665	45.0	54.0	-9.0	Horizontal	Horizontal	-18.8
4879.410	45.4	54.0	-8.6	Horizontal	Horizontal	-18.7
9752.143	41.8	54.0	-12.2	Horizontal	Horizontal	-13.7
9919.130	42.0	54.0	-12.0	Horizontal	Horizontal	-13.0

Frequency (MHz)	Peak (dBμV/m)	Lim.Peak (dBμV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
4803.882	51.4	74.0	-22.6	Horizontal	Horizontal	-18.8
4828.665	50.2	74.0	-23.8	Horizontal	Horizontal	-18.8
4880.000	51.9	74.0	-22.1	Horizontal	Horizontal	-18.7
9759.223	50.2	74.0	-23.8	Horizontal	Horizontal	-13.7
9919.130	50.6	74.0	-23.4	Horizontal	Horizontal	-13.0

9.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the product **ETISENSE EMET-HD SN: OEG00083; OEG00081; OEG00085**, 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. MEASUREMENT OF CONDUCTED EMISSION

10.1. ENVIRONMENTAL CONDITIONS

Date of test : February 17, 2021
 Test performed by : Hamza GHAFILI
 Atmospheric pressure (hPa) : 999
 Relative humidity (%) : 37
 Ambient temperature (°C) : 23

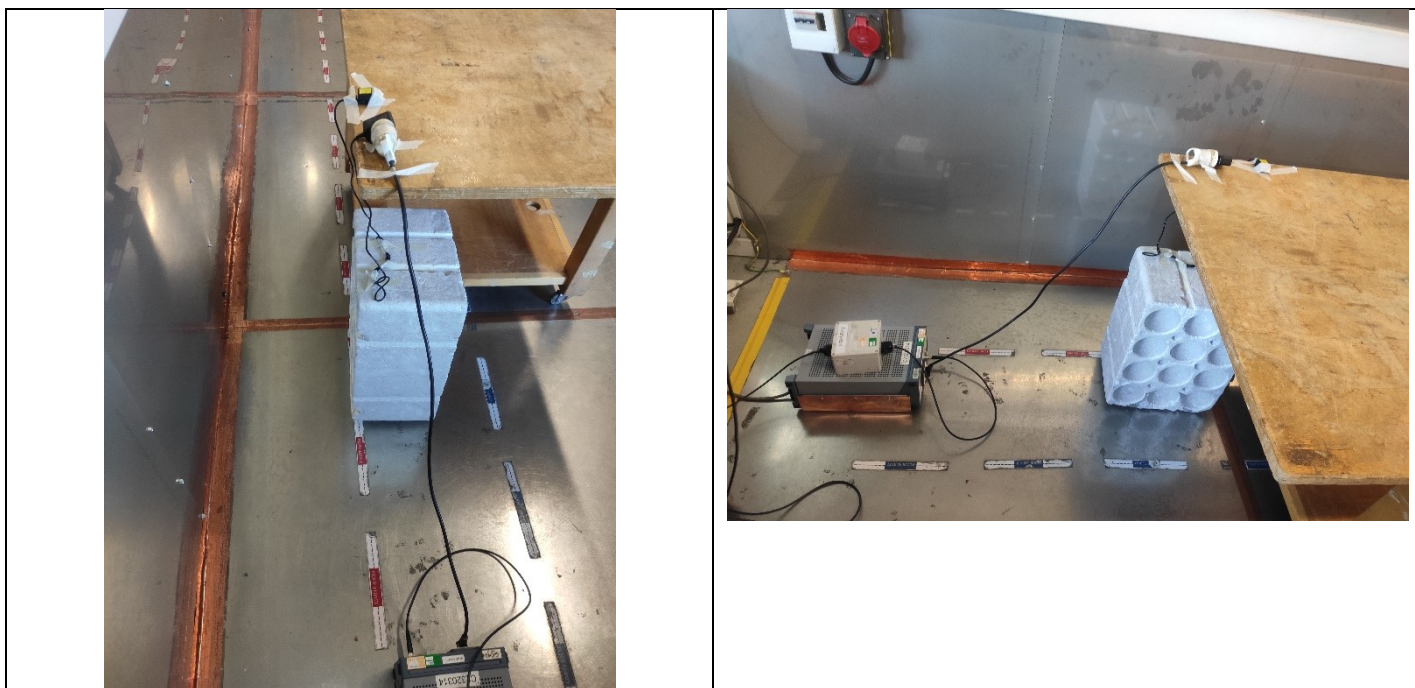
10.2. TEST SETUP

Mains terminals

The EUT and auxiliaries are set 80cm above the ground on the non-conducting table (Table-top equipment).

The EUT is powered by V_{nom} .

The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.



Test setup



10.3. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
BAT EMC	NEXIO	v3.19.1.23	L1000115		
Cable + self	—	—	A5329578	02/20	02/21
EMC comb generator	LCIE SUD EST	—	A3169098		
LISN	ROHDE & SCHWARZ	ENV216	C2320291	06/20	06/21
Probe - Current	ROHDE & SCHWARZ	ESH2-Z1	A1290018	02/20	02/21
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	11/20	11/22
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	08/20	08/21

10.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

10.5. TEST RESULTS – RUNNING MODE N°1

Mains terminals:

Supply1

Measurements are performed on the phase (L1) and neutral (N) of the power line.

Results: (PEAK detection)

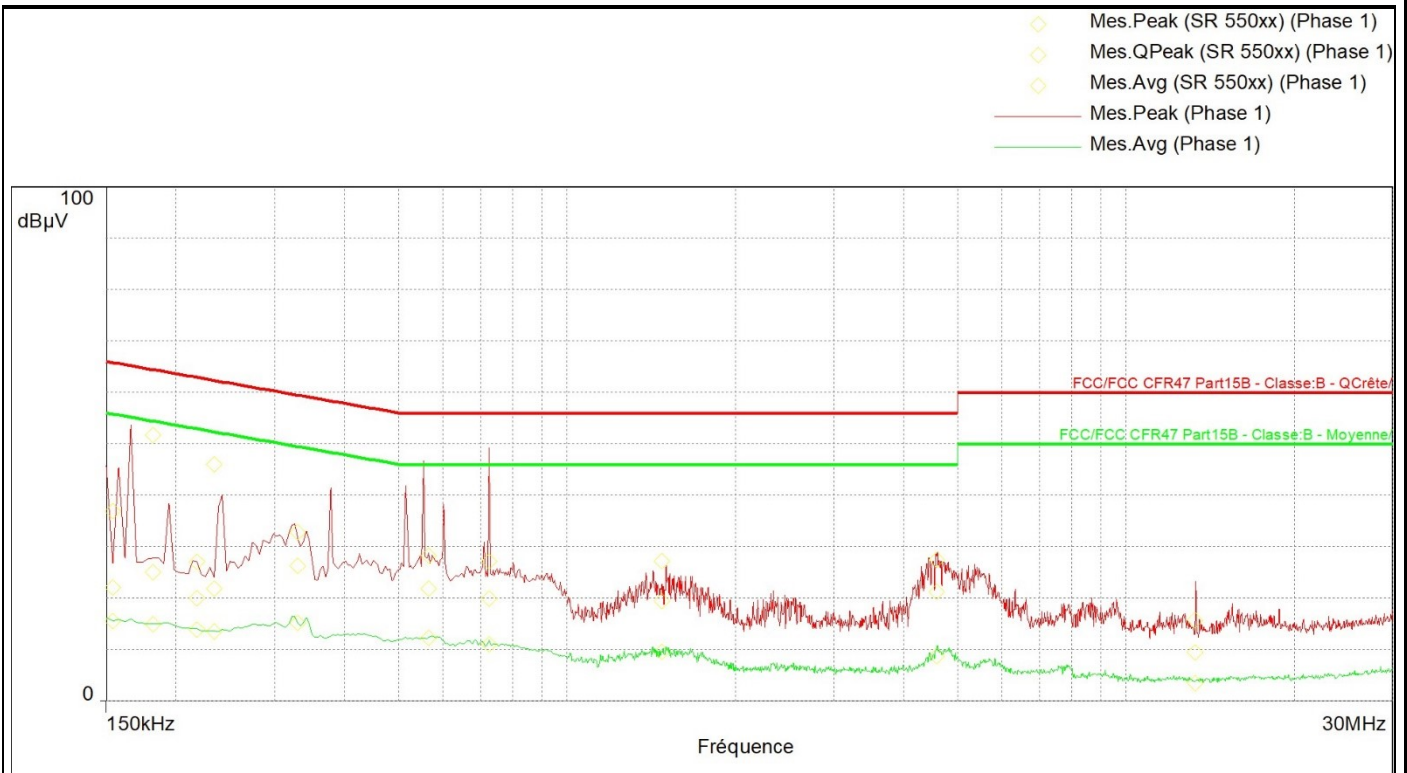
Graph identifier	Line	Comments	
Emc# 1	Phase	240VAC/50Hz	See below
Emc# 2	Neutral	240VAC/50Hz	See below
Emc# 3	Phase	120VAC/60Hz	See below
Emc# 4	Neutral	120VAC/60Hz	See below



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#1	Test configuration:	
Limit:	FCC CFR47 Part15B		/
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC / 50Hz	RBW :	10kHz
Line:	Phase	VBW :	30kHz



Spurious emissions

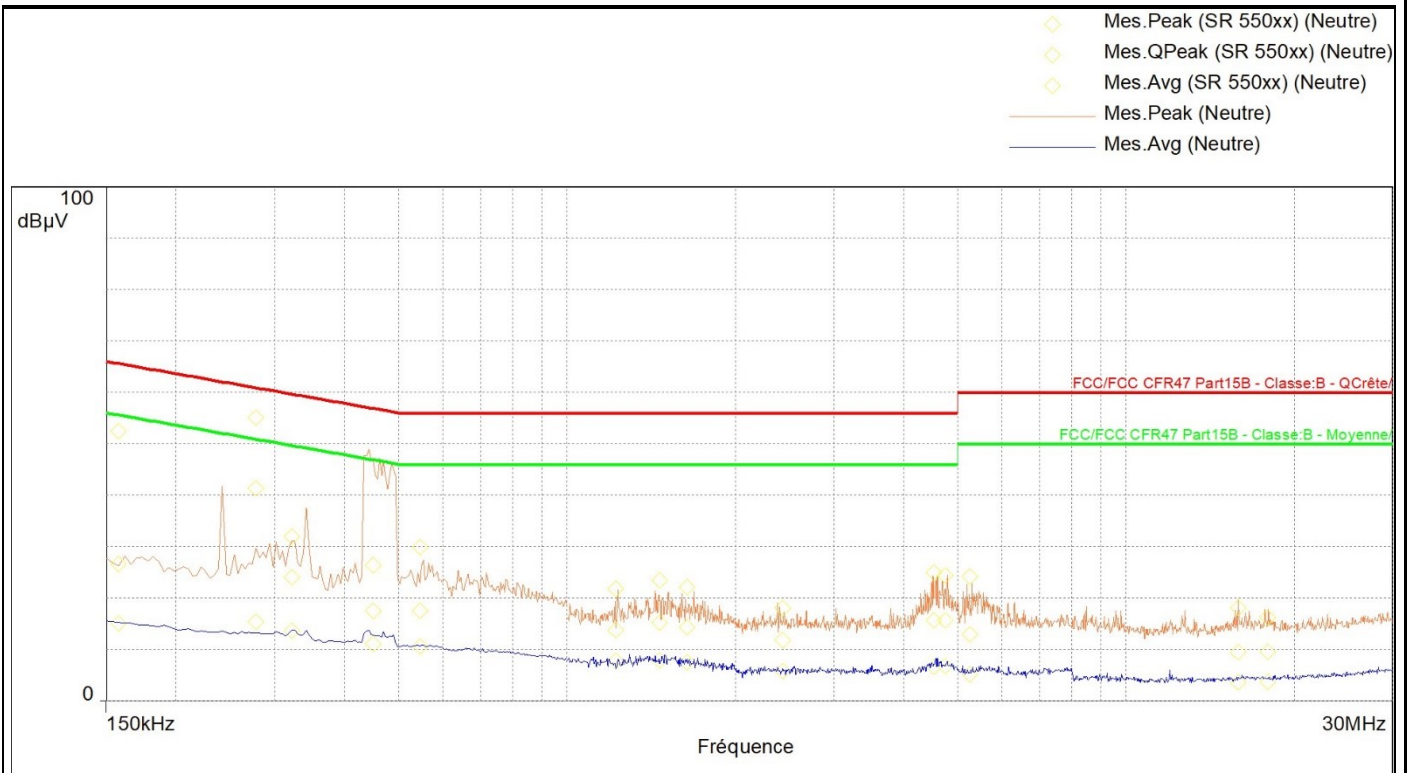
Frequency (MHz)	Mes.Peak (dB μ V)	Mes.QPeak (dB μ V)	LimQP (dB μ V)	Mes.QPeak-LimQP (dB)	Mes.Avg (dB μ V)	LimAvg (dB μ V)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.154	37.0	22.1	65.8	-43.7	15.5	55.8	-40.2	Phase 1	9.8
0.182	51.7	25.0	64.4	-39.4	14.9	54.4	-39.5	Phase 1	9.9
0.218	27.0	20.0	62.9	-42.9	13.8	52.9	-39.1	Phase 1	9.8
0.234	46.0	21.8	62.3	-40.5	13.5	52.3	-38.8	Phase 1	9.8
0.330	32.7	26.2	59.4	-33.2	15.2	49.4	-34.3	Phase 1	9.9
0.566	28.2	21.8	56.0	-34.2	12.2	46.0	-33.8	Phase 1	9.9
0.726	27.2	19.9	56.0	-36.1	11.0	46.0	-35.0	Phase 1	9.9
1.480	27.2	19.5	56.0	-36.5	9.6	46.0	-36.4	Phase 1	9.9
4.588	27.4	21.3	56.0	-34.7	8.8	46.0	-37.2	Phase 1	10.1
13.300	15.8	9.5	60.0	-50.5	3.5	50.0	-46.5	Phase 1	10.3



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#2	Test configuration:	
Limit:	FCC CFR47 Part15B		
Class:	B		/
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC / 50Hz	RBW :	10kHz
Line:	Neutral	VBW :	30kHz



Spurious emissions

Frequency (MHz)	Mes.Peak (dBμV)	Mes.QPeak (dBμV)	LimQP (dBμV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBμV)	LimAvg (dBμV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.158	52.6	26.7	65.6	-38.9	15.2	55.6	-40.4	Neutre	9.8
0.278	55.1	41.5	60.9	-19.4	15.4	50.9	-35.5	Neutre	9.8
0.322	31.9	24.1	59.7	-35.6	13.7	49.7	-36.0	Neutre	9.8
0.450	26.4	17.5	56.9	-39.3	11.1	46.9	-35.8	Neutre	9.8
0.546	29.9	17.5	56.0	-38.5	10.6	46.0	-35.4	Neutre	9.9
1.224	21.8	13.8	56.0	-42.2	7.7	46.0	-38.3	Neutre	9.9
1.464	23.5	15.2	56.0	-40.8	8.0	46.0	-38.0	Neutre	9.9
1.640	22.1	14.3	56.0	-41.7	7.5	46.0	-38.5	Neutre	9.9
2.428	18.1	11.8	56.0	-44.2	5.8	46.0	-40.2	Neutre	10.0
4.528	25.0	15.7	56.0	-40.3	6.7	46.0	-39.3	Neutre	10.1
4.752	24.4	15.7	56.0	-40.3	6.8	46.0	-39.2	Neutre	10.1
5.248	24.2	12.9	60.0	-47.1	5.2	50.0	-44.8	Neutre	10.1



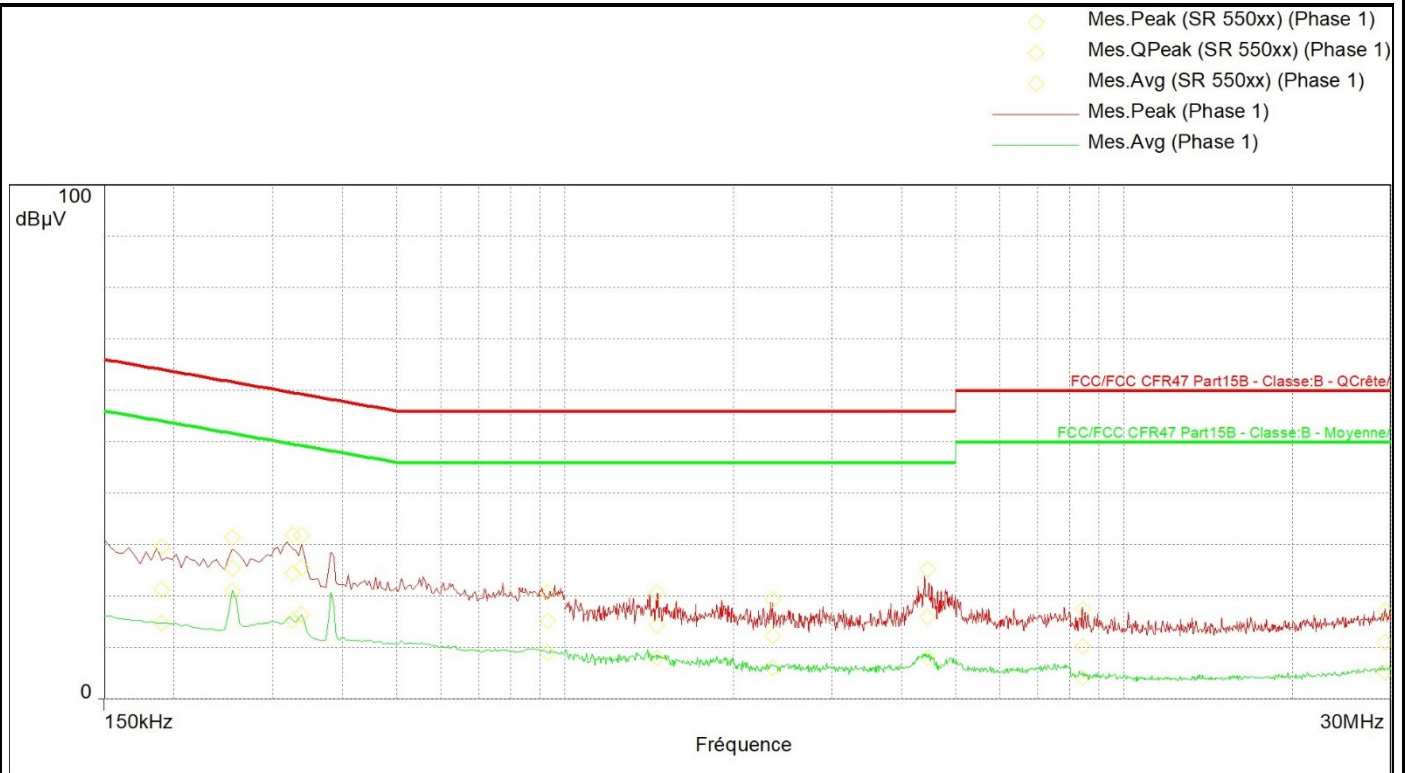
Frequency (MHz)	Mes.Peak (dBμV)	Mes.QPeak (dBμV)	LimQP (dBμV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBμV)	LimAvg (dBμV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
15.852	18.0	9.5	60.0	-50.5	3.7	50.0	-46.3	Neutre	10.5
17.900	16.3	9.6	60.0	-50.4	3.8	50.0	-46.2	Neutre	10.6



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#3	Test configuration:	
Limit:	FCC CFR47 Part15B		
Class:	B		/
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC / 60Hz	RBW :	10kHz
Line:	Phase	VBW :	30kHz

**Spurious emissions**

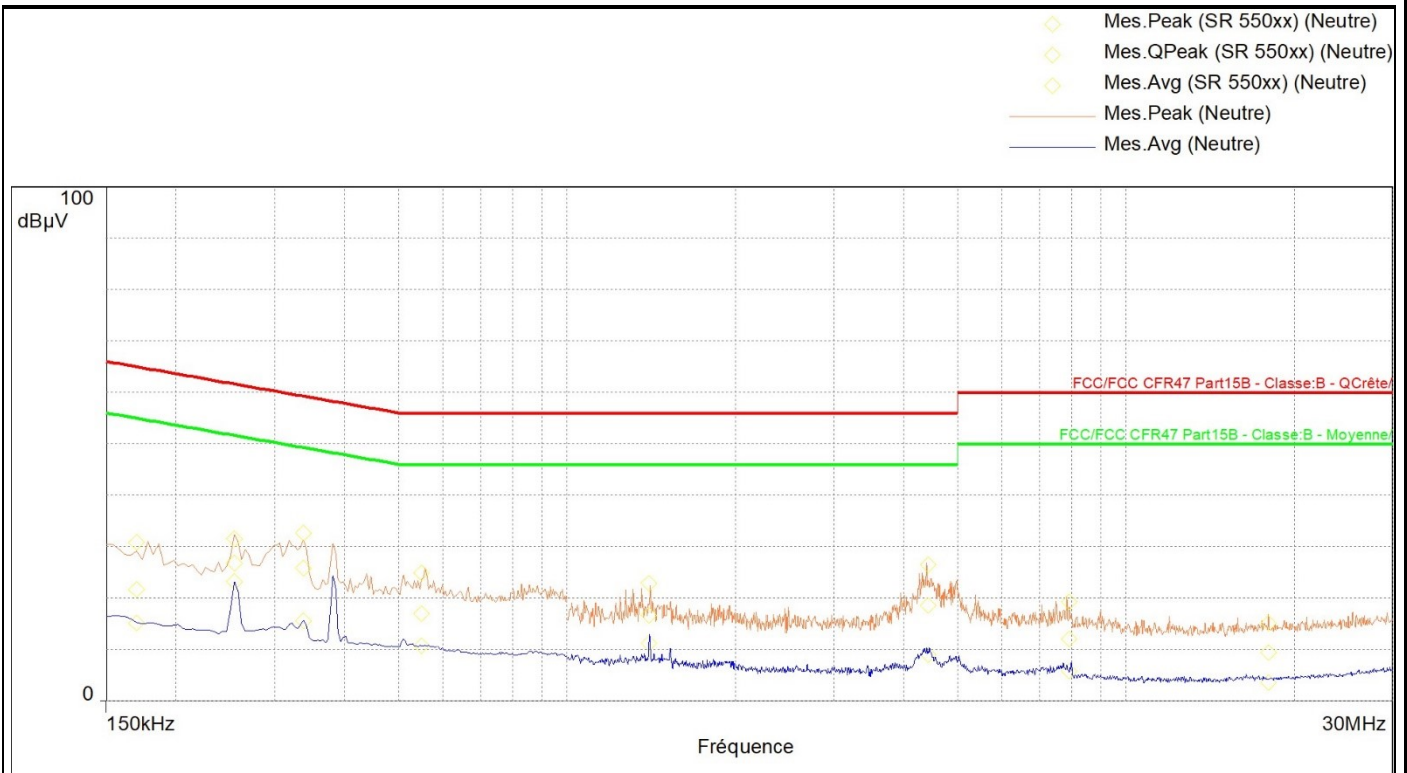
Frequency (MHz)	Mes.Peak (dBμV)	Mes.QPeak (dBμV)	LimQP (dBμV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBμV)	LimAvg (dBμV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.190	29.6	21.2	64.0	-42.8	14.7	54.0	-39.3	Phase 1	9.9
0.254	31.3	25.5	61.6	-36.1	21.0	51.6	-30.6	Phase 1	9.8
0.326	31.8	24.4	59.6	-35.1	15.2	49.6	-34.3	Phase 1	9.9
0.338	31.8	25.6	59.2	-33.6	16.4	49.2	-32.8	Phase 1	9.9
0.930	20.7	15.2	56.0	-40.8	9.0	46.0	-37.0	Phase 1	9.9
1.460	20.7	14.3	56.0	-41.7	8.1	46.0	-37.9	Phase 1	9.9
2.352	19.3	12.2	56.0	-43.8	5.9	46.0	-40.1	Phase 1	10.0
4.444	25.3	15.9	56.0	-40.1	8.0	46.0	-38.0	Phase 1	10.1
8.440	17.6	10.2	60.0	-49.8	4.2	50.0	-45.8	Phase 1	10.2
29.284	17.1	11.0	60.0	-49.0	5.2	50.0	-44.8	Phase 1	10.9



L C I E

CONDUCTED EMISSIONS

Graph name:	Emc#4	Test configuration:	
Limit:	FCC CFR47 Part15B		
Class:	B		/
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC / 60Hz	RBW :	10kHz
Line:	Neutral	VBW :	30kHz

**Spurious emissions**

Frequency (MHz)	Mes.Peak (dBμV)	Mes.QPeak (dBμV)	LimQP (dBμV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBμV)	LimAvg (dBμV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.170	30.8	21.6	65.0	-43.3	15.2	55.0	-39.8	Neutre	9.8
0.254	31.5	26.9	61.6	-34.8	23.2	51.6	-28.5	Neutre	9.8
0.338	32.7	25.9	59.2	-33.3	15.6	49.2	-33.7	Neutre	9.9
0.550	24.9	17.0	56.0	-39.0	10.7	46.0	-35.3	Neutre	9.9
1.400	22.9	16.7	56.0	-39.3	11.3	46.0	-34.7	Neutre	9.9
4.428	26.6	18.6	56.0	-37.4	9.1	46.0	-36.9	Neutre	10.1
7.896	19.3	12.1	60.0	-47.9	5.9	50.0	-44.1	Neutre	10.2
17.988	15.1	9.4	60.0	-50.6	3.6	50.0	-46.4	Neutre	10.6



10.6. CONCLUSION

The sample of the equipment **EMET-HD EMITTER**, Sn : **OEG00083; OEG00081; OEG00085**, tested in the configuration presented in this test report **satisfies** to requirements of the product family standard applied (See §Test Program) for conducted emissions.

11. UNCERTAINTIES CHART

Type de mesure / Kind of measurement	Incertitude élargie laboratoire / Wide uncertainty laboratory (k=2) $\pm x$	Incertitude limite du CISPR / CISPR uncertainty limit $\pm y$
Measurement of conducted disturbances in voltage on the power port	3.29dB	3.4 dB
Measurement of conducted disturbances in voltage on the telecommunication port.	3.26 dB	5dB
Measurement of discontinuous conducted disturbances in voltage	3.33 dB	3.4 dB
Measurement of conducted disturbances in current	2.67 dB	2.9dB
Spurious emission, radiated (Semi anechoic chamber & open test site)	5.60 dB	6 dB
Spurious emission, radiated (Full anechoic chamber above 1GHz)	± 3.8 dB	± 6 dB
Occupied Channel Bandwidth	± 2.8 %	± 5 %
RF power, conducted	± 1.2 dB	± 1.5 dB
Power Spectral Density, Conducted	± 1.7 dB	± 3 dB
Spurious emission, conducted	± 2.3 dB	± 3 dB
Temperature	± 0.75 °C	± 3 °C
Supply Voltages	± 1.7 %	± 3 %

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par la norme, la conformité de l'échantillon est établie directement par les niveaux limites applicables. / The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the standard. The conformity of the sample is directly established by the applicable limits values.