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TEST REPORT

N°: **19798078-792767-A(FILE#5506002)** Version: **02**

Subject	**Radio spectrum tests according to the standards: FCC CFR 47 Part 15.247 & ANSI C63.10 RSS-247 & RSS-Gen**
Issued to	**BIOCORP** Parc Technologique de Lavaur- La Bechade 63500 - ISSOIRE FRANCE
Apparatus under test	
Product	**Smart cap for pen injectors**
Trade mark	**Mallya**
Manufacturer	**BIOCORP**
Family range	**EFA1 / EFA2 / CND1**
Model under test	**EFA2**
Serial number	**None**
FCCID	**2AYCW-MALLYANN**
IC	**26747- MALLYANN**
Conclusion	See Test Program chapter
Test date	September 12, 2023 to September 14, 2023
Test location	LCIE Grenoble
FCC Test site	FR0008 - 197516 (MOI)
ISED Test site	6500A (MOI)
Sample receipt date	August 30, 2023
Composition of document	57 pages
Document issued on	July 23, 2024

Written by :
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Tests operator

Approved by :
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Technical manager

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	November 08, 2023	Majid MOURZAGH	Creation of the document
02	July 23, 2024	Majid MOURZAGH	Add model CND1 on Family range

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 (2023)**
- **RSS 247 Issue 2**
- **RSS Gen Issue 5**
- **KDB 558074 D01 DTS Meas Guidance v05r02**
- **KDB 662911 D01 Multiple Transmitter Output v02r01**
- **ANSI C63.10 (2013)**

Radio requirement:

Clause - Test Description		Test result - Comments
Occupied Bandwidth	***ISED***	**PASS**
6dB Bandwidth	***FCC & ISED***	**PASS**
Maximum Conducted Output Power	***FCC & ISED***	**PASS**
Power Spectral Density	***FCC & ISED***	**PASS**
Unwanted Emissions in Non-Restricted Frequency Bands	***FCC & ISED***	**PASS**
Unwanted Emissions in Restricted Frequency Bands	***FCC & ISED***	**PASS**
Receiver Radiated Emissions	***ISED***	**PASS(2)**
AC Power Line Conducted Emission	***FCC & ISED***	**PASS**
This table is a summary of test report, see conclusion of each clause of this test report for detail.		

(1) Limited program
(2) Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

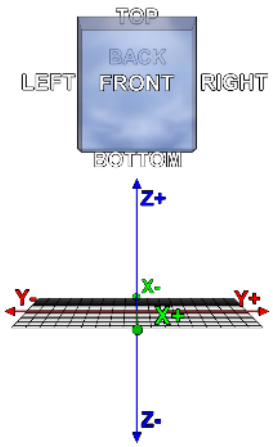
PASS: EUT complies with standard's requirement
FAIL: EUT does not comply with standard's requirement
NA: Not Applicable
NP: Test Not Performed

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

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

Model under test:	**EFA2**
Serial Number:	**None**



Dimensions:	24,8mm diameter/40,1mm height
Type:	Table-Top

Power supply:

Name	Type	Rating	Reference / Sn	Comments
Supply1	Battery	3.7Vdc	/	/
Supply2	DC	5Vdc 2A	/	/

NC: Not communicated by provider

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Comments
Supply2	USB cable	0.9	Yes	Yes	/

NC: Not communicated by provider

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop LENOVO	L460	/	/
AC/DC PSU LENOVO	/		
Development map	ARM mbed	L460	Used for the configuration of the product
AC/ DC Switching Adapter	SOY-0200500EU	/	100-240Vac 56/60Hz

NC: Not communicated by provider

Equipment information (declaration of provider):

Bluetooth Low Energy:	**v5.2**
Chipset	nRF52832
Frequency band:	[2400 – 2483.5] MHz
Spectrum Modulation:	DSSS (Tested like it – international agreements)
Number of Channel:	40
Spacing channel:	2MHz
Channel bandwidth:	1MHz
Antenna Type:	Internal
Antenna connector:	Permanent internal
Antenna requirements §15.203	Conducted Method (welded connection, according to manufacturer's requirements)
Transmit chains:	1
Receiver chains	1

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

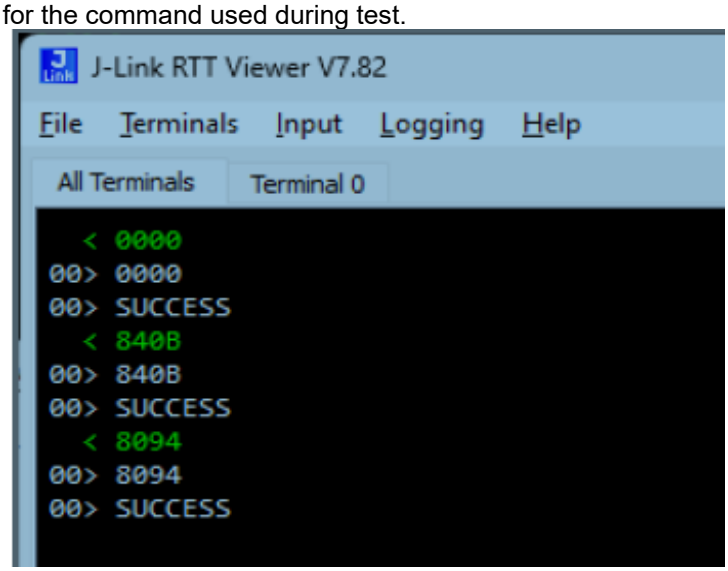
DATA RATE			
Available	**Data Rate (Mbps)**	**Modulation Type**	**Worst Case Modulation**
☑	0.25	GFSK (1MHz)	☐
☑	1	GFSK (1MHz)	☑
☐	2	GFSK (2MHz)	☐

Antenna Characteristic			
Antenna reference	Gain (dBi)	Frequency Band (MHz)	Impedance(Ω)
P/N 2450AT18B100	0.5	2400 - 2500	50

Hardware information			
Highest internal frequency (PLL, Quartz, Clock, Microprocessor…):	**$F_{Highest}$:**	32	**MHz**
Firmware (if applicable):	**V:**	v1.0.0	
Software (if applicable):	**V:**	v1.1.1	
Equipment intended:	Portable		
Type of equipment:	Stand-alone		
Equipment sample:	Production model		
Duty cycle:	Continuous duty		
Operating temperature range:	T_{min}:	2 °C	
	T_{nom}:	20°C	
	T_{max}:	45 °C	
Operating voltage:	V_{min} (85% Vnom):	3V	
	V_{nom}:	3.6V	
	V_{max} (115% Vnom):	4.2V	

NC: Not communicated by provider

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. Following commands with the specific test software “J-Link RTT Viewer” are used to set the product, see for the command used during test.  • Set transmission power (840B) Tx power +4dB • Start a PRBS9 transmission (8094) Transmitter test 2402 MHz • Start a PRBS9 transmission (9494) Transmitter test 2442 MHz • Start a PRBS9 transmission (A794) Transmitter test 2480 MHz • Stop a transmission (C000) and return number of packet received • Reset (0000) • Start a PRBS9 RX Channel Min : 4094 (hexadecimal) • Set a PRBS9 Channel Max : 6794 (hexadecimal)
Test mode 2	Permanent reception

Test	Running mode
Occupied Bandwidth	Test mode 1
6dB Bandwidth	Test mode 1
Maximum Conducted Output Power	Test mode 1
Power Spectral Density	Test mode 1
Conducted Spurious Emission at the Band Edge	Test mode 1
Unwanted Emissions in Non-Restricted Frequency Bands	Test mode 1
AC Power Line Conducted Emission	Test mode 1
Unwanted Emissions in Restricted Frequency Bands	Test mode 1
Receiver Radiated Emissions	Test mode 2 (1)

(1) Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

2.3. EQUIPMENT LABELLING

Label
None

2.4. EQUIPMENT MODIFICATIONS DURING THE TESTS

None

2.5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

$$FS = RA + AF + CF - AG$$

Where:
FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain

Example:
Assume a receiver reading of 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.
FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m
The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(32dBµV/m)/20] = 39.8 µV/m.

2.6. TEST DISTANCE EXTRAPOLATION – FCC/ISED

The field strength is extrapolated to the new measurement distance using formula from FCC Part15.31 (f) and §6.5-6.6 RSS-GEN:

Below 30MHz,

$$FS_{\text{limit}} = FS_{\max} - 40\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

Above 30MHz,

$$FS_{\text{limit}} = FS_{\max} - 20\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

Where:
FS_{limit} is the calculation of field strength at the limit distance, expressed in dBµV/m
FS_{max} is the measured field strength, expressed in dBµV/m
$d_{measure}$ is the distance of the measurement point from the EUT
d_{limit} is the reference limit distance

2.7. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period.

2.8. METHOD TO DETERMINATE THE SPURIOUS RADIATED EMISSION

The Normalized Site Attenuation (NSA) is added to the maximum values observed during the azimuth search in order to obtain the spurious radiated emission. For spurious above -6dB from the limit found with the NSA, the Substitution Method is applied.
The substitution antenna replaces the equipment under test (EUT) for Effective Radiated Power (ERP) or Effective Isotropically Radiated Power (EIRP) measurement following the standard. Power is measured for a high level and calculated for the same level of radiated field strength obtained on the measuring antenna and EUT.

3. OCCUPIED BANDWIDTH

3.1. *TEST CONDITIONS*

Date of test	:	September 12, 2023
Test performed by	:	Majid MOURZAGH
Relative humidity (%)	:	39
Ambient temperature (°C)	:	23

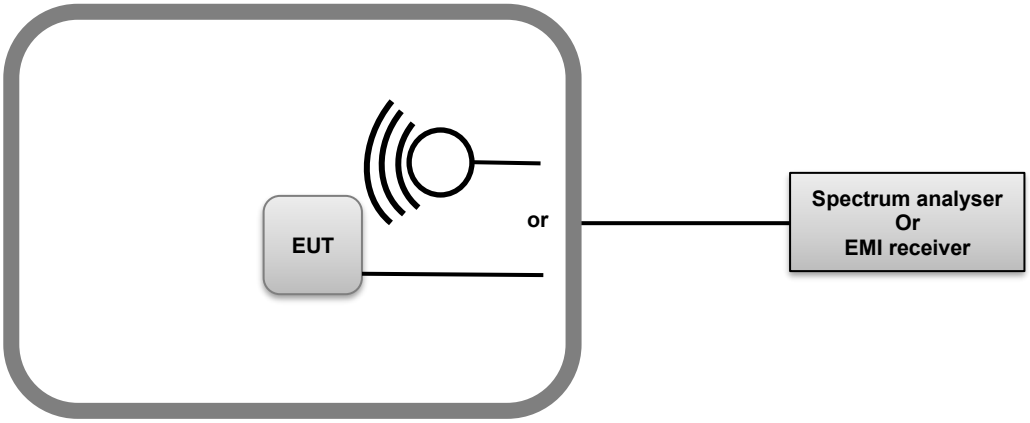
3.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

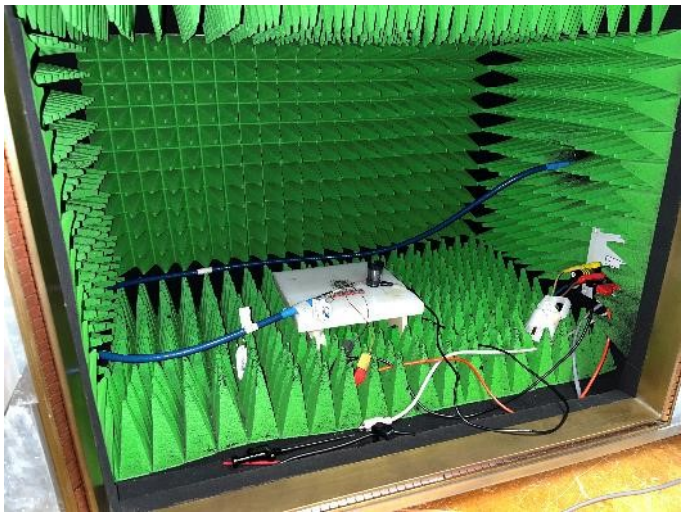
The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

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

- RBW used in the range of 1% to 5% of the anticipated emission bandwidth
- Set the video bandwidth (VBW) ≥ 3 x RBW.
- Detector = Peak.
- Trace mode = Max Hold.
- Sweep = Auto couple.
- Allow the trace to stabilize.
- OBW 99% function of spectrum analyzer used



Test setup of Occupied Bandwidth



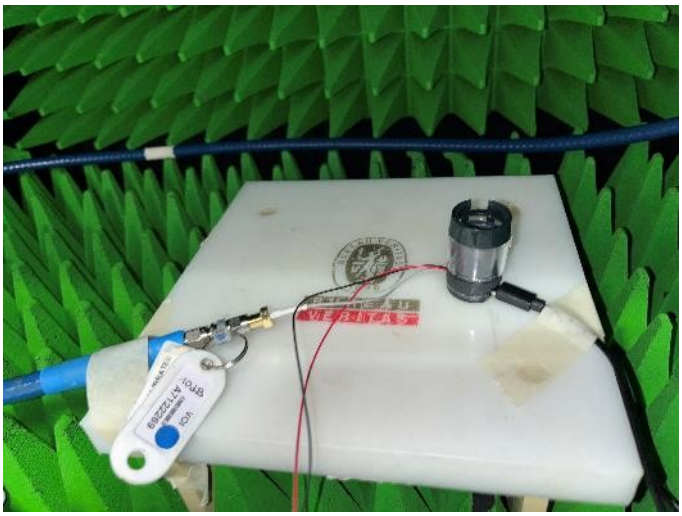


Photo of Occupied bandwidth

3.3. *LIMIT*

None

3.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122269	07/23	07/25
Full Anechoic Room	SIEPEL	_	D3044024		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	05/22	09/23
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
SMA 1.5m	SUCOFLEX	18GHz	A5329864	09/22	09/23
Multimeter - CEM	FLUKE	189	A1240171	09/21	09/23

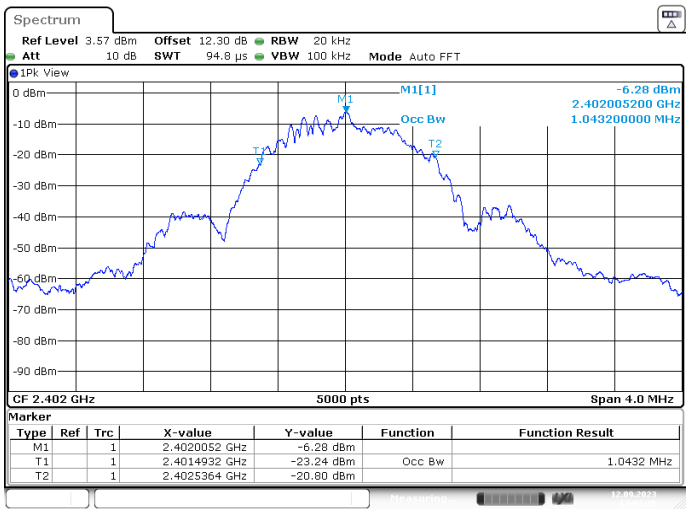
3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

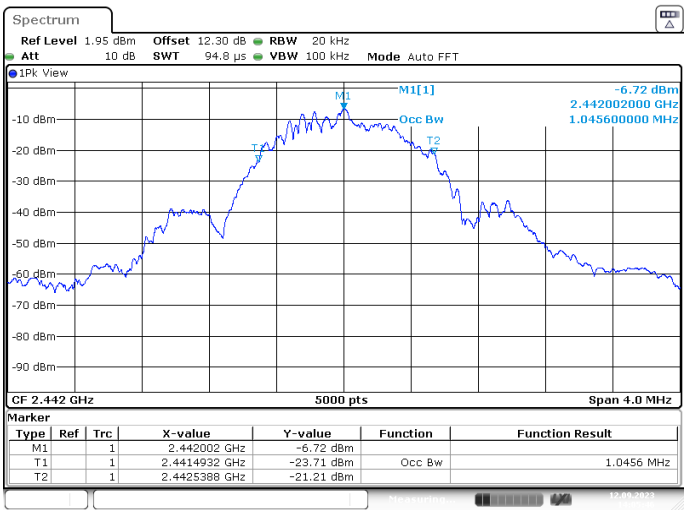
3.6. *RESULTS*

Occupied Bandwidth

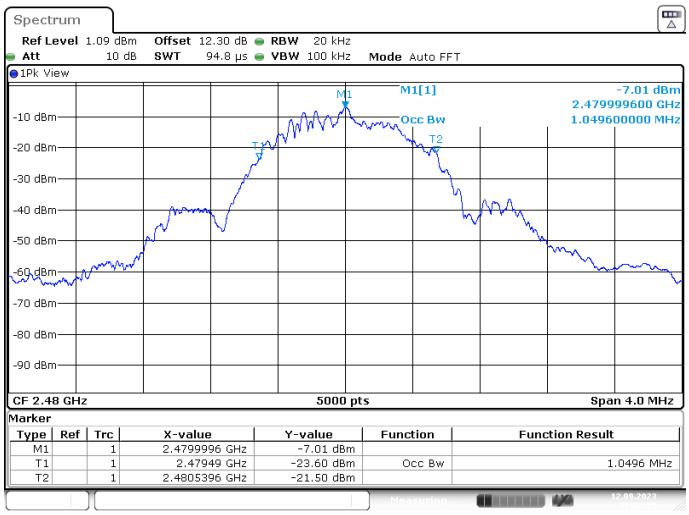
Cmin



Cmid



Cmax



Configuration: BLE - 1MBits/s

Channel	Occupied Bandwidth (MHz)
Cmin	1.043
Cmid	1.046
Cmax	1.050

3.7. *CONCLUSION*

Occupied Channel Bandwidth measurement performed on the sample of the product **EFA2**, Sn: **None**, in configuration and description presented in this test report, show levels **compliant** to the **RSS-GEN** limits.

4. 6dB Bandwidth

4.1. *TEST CONDITIONS*

Date of test	:	September 12, 2023
Test performed by	:	Majid MOURZAGH
Relative humidity (%)	:	39
Ambient temperature (°C)	:	23

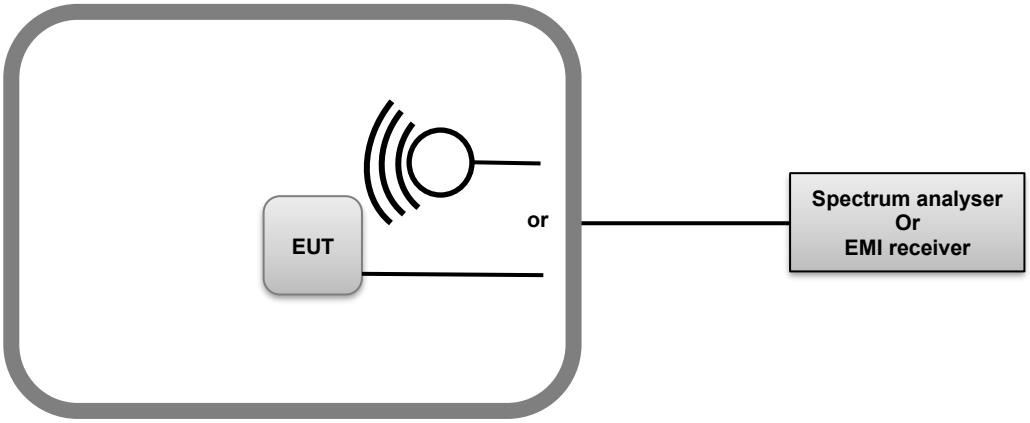
4.2. *TEST SETUP*

The Equipment Under Test is installed in a climatic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

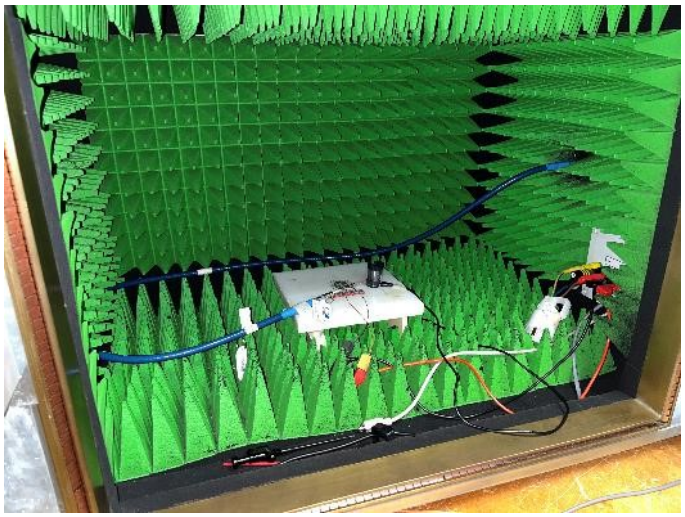
The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure:
KDB 558074 D01 DTS Meas Guidance v05r02 § 8.2

- Set resolution bandwidth (RBW) = 100kHz.
- Set the video bandwidth (VBW) ≥ 3 x RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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 setup of 6dB Bandwidth



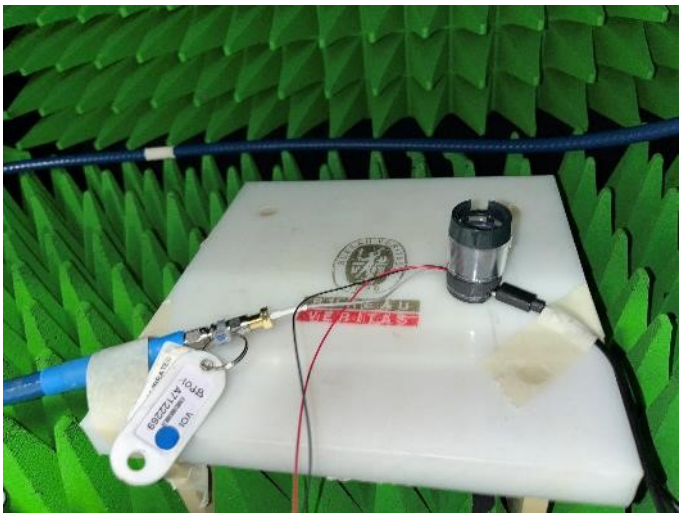


Photo of 6dB bandwidth

4.3. *LIMIT*

Frequency range	6dB bandwidth
902-928MHz 2400MHz to 2483.5MHz 5725-5850 MHz	≥500kHz

4.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122269	07/23	07/25
Full Anechoic Room	SIEPEL	_	D3044024		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	05/22	09/23
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
SMA 1.5m	SUCOFLEX	18GHz	A5329864	09/22	09/23
Multimeter - CEM	FLUKE	189	A1240171	09/21	09/23

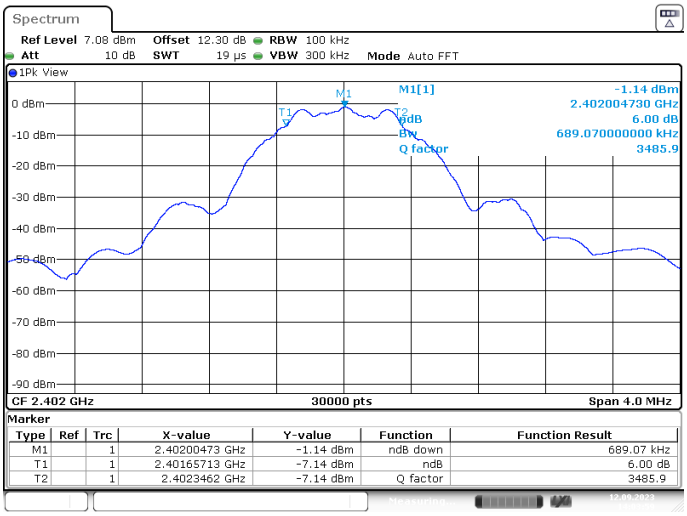
4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

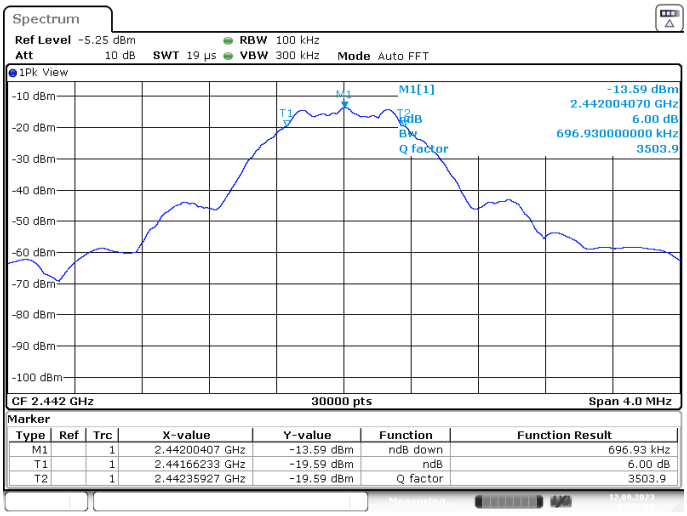
4.6. *RESULTS*

6dB Bandwidth

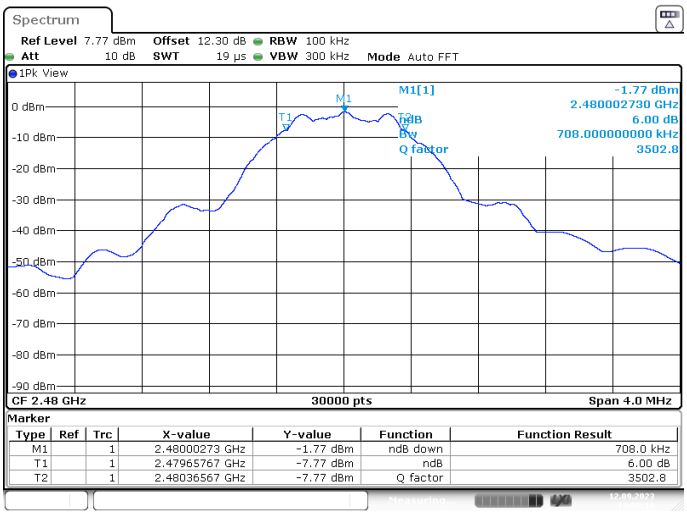
Cmin



Cmid



Cmax



Configuration: BLE - 1MBits/s

Channel	6dB Bandwidth (MHz)	Limit (MHz)
Cmin	0.689	**> 0.5**
Cmid	0.697	**> 0.5**
Cmax	0.708	**> 0.5**

4.7. CONCLUSION

6dB Bandwidth measurement performed on the sample of the product **EFA2**, Sn: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

5. MAXIMUM CONDUCTED OUTPUT POWER

5.1. *TEST CONDITIONS*

Date of test	:	September 12, 2023
Test performed by	:	Majid MOURZAGH
Relative humidity (%)	:	39
Ambient temperature (°C)	:	23

5.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

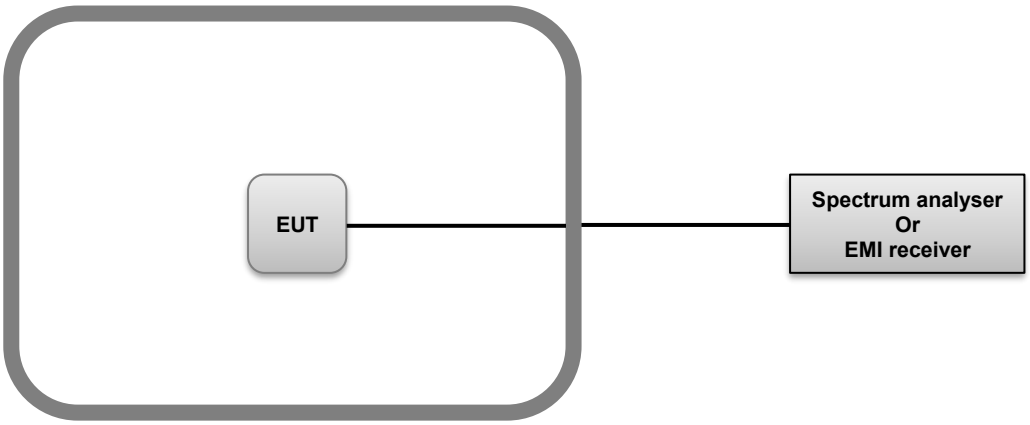
The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure used: KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.1

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.

- Set the RBW ≥ DTS bandwidth.
- Set VBW ≥ 3 x RBW.
- Set span ≥ 3 x RBW
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.



Test setup of Maximum Conducted Output Power

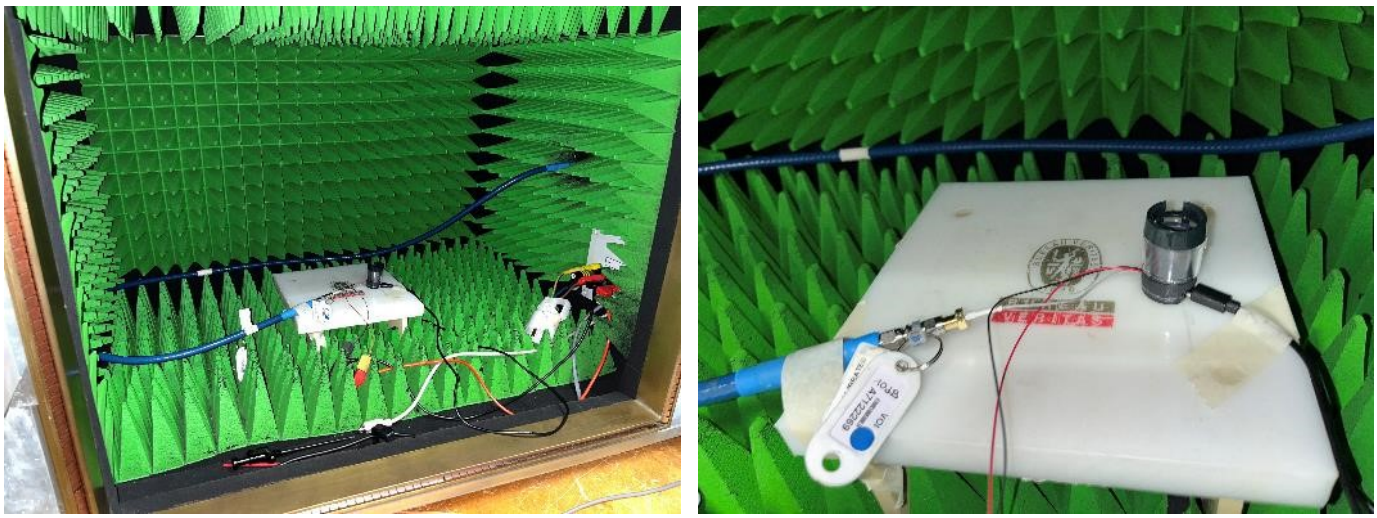


Photo of Maximum Conducted Output Power

5.3. *LIMIT*

Frequency range	Maximum Conducted Output Power
902-928MHz 2400MHz to 2483.5MHz 5725-5850 MHz	≤30dBm*

*Remark: 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	07/23	07/25
Full Anechoic Room	SIEPEL	_	D3044024		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	05/22	09/23
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
SMA 1.5m	SUCOFLEX	18GHz	A5329864	09/22	09/23
Multimeter - CEM	FLUKE	189	A1240171	09/21	09/23

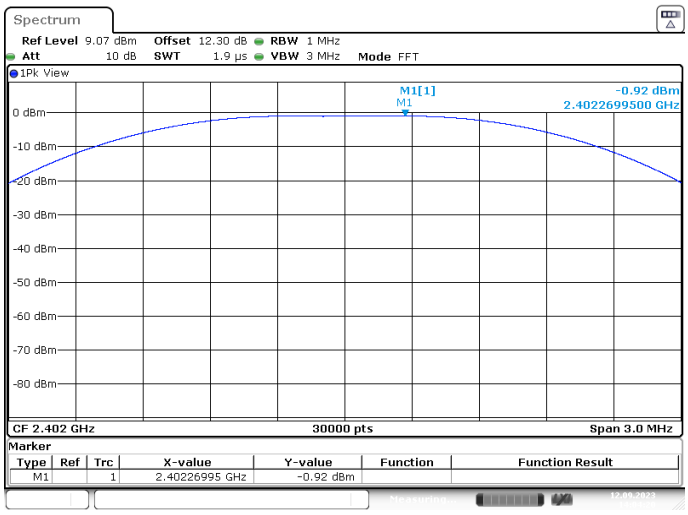
5.5. *DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION*

None

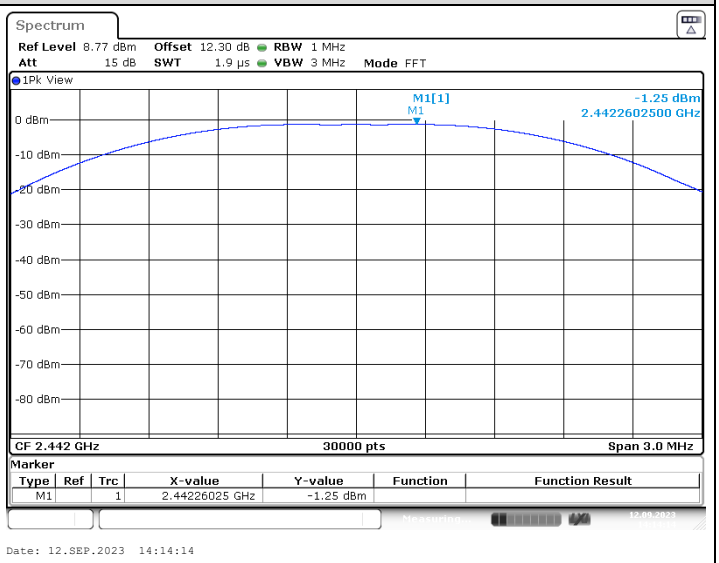
5.6. RESULTS

Maximum Conducted Output Power

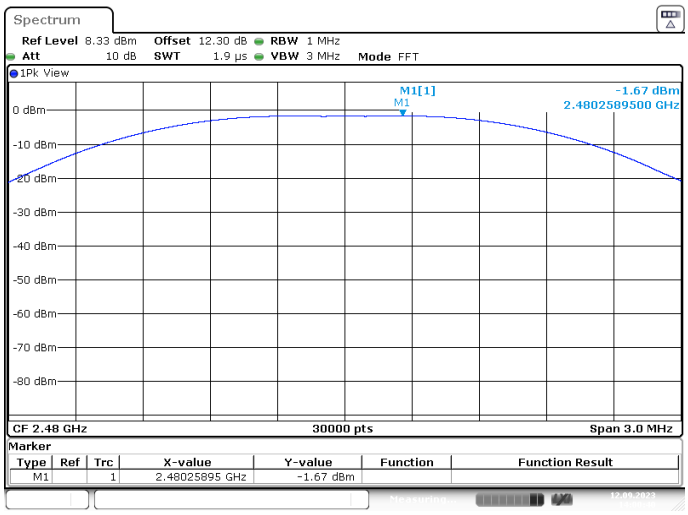
Cmin



Cmid



Cmax



Configuration: BLE - 1MBits/s

Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Conducted Power (dBm)	Limit (dBm)
Cmin	12.3	0.5	-0.92	**30**
Cmid	12.3	0.5	-1.25	**30**
Cmax	12.3	0.5	-1.67	**30**

5.7. CONCLUSION

Maximum Output Conducted Power measurement performed on the sample of the product **EFA2**, Sn: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

6. POWER SPECTRAL DENSITY

6.1. *TEST CONDITIONS*

Date of test	:	September 12, 2023
Test performed by	:	Majid MOURZAGH
Relative humidity (%)	:	39
Ambient temperature (°C)	:	23

6.2. *TEST SETUP*

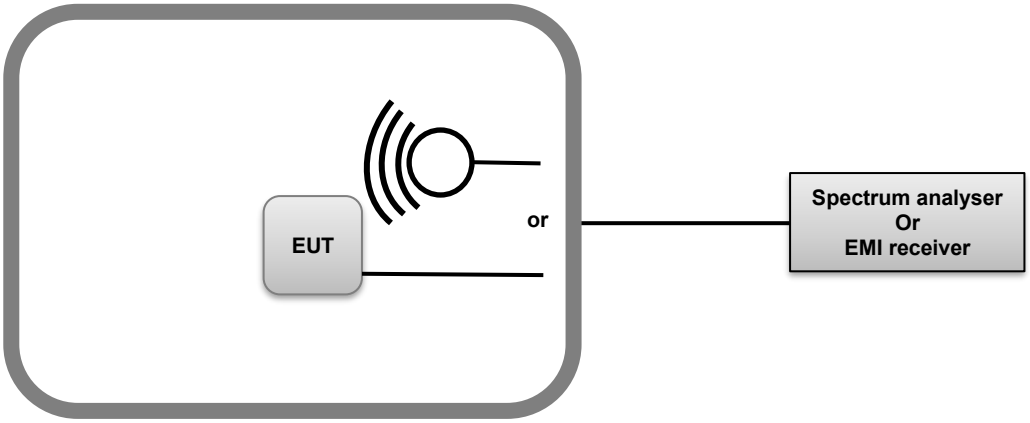
The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure used: KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method PKPSD)
KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method PKPSD)

Subclause 11.10 of ANSI C63.10 is applicable

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: 3 kHz.
- Set the VBW ≥ 3 x RBW.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
-



Test setup of Power Spectral Density

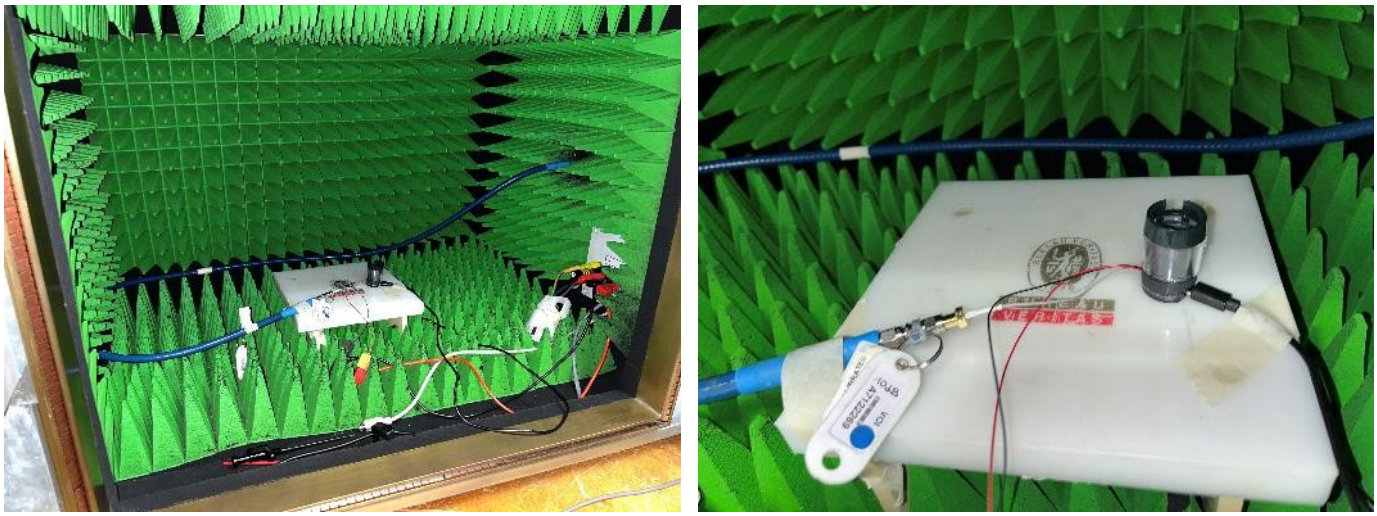


Photo of Power Spectral Density

6.3. *LIMIT*

Frequency range	Power Spectral Density
902-928MHz 2400MHz to 2483.5MHz 5725-5850 MHz	≤8dBm / 3kHz *

*Remark: 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	07/23	07/25
Full Anechoic Room	SIEPEL	_	D3044024		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	05/22	09/23
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
SMA 1.5m	SUCOFLEX	18GHz	A5329864	09/22	09/23
Multimeter - CEM	FLUKE	189	A1240171	09/21	09/23

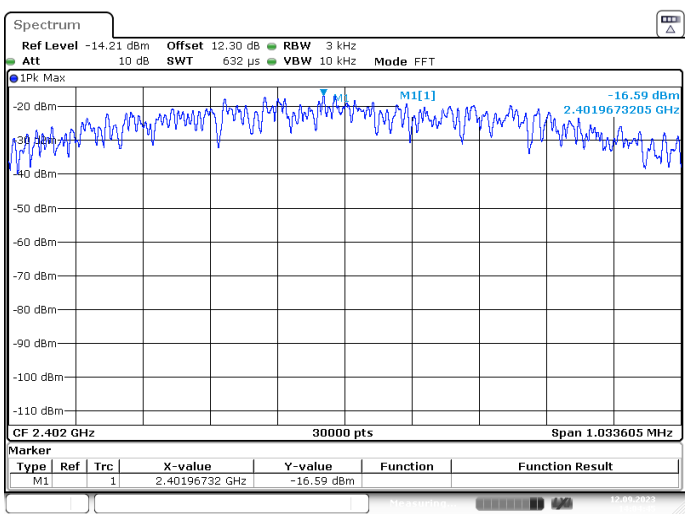
6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

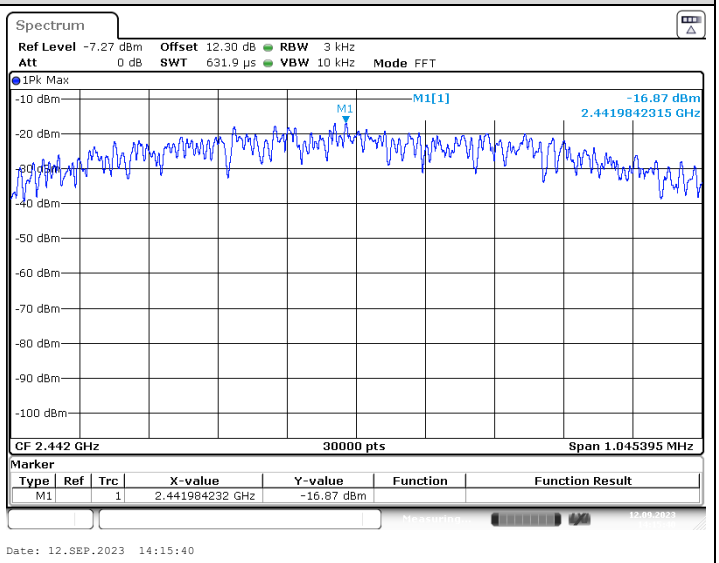
6.6. RESULTS

Power Spectral Density

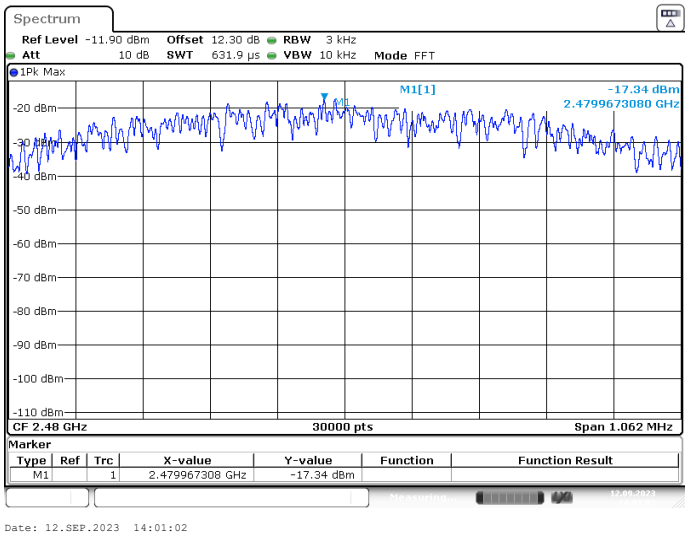
Cmin



Cmid



Cmax



Configuration: BLE - 1MBits/s

Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Power Spectral Density (dBm)	Limit (dBm)
Cmin	12.3	0.5	-16.59	**30**
Cmid	12.3	0.5	-16.87	**30**
Cmax	12.3	0.5	-17.34	**30**

6.7. CONCLUSION

Power Spectral Density measurement performed on the sample of the product **EFA2**, Sn: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

7. UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

7.1. *TEST CONDITIONS*

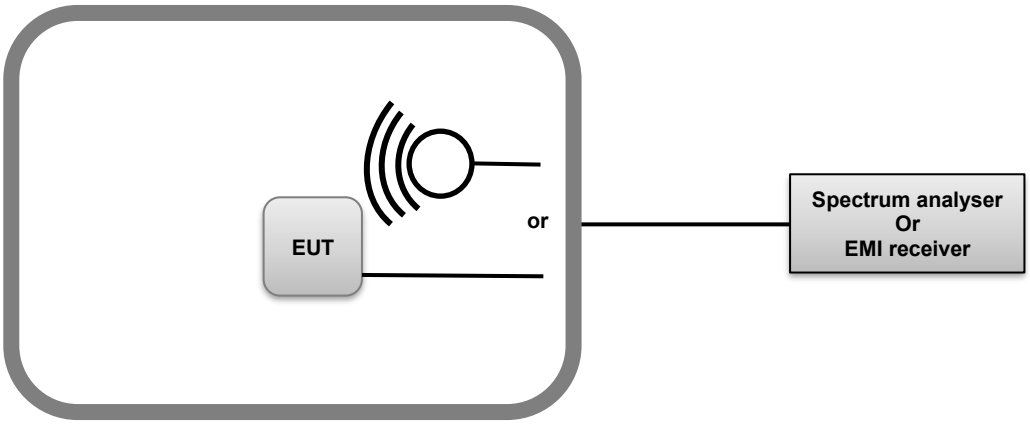
Date of test	:	September 12, 2023
Test performed by	:	Majid MOURZAGH
Relative humidity (%)	:	39
Ambient temperature (°C)	:	23

7.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure:
KDB 558074 D01 DTS Meas Guidance v05r02 § 8.5



Test setup of Unwanted emissions in non-restricted frequency bands

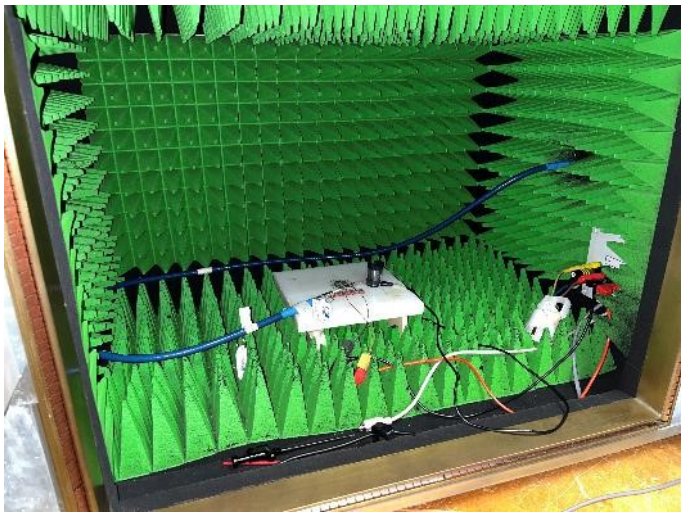
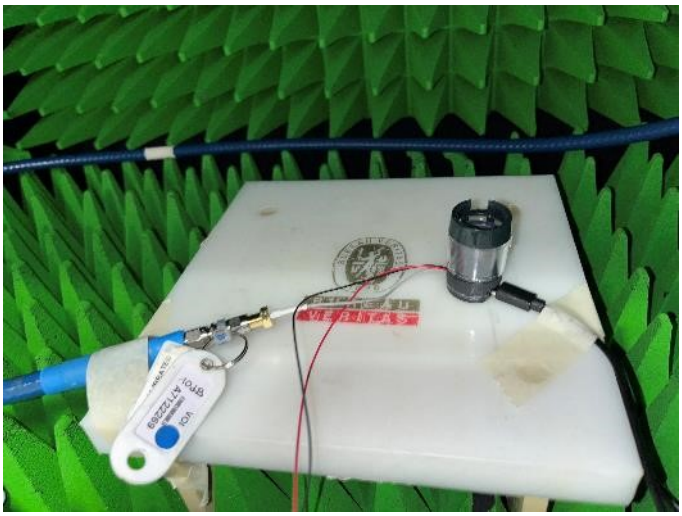



Photo of Unwanted emissions in non-restricted frequency bands

7.3. *LIMIT*

All Spurious Emissions must be at least 20dB below the Fundamental Radiator Level at the Band Edge of operating frequency band and in non-restricted bands.

7.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122269	07/23	07/25
Full Anechoic Room	SIEPEL	_	D3044024		
SMA 1.5m	SUCOFLEX	18GHz	A5329863	05/22	09/23
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
SMA 1.5m	SUCOFLEX	18GHz	A5329864	09/22	09/23
Multimeter - CEM	FLUKE	189	A1240171	09/21	09/23

7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

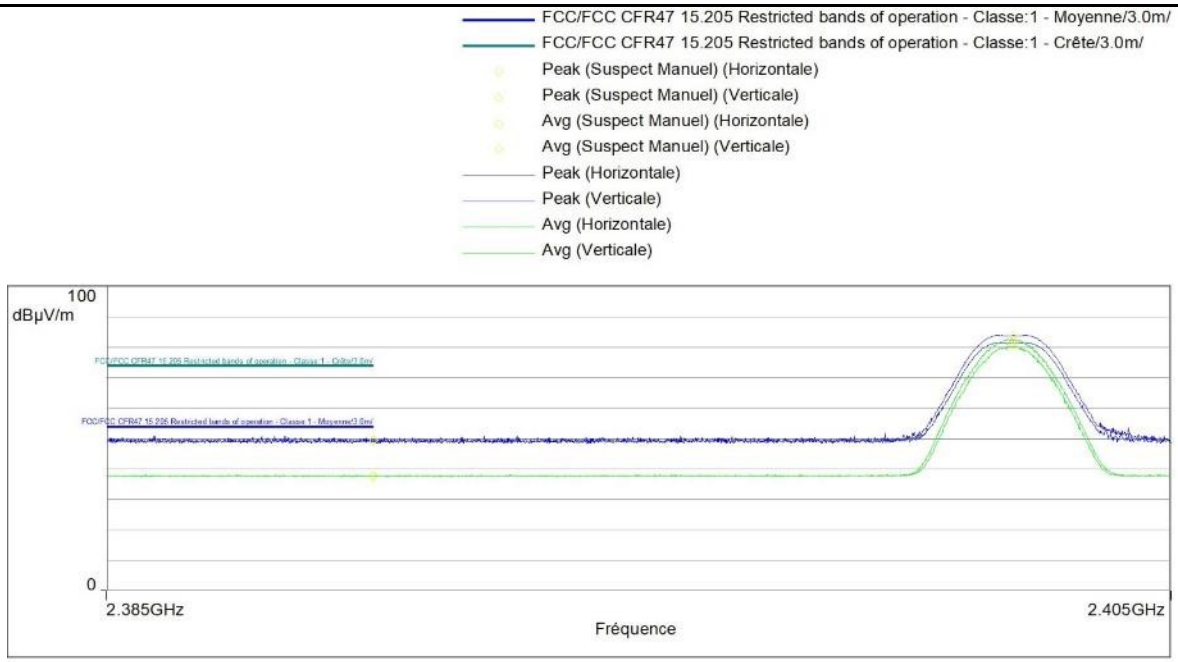
None

7.6. RESULTS

7.6.1. At the band edge

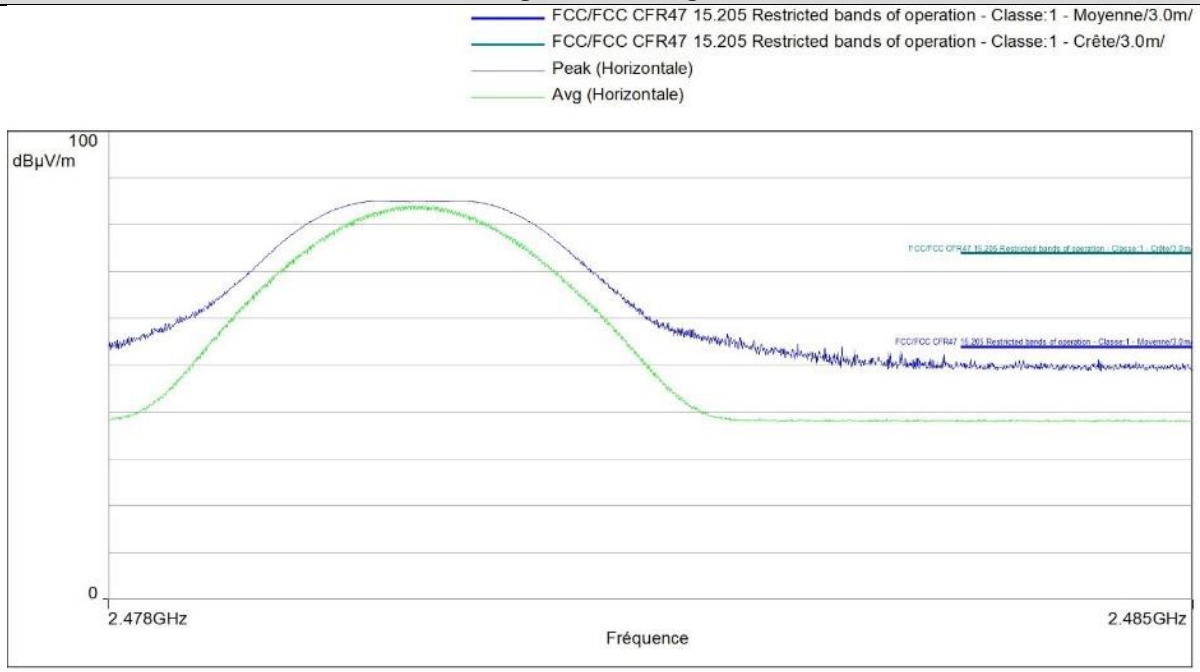
Unwanted emissions in non-restricted bands at the band edge
Configuration: BLE - 1MBits/s
Cmin / max
Lower band edge

RADIATED EMISSIONS			
Graph name:	Emr#9	**Test configuration:**	
Limit:	FCC CFR47 15.205 Restricted bands of operation	(H+V) - Cmin- TX mode - Automatic Axis	
Class:	1		
Frequency range: [2.385GHz - 2.405GHz]			
Antenna polarization:		**RBW :**	100kHz to 1MHz
Azimuth:	0° - 360°	**VBW :**	300kHz to 3MHz



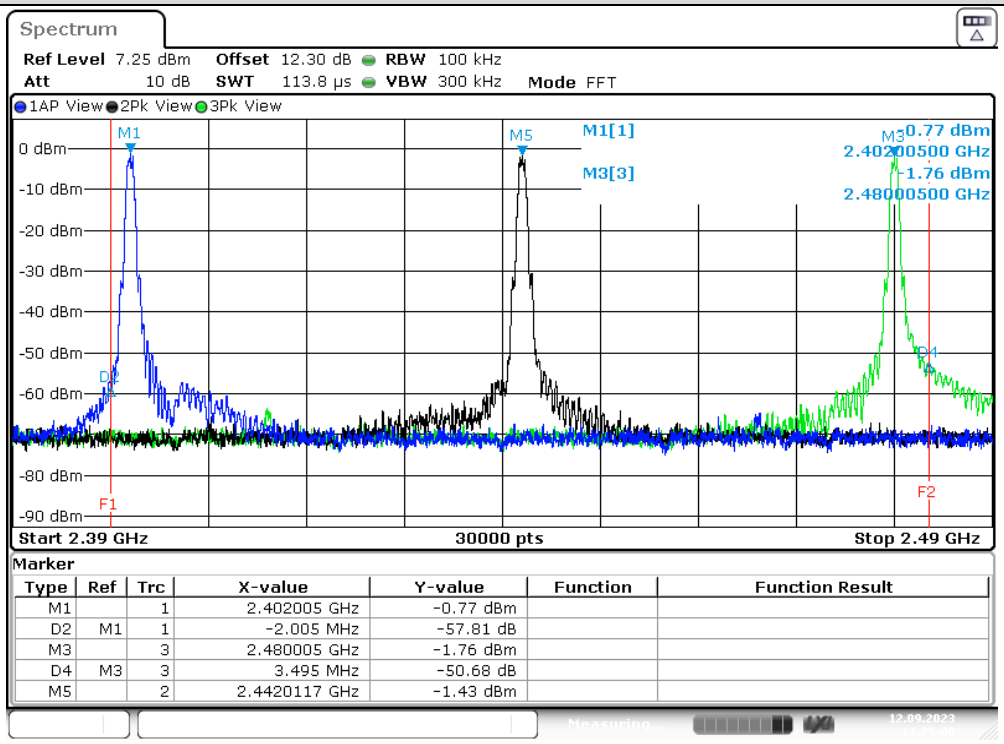
Spurious emissions

Higher band edge



7.6.2. Non restricted frequency bands

Unwanted emissions in non-restricted bands		
Configuration: BLE - 1MBits/s		
Cmin / Cmid / Cmax		



Frequency (MHz)	Level (dBc)	Limit (dBc)
2400	**-57.81**	**-20.0**
2483.5	**-50.68**	**-20.0**

7.7. CONCLUSION

Unwanted emissions in non-restricted bands and at the band edge measurement performed on the sample of the product **EFA2**, Sn: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

8. AC POWER LINE CONDUCTED EMISSIONS

8.1. TEST CONDITIONS

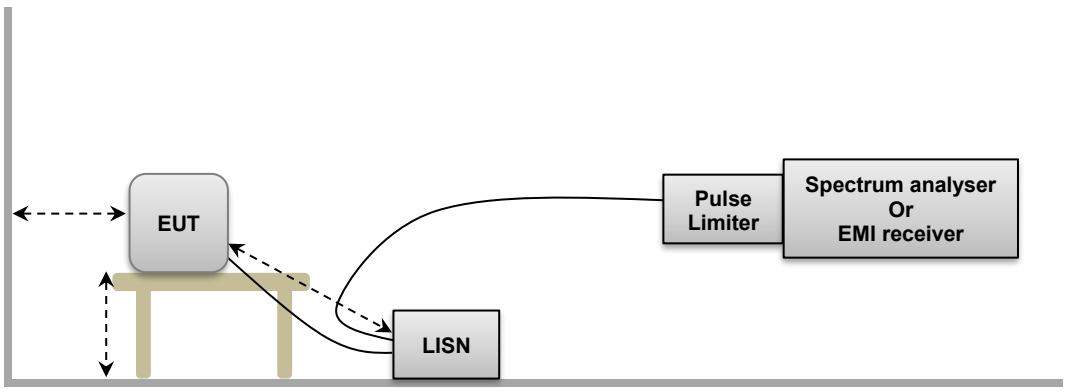
Date of test	:	September 14, 2023
Test performed by	:	Majid MOURZAGH
Relative humidity (%)	:	40
Ambient temperature (°C)	:	23

8.2. TEST SETUP

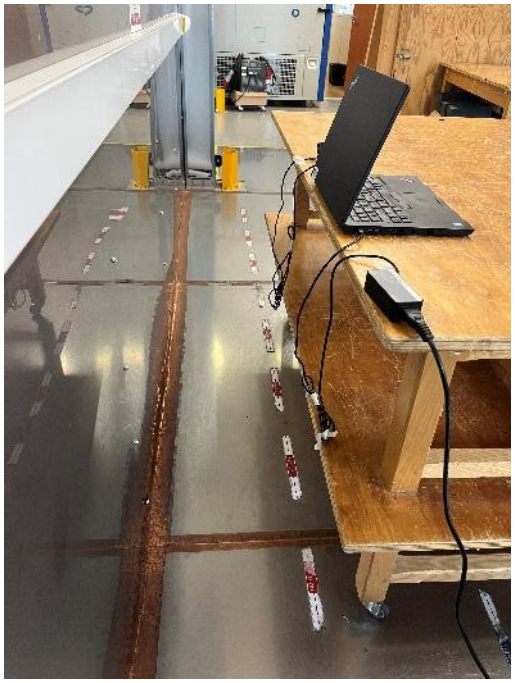
Test procedure:
☑ ANSI C63.10 & FCC Part 15 subpart C

The EUT and auxiliaries are set 80cm above the ground on the non-conducting table (Table-top equipment) at 80cm from the LISN, the cable has been shorted to 1meter length. The distance between the EUT and the vertical ground plane is 40cm. 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. Interconnecting cables and equipment's were moved to position that maximized emission. The EUT is powered like specified in following table, through a LISN (measure); auxiliaries are powered by another LISN.

Type	Measurement performed:	
☑ AC / ☐ DC (Auxiliary used)	☑ 120VAC/60Hz	☑ 240VAC/50Hz
☑ USB (Laptop auxiliary)	☐ 120VAC/60Hz (Laptop auxiliary)	☐ 240VAC/50Hz (Laptop auxiliary)



Test setup of AC Power Line Conducted Emissions



Photograph of AC Power Line Conducted Emissions powered with USB laptop

Photograph of AC Power Line Conducted Emissions powered with AC/DC adapter

8.3. 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

8.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
BAT EMC	NEXIO	v3.21.0.32	L1000115		
Cable + self	_	_	A5329578	05/22	05/24
EMC comb generator	LCIE SUD EST	_	A3169098		
LISN	ROHDE & SCHWARZ	ENV216	C2320291	07/23	07/24
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	08/22	08/24

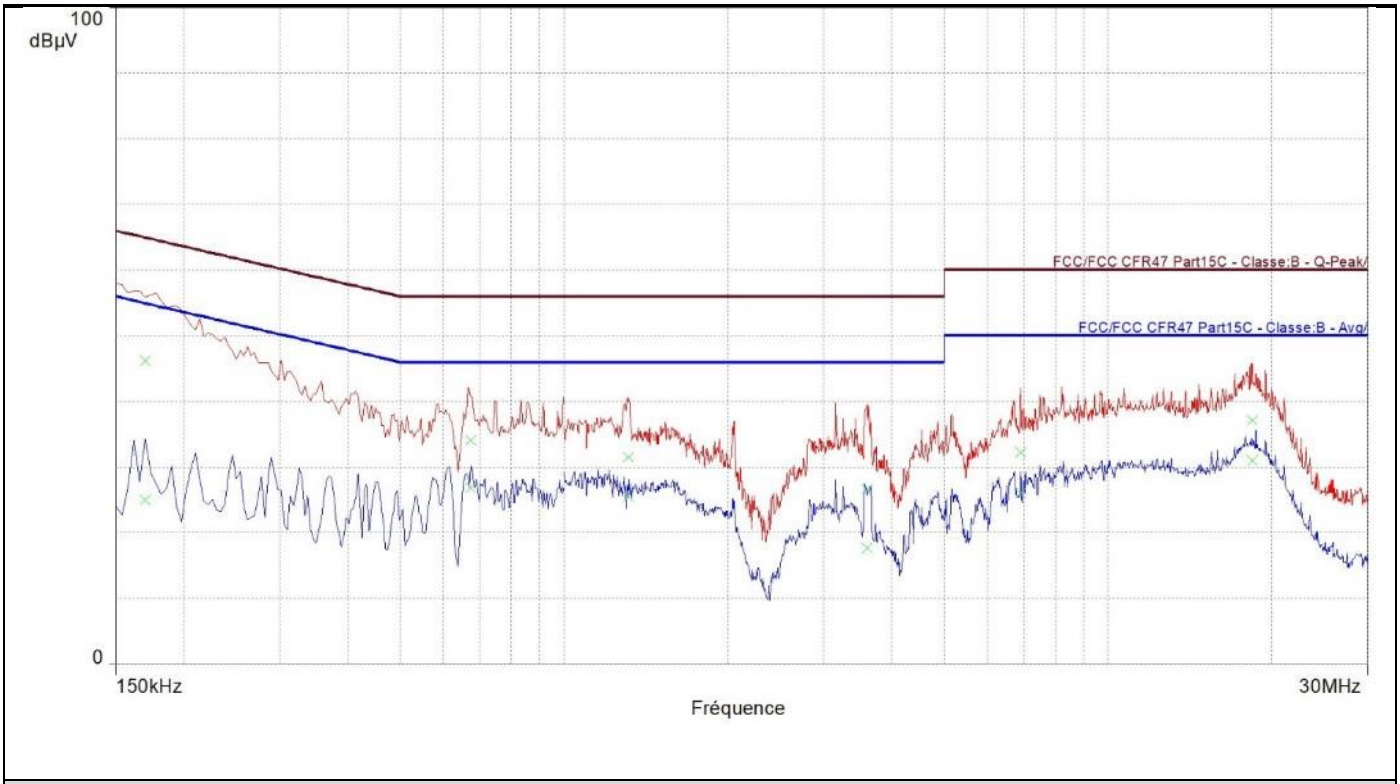
8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

8.6. TEST RESULTS

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

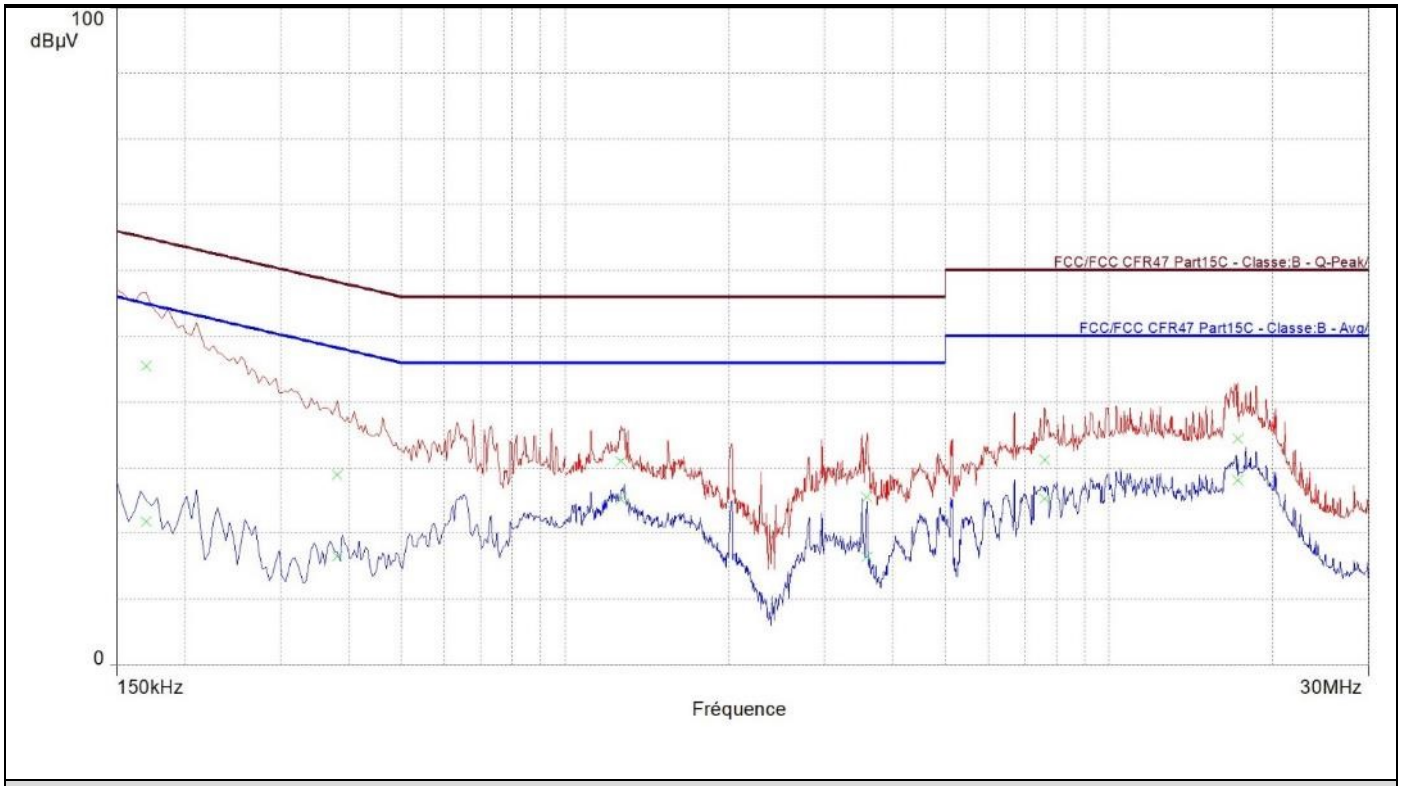
CONDUCTED EMISSIONS			
Graph name:	Emc#1	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with Laptop 240VAC 50Hz_ Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)
0.170	46.2	65.0	-18.7	25.0	55.0	-29.9
0.674	34.1	56.0	-21.9	26.9	46.0	-19.1
1.312	31.5	56.0	-24.5	25.5	46.0	-20.5
6.900	32.2	60.0	-27.8	26.0	50.0	-24.0
18.384	37.1	60.0	-22.9	31.0	50.0	-19.0

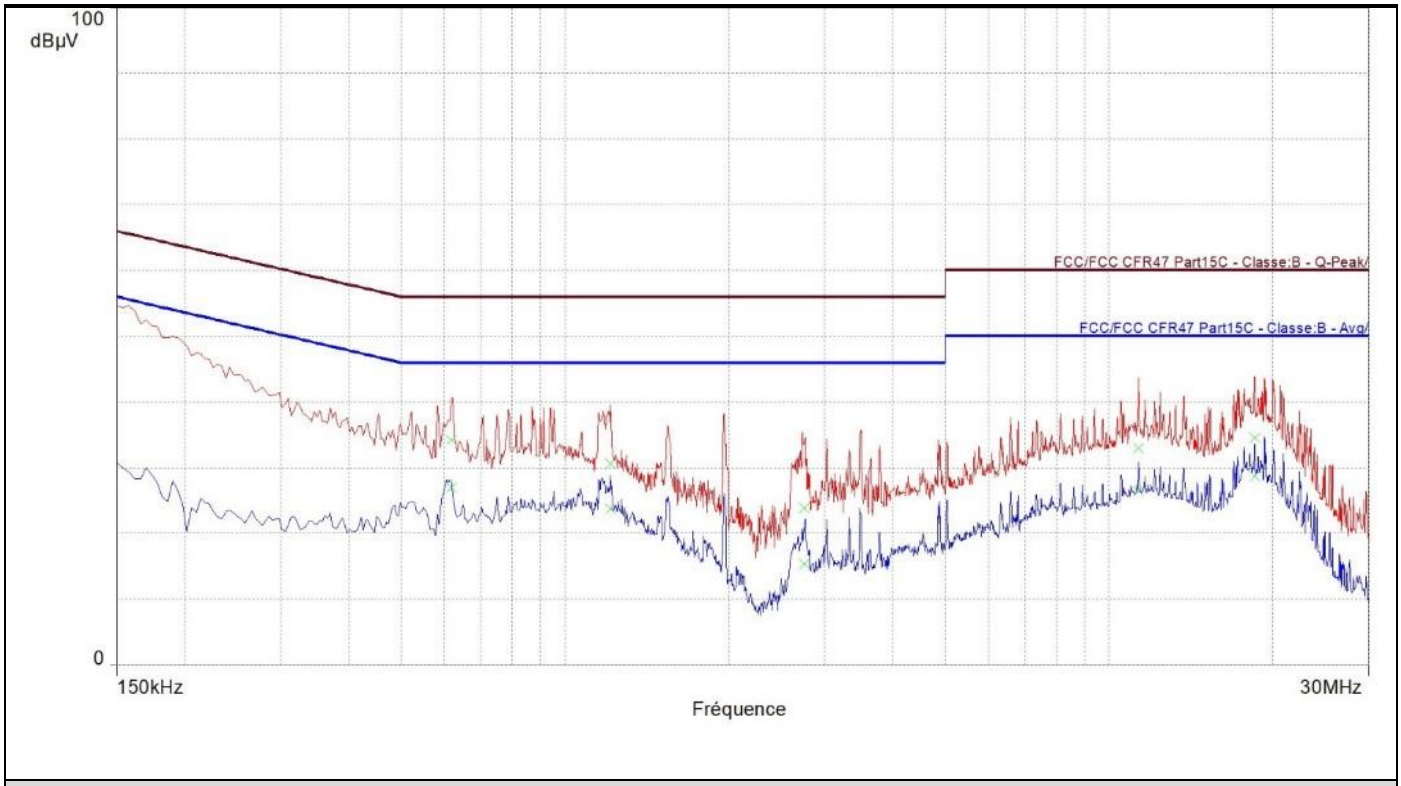
CONDUCTED EMISSIONS			
Graph name:	Emc#2	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with Laptop 240VAC 50Hz_ Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)
0.17	45.5	65	-19.5	21.8	55	-33.2
0.382	29	56	-27	16.6	46	-29.4
1.268	31	56	-25	25.3	46	-20.7
3.58	25.5	56	-30.5	16.4	46	-29.6
7.612	31.2	60	-28.8	25.3	50	-24.7
17.232	34.4	60	-25.6	28.1	50	-21.9

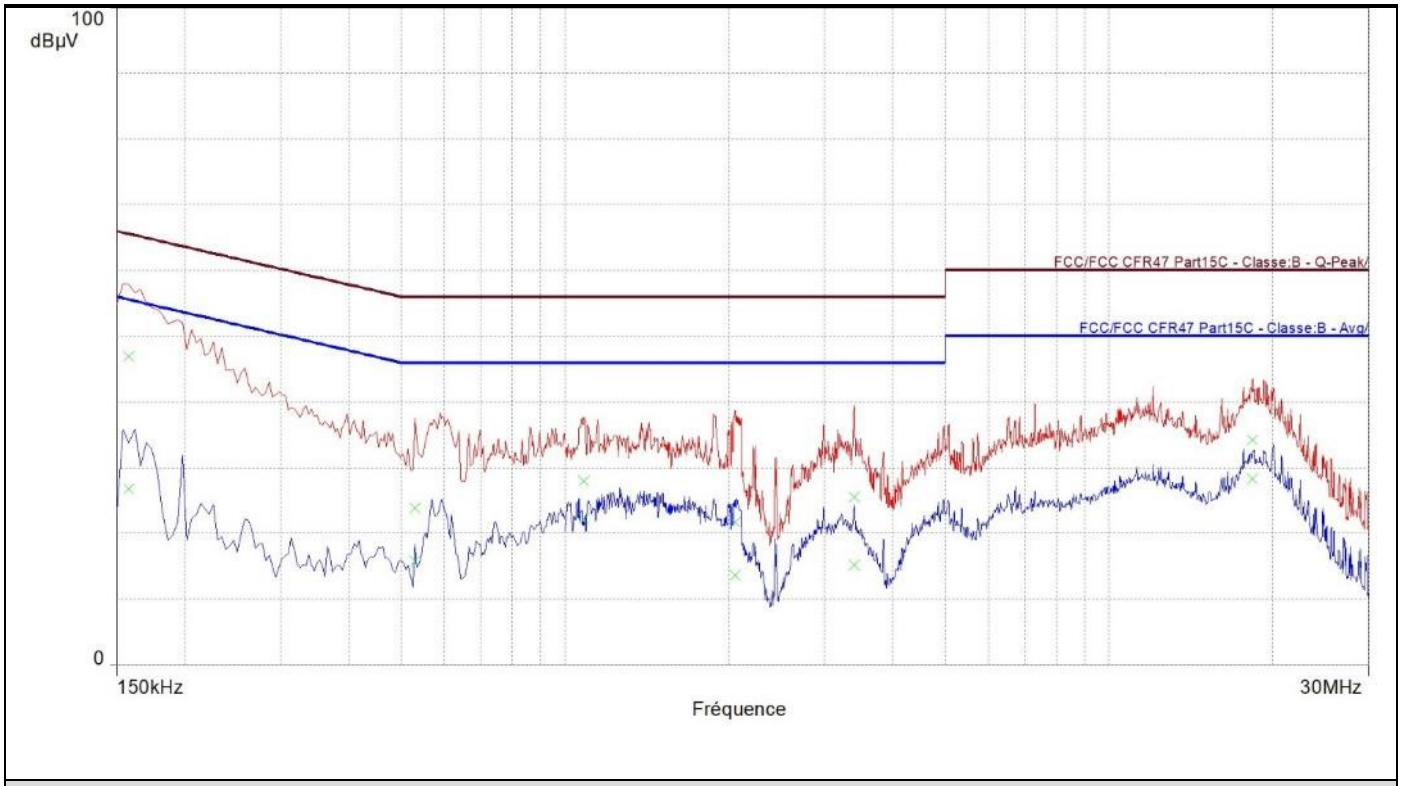
CONDUCTED EMISSIONS			
Graph name:	Emc#3	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with Laptop 120VAC 60Hz_ Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)
0.618	34.2	56.0	-21.8	27.0	46.0	-19.0
1.212	30.6	56.0	-25.4	23.7	46.0	-22.3
2.752	23.8	56.0	-32.2	15.4	46.0	-30.6
11.324	33.0	60.0	-27.0	26.5	50.0	-23.5
18.524	34.5	60.0	-25.5	28.7	50.0	-21.3

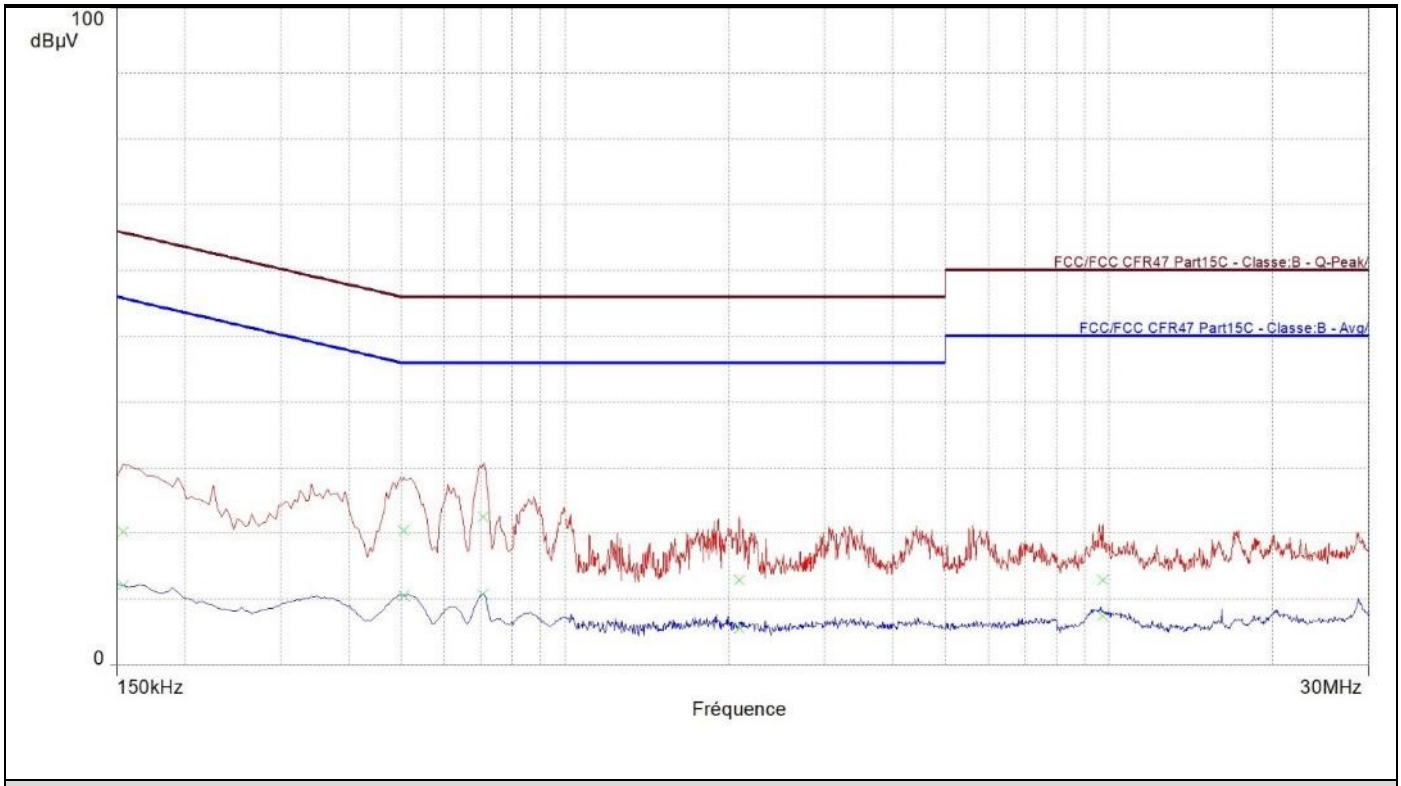
CONDUCTED EMISSIONS			
Graph name:	Emc#4	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with Laptop 120VAC 60Hz_ Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)
0.154	46.9	65.8	-18.9	26.8	55.8	-29
0.53	23.8	56	-32.2	15.8	46	-30.2
1.084	28	56	-28	22.2	46	-23.8
2.052	21.7	56	-34.3	13.6	46	-32.4
3.396	25.6	56	-30.4	15.2	46	-30.8
18.352	34.2	60	-25.8	28.3	50	-21.7

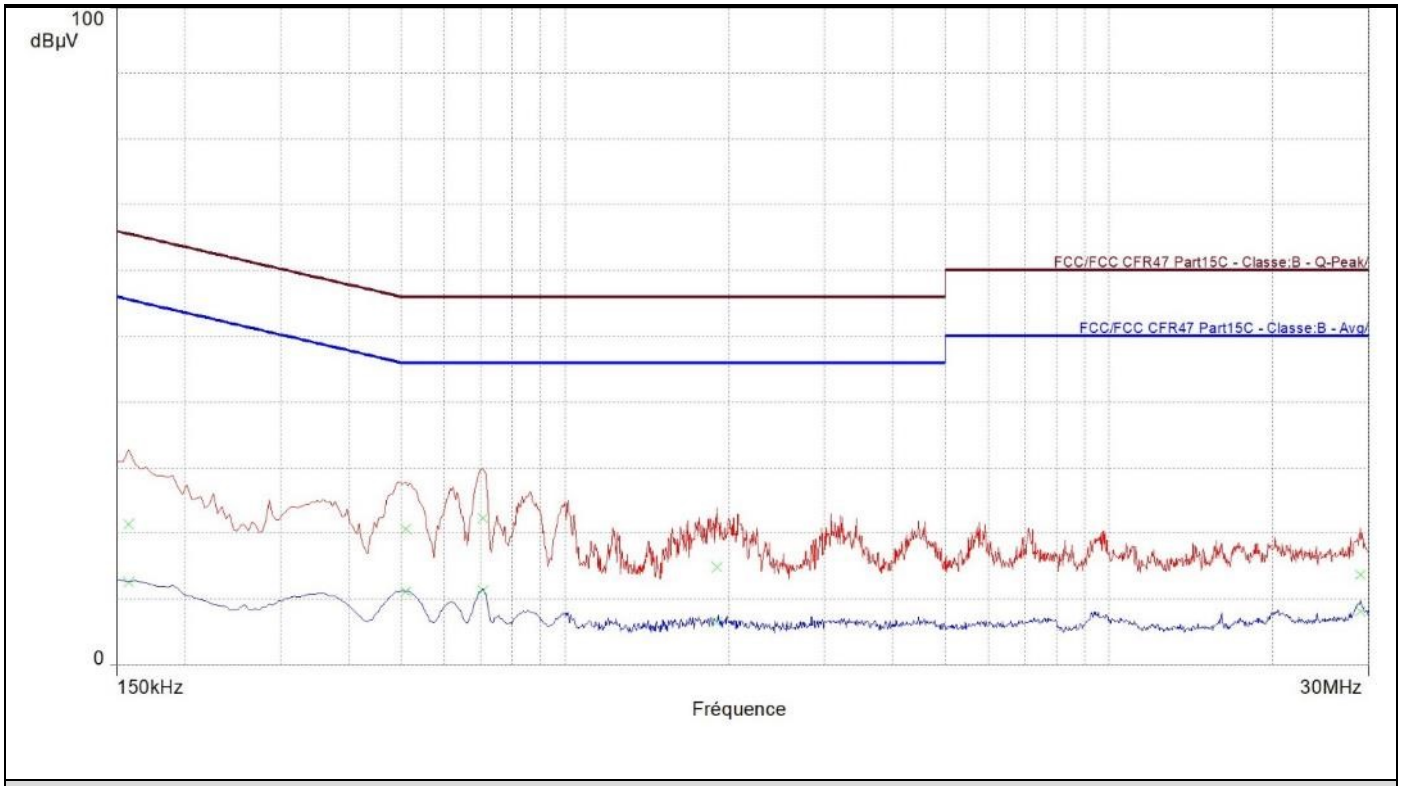
CONDUCTED EMISSIONS			
Graph name:	Emc#5	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with AC/DC Adapter 240VAC 50Hz_ Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)
0.154	20.2	65.8	-45.6	12.1	55.8	-43.7
0.506	20.4	56	-35.6	10.6	46	-35.4
0.706	22.6	56	-33.4	10.8	46	-35.2
2.088	13	56	-43	5.6	46	-40.4
9.72	12.9	60	-47.1	7.5	50	-42.5
18.352	34.2	60	-25.8	28.3	50	-21.7

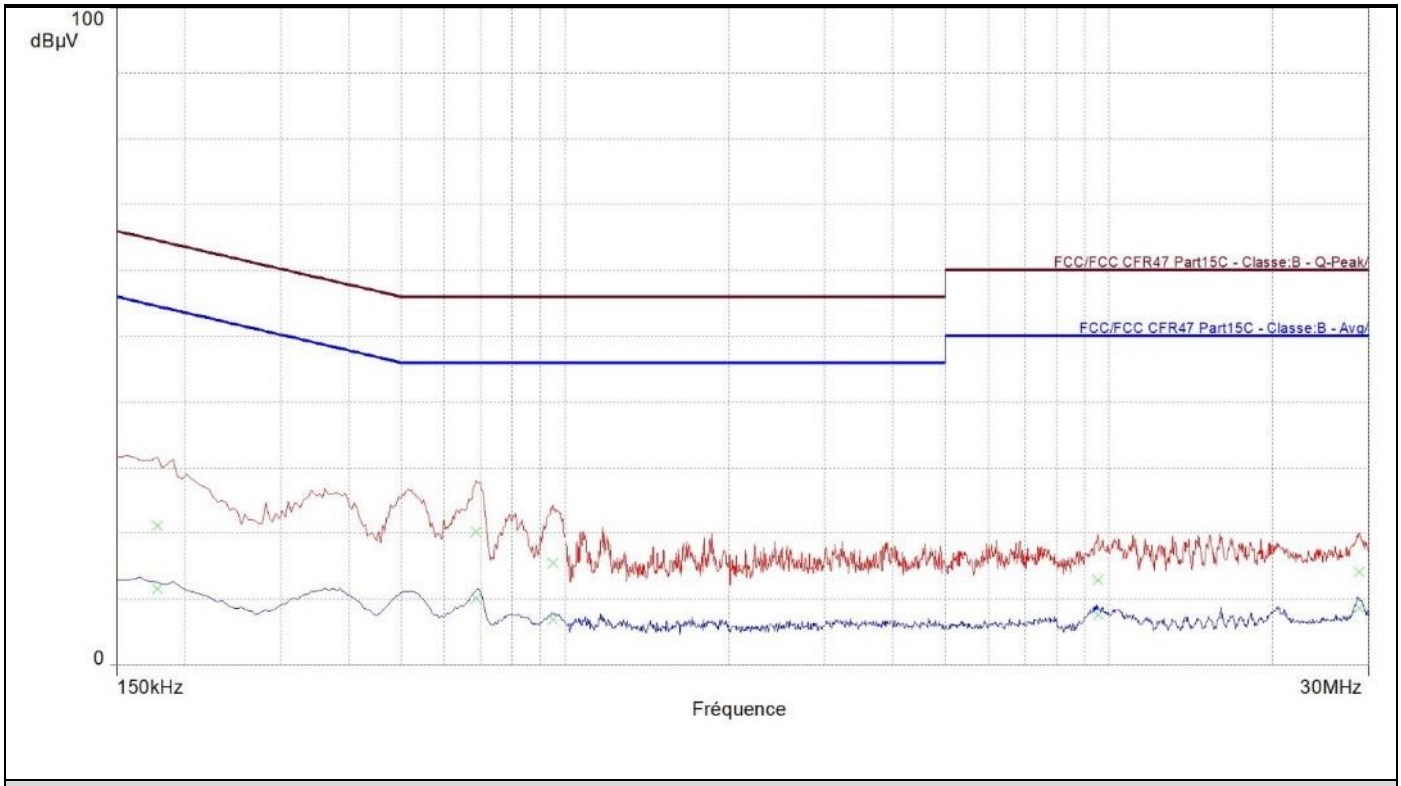
CONDUCTED EMISSIONS			
Graph name:	Emc#6	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with AC/DC Adapter 240VAC 50Hz_ Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	Q-Peak (dBµV)	CISPR AVG (dBµV)
0.158	21.4	12.6
0.510	20.7	11.1
0.706	22.3	11.4
1.900	14.9	6.5
28.976	13.7	8.1

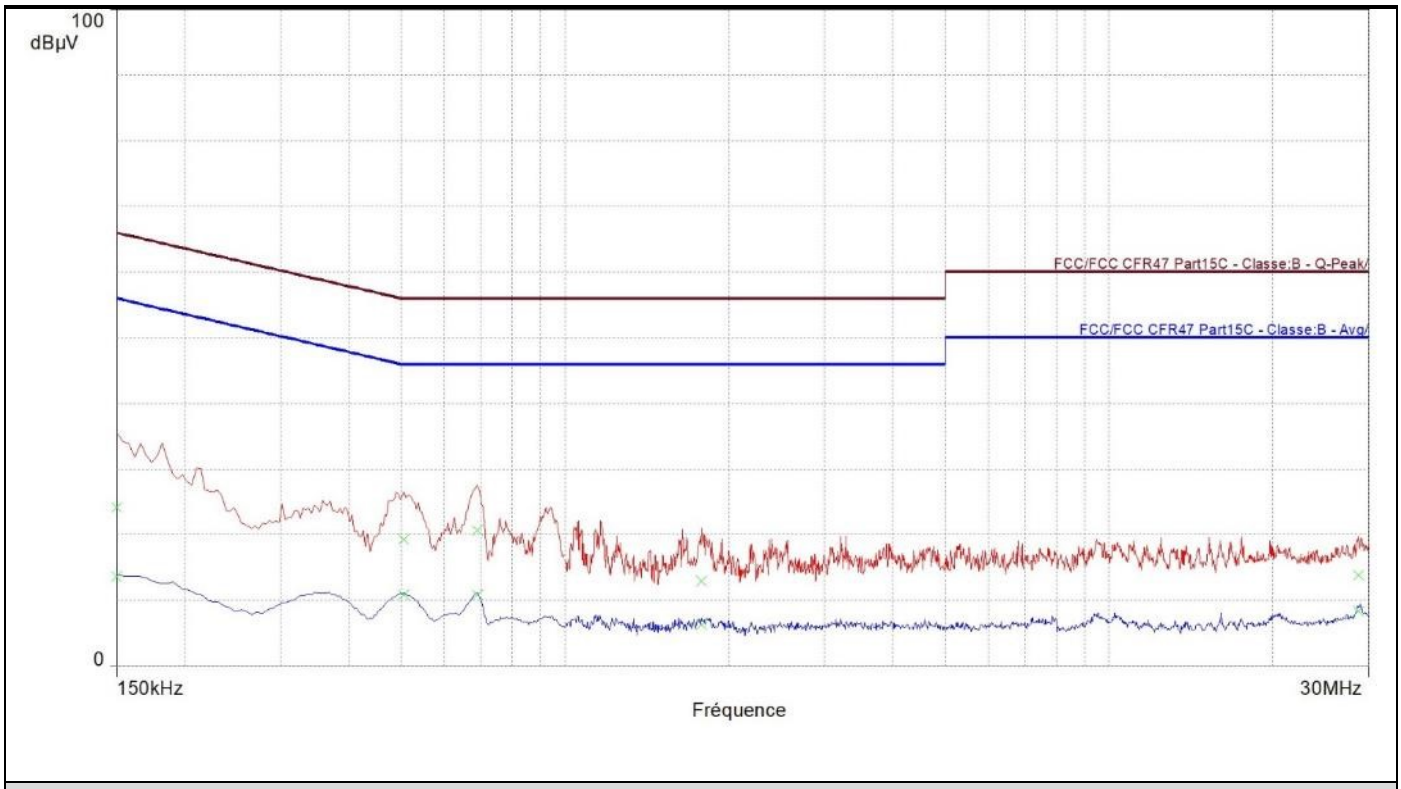
CONDUCTED EMISSIONS			
Graph name:	Emc#7	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with AC/DC Adapter 120VAC 60Hz_ Phase	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)
0.154	21.4	65.8	-44.4	12.6	55.8	-43.2
0.51	20.7	56	-35.3	11.1	46	-34.9
0.706	22.3	56	-33.7	11.4	46	-34.6
1.9	14.9	56	-41.1	6.5	46	-39.5
28.976	13.7	60	-46.3	8.1	50	-41.9

CONDUCTED EMISSIONS			
Graph name:	Emc#8	**Test configuration:**	
Limit:	FCC CFR47 Part15C	STUART_with AC/DC Adapter 120VAC 60Hz_ Neutral	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:		**RBW:** 10kHz	**VBW:** 30kHz
Line:		**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)
0.15	24.2	66	-41.8	13.6	56	-42.4
0.506	19.3	56	-36.7	10.8	46	-35.2
0.69	20.7	56	-35.3	10.9	46	-35.1
1.78	13	56	-43	6.3	46	-39.7
28.736	13.9	60	-46.1	8.4	50	-41.6

8.7. CONCLUSION

AC Power Line Conducted Emission measurement performed on the sample of the product **EFA2**, Sn: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15 & RSS Gen** limits.

9. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS

9.1. *TEST CONDITIONS*

Date of test : September 13, 2023
Test performed by : Majid MOURZAGH
Relative humidity (%) : 37
Ambient temperature (°C) : 22

9.2. *TEST SETUP*

Test procedure:
ANSI C63.10 & FCC Part 15 subpart C

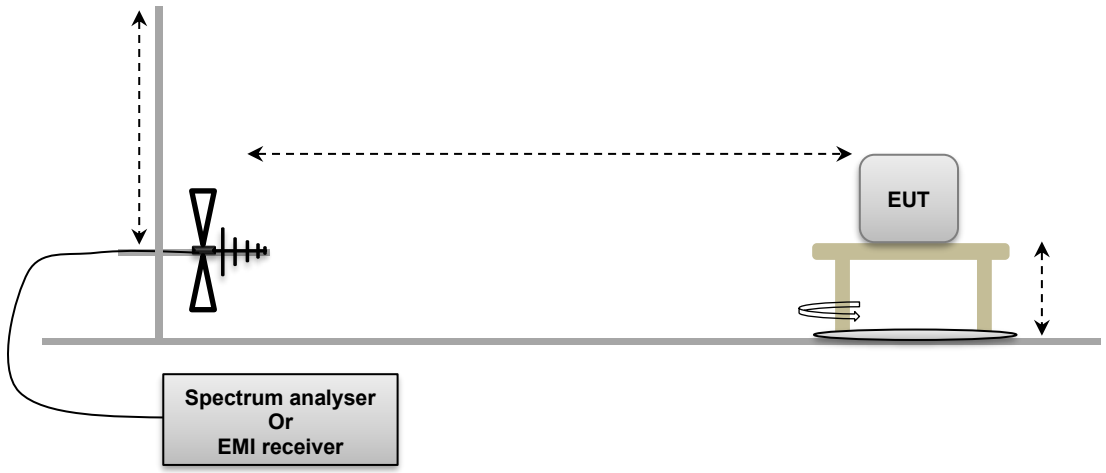
Following frequency ranges, test setup parameters are different and specified in this table:

Frequency range:	**9kHz to 30MHz**	
Test:	**Pre-Characterization**	**Qualification**
Antenna Polarization:	Parallel, Perpendicular and Ground parallel	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	1m
Antenna Type:	Loop	
RBW Filter:	200Hz below 150kHz / 9kHz above 150kHz	
Maximization:	Turntable rotation of 360 degrees range	
EUT height:	1.5m	0.8m
Test site:	Full Anechoic Chamber	Open Aera Test Site
Distance EUT - Antenna:	3m	10m
Detector:	Peak	QPeak

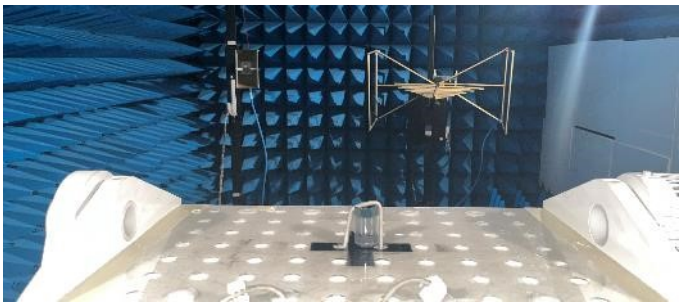
Frequency range:	**30MHz to 1GHz**	
Test:	**Pre-Characterization**	**Qualification**
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Varied from 1m to 4m
Antenna Type:	Biconical & Bi-Log	
RBW Filter:	120kHz	
Maximization:	Turntable rotation of 360 degrees range	
EUT height:	1.5m	0.8m
Test site:	Full Anechoic Chamber	Open Aera Test Site
Distance EUT - Antenna:	3m	10m
Detector:	Peak	QPeak

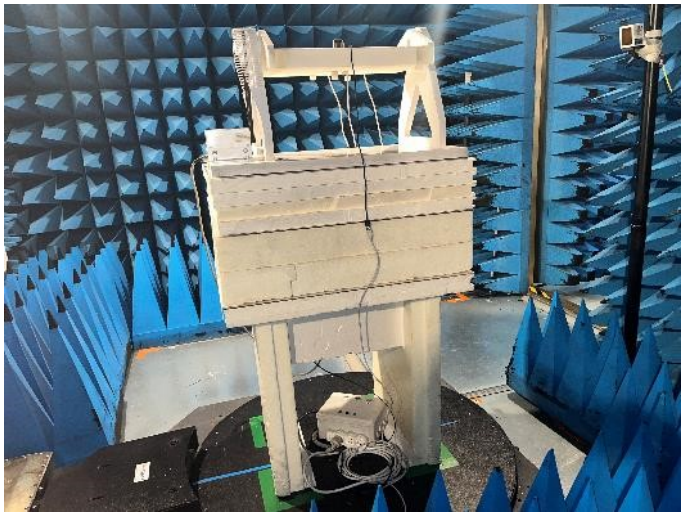
Frequency range:	1GHz to 14GHz	
Test:	Pre-Characterization	Qualification
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Centered on EUT (§6.6.5 ANSI C63-10)
Antenna Type:	Horn	
RBW Filter:	1MHz	
Maximization:	Turntable rotation of 360 degrees range	
EUT height:	1.5m	1.5m
Test site:	Full Anechoic Chamber	Full Anechoic Chamber
Distance EUT - Antenna:	3m	3m
Detector:	Peak & Average	Peak & Average

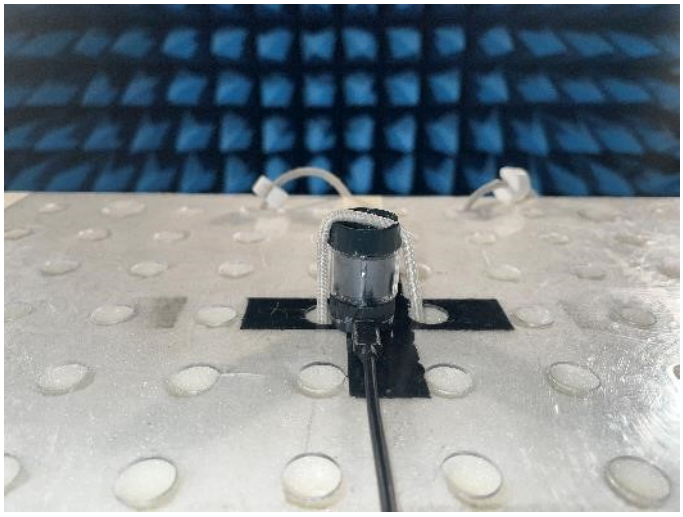
Frequency range:	14GHz to 25GHz	
Test:	Pre-Characterization	Qualification
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Centered on EUT (§6.6.5 ANSI C63-10)
Antenna Type:	Horn	
RBW Filter:	1MHz	
Maximization:	Turntable rotation of 360 degrees range	
EUT height:	1.5m	1.5m
Test site:	Full Anechoic Chamber	Full Anechoic Chamber
Distance EUT - Antenna:	1m	1m
Detector:	Peak & Average	Peak & Average

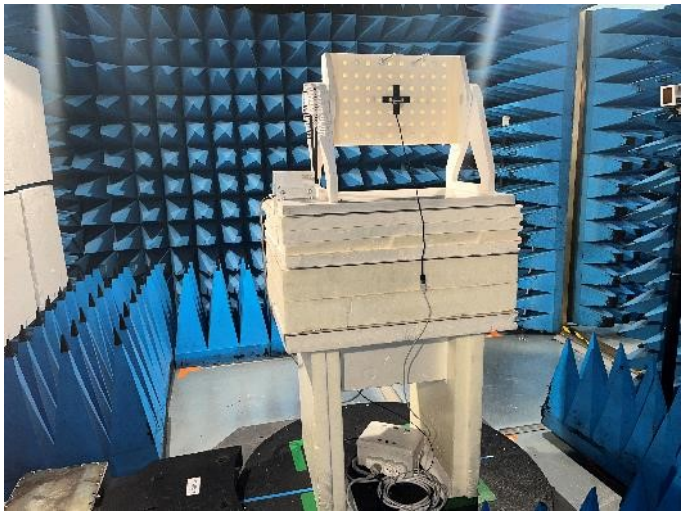


Test setup of Unwanted Emissions in Restricted Frequency Bands









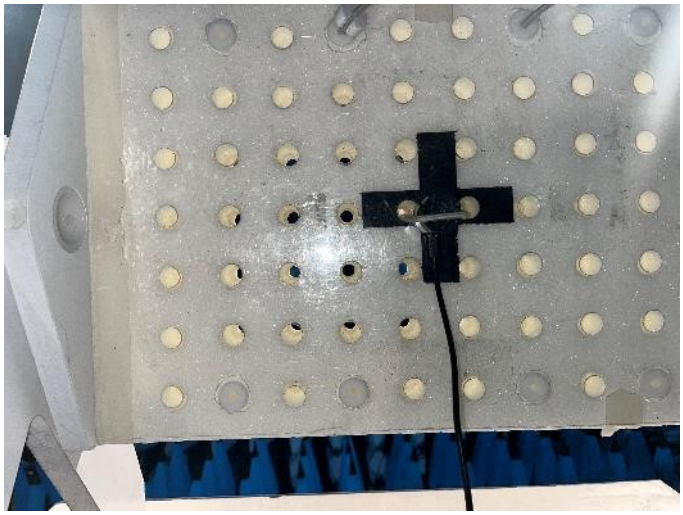
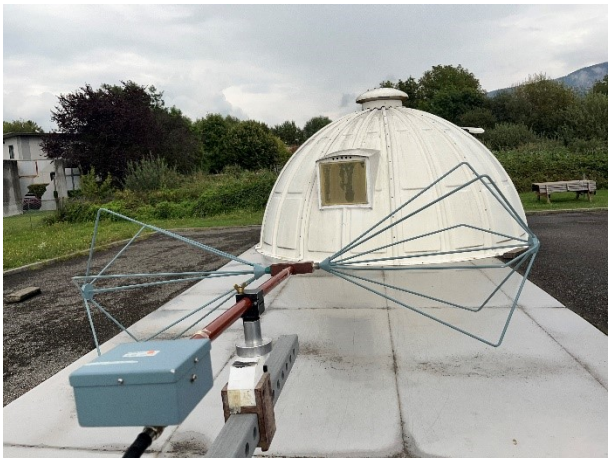


Photo of Unwanted Emissions in Restricted Frequency Bands on FAR



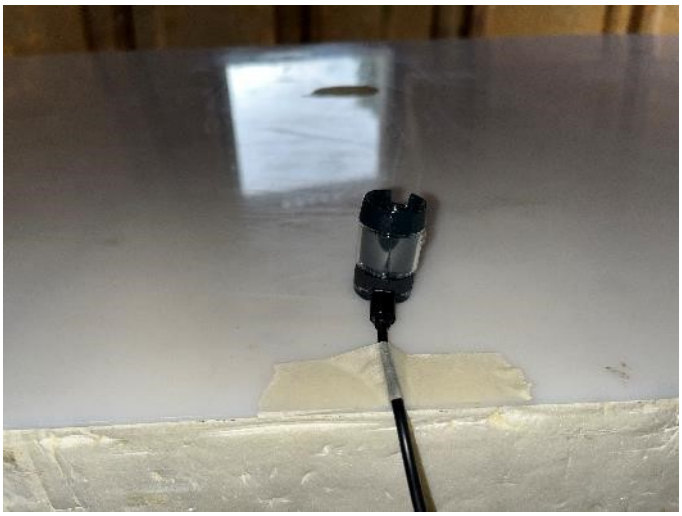


Photo of Unwanted Emissions in Restricted Frequency Bands on OATS

9.3. *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

9.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Amplifier 10MHz - 18GHz	LCIE SUD EST	_	A7102082	05/22	05/24
Antenna Bi-log	AH System	SAS-521-7	C2040180	05/23	05/25
Antenna horn 18GHz	EMCO	3115	C2042029	03/22	03/25
Antenna loop	ELECTRO-METRICS	EM-6879	C2040294	08/22	08/24
BAT EMC	NEXIO	v3.21.0.32	L1000115		
Cable 0.75m	-	18GHz	A5329900	08/22	10/24
Comb EMR HF	YORK	CGE01	A3169114		
CONTROLLER	INNCO	CO3000	D3044034		
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	03/23	03/25
Multimeter - CEM	FLUKE	189	A1240171	09/21	09/23
Rehausse Table C3	LCIE	_	F2000511		
Rehausse Table C3	LCIE	_	F2000507		
Semi-Anechoic chamber #3 (BF)	SIEPEL	_	D3044017_BF	04/22	04/25
Semi-Anechoic chamber #3 (VSWR)	SIEPEL	_	D3044017_VSWR	04/22	04/25
SMA Cable 18GHz 0.5m	TELEDYNE	18GHz	A5330060	02/23	02/24
SMA Cable 18GHz 0.5m	TELEDYNE	18GHz	A5330059	02/23	02/24
SMA Cable 18GHz 0.6m	TELEDYNE	18GHz	A5330055	02/23	02/24
SMA Cable 18GHz 3.5m	TELEDYNE	18GHz	A5330058	02/23	02/24
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/21	09/23
Table C3	LCIE	_	F2000461		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
TILT	INNCO	TILT	D3044033		
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Antenna Mat (OATS)	ETS Lingren	2071-2	F2000392		
Cable (OATS)	_	1GHz	A5329623	09/22	09/23
Table C1/OATS	LCIE	_	F2000445		
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Antenna horn 40GHz	SCHWARZBECK	BBHA 9170	C2042028	06/22	06/25
Cable 1m 40GHz	INTELLICONNECT	C-KPKP-1503-1M	A5329987	04/21	08/22
PRE-AMPLIFIER	LCIE SUD EST	PRE-AMPLIFIER (40GHz)	A7080078	09/22	09/24
SMA 1.5m	SUCOFLEX	18GHz	A5329864	09/22	09/23
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Cable Measure	_	36G	A5329604	09/22	09/23

9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

9.6. RESULTS

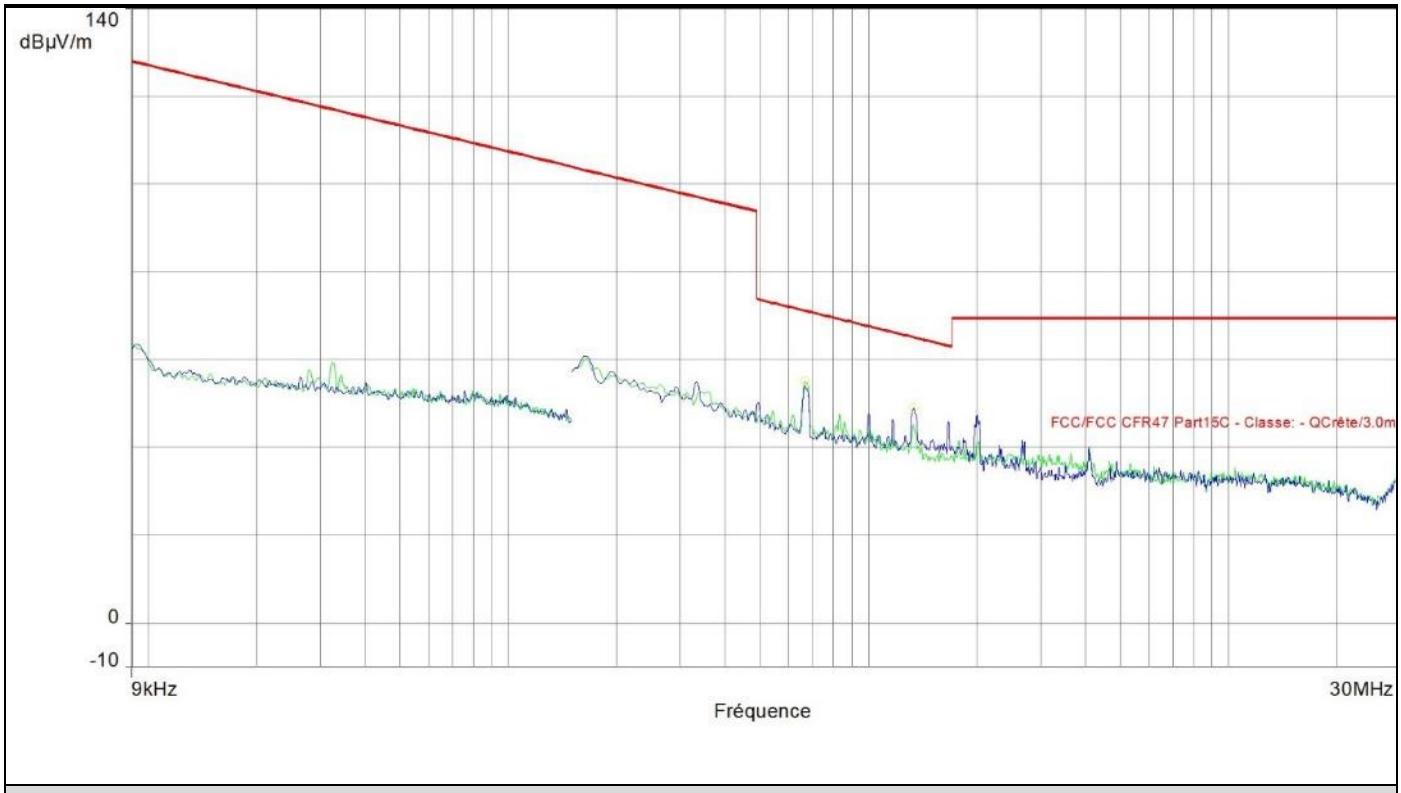
For all following measurements, worst case is presented with different configurations and modulations of EUT.

9.6.1. 9kHz to 30MHz

Graphs – Pre characterization:

Graph identifier	Polarization	Mode	Channel	EUT position	Comments
Emr# 1	0°/90°	TX	Cmin	Axis XY/Z	See the following results
Emr# 2	180°	TX	Cmin	Axis XY/Z	See the following results

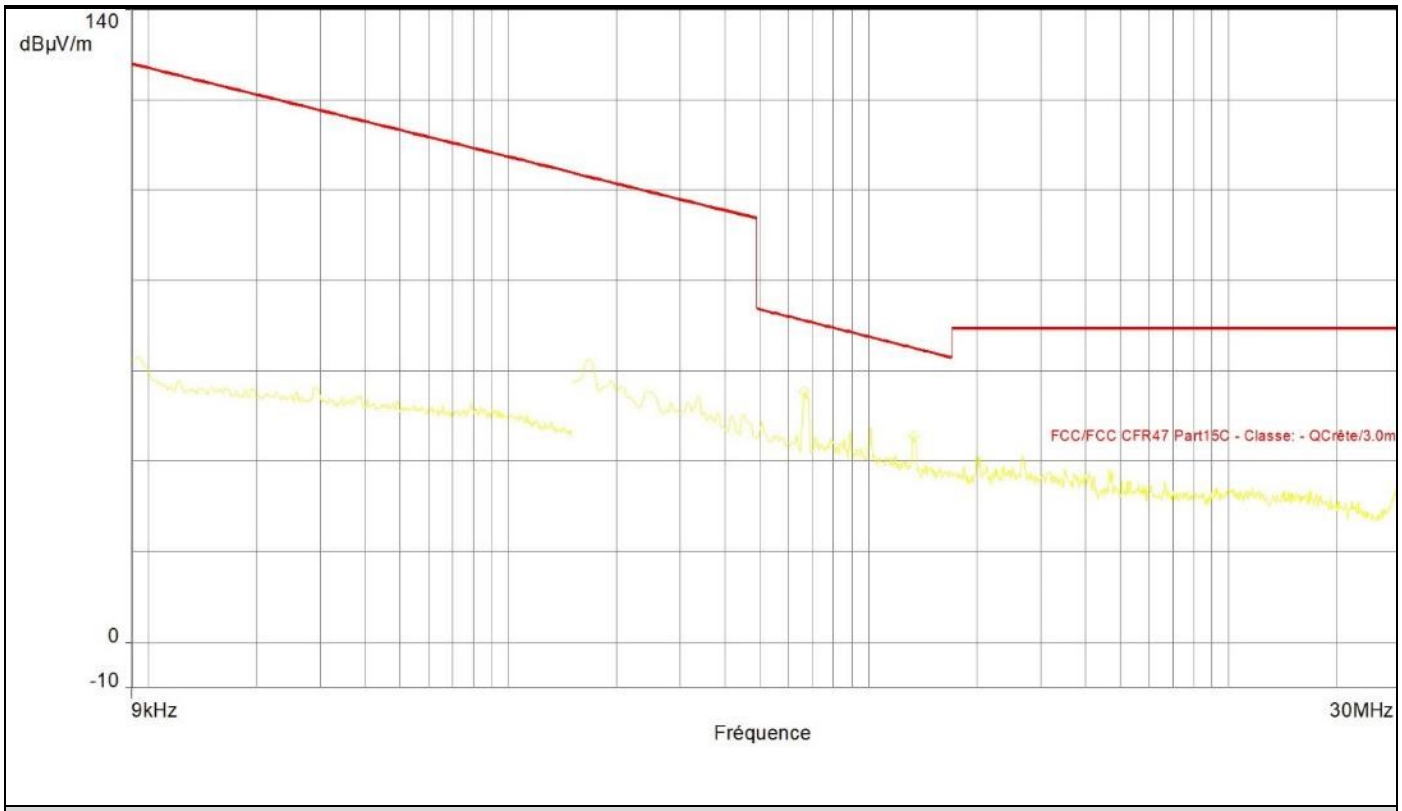
RADIATED EMISSIONS			
Graph name:	Emr#1	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(0°/90°) - TX mode - Axis 0° (Worst case presented)	
Class:			
Frequency range: [9kHz - 30MHz]			
Antenna polarization:		**RBW :**	200Hz to 10kHz
Azimuth:	0° - 360°	**VBW :**	1kHz to 30kHz



Spurious emissions

No significative frequency observed

RADIATED EMISSIONS			
Graph name:	Emr#2	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(180°) - TX mode - Axis 0° (Worst case presented)	
Class:			
Frequency range: [9kHz - 30MHz]			
Antenna polarization:		**RBW :**	200Hz to 10kHz
Azimuth:	0° - 360°	**VBW :**	1kHz to 30kHz



Spurious emissions

No significative frequency observed

Final measurement:

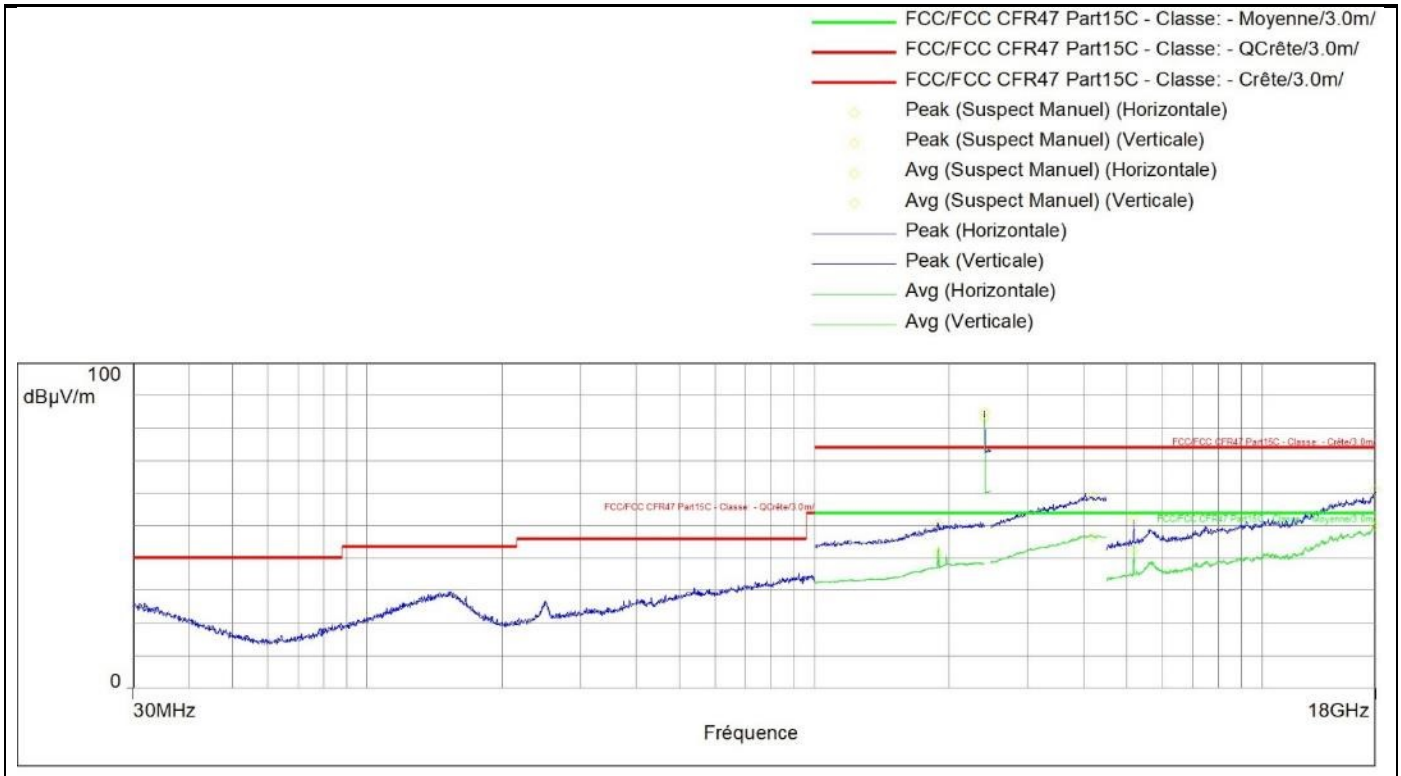
9kHz to 30MHz					
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**	**Margin QPeak (dBµV/m)**
No significant frequency observed					

9.6.2. 30MHz to 18GHz

Graphs – Pre characterization:

Graph identifier	Polarization	Mode	Channel	EUT position	Comments
Emr# 3	H/V	TX	Cmin	0° to 150° step30°	See the following results
Emr# 4	H/V	TX	Cmin	0° to 150° step30°	See the following results
Emr# 5	H/V	TX	Cmin	0° to 150° step30°	See the following results

RADIATED EMISSIONS			
Graph name:	Emr#3	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Cmin - TX mode - Automatic Axis	
Class:			
Frequency range: [30MHz - 18GHz]			
Antenna polarization:		**RBW :**	100kHz to 1MHz
Azimuth:	0° - 360°	**VBW :**	300kHz to 3MHz

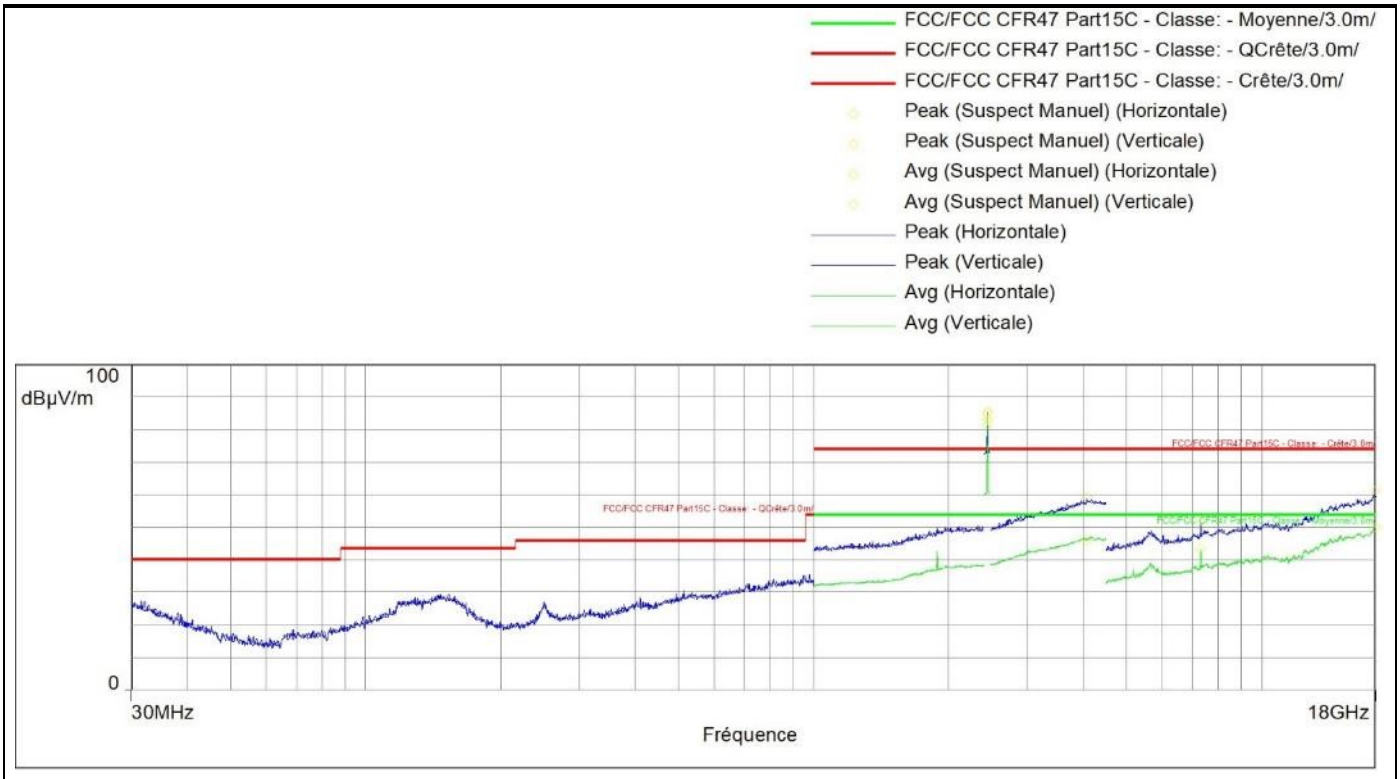


Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
2401.920*	84.9	/	83.0	/	/	Horizontal	35.0
1889.000	50.6	74.0	41.5	54.0	/	Horizontal	34.1
5180.062	52.0	74.0	42.3	54.0	/	Vertical	-18.3
17946.844	61.1	74.0	50.0	54.0	/	Vertical	20.5
4187.846	59.2	74.0	46.6	54.0	/	Vertical	40.7

* : Carrier frequency

RADIATED EMISSIONS			
Graph name:	Emr#4	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Cmid - TX mode - Automatic Axis	
Class:			
Frequency range: [30MHz - 18GHz]			
Antenna polarization:		**RBW :**	100kHz to 1MHz
Azimuth:	0° - 360°	**VBW :**	300kHz to 3MHz

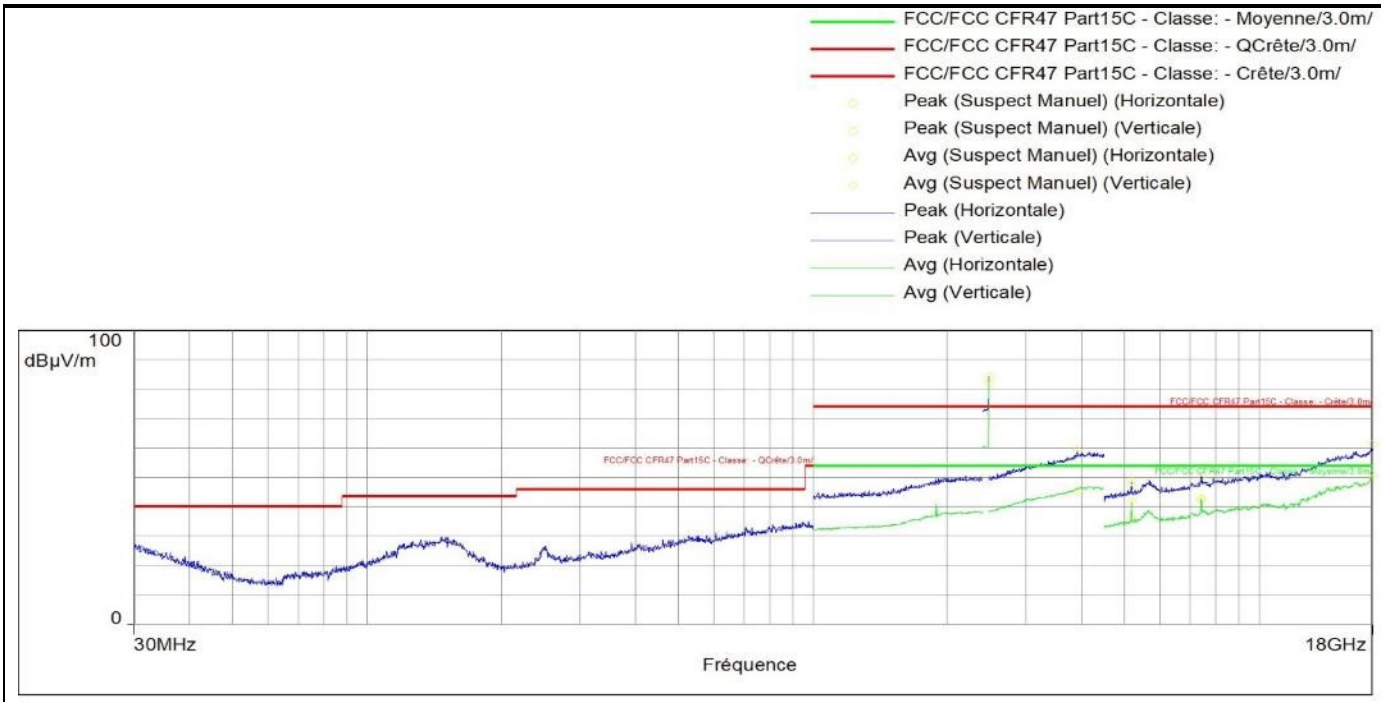


Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
2442.042*	85.5	/	82.9	/		Horizontal	35.1
4069.679	59.0	74.0	46.0	54.0		Horizontal	40.7
7324.875	51.5	74.0	43.2	54.0		Horizontal	-14.6
17988.188	61.3	74.0	50.0	54.0		Horizontal	21.0
2442.042	84.9	/	81.7	/		Vertical	35.1

* : Carrier frequency

RADIATED EMISSIONS			
Graph name:	Emr#5	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - Cmax - TX mode - Automatic Axis	
Class:			
Frequency range: [30MHz - 18GHz]			
Antenna polarization:		**RBW :**	100kHz to 1MHz
Azimuth:	0° - 360°	**VBW :**	300kHz to 3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
2479.993	84.2	/	82.3	/	/	Horizontal	35.1
3911.585	59.2	74.0	45.6	54.0	/	Horizontal	40.5
5184.281	47.2	74.0	41.9	54.0	/	Horizontal	-18.3
5185.125	49.0	74.0	36.0	54.0	/	Horizontal	-18.3
7440.469	50.5	74.0	42.5	54.0	/	Horizontal	-14.4
17999.156	61.2	74.0	50.6	54.0	/	Horizontal	21.2
7440.469	50.5	74.0	42.6	54.0	/	Vertical	-14.4

* : Carrier frequency

Final measurement:

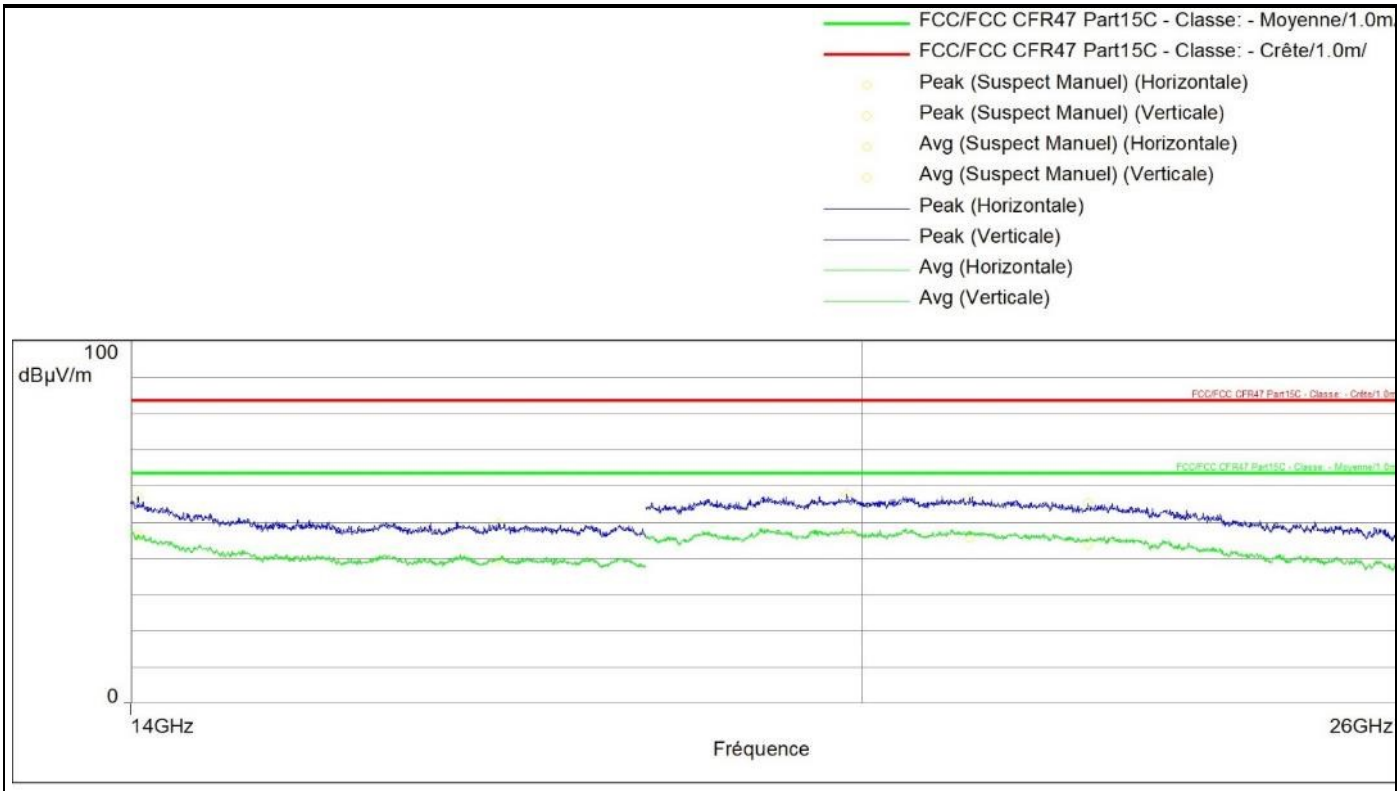
30MHz to 18GHz					
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**	**Margin QPeak (dBµV/m)**
No significant frequency observed					

9.6.3. 18GHz to 25GHz

Graphs – Pre characterization:

Graph identifier		Polarization	Mode	Channel	EUT position	Comments
Emr#	6	H/V	TX	Cmin	0° to 150° step30°	See the following results
Emr#	7	H/V	TX	Cmid	0° to 150° step30°	See the following results
Emr#	8	H/V	TX	Cmax	0° to 150° step30°	See the following results

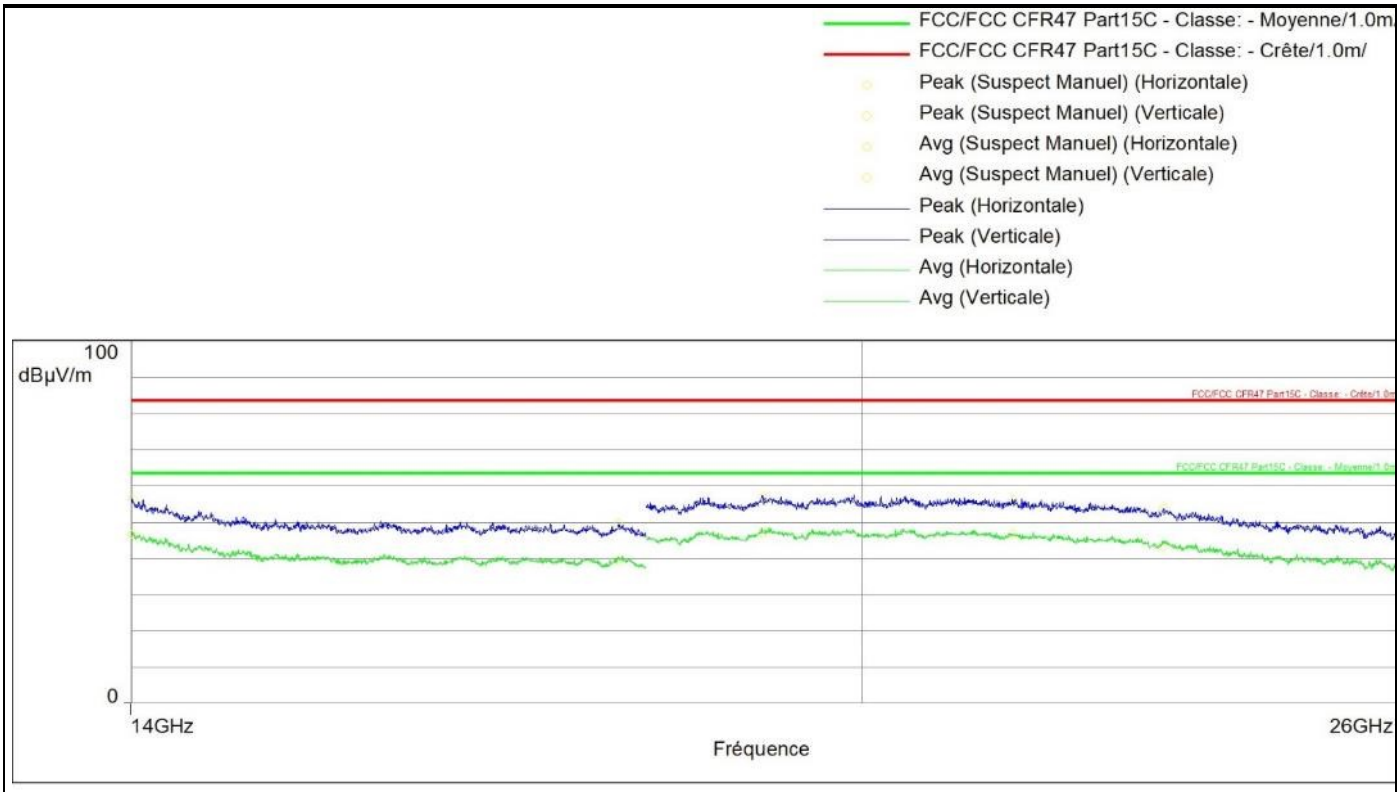
RADIATED EMISSIONS			
Graph name:	Emr#6	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMin - TX mode - Automatic Axis	
Class:			
Frequency range: [14GHz - 26GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Polarization	Correction (dB)
21081.000	56.8	83.5	45.6	63.5	Horizontal	3.2
22338.000	55.4	83.5	43.9	63.5	Horizontal	2.9
14051.500	57.1	83.5	46.6	63.5	Vertical	3.2
16753.500	49.5	83.5	39.2	63.5	Vertical	-4.2
19854.000	57.7	83.5	47.3	63.5	Vertical	4.0

RADIATED EMISSIONS			
Graph name:	Emr#7	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMid - TX mode -Automatic Axis	
Class:			
Frequency range: [14GHz - 26GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Polarization	Correction (dB)
21530.000	56.1	83.5	46.7	63.5	Horizontal	3.0
23166.000	53.9	83.5	43.4	63.5	Horizontal	3.2
14012.000	56.5	83.5	46.6	63.5	Vertical	3.4
17759.500	49.5	83.5	39.2	63.5	Vertical	-4.4
19059.000	56.9	83.5	46.8	63.5	Vertical	4.4

RADIATED EMISSIONS			
Graph name:	Emr#8	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - CMax - TX mode - Automatic Axis	
Class:			
Frequency range: [14GHz - 26GHz]			
Antenna polarization:		**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz

Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Polarization	Correction (dB)
19059.000	56.7	83.5	47.2	63.5	Horizontal	4.4
20452.000	58.0	83.5	46.3	63.5	Horizontal	3.8
21657.000	56.0	83.5	45.4	63.5	Horizontal	3.2
14045.500	56.2	83.5	45.8	63.5	Vertical	3.2
17838.500	50.0	83.5	39.0	63.5	Vertical	-4.1

Final measurement:

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Remark
No significant frequency observed										

9.7. CONCLUSION

Unwanted emissions in non-restricted bands measurement performed on the sample of the product **EFA2**, Sn: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

10. UNCERTAINTIES CHART

Kind of measurement	*Wide uncertainty laboratory*
Occupied Channel Bandwidth	±2.8 %
Humidity	±3.2 %
Power Spectral Density, Conducted	±1.7 dB
Radio frequency	±0.3 ppm
RF power, conducted	±1.2 dB
RF power, radiated (Full anechoic chamber above 1GHz)	±3.7 dB
RF power, radiated (Semi anechoic chamber & open test site)	±5.6 dB
Spurious emission, conducted	±2.3 dB
Spurious emission, radiated (Full anechoic chamber above 1GHz)	±3.8 dB
Spurious emission, radiated (Semi anechoic chamber & open test site)	±5.7 dB
Temperature	±0.75 °C
Time	±2.3 %
Voltage	±1.7 %

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 limit values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report.