TEST REPORT

N°:163488-752917-A (FILE#1023927) **Version : 04**

Subject	**Radio spectrum matters** **tests according to standards:** **47 CFR Part 15.247 & RSS-247 Issue 2 & RSS-Gen Issue 5**
Issued to	**MINDMAZE SA** Chemin de Roseneck 5 1015 - Lausanne Switzerland
Apparatus under test	
↳ Product	**Physilog 6**
↳ Trade mark	**Physilog**
↳ Manufacturer	**Mindmaze SA**
↳ Family Range	**PHY-06 and PHY-06S**
↳ Model under test	**PHY-06**
↳ Serial number	**002,004,009,010**
↳ FCC ID	**2AYHH-PHY06GAITUP**
↳ IC	**26802-PHY06GAITUP**
Conclusion	See Test Program chapter
Test date	July 16, 2020 to July 28, 2020
Test location	Moirans
Test Site	6230B-1
FCC Test Site	FR0008
ISED Test Site	FR0008 – 6500A
Sample receipt date	July 16, 2020
Composition of document	69 pages
Document issued on	January 25, 2021

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	January 25, 2021	Mounir BOUAMARA	Creation of the document
02	January 25, 2021	Mounir BOUAMARA	Changing the sentences *Emissions non essentielles to No significative frequency observed in all graphes of radiated emissions and test program information* - Trade mark and Manufacturer (page 1)
03	January 25, 2021	Mounir BOUAMARA	Adding of FCC/IC informations
04	March 31, 2021	Mounir BOUAMARA	-Correcting the date in the publication history in the second version -delate NA in the test 'Receiver Radiated emissions' - changed the call due of the Transient limiter from 02/19 to 08/20 - add a description of the two products PHY-06 and PHY-06S in 2.1 paragraph '2.1.INTRODUCTION' - adding the following information FCC Test Site :FR0008 ISED Test Site :FR0008 – 6500A

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. *INTRODUCTION*

PHY-06 and PHY-06S are two wearable devices designed and developed by Gait Up SA and manufactured by Mindmaze SA. The two sensors share, in its version 1.0, the same core technology (same HW and same core FW). However, PHY-06 is an accessory of a medical device whereas PHY-06S is an IoT commercial grade wearable sensor. Both devices have independent product lifecycles.
PHY-06 and PHY-06S will be marketed in the USA. That is why, Mindmaze SA is applying for an FCC license per product. However, the official Radio and EMC testing was only performed to PHY-06 (medical device accessory).

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
Physilog PHY-06 **Serial Number: 002,004,009,010**

Equipment Under Test

Power supply:
During all the tests, EUT is supplied by V_{nom}: 3.7VDC
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	☐ AC ☐ DC ☑ Battery	3.7DC		

Voltage table used (for Power Line Conducted Emissions):

Type	Measurement performed:	
☐ AC	☐ **120VAC/60Hz**	☐ **240VAC/50Hz**
☐ DC	☐ **+ VDC**	☐ **-....VDC**
☑ Battery	☑ **+**3.7**VDC**	☐ **-....VDC**
☐ USB (Laptop auxiliary)	☑ **120VAC/60Hz (Laptop auxiliary)**	☐ **240VAC/50Hz(Laptop auxiliary)**

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	µUSB	0.5	☑	☐	☐	Use for update the firmware of the EUT

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
laptop			

Equipment information:

Type:	☑ **Proprietary**			
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: 1dBi			
Beam forming gain:	No			
Receiver chains	1			
Type of equipment:	☑ Stand-alone	☐ Plug-in	☐ Combined	
Ad-Hoc mode:	☐ Yes		☑ No	
Adaptivity mode:	☐ Yes (Load Based)	☐ Off mode	☐ No	
	Clear Channel Assessment Time:		Xµs	
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	☑ 35°C
Type of power source:	☐ AC power supply	☐ DC power supply	☑ Battery	
Operating voltage range:	Vnom:	☐ 230V/50Hz	☑ 3.7Vdc	

CHANNEL PLAN			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
Cmin: 0	2402	**Cmid: 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
19	2440	**Cmax: 39**	2480

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

2.3. 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 “X” are used to set the product:

a. – See document “X”(provided by customer) for the command used during test.

Hardware information		
Software (if applicable):	**V. :**	**Nc***

Nc*: Not communicated

2.4. EQUIPMENT MODIFICATION

☑ None ☐ Modification:

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by	: Mounir BOUAMARA
Date of test	: July 16, 2020 to July 28, 2020
Ambient temperature	: 22 °C
Relative humidity	: 38 %

3.2. TEST SETUP

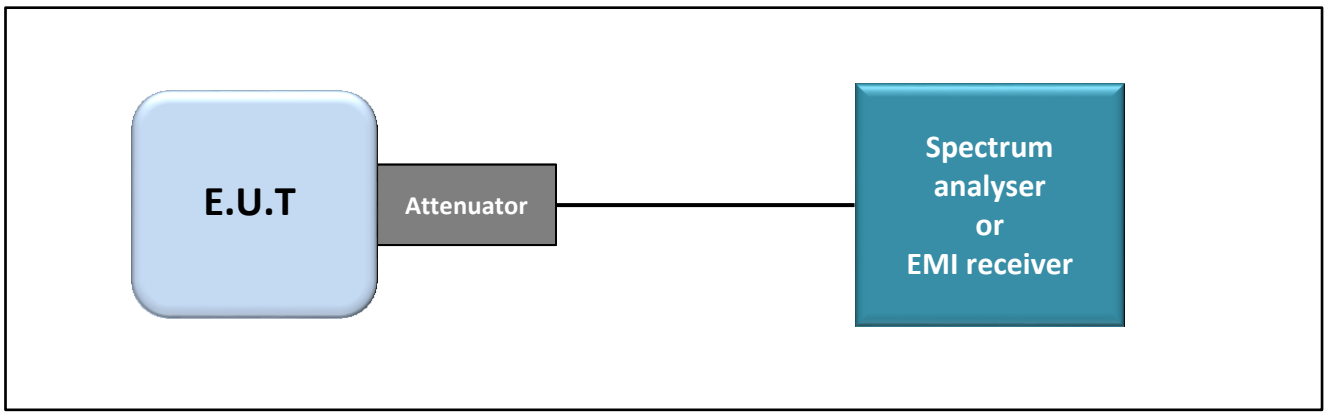
- The Equipment under Test is installed:
☑ On a table
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method

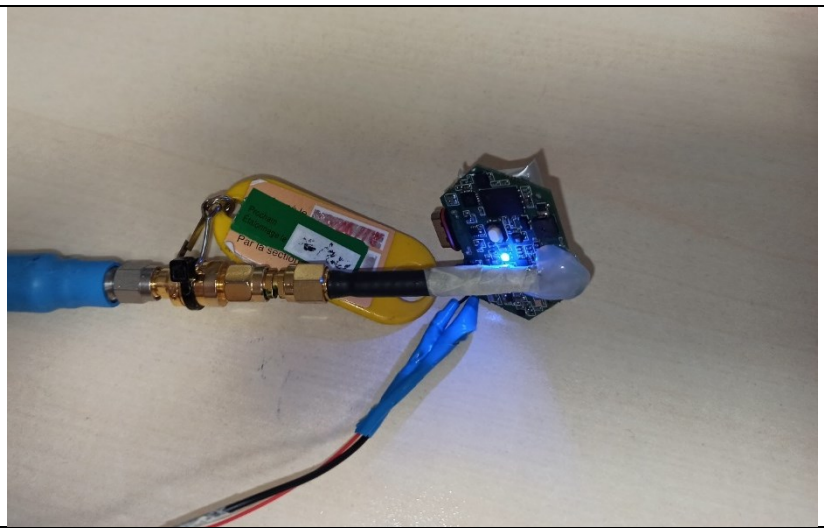
- Test Procedure:
☐ RSS-Gen Issue 5 § 6.7
☐ ANSI C63.10 § 6.9.2

Measurement Procedure:

a) RBW shall be in the range of 1% to 5% of the anticipated occupied bandwidth
b) Set the video bandwidth (VBW) ≥ 3 x RBW
c) SPAN = Capture all products of the modulation process
d) Detector = Peak.
e) Trace mode = max hold.
f) Sweep = auto couple.
g) Allow the trace to stabilize.
h) 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**
CABLE SMA 1m	RADIALL	18GHz	A5329863	11/18	05/20
DC POWER SUPPLY 20V	HEWLETT PACKARD	6632A	A7042061	-	-
Fichier_Calcul_300-220	LCIE SUD EST	v1	L2000054	-	-
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Attenuator 10dB	TECHNIWAVE	_	A7122273	06/18	06/20

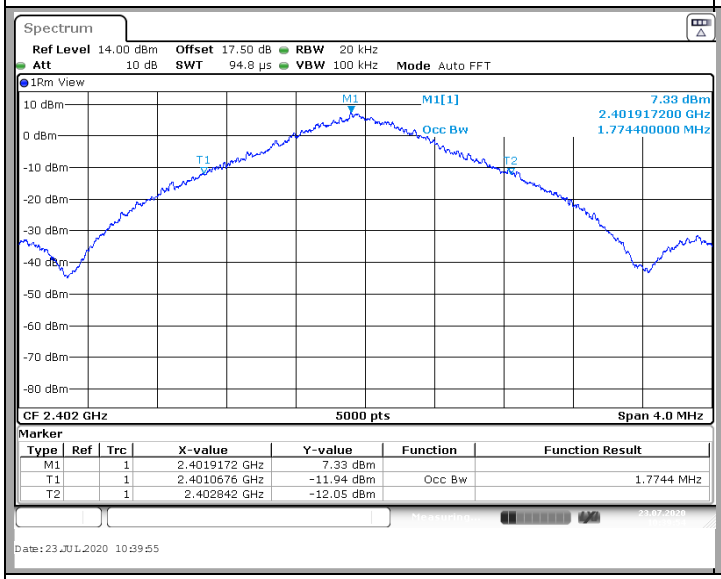
Note: In our quality system, the test equipment calibration due is more & less 2 months

3.5. RESULTS

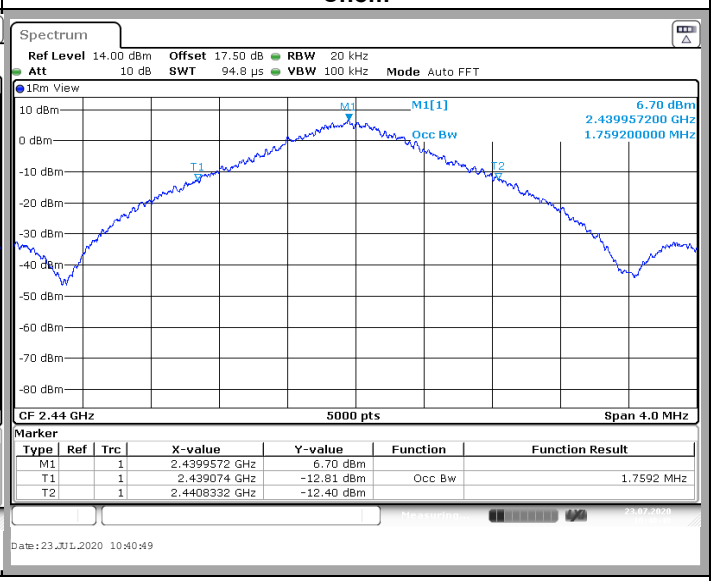
2MBits/s

Occupied Bandwidth

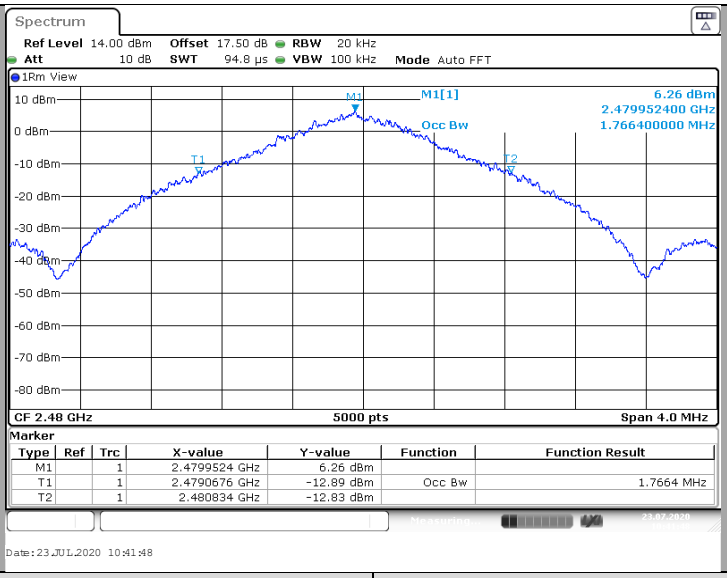
Cmin



Cnom



Cmax



Channel	Occupied Bandwidth (MHz)
Cmin	**1.7744**
Cnom	**1.7592**
Cmax	**1.7664**

3.6. *CONCLUSION*

Occupied Channel Bandwidth measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS-GEN ISSUE 5** limits.

4. 6DB EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by	: Mounir BOUAMARA
Date of test	: July 16, 2020 to July 28, 2020
Ambient temperature	: 22 °C
Relative humidity	: 38 %

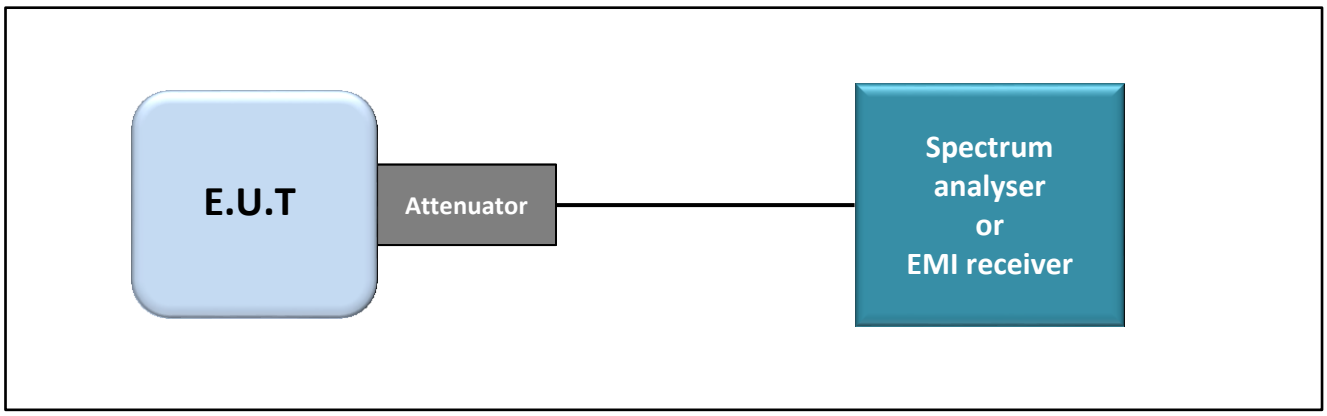
4.2. TEST SETUP

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

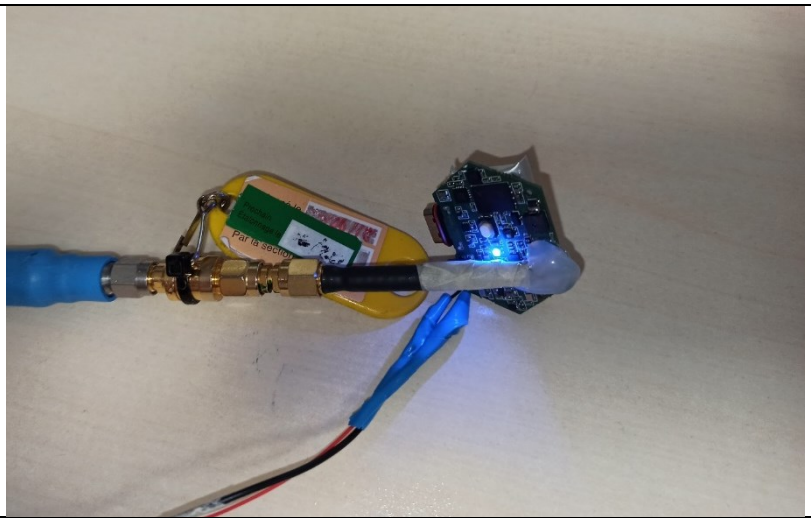
- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method

- 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) ≥ 3 x 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**
CABLE SMA 1m	RADIALL	18GHz	A5329863	11/18	05/20
DC POWER SUPPLY 20V	HEWLETT PACKARD	6632A	A7042061		
Fichier_Calcul_300-220	LCIE SUD EST	v1	L2000054		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Attenuator 10dB	TECHNIWAVE	_	A7122273	06/18	06/20

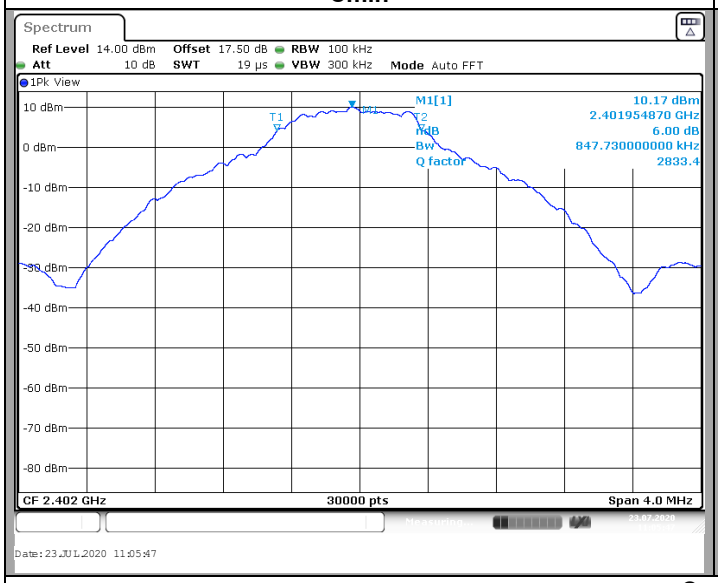
Note: In our quality system, the test equipment calibration due is more & less 2 months

4.5. RESULTS

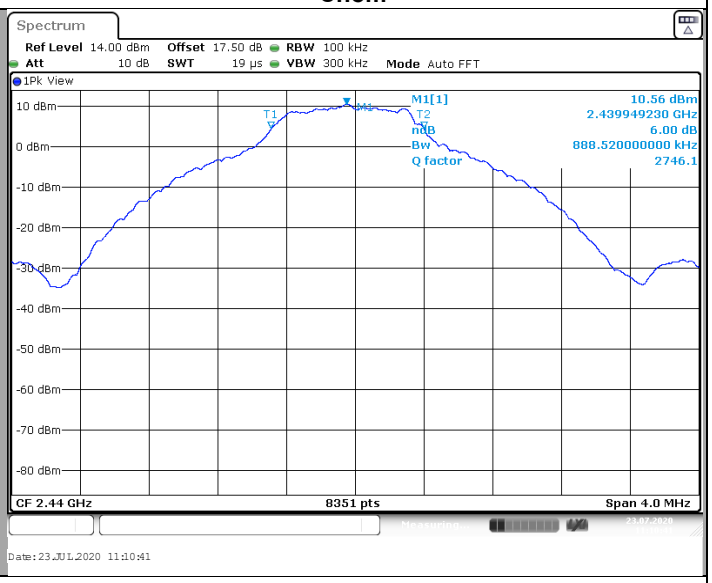
2MBits/s

6dB Emission Bandwidth

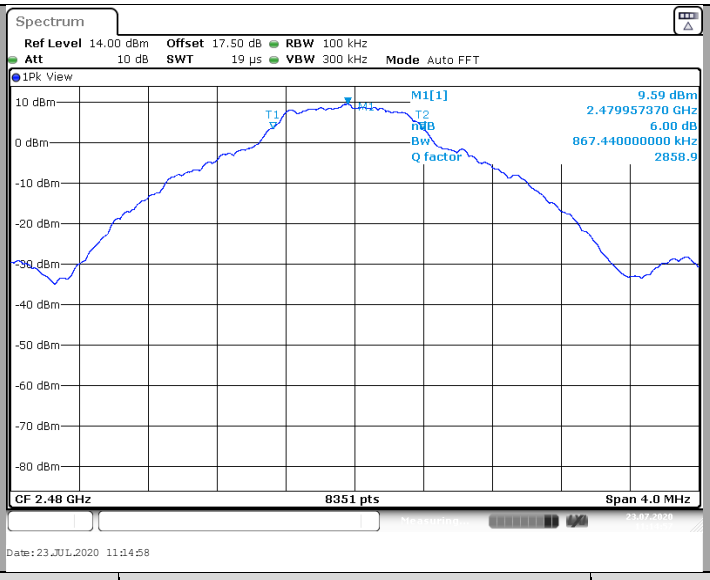
Cmin



Cnom



Cmax



Channel	6dB Emission Bandwidth (MHz)	Limit (MHz)
Cmin	**0.84773**	Minimum 0.5
Cnom	**0.88852**	Minimum 0.5
Cmax	**0.86744**	Minimum 0.5

4.6. CONCLUSION

6dB Emission Bandwidth measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, 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	: July 16, 2020 to July 28, 2020
Ambient temperature	: 22 °C
Relative humidity	: 38 %

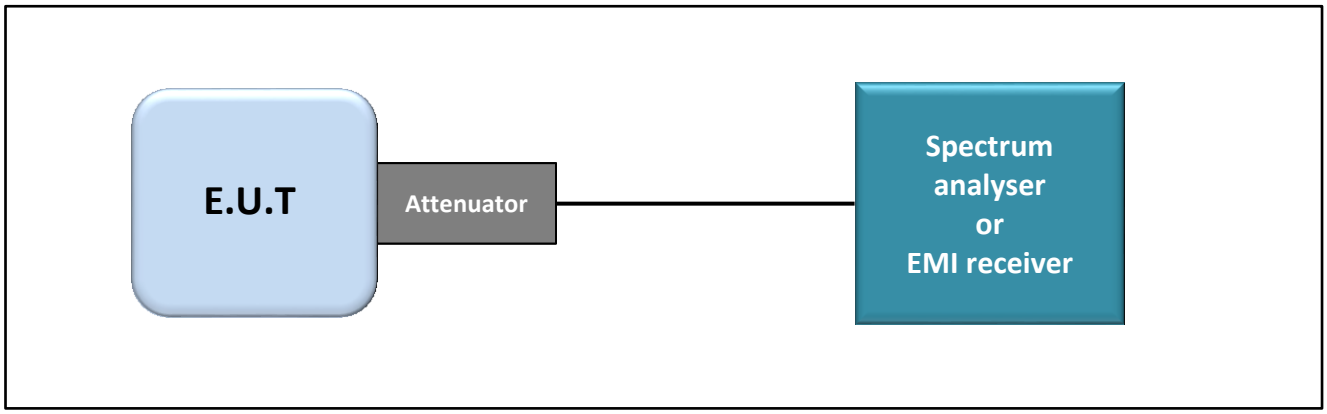
5.2. TEST SETUP

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

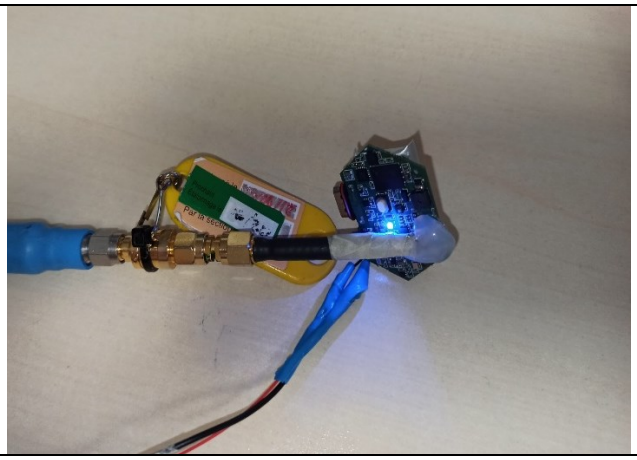
- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method

- 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 ≥ DTS bandwidth.
b) Set VBW ≥ 3 x RBW.
c) Set span ≥ 3 x 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 ≥ 3 x RBW
c) Set the span ≥ 1.5 x 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**
CABLE SMA 1m	RADIALL	18GHz	A5329863	11/18	05/20
DC POWER SUPPLY 20V	HEWLETT PACKARD	6632A	A7042061		
Fichier_Calcul_300-220	LCIE SUD EST	v1	L2000054		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Attenuator 10dB	TECHNIWAVE	_	A7122273	06/18	06/20

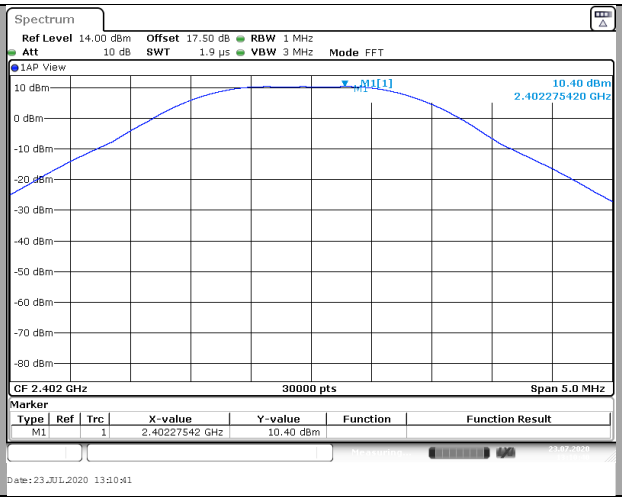
Note: In our quality system, the test equipment calibration due is more & less 2 months

5.5. RESULTS

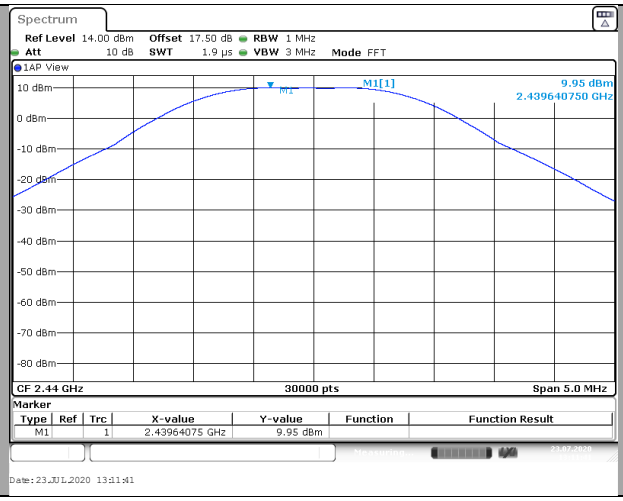
2MBits/s

Maximum Conducted Output Power

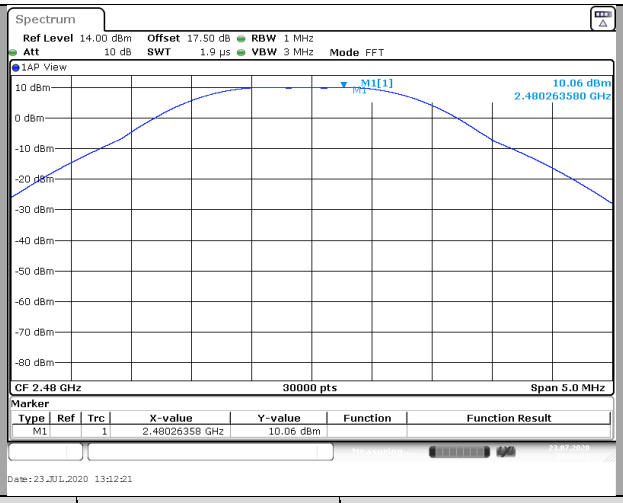
Cmin



Cnom



Cmax



Channel	Offset Cable + Att (dB)	Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Limit (dBm)
Cmin	**17.5**	1	10.40	30. Reduced by G-6dBi if Antenna Gain above 6dBi
Cnom	**17.5**	1	9.95	30. Reduced by G-6dBi if Antenna Gain above 6dBi
Cmax	**17.5**	1	10.06	30. Reduced by G-6dBi if Antenna Gain above 6dBi

5.6. CONCLUSION

Maximum Conducted Output Power measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, 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

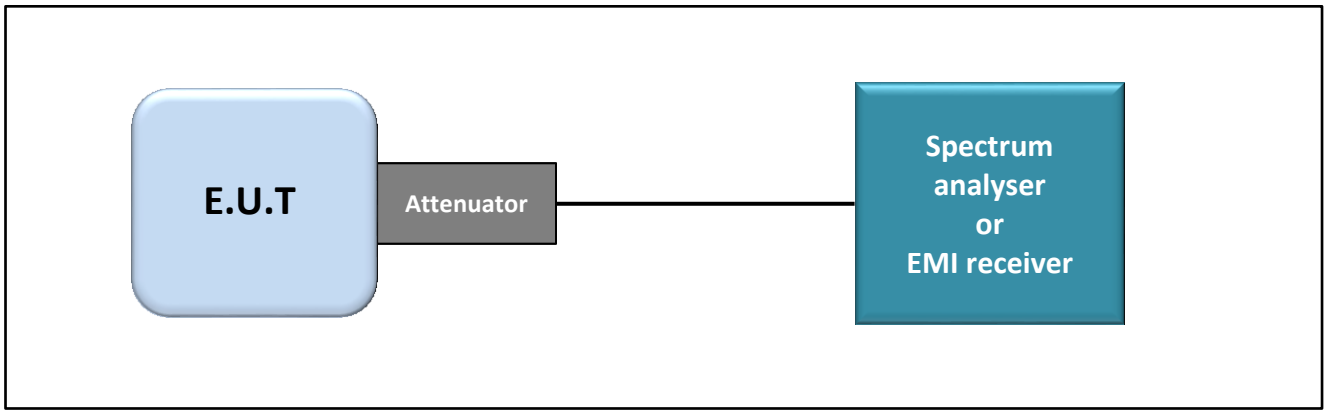
Test performed by	: Mounir BOUAMARA
Date of test	: July 16, 2020 to July 28, 2020
Ambient temperature	: 22 °C
Relative humidity	: 38 %

6.2. TEST SETUP

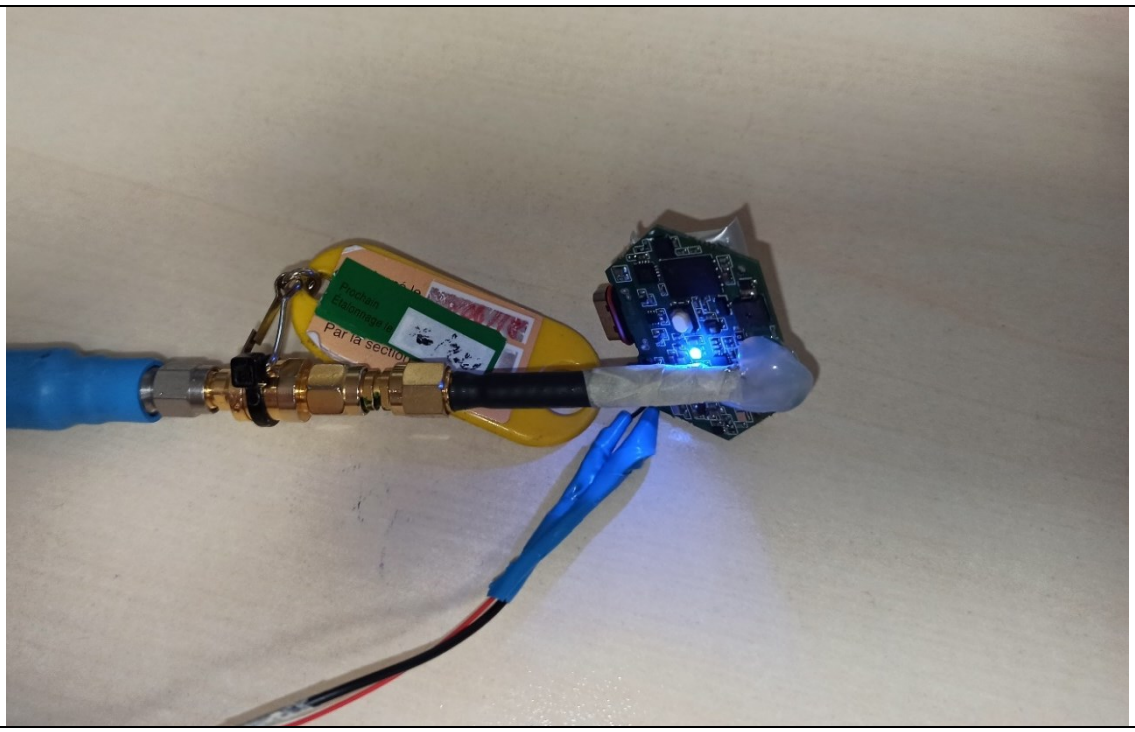
- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

- 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 ≥ 3 x 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**
CABLE SMA 1m	RADIALL	18GHz	A5329863	11/18	05/20
DC POWER SUPPLY 20V	HEWLETT PACKARD	6632A	A7042061		
Fichier_Calcul_300-220	LCIE SUD EST	v1	L2000054		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Attenuator 10dB	TECHNIWAVE	_	A7122273	06/18	06/20

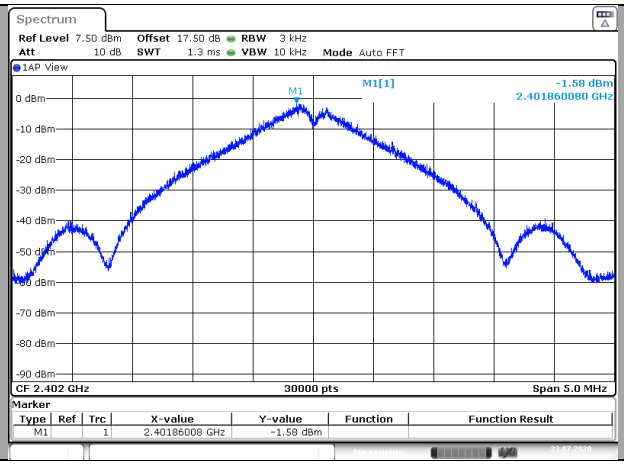
Note: In our quality system, the test equipment calibration due is more & less 2 months

6.5. RESULTS

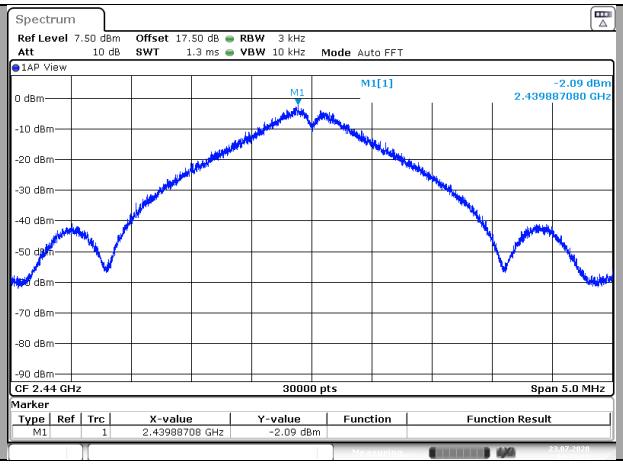
2MBits/s

Power Spectral Density

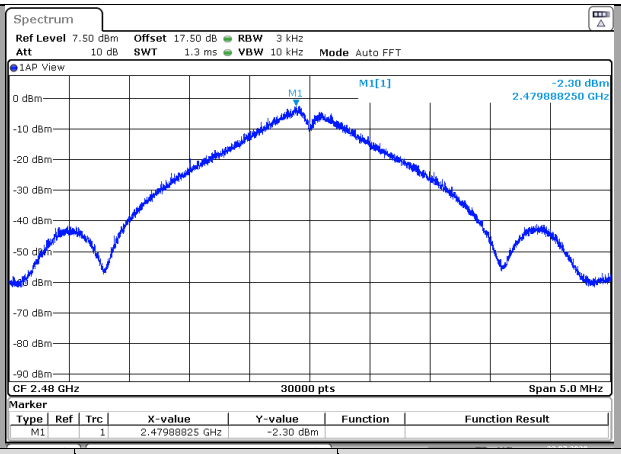
Cmin



Cnom



Cmax



Channel	Offset Cable + Att (dB)	Antenna Gain (dBi)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
Cmin	**17.5**	1	-1.58	8. Reduced by G-6dBi if Antenna Gain above 6dBi
Cnom	**17.5**	1	-2.09	8. Reduced by G-6dBi if Antenna Gain above 6dBi
Cmax	**17.5**	1	-2.3	8. Reduced by G-6dBi if Antenna Gain above 6dBi

6.6. CONCLUSION

Power Spectral Density measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, 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

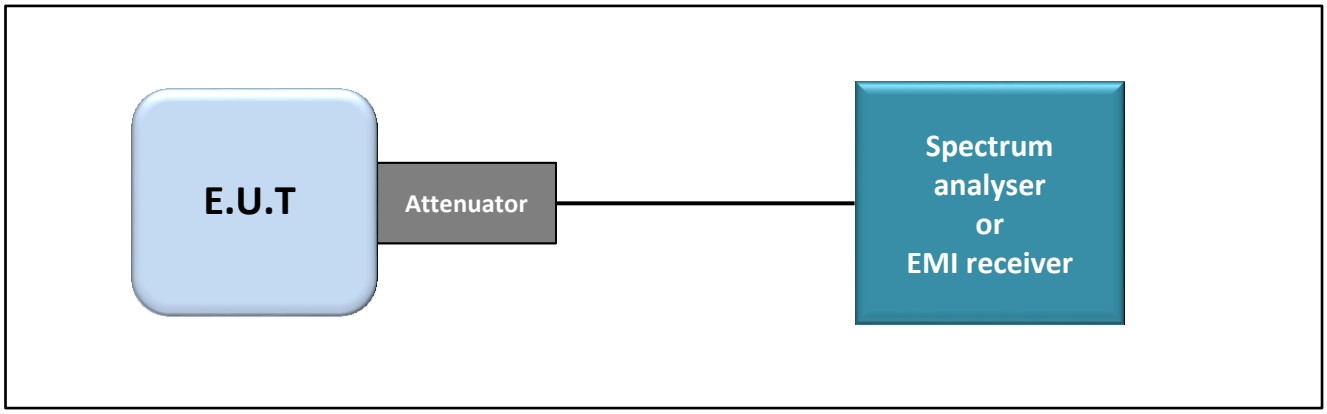
Test performed by	: Mounir BOUAMARA
Date of test	: July 16, 2020 to July 28, 2020
Ambient temperature	: 22 °C
Relative humidity	: 38 %

7.2. TEST SETUP

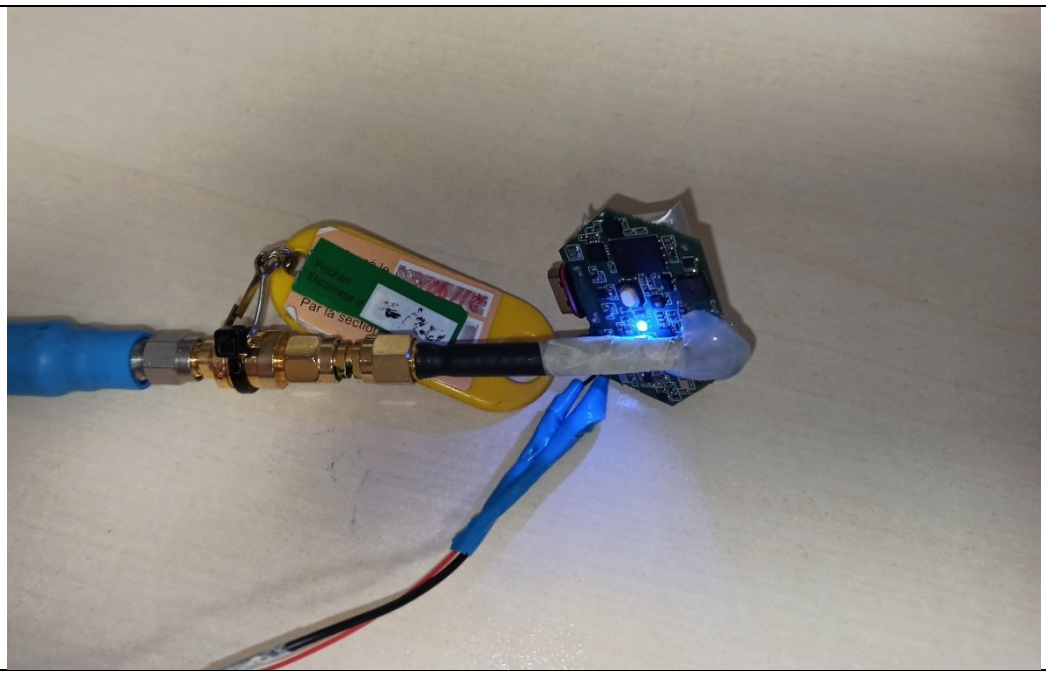
- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

- 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 Edge “2400MHz & 2483,5MHz”

7.4. TEST EQUIPMENT LIST

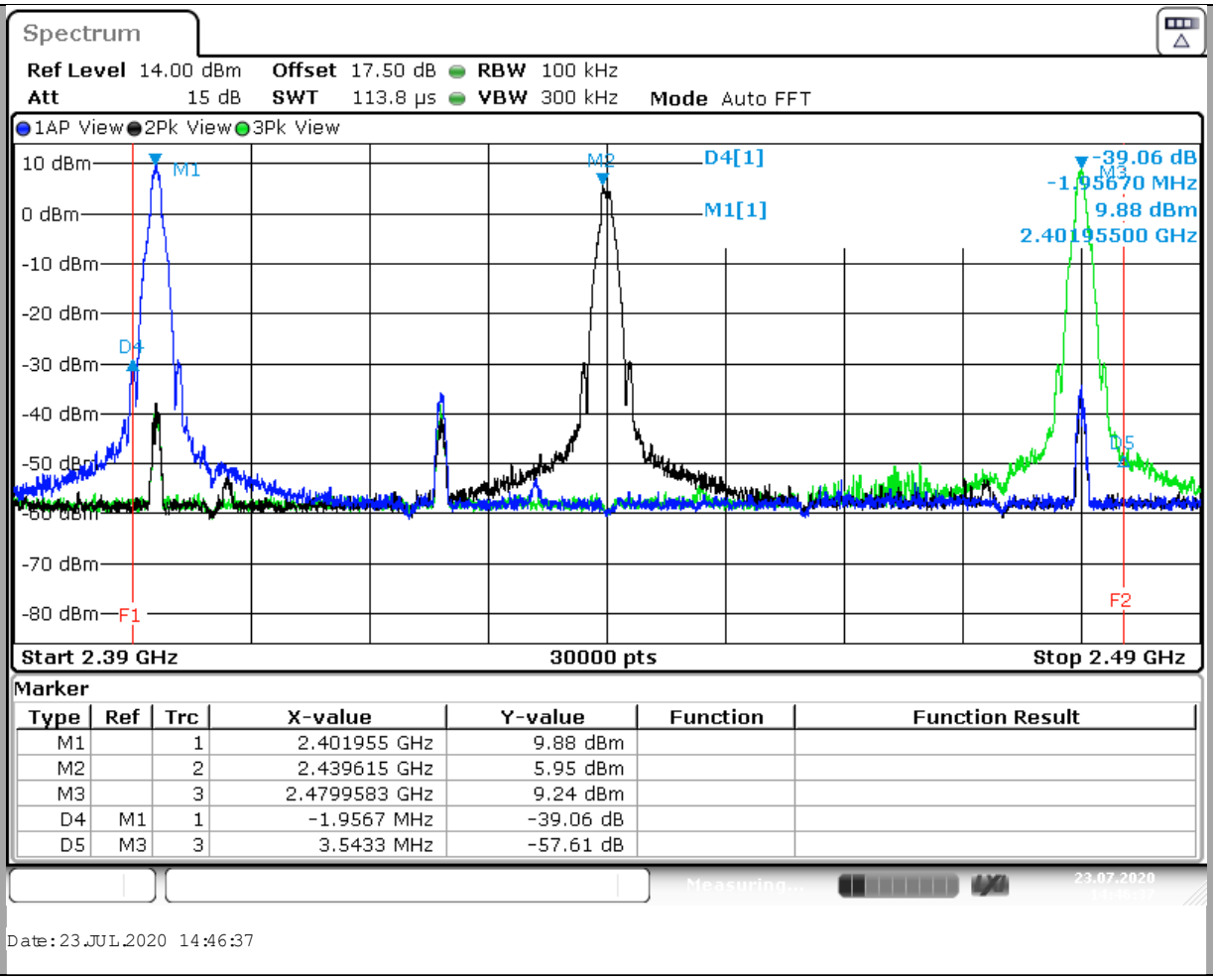
TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
CABLE SMA 1m	RADIALL	18GHz	A5329863	11/18	05/20
DC POWER SUPPLY 20V	HEWLETT PACKARD	6632A	A7042061		
Fichier_Calcul_300-220	LCIE SUD EST	v1	L2000054		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Attenuator 10dB	TECHNIWAVE	_	A7122273	06/18	06/20

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

7.5. RESULTS

2MBits/s

Cmin/Cnom/Cmax



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.401955 GHz	9.88 dBm		
M2		2	2.439615 GHz	5.95 dBm		
M3		3	2.4799583 GHz	9.24 dBm		
D4	M1	1	-1.9567 MHz	-39.06 dB		
D5	M3	3	3.5433 MHz	-57.61 dB		

7.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands at the band edge measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, 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

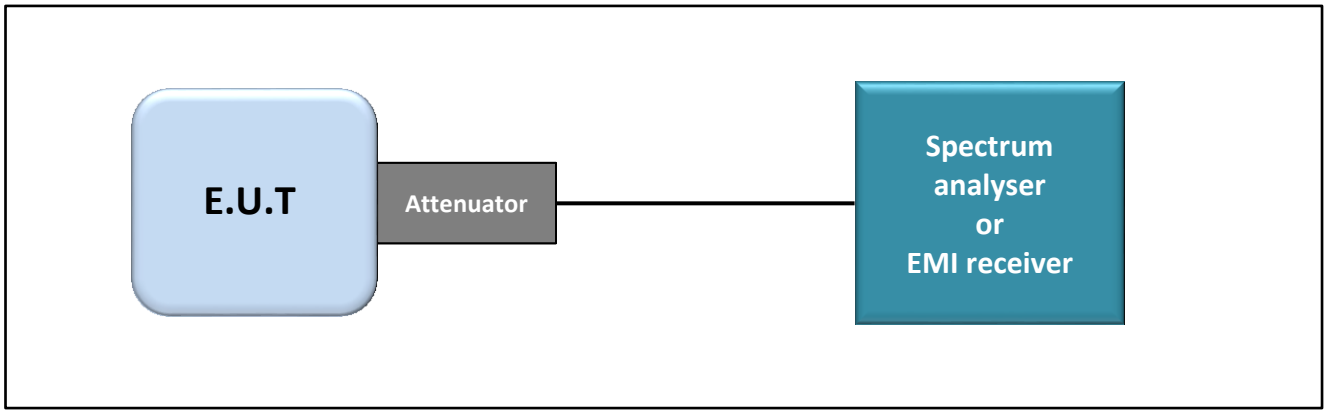
Test performed by	: Mounir BOUAMARA
Date of test	: July 16, 2020 to July 28, 2020
Ambient temperature	: 22 °C
Relative humidity	: 38 %

8.2. TEST SETUP

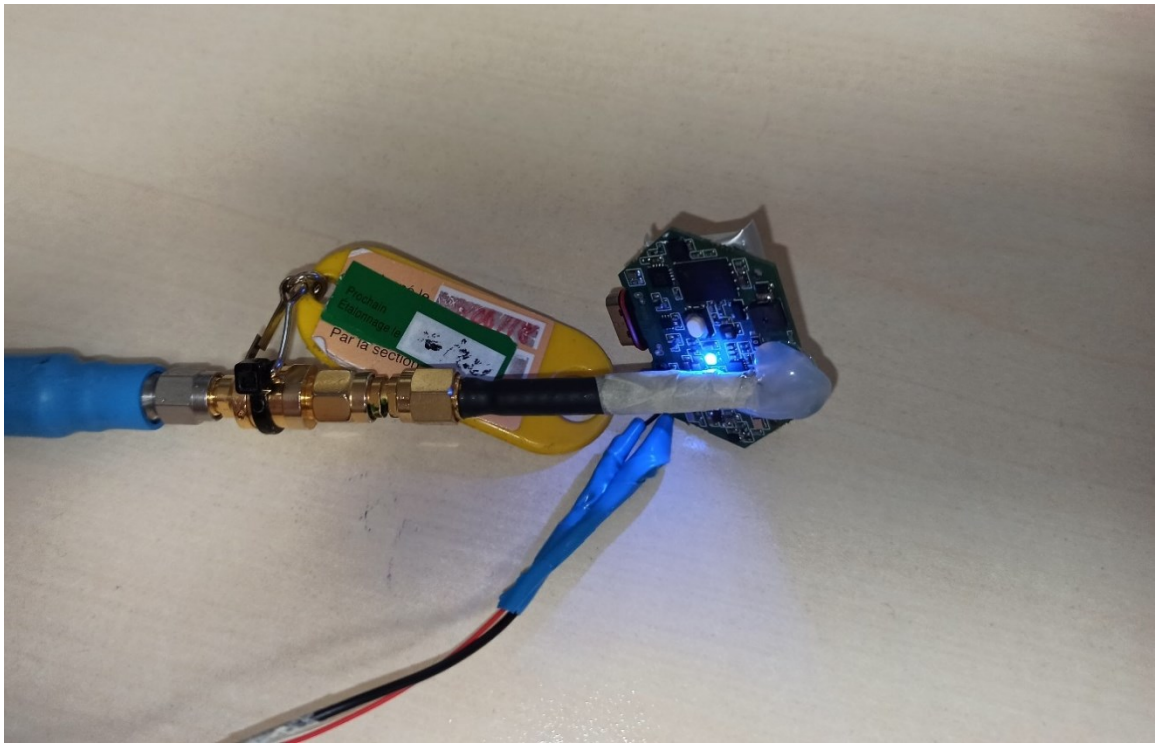
- The Equipment under Test is installed:
☑ On a table
☐ In an anechoic chamber

- 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

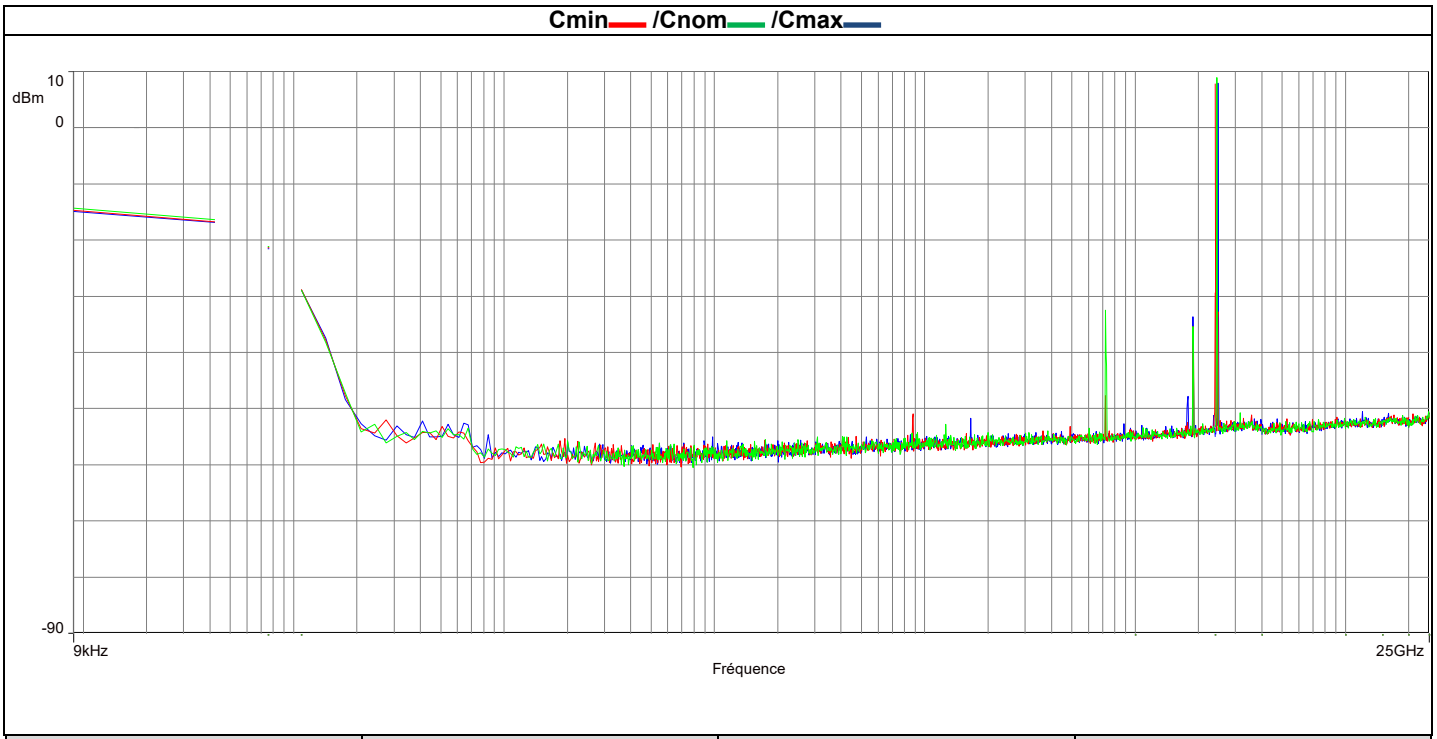
8.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
CABLE SMA 1m	RADIALL	18GHz	A5329863	11/18	05/20
DC POWER SUPPLY 20V	HEWLETT PACKARD	6632A	A7042061		
Fichier_Calcul_300-220	LCIE SUD EST	v1	L2000054		
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Attenuator 10dB	TECHNIWAVE	_	A7122273	06/18	06/20

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

8.5. RESULTS

2MBits/s



Frequency (MHz)	Level (dBm)	Level (dBc)	Limit (dBc)
2402.00	7.81		
87.84	-50.93	58.74	20
723.6	-47.77	55.58	20
1883.26	-35.41	43.22	20
1895.67	-38.59	46.4	20
2456.32	-34.09	41.9	20
2480.1	-32.7	40.51	20
2442	8.98		
724.03	-32.4	41.38	20
1883.91	-35.44	44.42	20
2465	-33.39	42.37	20
2480	7.96		
165.64	-51.7	59.66	20
1780.36	-47.8	55.76	20
1883.21	-36.7	44.66	20

8.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

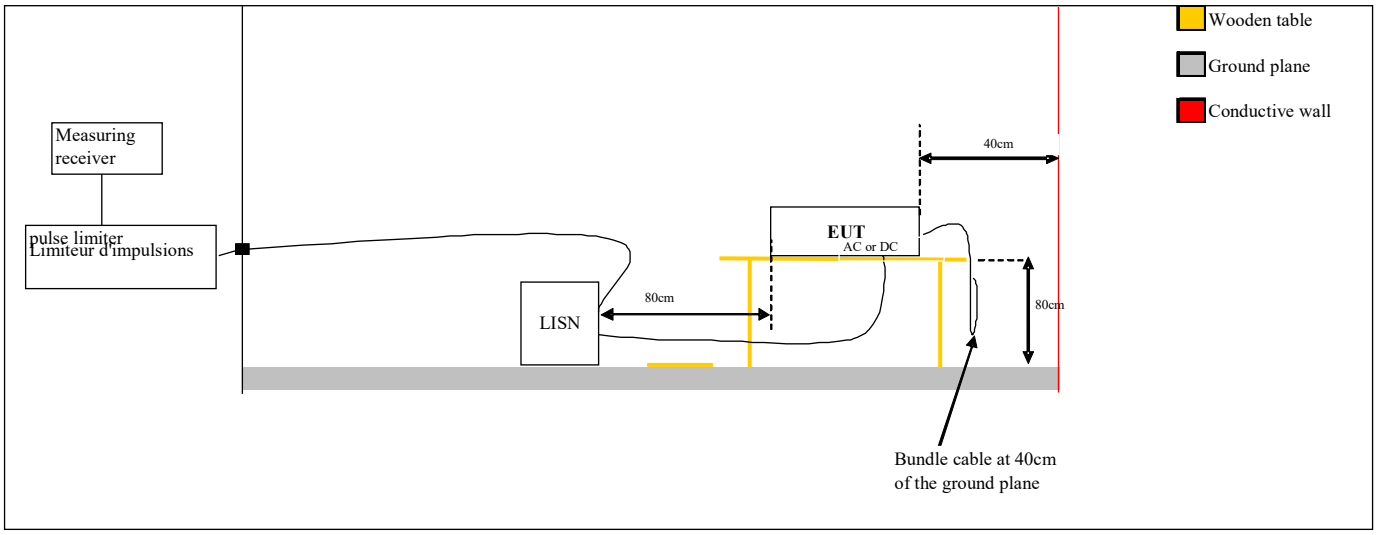
9. AC POWER LINE CONDUCTED EMISSIONS

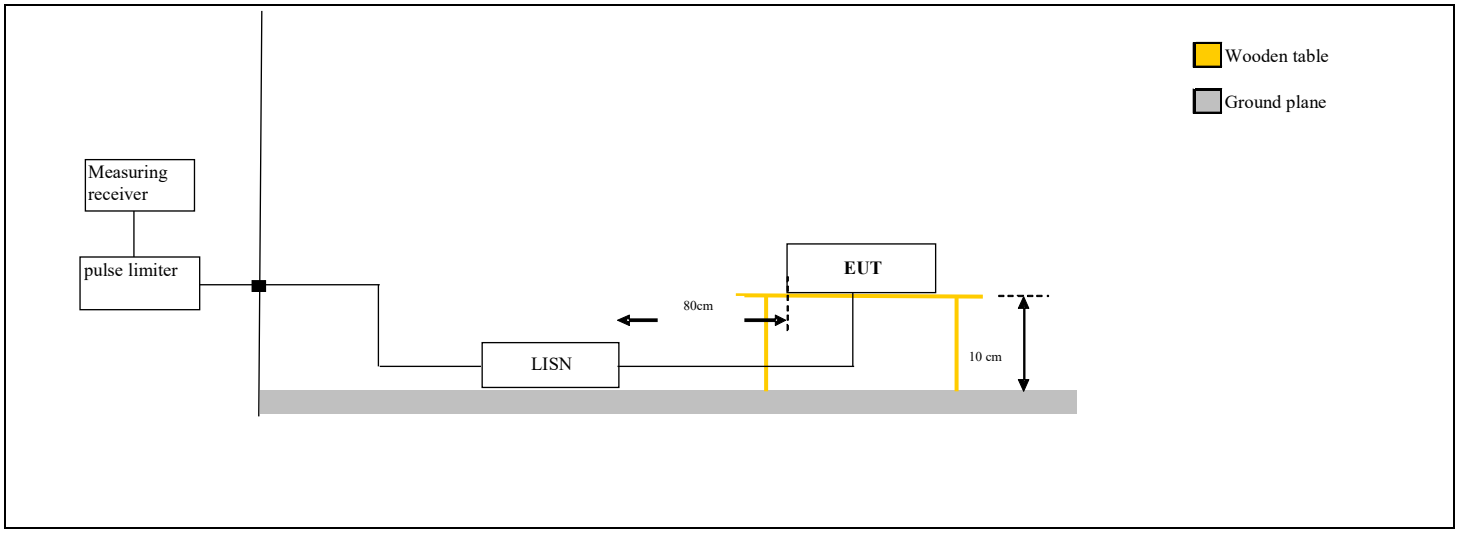
9.1. TEST CONDITIONS

Date of test	:	July 22, 2020
Test performed by	:	Hamza GHAFILI
Ambient temperature	:	23 °C
Relative humidity	:	40 %

9.2. 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.





Test set up of AC Power Line Conducted Emissions

Photograph for AC Power Line Conducted Emissions (Front view)

9.3. LIMIT

Frequency range	Level	Detector
0,15kHz to 0,5MHz	66dBµV to 56µV*	QPeak
	56dBµV to 46µV*	Average
0,5MHz to 5MHz	56dBµV	QPeak
	46dBµV	Average
5MHz to 30MHz	60BµV	QPeak
	50dBµV	Average

*Decreases with the logarithm of the frequency

9.4. 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
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	12/17	06/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	02/19	08/20

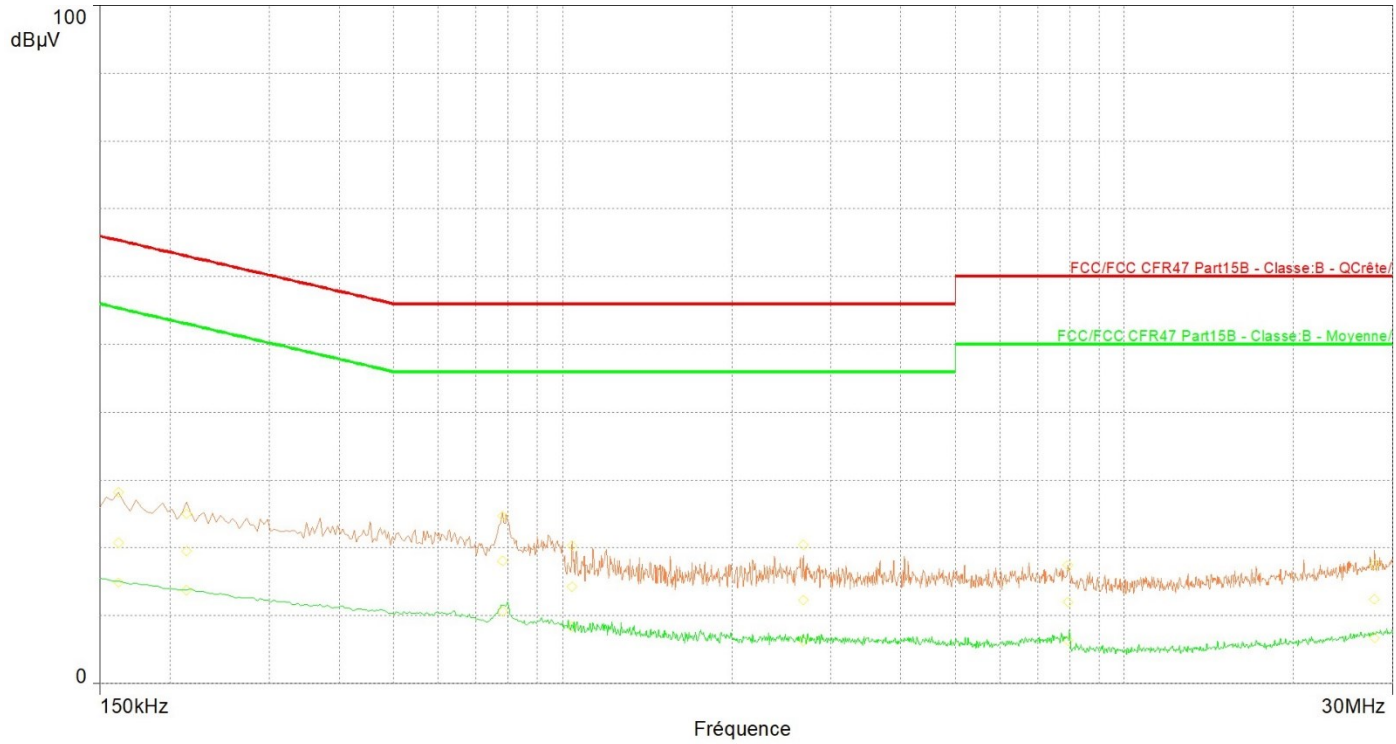
Note: In our quality system, the test equipment calibration due is more & less 2 months

9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

9.6. RESULTS

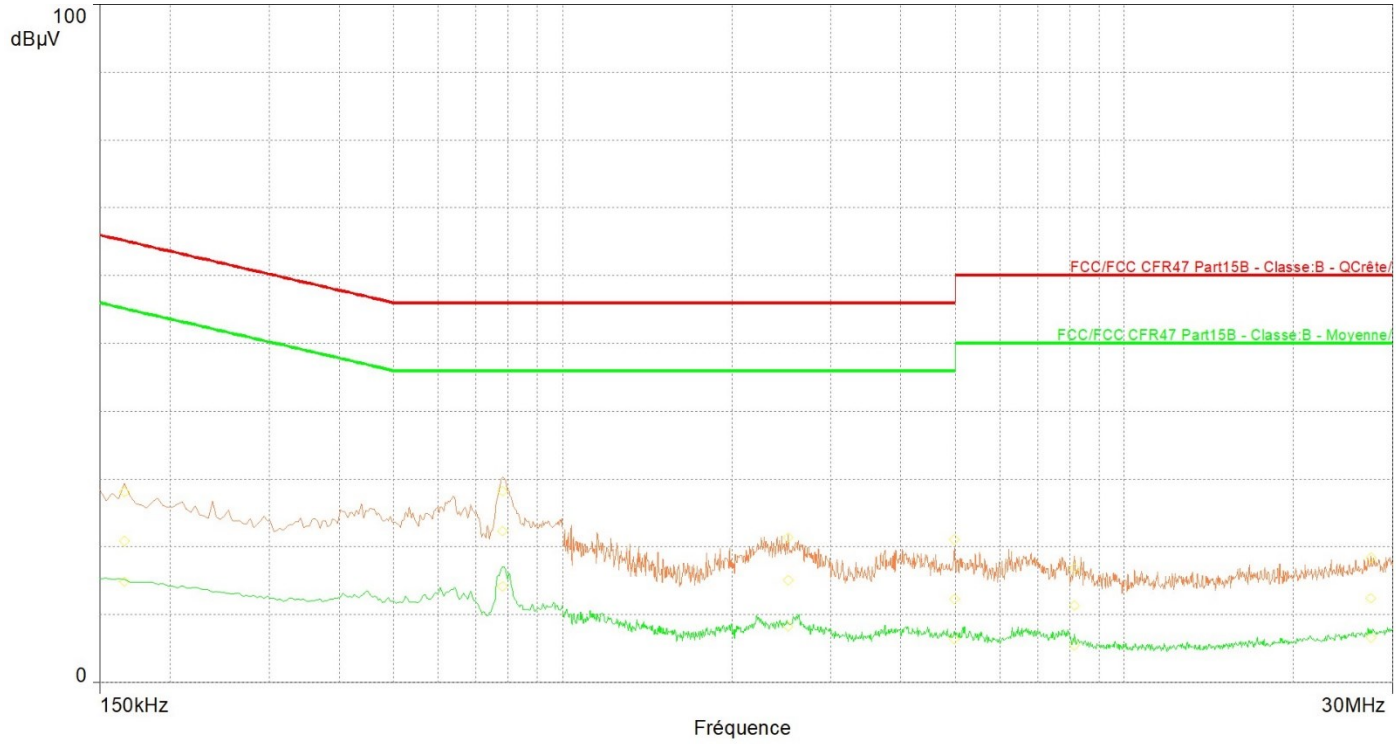
CONDUCTED EMISSIONS			
Graph name:	Emc#1	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test1_FCC_BlocALIM5V_120VAC/60Hz_Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC/60Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



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)
0.162	28.2	20.8	65.4	-44.6	14.9	55.4	-40.5	Phase 1	10.1
0.214	25.0	19.5	63.0	-43.5	13.7	53.0	-39.3	Phase 1	10.1
0.782	24.7	18.0	56.0	-38.0	10.7	46.0	-35.3	Phase 1	10.1
1.040	20.4	14.3	56.0	-41.7	8.4	46.0	-37.6	Phase 1	10.2
2.684	20.4	12.3	56.0	-43.7	6.3	46.0	-39.7	Phase 1	10.3
7.936	17.5	12.0	60.0	-48.0	6.3	50.0	-43.7	Phase 1	10.9
27.876	17.6	12.4	60.0	-47.6	6.7	50.0	-43.3	Phase 1	12.6

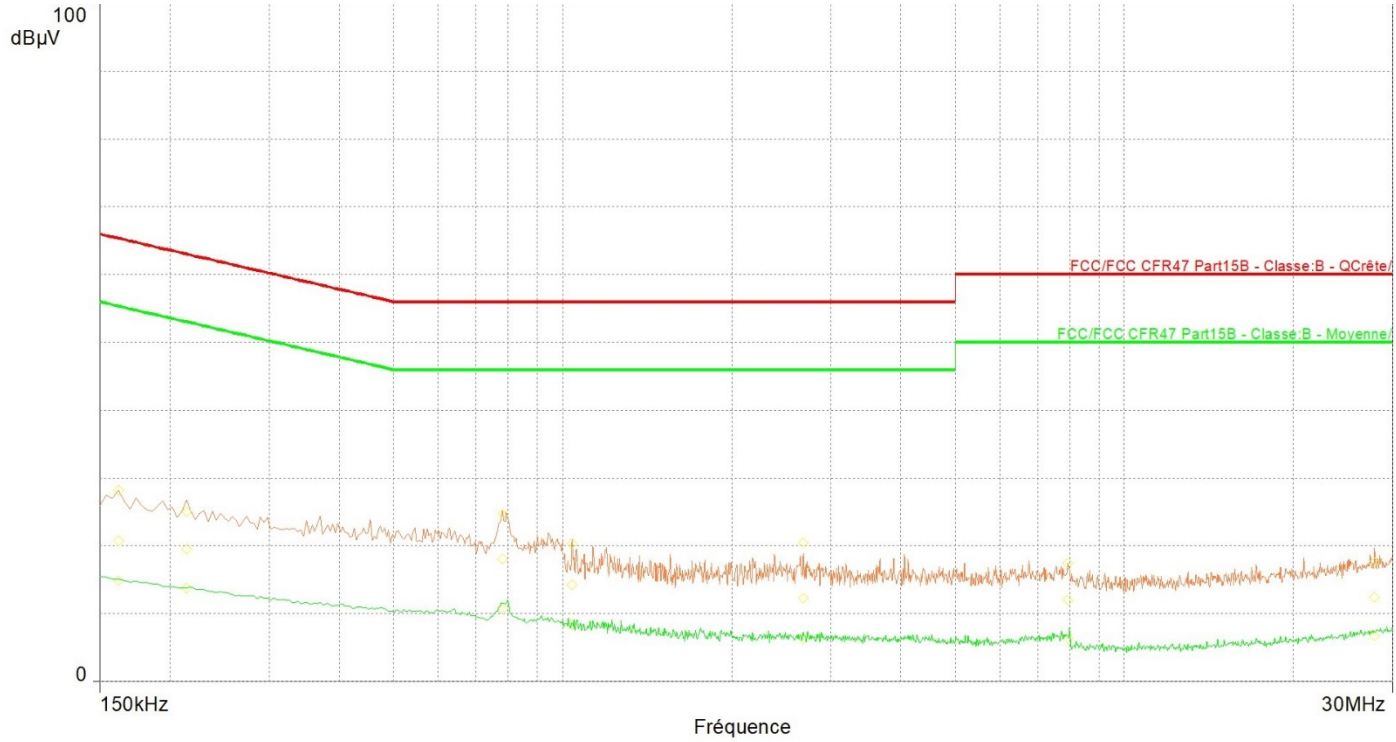
CONDUCTED EMISSIONS			
Graph name:	Emc#2	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test2_FCC_BlocALIM5V_120VAC/60Hz_Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC/60Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz



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)
0.166	28.1	20.9	65.2	-44.3	14.9	55.2	-40.3	Neutre	10.1
0.782	28.2	22.3	56.0	-33.7	14.1	46.0	-31.9	Neutre	10.1
2.520	21.3	15.1	56.0	-40.9	8.2	46.0	-37.8	Neutre	10.3
4.984	21.1	12.3	56.0	-43.7	6.4	46.0	-39.6	Neutre	10.6
8.144	16.8	11.4	60.0	-48.6	5.4	50.0	-44.6	Neutre	10.9
27.468	18.4	12.4	60.0	-47.6	6.7	50.0	-43.3	Neutre	12.6

CONDUCTED EMISSIONS			
Graph name:	Emc#3	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test3_FCC_BlocALIM5V_240VAC/50Hz_Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC/50Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



Spurious emissions

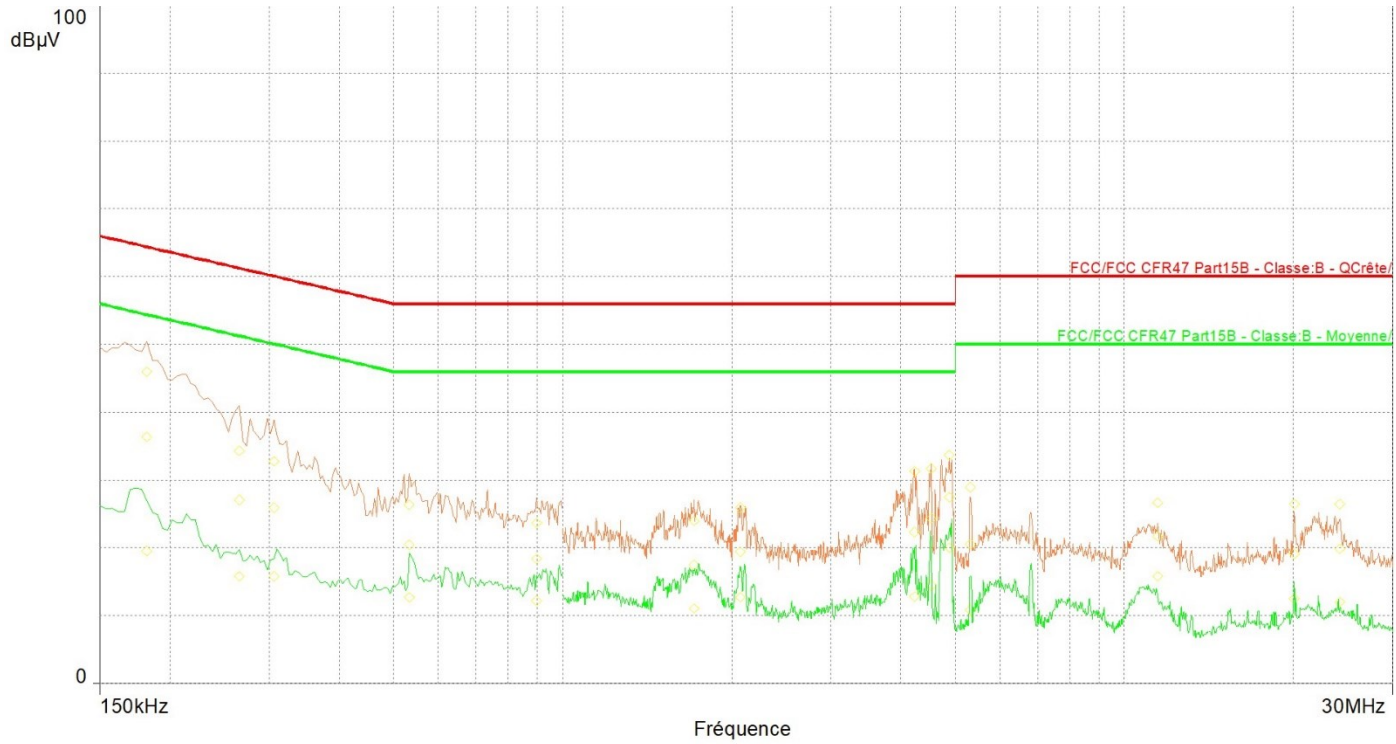
Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.162	28.2	20.8	65.4	-44.6	14.9	55.4	-40.5	Phase 1	10.1
0.214	25.0	19.5	63.0	-43.5	13.7	53.0	-39.3	Phase 1	10.1
0.782	24.7	18.0	56.0	-38.0	10.7	46.0	-35.3	Phase 1	10.1
1.040	20.4	14.3	56.0	-41.7	8.4	46.0	-37.6	Phase 1	10.2
2.684	20.4	12.3	56.0	-43.7	6.3	46.0	-39.7	Phase 1	10.3
7.936	17.5	12.0	60.0	-48.0	6.3	50.0	-43.7	Phase 1	10.9
27.876	17.6	12.4	60.0	-47.6	6.7	50.0	-43.3	Phase 1	12.6

CONDUCTED EMISSIONS			
Graph name:	Emc#4	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test4_FCC_BlocALIM5V_240VAC/50Hz_Neutral	
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)
0.166	28.1	20.9	65.2	-44.3	14.9	55.2	-40.3	Neutre	10.1
0.782	28.2	22.3	56.0	-33.7	14.1	46.0	-31.9	Neutre	10.1
2.520	21.3	15.1	56.0	-40.9	8.2	46.0	-37.8	Neutre	10.3
4.984	21.1	12.3	56.0	-43.7	6.4	46.0	-39.6	Neutre	10.6
8.144	16.8	11.4	60.0	-48.6	5.4	50.0	-44.6	Neutre	10.9
27.468	18.4	12.4	60.0	-47.6	6.7	50.0	-43.3	Neutre	12.6

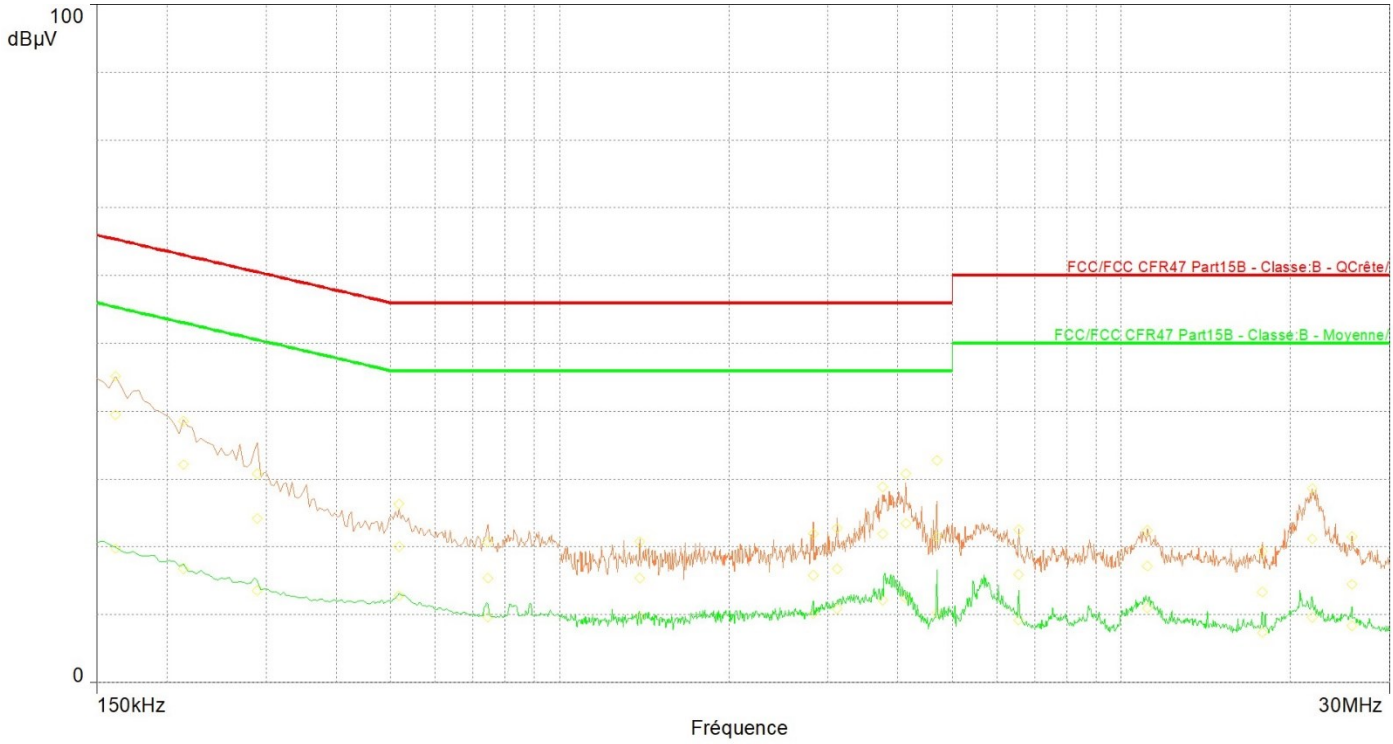
CONDUCTED EMISSIONS			
Graph name:	Emc#5	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test5_FCC_USB-Laptop_120VAC/60Hz_Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC/60Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



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)
0.182	46.0	36.4	64.4	-28.0	19.5	54.4	-34.9	Phase 1	10.1
0.266	34.3	27.1	61.2	-34.2	15.8	51.2	-35.4	Phase 1	10.1
0.306	32.8	25.9	60.1	-34.2	15.8	50.1	-34.3	Phase 1	10.1
0.534	26.4	20.5	56.0	-35.5	12.7	46.0	-33.3	Phase 1	10.1
0.898	23.7	18.4	56.0	-37.6	12.2	46.0	-33.8	Phase 1	10.1
1.716	24.0	17.4	56.0	-38.6	11.1	46.0	-34.9	Phase 1	10.2
2.072	25.9	19.4	56.0	-36.6	12.7	46.0	-33.3	Phase 1	10.3
4.228	31.3	22.3	56.0	-33.7	12.8	46.0	-33.2	Phase 1	10.5
4.532	31.7	24.4	56.0	-31.6	14.5	46.0	-31.5	Phase 1	10.5
4.872	33.7	27.5	56.0	-28.5	20.0	46.0	-26.0	Phase 1	10.5
5.312	28.9	20.5	60.0	-39.5	10.8	50.0	-39.2	Phase 1	10.6
11.440	26.7	21.7	60.0	-38.3	15.8	50.0	-34.2	Phase 1	11.2
20.036	26.4	19.1	60.0	-40.9	12.5	50.0	-37.5	Phase 1	12.1
24.180	26.5	19.9	60.0	-40.1	12.0	50.0	-38.0	Phase 1	12.4

CONDUCTED EMISSIONS			
Graph name:	Emc#6	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test6_FCC_USB-Laptop_120VAC/60Hz_Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC/60Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz

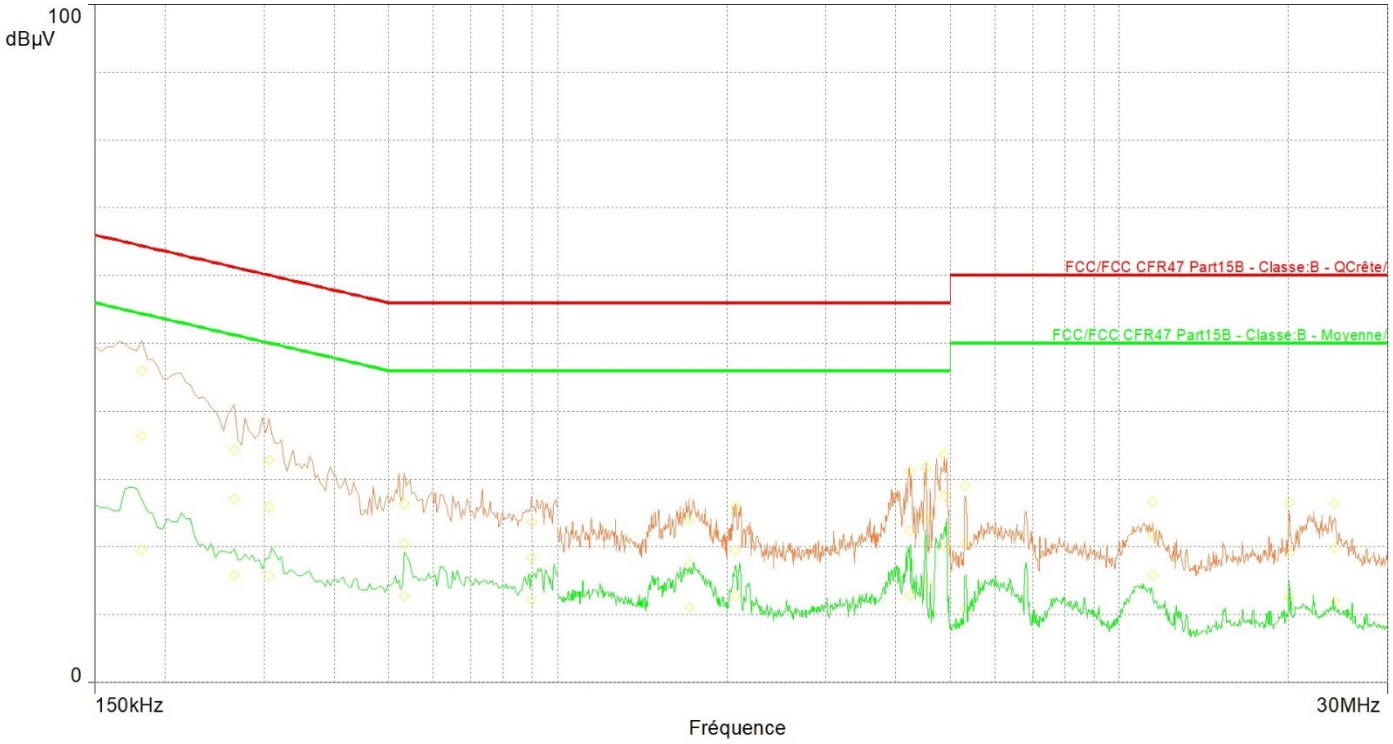


Spurious emissions

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)
0.162	45.1	39.5	65.4	-25.8	19.7	55.4	-35.7	Neutre	10.1
0.214	38.5	32.2	63.0	-30.9	16.8	53.0	-36.3	Neutre	10.1
0.290	30.8	24.2	60.5	-36.4	13.6	50.5	-37.0	Neutre	10.1
0.518	26.4	20.0	56.0	-36.0	12.8	46.0	-33.2	Neutre	10.1
0.746	20.7	15.4	56.0	-40.6	9.6	46.0	-36.4	Neutre	10.1
1.388	20.7	15.4	56.0	-40.6	9.7	46.0	-36.3	Neutre	10.2
2.824	21.9	15.8	56.0	-40.2	10.1	46.0	-35.9	Neutre	10.3
3.120	22.7	16.7	56.0	-39.3	10.8	46.0	-35.2	Neutre	10.4
3.756	28.8	21.9	56.0	-34.1	12.1	46.0	-33.9	Neutre	10.4
4.132	30.8	23.4	56.0	-32.6	12.4	46.0	-33.6	Neutre	10.5
4.692	32.7	21.5	56.0	-34.5	10.2	46.0	-35.8	Neutre	10.5
6.564	22.6	15.9	60.0	-44.1	9.2	50.0	-40.8	Neutre	10.7

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)
11.112	22.4	17.2	60.0	-42.8	11.0	50.0	-39.0	Neutre	11.2
17.832	19.4	13.3	60.0	-46.7	7.4	50.0	-42.6	Neutre	11.9
21.828	28.6	21.2	60.0	-38.8	9.6	50.0	-40.4	Neutre	12.2
25.696	21.5	14.4	60.0	-45.6	8.4	50.0	-41.6	Neutre	12.5

CONDUCTED EMISSIONS			
Graph name:	Emc#7	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test7_FCC_USB-Laptop_240VAC/50Hz_Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC/50Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz

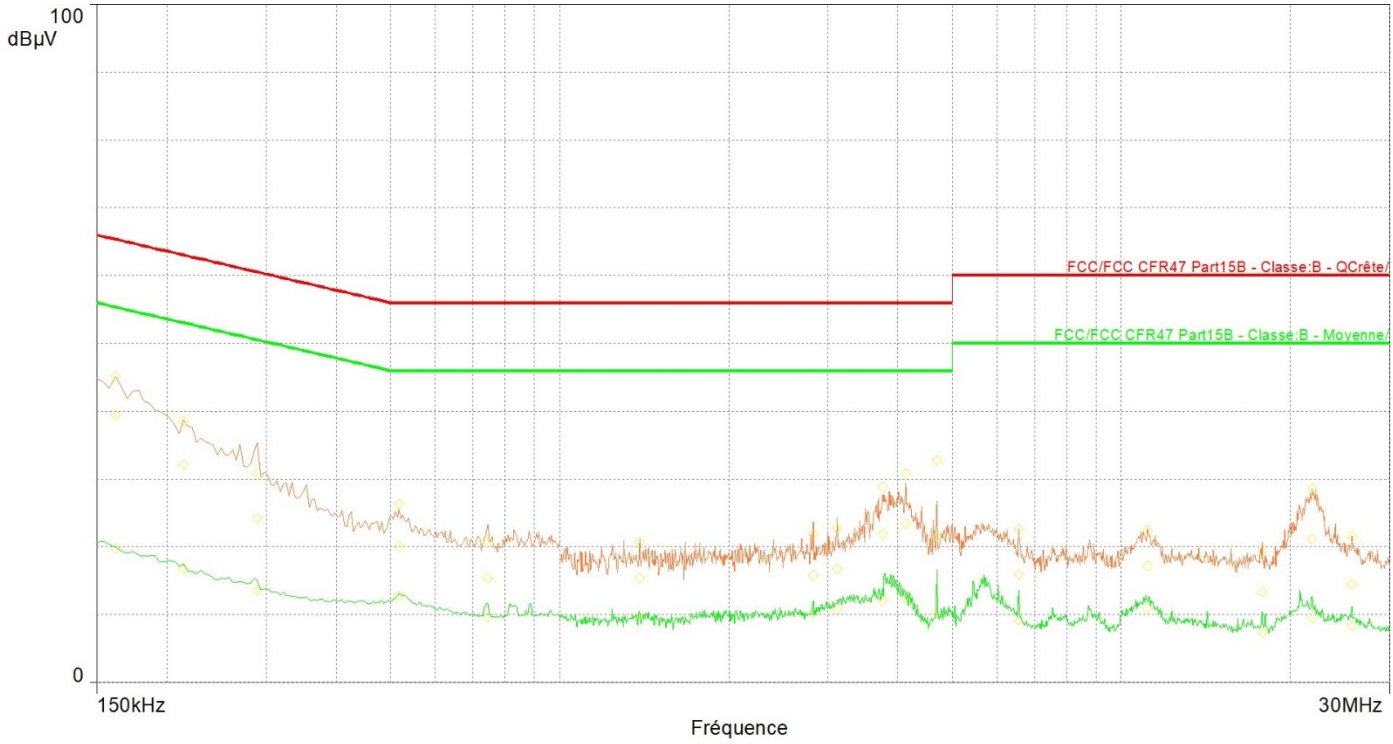


Spurious emissions

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)
0.182	46.0	36.4	64.4	-28.0	19.5	54.4	-34.9	Phase 1	10.1
0.266	34.3	27.1	61.2	-34.2	15.8	51.2	-35.4	Phase 1	10.1
0.306	32.8	25.9	60.1	-34.2	15.8	50.1	-34.3	Phase 1	10.1
0.534	26.4	20.5	56.0	-35.5	12.7	46.0	-33.3	Phase 1	10.1
0.898	23.7	18.4	56.0	-37.6	12.2	46.0	-33.8	Phase 1	10.1
1.716	24.0	17.4	56.0	-38.6	11.1	46.0	-34.9	Phase 1	10.2
2.072	25.9	19.4	56.0	-36.6	12.7	46.0	-33.3	Phase 1	10.3
4.228	31.3	22.3	56.0	-33.7	12.8	46.0	-33.2	Phase 1	10.5
4.532	31.7	24.4	56.0	-31.6	14.5	46.0	-31.5	Phase 1	10.5
4.872	33.7	27.5	56.0	-28.5	20.0	46.0	-26.0	Phase 1	10.5
5.312	28.9	20.5	60.0	-39.5	10.8	50.0	-39.2	Phase 1	10.6
11.440	26.7	21.7	60.0	-38.3	15.8	50.0	-34.2	Phase 1	11.2

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)
20.036	26.4	19.1	60.0	-40.9	12.5	50.0	-37.5	Phase 1	12.1
24.180	26.5	19.9	60.0	-40.1	12.0	50.0	-38.0	Phase 1	12.4

CONDUCTED EMISSIONS			
Graph name:	Emc#8	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Test8_FCC_USB-Laptop_240VAC/50Hz_Neutral	
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)
0.162	45.1	39.5	65.4	-25.8	19.7	55.4	-35.7	Neutre	10.1
0.214	38.5	32.2	63.0	-30.9	16.8	53.0	-36.3	Neutre	10.1
0.290	30.8	24.2	60.5	-36.4	13.6	50.5	-37.0	Neutre	10.1
0.518	26.4	20.0	56.0	-36.0	12.8	46.0	-33.2	Neutre	10.1
0.746	20.7	15.4	56.0	-40.6	9.6	46.0	-36.4	Neutre	10.1
1.388	20.7	15.4	56.0	-40.6	9.7	46.0	-36.3	Neutre	10.2
2.824	21.9	15.8	56.0	-40.2	10.1	46.0	-35.9	Neutre	10.3
3.120	22.7	16.7	56.0	-39.3	10.8	46.0	-35.2	Neutre	10.4
3.756	28.8	21.9	56.0	-34.1	12.1	46.0	-33.9	Neutre	10.4
4.132	30.8	23.4	56.0	-32.6	12.4	46.0	-33.6	Neutre	10.5
4.692	32.7	21.5	56.0	-34.5	10.2	46.0	-35.8	Neutre	10.5
6.564	22.6	15.9	60.0	-44.1	9.2	50.0	-40.8	Neutre	10.7

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)
11.112	22.4	17.2	60.0	-42.8	11.0	50.0	-39.0	Neutre	11.2
17.832	19.4	13.3	60.0	-46.7	7.4	50.0	-42.6	Neutre	11.9
21.828	28.6	21.2	60.0	-38.8	9.6	50.0	-40.4	Neutre	12.2
25.696	21.5	14.4	60.0	-45.6	8.4	50.0	-41.6	Neutre	12.5

9.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.247 & RSS 247 ISSUE 2 limits.

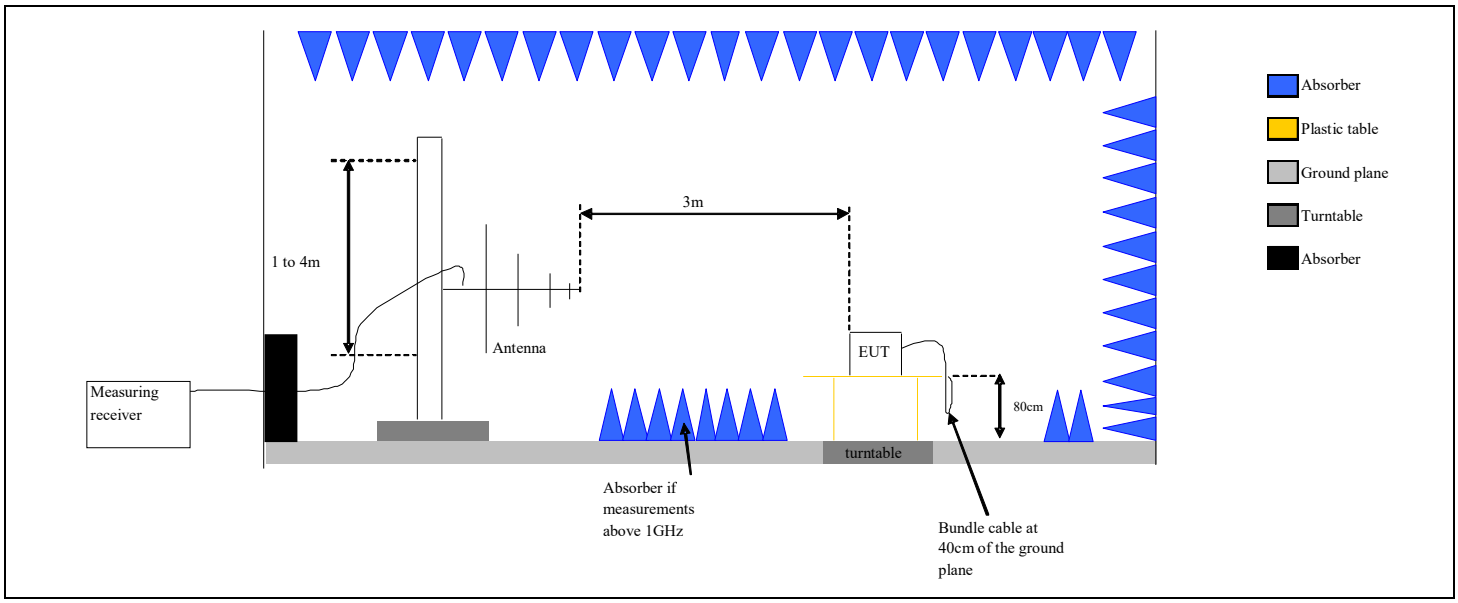
10. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS

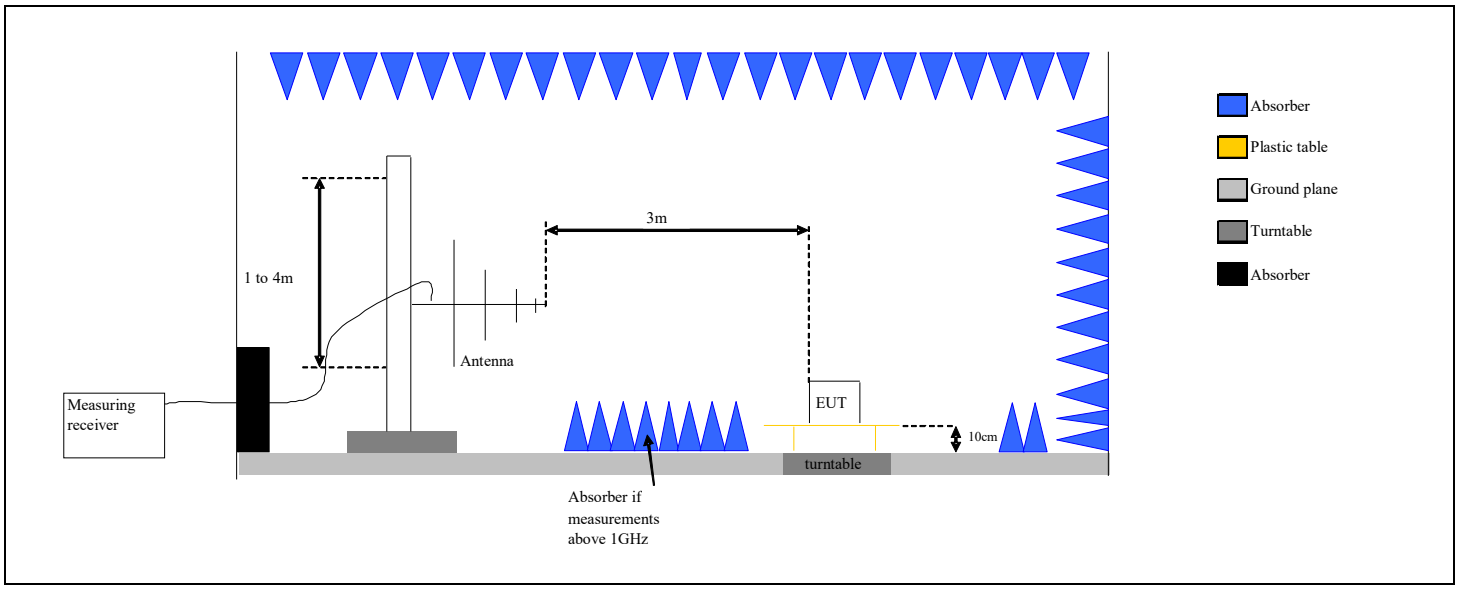
10.1. TEST CONDITIONS

Test performed by	: Mounir BOUAMARA
Date of test	: July 16, 2020 to July 28, 2020
Ambient temperature	: 22 °C
Relative humidity	: 38 %

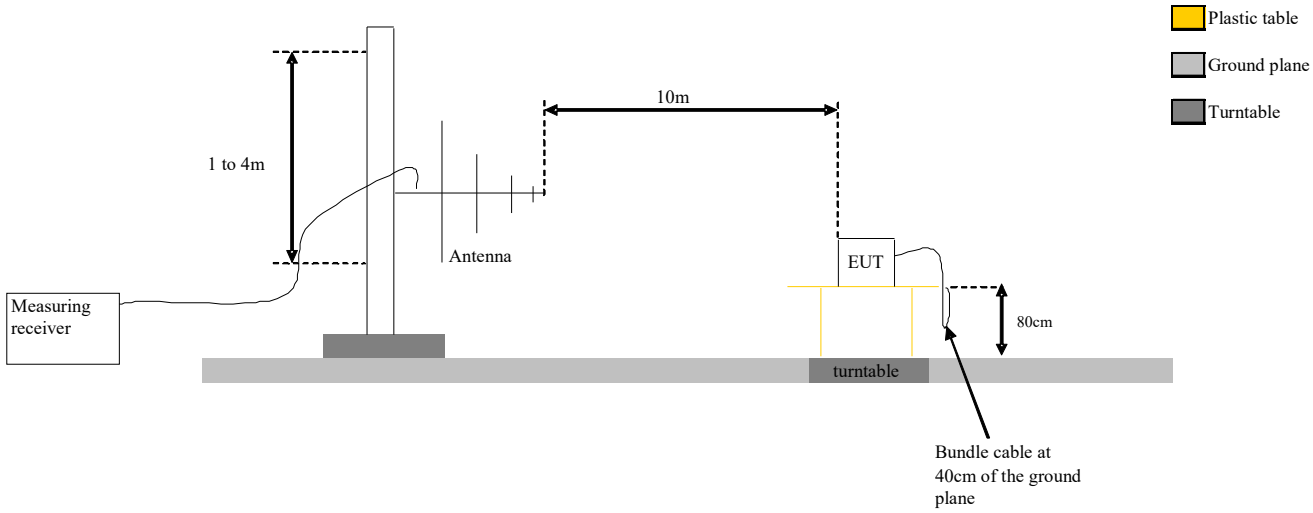
10.2. TEST SETUP

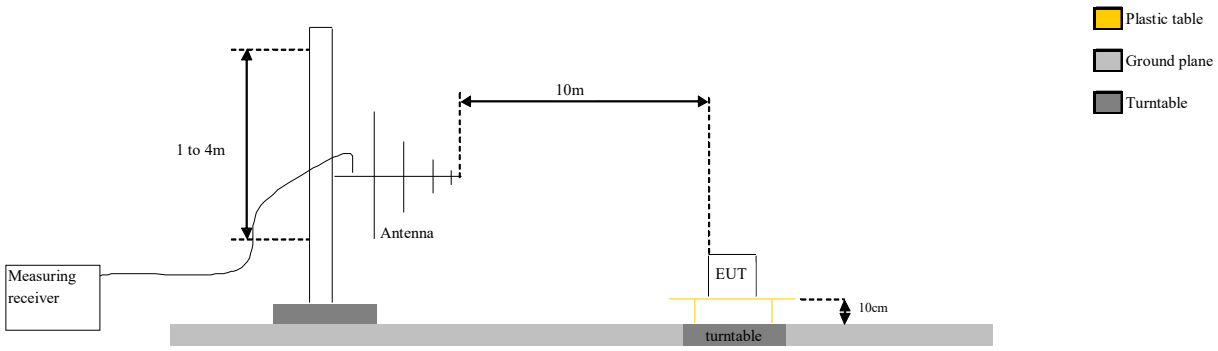
The product has been tested according to ANSI C63.10 (2013) and FCC part15 subpart C.
Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz. Measurement bandwidth was 200Hz below 150kHz and 9kHz between 150kHz & 30MHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. Antenna height was 1m. The EUT is placed **Select Test Site**. Distance between measuring antenna and the EUT is **Distance**.
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 place 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.



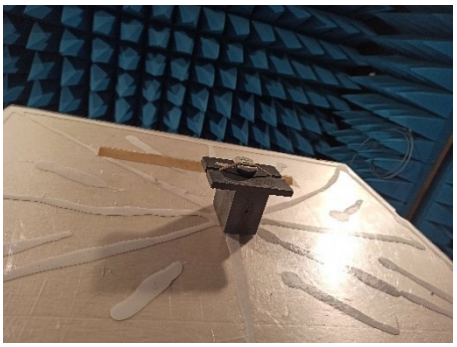


Test set up of Unwanted Emissions in Restricted Frequency Bands in semi anechoic chamber

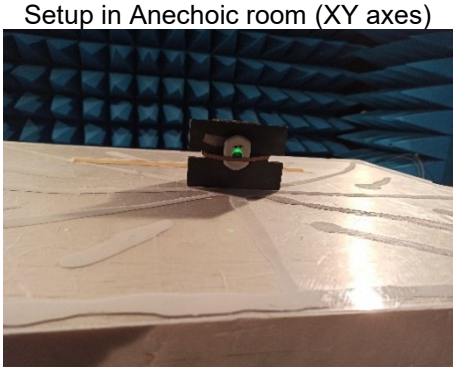




Test Set up for radiated measurement in open area test site



Setup in Anechoic room (XY axes)



Setup in Anechoic room (Z axes)

Photograph for Unwanted Emission in restricted frequency bands

10.3. LIMIT

Measure at 300m		
Frequency range	**Level**	**Detector**
9kHz-490kHz	67.6dBµV/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	**Level**	**Detector**
490kHz-1.705MHz	87.6dBµV/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dBµV/m	QPeak
Measure at 10m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	29.5dBµV/m	QPeak
88MHz to 216MHz	33dBµV/m	QPeak
216MHz to 960MHz	35.5BµV/m	QPeak
960MHz to 1000MHz	43.5dBµV/m	QPeak
Above 1000MHz	63.5dBµV/m	Peak
	43.5dBµV/m	Average
Measure at 3m		

Frequency range	Level	Detector
30MHz to 88MHz	40dBµV/m	QPeak
88MHz to 216MHz	43.5dBµV/m	QPeak
216MHz to 960MHz	46BµV/m	QPeak
960MHz to 1000MHz	54dBµV/m	QPeak
Above 1000MHz	74dBµV/m	Peak
	54dBµV/m	Average

10.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Amplifier 9kHz - 40GHz	LCIE SUD EST	_	A7102082	06/20	06/21
Antenna Bi-Log	CHASE	UPA6192	C2040221	01/18	08/20
Antenna horn 18GHz	EMCO	3115	C2042029	09/17	09/20
BAT EMC	NEXIO	v3.19.1.23	L1000115		
Comb EMR HF	YORK	CGE01	A3169114		
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	01/19	08/20
Emission Cable (SMA 3.3m)	TELEDYNE	26GHz	A5329875	01/19	08/20
Emission Cable (SMA 30cm)	TELEDYNE	26GHz	A5329873	01/19	08/20
Emission Cable <1GHz (Ampl <-> Cage)	-	18GHz	A5329562	08/19	08/20
Emission Cable <1GHz (Ampl <-> Cage)	-	18GHz	A5329907	08/19	08/20
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Power supply DC	METRIX	AX503	A7042308		
Radiated emission comb generator	BARDET	_	A3169050		
Rehausse Table C3	LCIE	_	F2000507		
Rehausse Table C3	LCIE	_	F2000511		
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	10/20
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
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

10.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

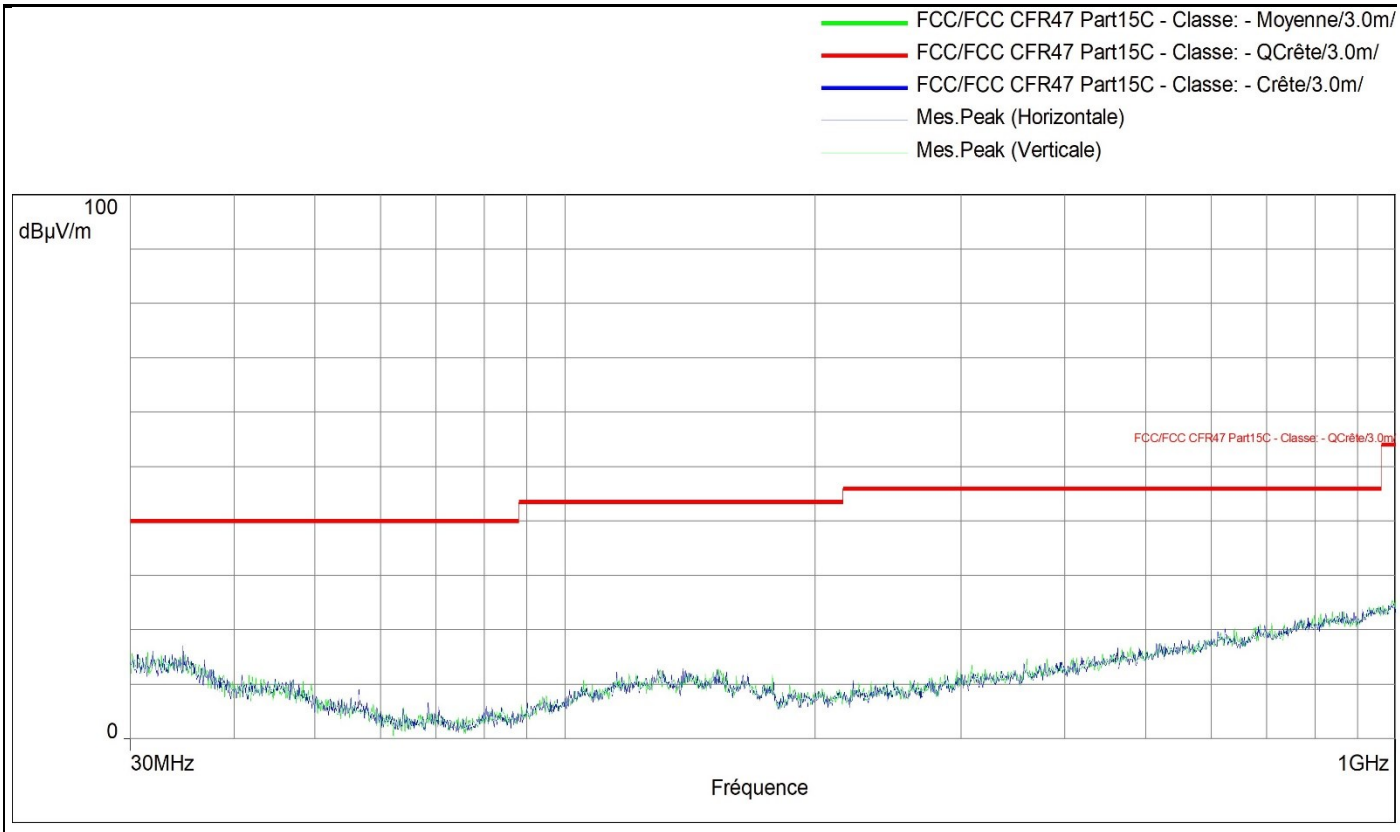
☑ None ☐ Divergence:

10.6. RESULTS

Results in the frequency band [0.009-30] MHz:
No significant frequency observed due to RF module (See test results in §8.5).

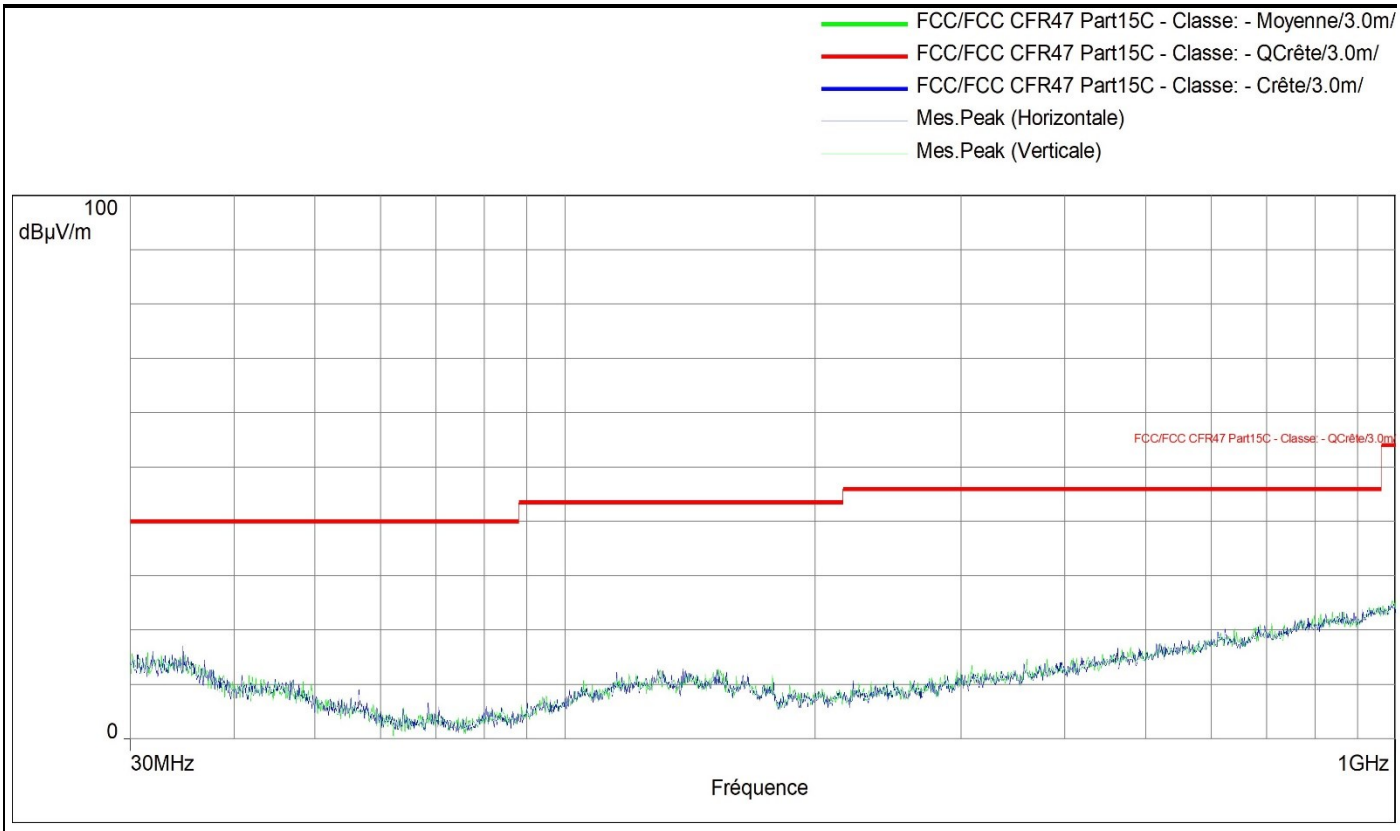
Results in the frequency band [30-1000] MHz: Worst case presented see test results in §8.5(Cmin, Cmid or Cmax):

RADIATED EMISSIONS			
Graph name:	Emr#1	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Worst case presented - TX mode - Axis XY	
Class:			
Frequency range: [30MHz - 1GHz]			
Antenna polarization:		**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



Spurious emissions
No significative frequency observed

RADIATED EMISSIONS			
Graph name:	Emr#2	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Worst case presented - TX mode - Axis Z	
Class:			
Frequency range: [30MHz - 1GHz]			
Antenna polarization:		**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



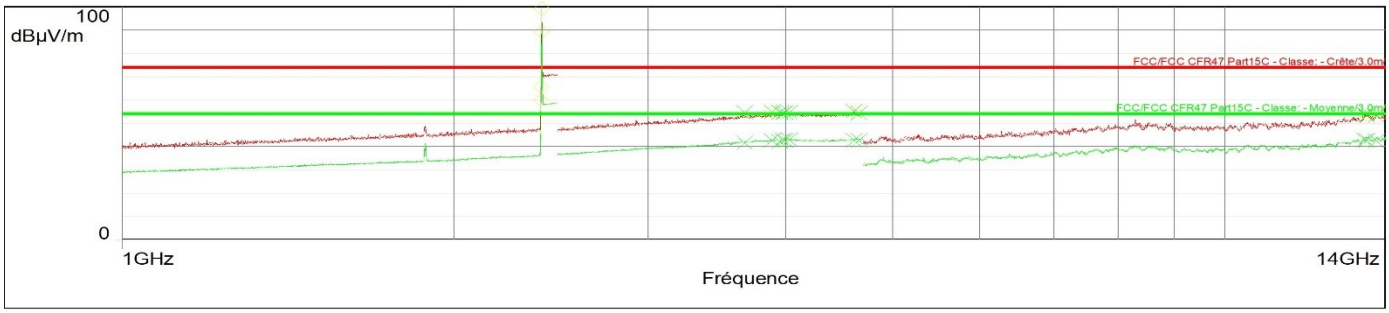
Spurious emissions

No significative frequency observed

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

CMIN

RADIATED EMISSIONS			
Graph name:	Emr#3	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMin - TX mode - Axis XY	
Class:			
Frequency range: [1GHz - 14GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

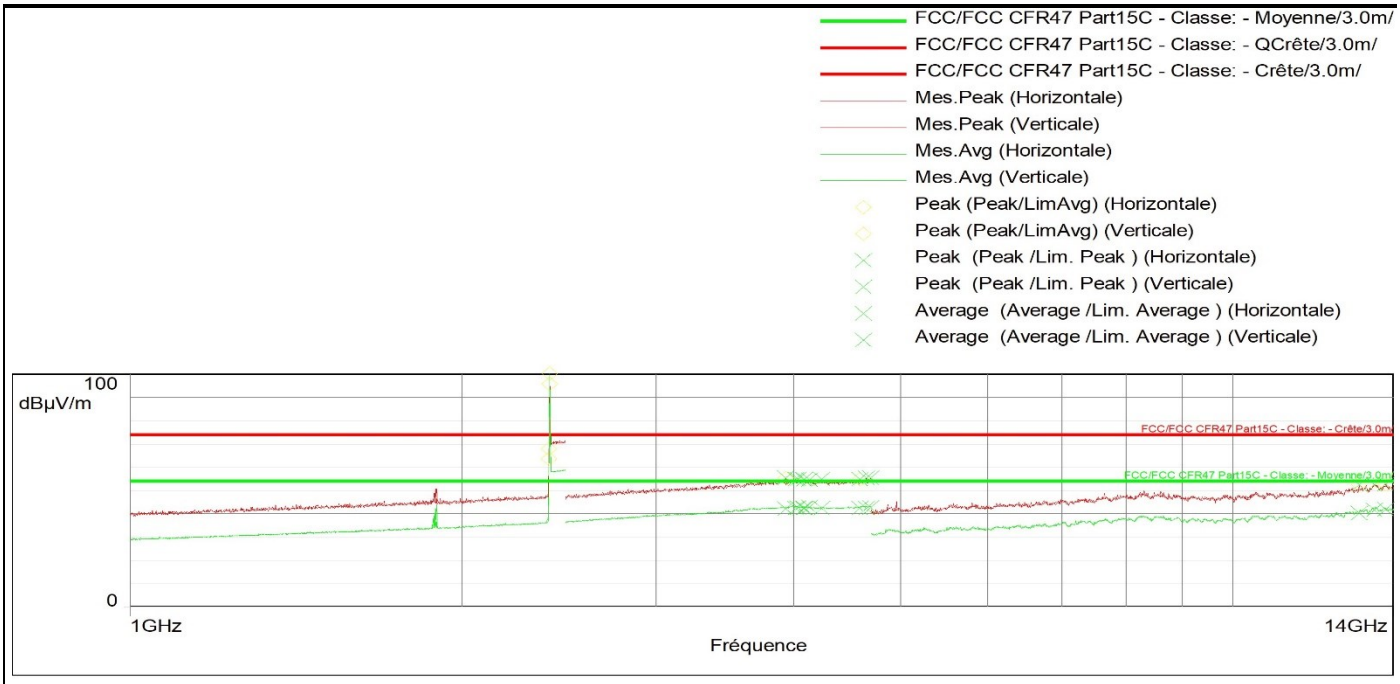


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
3970.772	42.6	54.0	-11.4	Horizontal	Horizontal	38.4
4613.556	42.6	54.0	-11.4	Horizontal	Horizontal	38.5
13400.410	42.6	54.0	-11.4	Horizontal	Horizontal	-13.2
13740.062	42.3	54.0	-11.7	Horizontal	Horizontal	-13.4
3671.987	41.6	54.0	-12.4	Vertical	Vertical	37.5
3886.544	42.5	54.0	-11.5	Vertical	Vertical	38.2
3947.720	42.1	54.0	-11.9	Vertical	Vertical	38.4
3989.833	42.5	54.0	-11.5	Vertical	Vertical	38.5
4030.617	42.7	54.0	-11.3	Vertical	Vertical	38.5
4657.886	42.5	54.0	-11.5	Vertical	Vertical	38.6
13462.795	42.6	54.0	-11.4	Vertical	Vertical	-12.5

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
3970.772	54.3	74.0	-19.7	Horizontal	Horizontal	38.4
4613.556	55.0	74.0	-19.0	Horizontal	Horizontal	38.5
13400.410	53.8	74.0	-20.2	Horizontal	Horizontal	-13.2
13740.062	53.3	74.0	-20.7	Horizontal	Horizontal	-13.4
3671.987	54.4	74.0	-19.6	Vertical	Vertical	37.5
3886.544	54.9	74.0	-19.1	Vertical	Vertical	38.2
3947.720	54.5	74.0	-19.5	Vertical	Vertical	38.4
3989.833	54.6	74.0	-19.4	Vertical	Vertical	38.5
4030.617	54.6	74.0	-19.4	Vertical	Vertical	38.5
4657.886	54.3	74.0	-19.7	Vertical	Vertical	38.6
13462.795	53.2	74.0	-20.8	Vertical	Vertical	-12.5

RADIATED EMISSIONS			
Graph name:	Emr#4	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMin - TX mode - Axis Z	
Class:			
Frequency range: [1GHz - 14GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

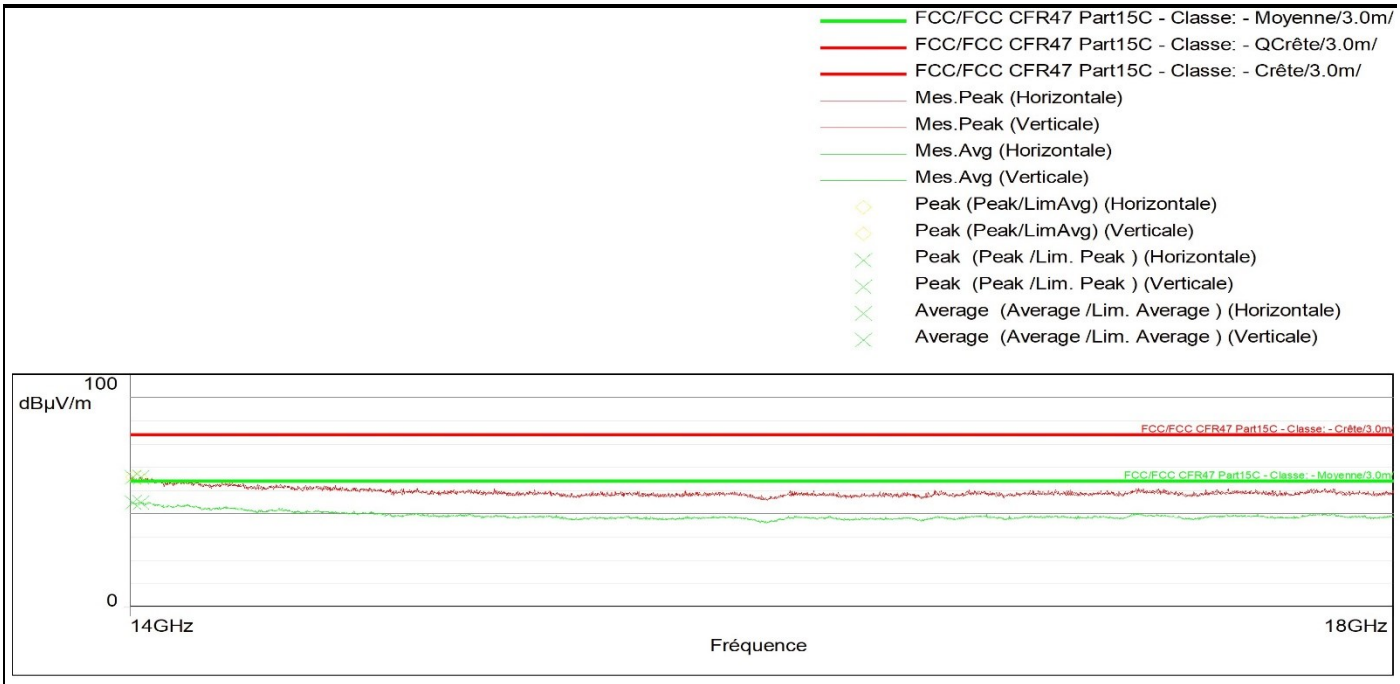


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
3934.421	42.0	54.0	-12.0	Horizontal	Horizontal	38.3
4033.277	42.6	54.0	-11.4	Horizontal	Horizontal	38.5
4134.349	42.8	54.0	-11.2	Horizontal	Horizontal	38.4
4652.124	42.2	54.0	-11.8	Horizontal	Horizontal	38.6
4693.350	42.6	54.0	-11.4	Horizontal	Horizontal	38.7
13450.665	41.5	54.0	-12.5	Horizontal	Horizontal	-12.6
13772.410	41.9	54.0	-12.1	Horizontal	Horizontal	-13.3
4082.040	42.4	54.0	-11.6	Vertical	Vertical	38.5
4238.081	42.2	54.0	-11.8	Vertical	Vertical	38.4
4592.721	42.4	54.0	-11.6	Vertical	Vertical	38.5
13027.832	40.2	54.0	-13.8	Vertical	Vertical	-14.8

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
3934.421	55.4	74.0	-18.6	Horizontal	Horizontal	38.3
4033.277	54.8	74.0	-19.2	Horizontal	Horizontal	38.5
4091.792	54.9	74.0	-19.1	Horizontal	Horizontal	38.5
4134.349	54.5	74.0	-19.5	Horizontal	Horizontal	38.4
4652.124	55.4	74.0	-18.6	Horizontal	Horizontal	38.6
4693.350	55.2	74.0	-18.8	Horizontal	Horizontal	38.7
13450.665	52.4	74.0	-21.6	Horizontal	Horizontal	-12.6
13772.410	52.7	74.0	-21.3	Horizontal	Horizontal	-13.3
4082.040	54.6	74.0	-19.4	Vertical	Vertical	38.5
4238.081	54.8	74.0	-19.2	Vertical	Vertical	38.4
4592.721	54.8	74.0	-19.2	Vertical	Vertical	38.5
13027.832	52.4	74.0	-21.6	Vertical	Vertical	-14.8

RADIATED EMISSIONS			
Graph name:	Emr#9	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMin - TX mode - Axis XY	
Class:			
Frequency range: [14GHz - 18GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

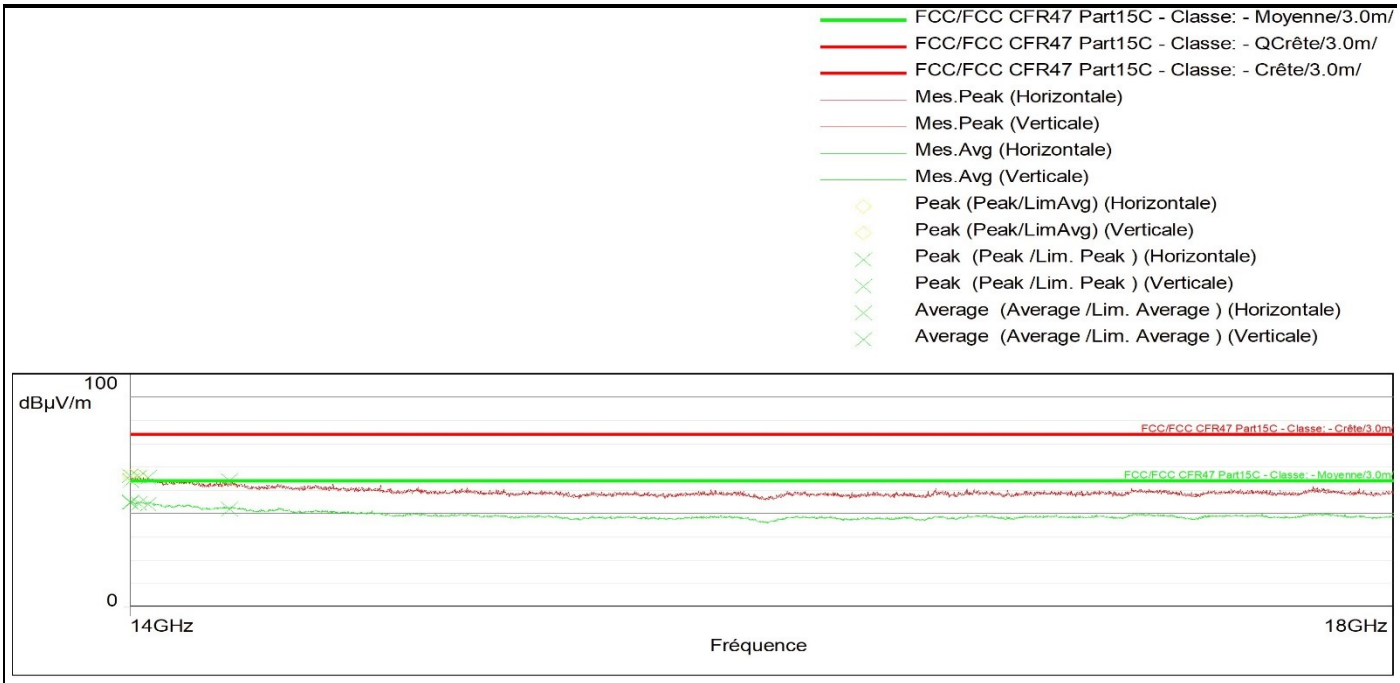


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
14008.500	44.6	54.0	-9.4	Horizontal	Horizontal	3.4
14029.500	44.7	54.0	-9.3	Vertical	Vertical	3.4

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
14008.500	55.5	74.0	-18.5	Horizontal	Horizontal	3.4
14029.500	55.6	74.0	-18.4	Vertical	Vertical	3.4

RADIATED EMISSIONS			
Graph name:	Emr#10	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMin - TX mode - Axis Z	
Class:			
Frequency range: [14GHz - 18GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



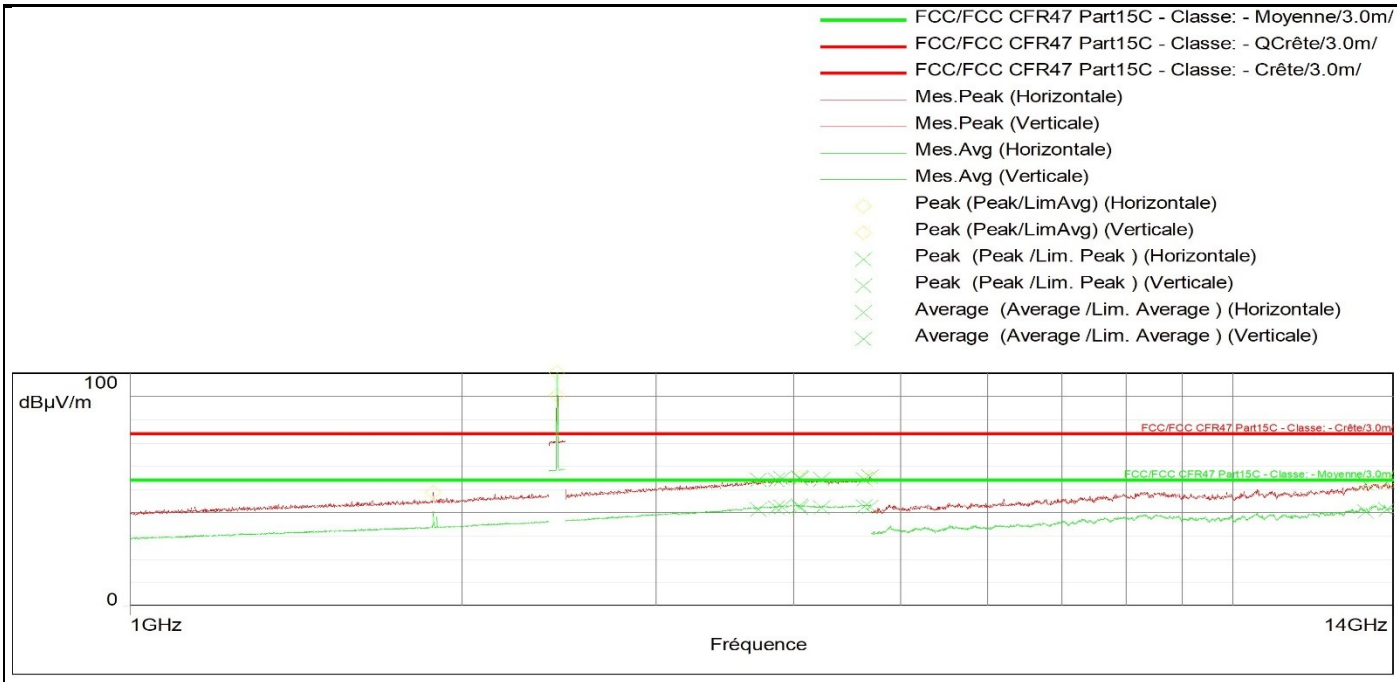
Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
14002.000	44.6	54.0	-9.4	Horizontal	Horizontal	3.4
14025.000	44.3	54.0	-9.7	Horizontal	Horizontal	3.4
14279.500	41.9	54.0	-12.1	Horizontal	Horizontal	1.1
14000.000	44.6	54.0	-9.4	Vertical	Vertical	3.4
14050.000	43.9	54.0	-10.1	Vertical	Vertical	3.4

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
14002.000	54.0	74.0	-20.0	Horizontal	Horizontal	3.4
14025.000	55.6	74.0	-18.4	Horizontal	Horizontal	3.4
14279.500	54.1	74.0	-19.9	Horizontal	Horizontal	1.1
14000.000	56.1	74.0	-17.9	Vertical	Vertical	3.4
14050.000	55.2	74.0	-18.8	Vertical	Vertical	3.4

CMID

RADIATED EMISSIONS			
Graph name:	Emr#5	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMid - TX mode - Axis XY	
Class:			
Frequency range: [1GHz - 14GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

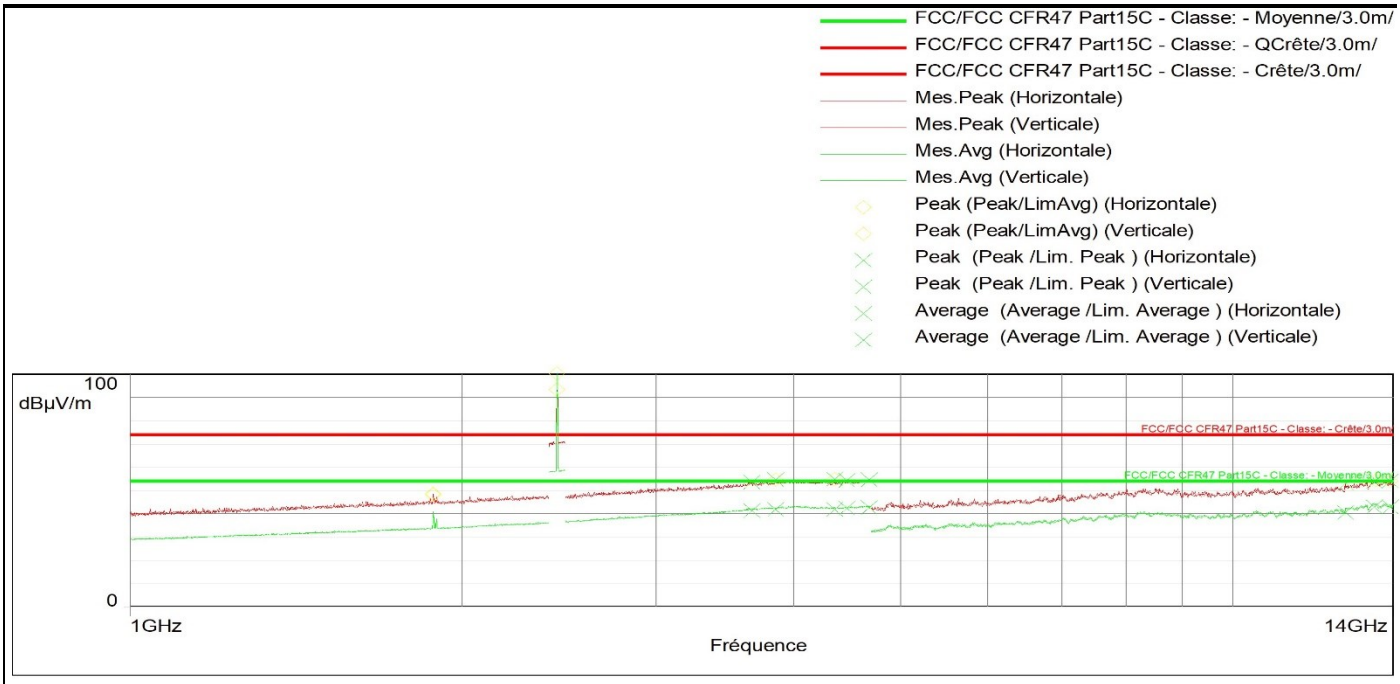


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
3715.431	41.4	54.0	-12.6	Horizontal	Horizontal	37.6
3905.606	42.2	54.0	-11.8	Horizontal	Horizontal	38.2
4053.225	42.0	54.0	-12.0	Horizontal	Horizontal	38.5
4238.968	41.9	54.0	-12.1	Horizontal	Horizontal	38.4
4687.144	42.4	54.0	-11.6	Horizontal	Horizontal	38.7
13788.584	41.1	54.0	-12.9	Horizontal	Horizontal	-13.2
3854.184	42.0	54.0	-12.0	Vertical	Vertical	38.1
4047.906	42.7	54.0	-11.3	Vertical	Vertical	38.5
4633.062	42.5	54.0	-11.5	Vertical	Vertical	38.5
13202.280	40.4	54.0	-13.6	Vertical	Vertical	-13.8

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
3715.431	54.0	74.0	-20.0	Horizontal	Horizontal	37.6
3905.606	54.7	74.0	-19.3	Horizontal	Horizontal	38.2
4053.225	54.7	74.0	-19.3	Horizontal	Horizontal	38.5
4238.968	54.4	74.0	-19.6	Horizontal	Horizontal	38.4
4687.144	55.3	74.0	-18.7	Horizontal	Horizontal	38.7
13788.584	52.8	74.0	-21.2	Horizontal	Horizontal	-13.2
3854.184	54.0	74.0	-20.0	Vertical	Vertical	38.1
4047.906	55.2	74.0	-18.8	Vertical	Vertical	38.5
4633.062	54.2	74.0	-19.8	Vertical	Vertical	38.5
13202.280	52.4	74.0	-21.6	Vertical	Vertical	-13.8

RADIATED EMISSIONS			
Graph name:	Emr#6	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMid - TX mode - Axis Z	
Class:			
Frequency range: [1GHz - 14GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

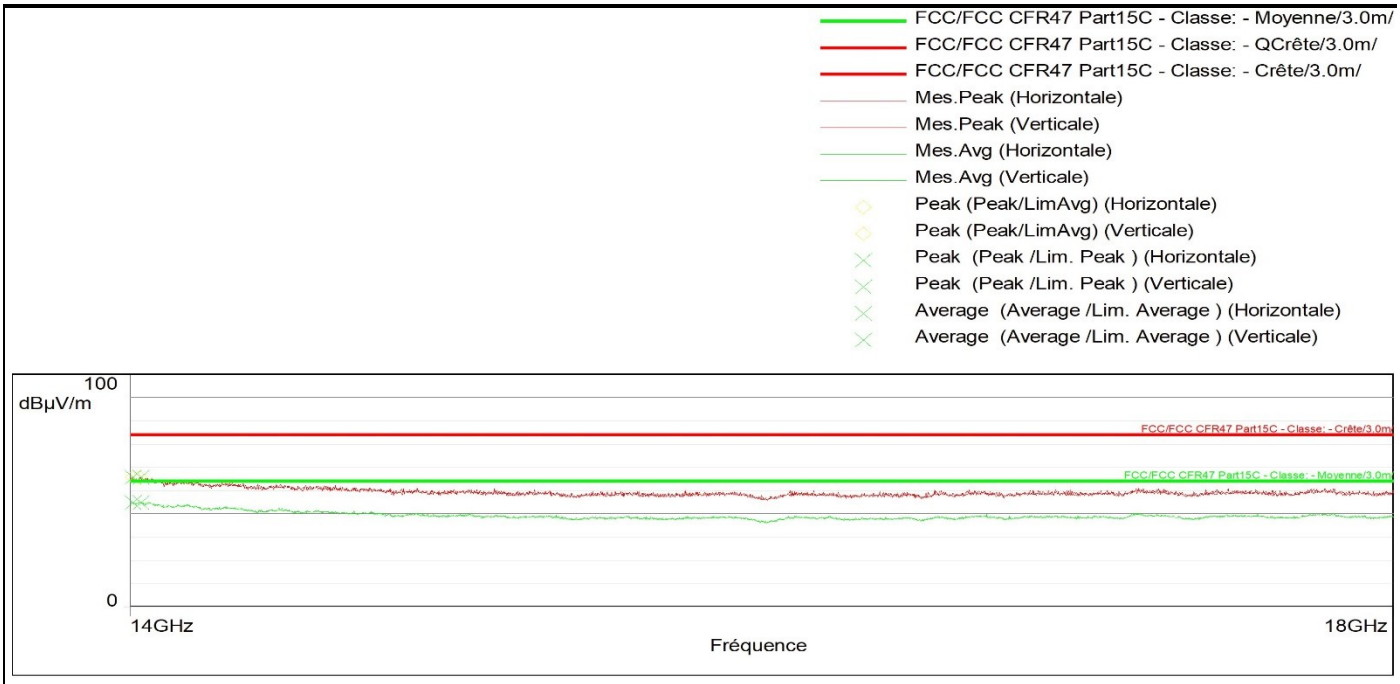


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
3665.338	41.3	54.0	-12.7	Horizontal	Horizontal	37.5
4353.339	41.8	54.0	-12.2	Horizontal	Horizontal	38.3
4678.722	42.4	54.0	-11.6	Horizontal	Horizontal	38.6
3852.410	41.9	54.0	-12.1	Vertical	Vertical	38.0
4467.711	42.4	54.0	-11.6	Vertical	Vertical	38.3
12663.342	40.5	54.0	-13.5	Vertical	Vertical	-15.0
13448.932	42.9	54.0	-11.1	Vertical	Vertical	-12.7
13901.224	42.9	54.0	-11.1	Vertical	Vertical	-12.7

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
3665.338	53.6	74.0	-20.4	Horizontal	Horizontal	37.5
4353.339	54.8	74.0	-19.2	Horizontal	Horizontal	38.3
4678.722	54.5	74.0	-19.5	Horizontal	Horizontal	38.6
3852.410	54.4	74.0	-19.6	Vertical	Vertical	38.0
4467.711	54.3	74.0	-19.7	Vertical	Vertical	38.3
12663.342	52.8	74.0	-21.2	Vertical	Vertical	-15.0
13448.932	53.8	74.0	-20.2	Vertical	Vertical	-12.7
13901.224	54.0	74.0	-20.0	Vertical	Vertical	-12.7

RADIATED EMISSIONS			
Graph name:	Emr#11	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMid - TX mode - Axis XY	
Class:			
Frequency range: [14GHz - 18GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

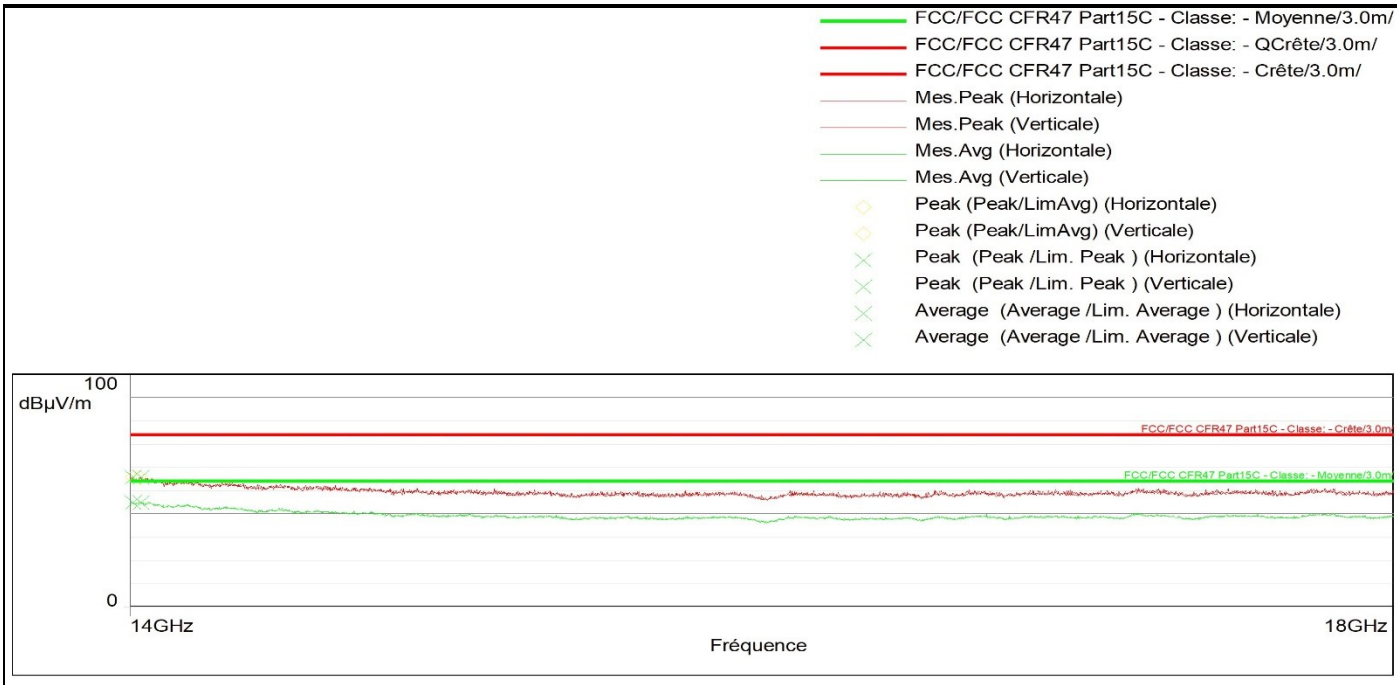


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
14008.500	44.6	54.0	-9.4	Horizontal	Horizontal	3.4
14029.500	44.7	54.0	-9.3	Vertical	Vertical	3.4

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
14008.500	55.5	74.0	-18.5	Horizontal	Horizontal	3.4
14029.500	55.6	74.0	-18.4	Vertical	Vertical	3.4

RADIATED EMISSIONS			
Graph name:	Emr#12	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMid - TX mode - Axis Z	
Class:			
Frequency range: [14GHz - 18GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



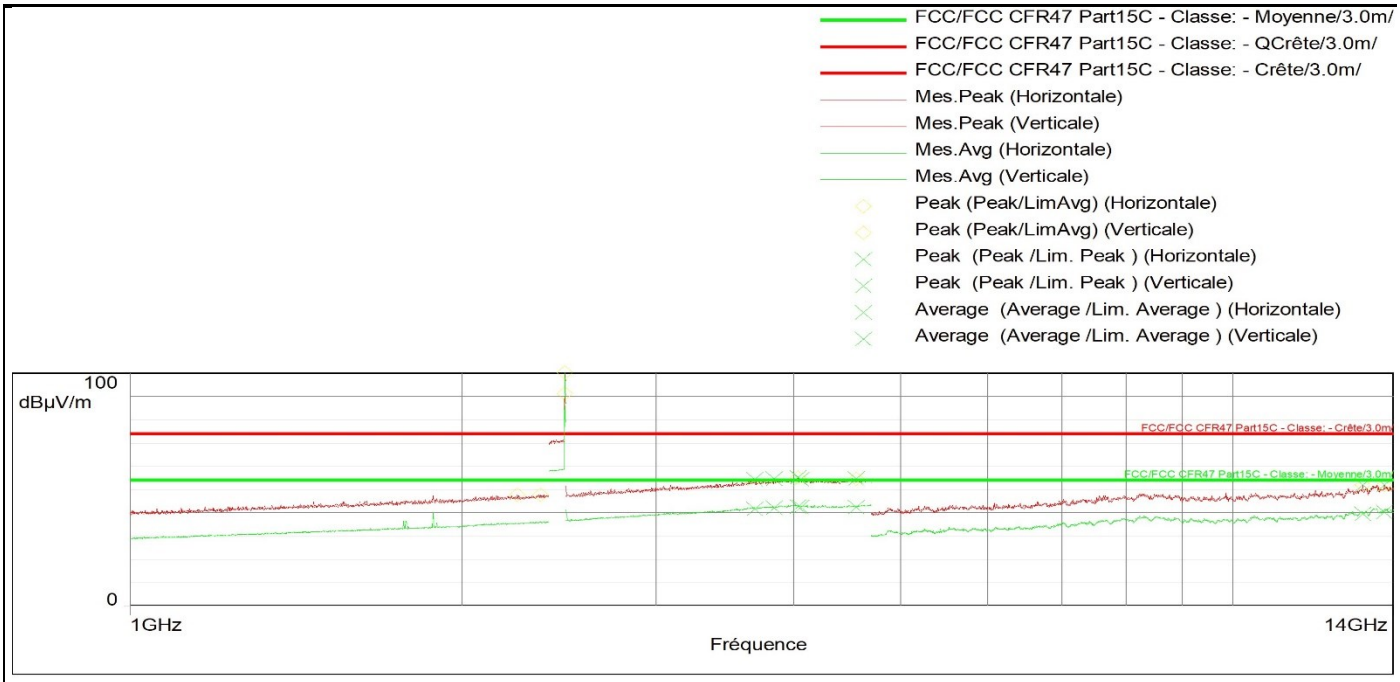
Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
14008.500	44.6	54.0	-9.4	Horizontal	Horizontal	3.4
14029.500	44.7	54.0	-9.3	Vertical	Vertical	3.4

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
14008.500	55.5	74.0	-18.5	Horizontal	Horizontal	3.4
14029.500	55.6	74.0	-18.4	Vertical	Vertical	3.4

CMAX

RADIATED EMISSIONS			
Graph name:	Emr#7	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMax - TX mode - Axis XY	
Class:			
Frequency range: [1GHz - 14GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

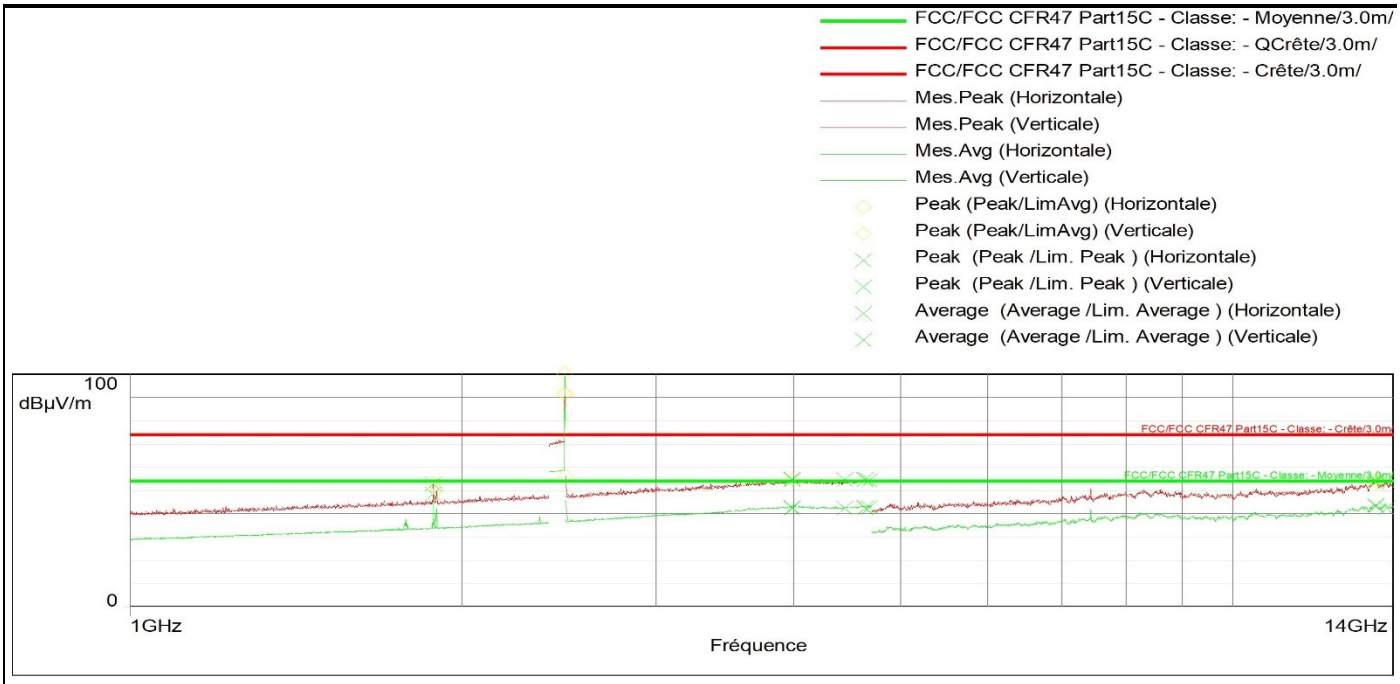


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
3837.338	41.9	54.0	-12.1	Horizontal	Horizontal	38.0
4036.380	42.5	54.0	-11.5	Horizontal	Horizontal	38.5
13120.255	39.3	54.0	-14.7	Horizontal	Horizontal	-15.9
3686.173	41.4	54.0	-12.6	Vertical	Vertical	37.5
4059.432	42.4	54.0	-11.6	Vertical	Vertical	38.5
4555.041	42.3	54.0	-11.7	Vertical	Vertical	38.4
13733.708	40.2	54.0	-13.8	Vertical	Vertical	-14.5

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
3837.338	54.7	74.0	-19.3	Horizontal	Horizontal	38.0
4036.380	55.1	74.0	-18.9	Horizontal	Horizontal	38.5
13120.255	51.8	74.0	-22.2	Horizontal	Horizontal	-15.9
3686.173	54.2	74.0	-19.8	Vertical	Vertical	37.5
4059.432	54.4	74.0	-19.6	Vertical	Vertical	38.5
4555.041	54.6	74.0	-19.4	Vertical	Vertical	38.4
13733.708	52.0	74.0	-22.0	Vertical	Vertical	-14.5

RADIATED EMISSIONS			
Graph name:	Emr#8	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMax - TX mode - Axis Z	
Class:			
Frequency range: [1GHz - 14GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

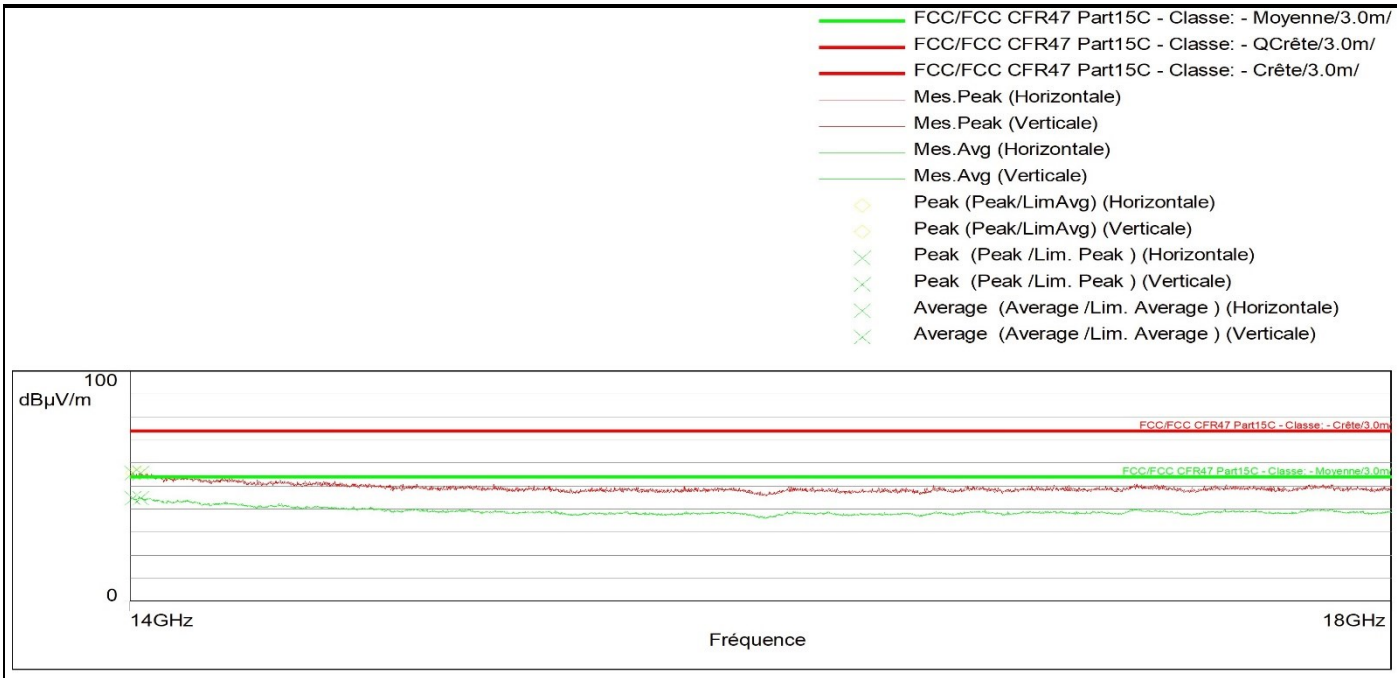


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
1883.750	48.3	54.0	-5.7	Horizontal	Horizontal	31.7
3988.504	42.3	54.0	-11.7	Horizontal	Horizontal	38.5
4450.422	42.3	54.0	-11.7	Horizontal	Horizontal	38.3
4641.041	42.4	54.0	-11.6	Horizontal	Horizontal	38.6
13479.547	43.0	54.0	-11.0	Horizontal	Horizontal	-12.4
13789.739	42.3	54.0	-11.7	Horizontal	Horizontal	-13.2
3984.514	42.5	54.0	-11.5	Vertical	Vertical	38.5
4648.134	42.7	54.0	-11.3	Vertical	Vertical	38.6
4680.495	42.5	54.0	-11.5	Vertical	Vertical	38.6
13491.677	43.6	54.0	-10.4	Vertical	Vertical	-12.3

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
1883.750	52.7	74.0	-21.3	Horizontal	Horizontal	31.7
3988.504	54.8	74.0	-19.2	Horizontal	Horizontal	38.5
4450.422	54.6	74.0	-19.4	Horizontal	Horizontal	38.3
4641.041	54.5	74.0	-19.5	Horizontal	Horizontal	38.6
13479.547	54.3	74.0	-19.7	Horizontal	Horizontal	-12.4
13789.739	53.8	74.0	-20.2	Horizontal	Horizontal	-13.2
3984.514	54.6	74.0	-19.4	Vertical	Vertical	38.5
4648.134	54.9	74.0	-19.1	Vertical	Vertical	38.6
4680.495	54.3	74.0	-19.7	Vertical	Vertical	38.6
13491.677	53.5	74.0	-20.5	Vertical	Vertical	-12.3

RADIATED EMISSIONS			
Graph name:	Emr#13	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMax - TX mode - Axis XY	
Class:			
Frequency range: [14GHz - 18GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

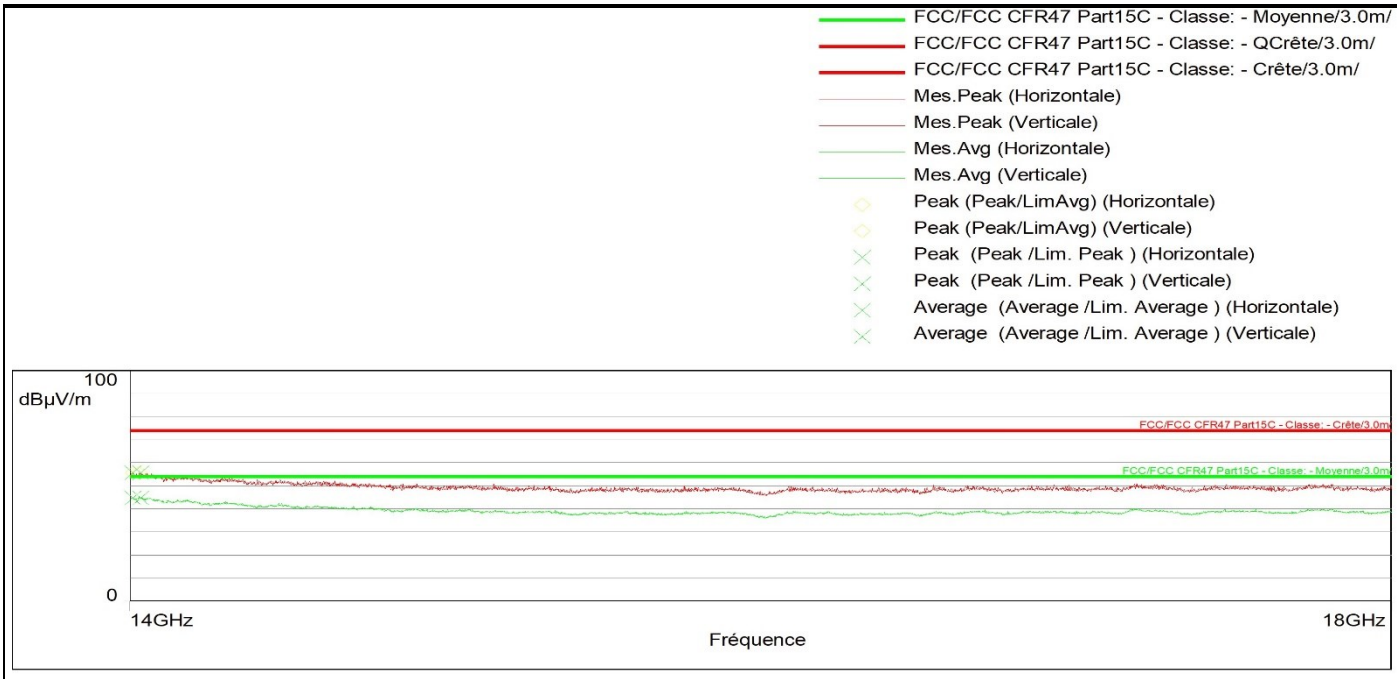


Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Commentaire	Polarization	Correction (dB)
14008.500	44.6	54.0	-9.4	Horizontal	Horizontal	3.4
14029.500	44.7	54.0	-9.3	Vertical	Vertical	3.4

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
14008.500	55.5	74.0	-18.5	Horizontal	Horizontal	3.4
14029.500	55.6	74.0	-18.4	Vertical	Vertical	3.4

RADIATED EMISSIONS			
Graph name:	Emr#14	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMax - TX mode - Axis Z	
Class:			
Frequency range: [14GHz - 18GHz]			
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)
14008.500	44.6	54.0	-9.4	Horizontal	Horizontal	3.4
14029.500	44.7	54.0	-9.3	Vertical	Vertical	3.4

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Commentaire	Polarization	Correction (dB)
14008.500	55.5	74.0	-18.5	Horizontal	Horizontal	3.4
14029.500	55.6	74.0	-18.4	Vertical	Vertical	3.4

10.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the product **Physilog PHY-06**, SN: 002,004,009,010, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.247 & RSS 247 ISSUE 2 limits.

11. UNCERTAINTIES CHART

Type de mesure / *Kind of measurement*	**Incertitude élargie laboratoire / *Wide uncertainty laboratory* (k=2) ± x**	**Incertitude limite du CISPR / *CISPR uncertainty limit* ± 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.*