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TEST REPORT

N°: 14400748-776692-A

Version : 03

Subject	Radio spectrum matters tests according to standards: 47 CFR Part 15.225 & RSS 210 Issue 10 & &RSS-Gen Issue 5
Issued to	IDEMIA Identity & Security France 2, place Samuel De Champlain 92400 COURBEVOIE FRANCE
Apparatus under test	MorphoWave Series Access control terminal with RFID and biometric identification IDEMIA IDEMIA Identity & Security France MPH-AC004A 2208SMP0000013 ZBW-MPHAC004A 11472A-MPHAC004A
Conclusion	See Test Program chapter
Test date	March 23, 2022 to April 5, 2022
Test location	Fontenay Aux Roses & Ecuelles
Test Site	6230B-1
Registration Number	582868
Designation Number	FR0010
Sample receipt date	March 22, 2022
Composition of document	52 pages
Initial issued on	April 27, 2022
Document issued on	November 17, 2022

Written by :
Laurent DENEUX
Tests operator

Approved by :
Julien BOUTAUD
Technical manager



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LCIE

Laboratoire Central des Industries Electriques
Une société de Bureau Veritas

33, Av du Général Leclerc
92266 Fontenay Aux Roses
FRANCE

Tél : +33 1 40 95 60 60
contact@lcie.fr
www.lcie.fr



PUBLICATION HISTORY

Version	Date	Author	Modification
01	April 27, 2022	Laurent DENEUX	Creation of the document
02	November 17, 2022	Laurent DENEUX	Modification of registration & designation number (page 1)
03	November 21, 2022	Laurent DENEUX	Modification of product details name (page 1)

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 15.225 (2020)
- RSS 210 Issue 10
- RSS Gen Issue 5
- ANSI C63.10 (2013)

Radio requirement:

Clause (47CFR Part 15.225 & RSS-210 Issue 9 & RSS-Gen Issue 5) Test Description	Test result - Comments			
Occupied Bandwidth	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input checked="" type="checkbox"/> NP(1)
20dB Bandwidth	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA	<input type="checkbox"/> NP(1)
AC Power Line Conducted Emission	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA(2)	<input type="checkbox"/> NP(1)
Frequency Tolerance	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input checked="" type="checkbox"/> NP(1)
Field strength within the band 13.110-14.010MHz	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Field strength outside of the bands 13.110-14.010 MHz	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Receiver Radiated Emissions	<input checked="" type="checkbox"/> PASS (3)	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
This table is a summary of test report, see conclusion of each clause of this test report for detail.				

(1): Limited program

(2): EUT not directly or indirectly connected to the AC Power Public Network

(3) 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):

IDEMIA MPH-AC004A

Serial Number: 2208SMP0000013



Equipment Under Test

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
POE	PHIHONG reference POE29U-1AT(PL)	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	100-240V~ 50/60Hz
AC/DC Power supply	FRIWO model : FW7362/12	1.8	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Input:100-240V~50-60Hz Output: 12Vdc 2.5A
DC Power supply	12Vdc	1.8	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Ethernet	RJ45	10	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Between POE and EUT when powered through POE or Between EUT and Laptop when powered through DC power supply.

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
LapTop	LENOVO R500	-	Not under test / just to send ping command
Power Supply - FRIWO	FW7362/12	-	Not sold with the product
POE Injector - PHIHONG	POE29U-1AT(PL)	-	Not sold with the product



Equipment information (declaration of provider):

Type:	<input checked="" type="checkbox"/> RFID		
Chipset Ref :			
Frequency band:	[13.553 to 13.567] MHz		
Number of Channel:	1		
Antenna Type:	<input checked="" type="checkbox"/> Integral	<input type="checkbox"/> External	<input type="checkbox"/> Dedicated
Antenna Requirements §15.203	Select Antenna Requirements		
Transmit chains:	1		
Receiver chains	1		
Type of equipment:	<input checked="" type="checkbox"/> Stand-alone	<input type="checkbox"/> Plug-in	<input type="checkbox"/> Combined
Equipment arrangement:	<input checked="" type="checkbox"/> Tabletop	<input type="checkbox"/> Floor-standing	<input type="checkbox"/> Multiple orientations
Equipment type:	<input checked="" type="checkbox"/> Production model	<input type="checkbox"/> Pre-production model	
Operating temperature range:	Tnom:	20°C	
DC Mode			
Operating voltage:	Vmin:	<input type="checkbox"/> 102V/60Hz	<input checked="" type="checkbox"/> 9.0 VDC
	Vnom:	<input type="checkbox"/> 120V/60Hz	<input checked="" type="checkbox"/> 12.0 VDC
	Vmax:	<input type="checkbox"/> 138V/60Hz	<input checked="" type="checkbox"/> 27.6 VDC
POE Mode			
Operating voltage:	Vmin:	<input type="checkbox"/> 102V/60Hz	<input checked="" type="checkbox"/> 42.5 VDC
	Vnom:	<input type="checkbox"/> 120V/60Hz	<input checked="" type="checkbox"/> 48 VDC
	Vmax:	<input type="checkbox"/> 138V/60Hz	<input checked="" type="checkbox"/> 57 VDC

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

Modulation Type			

Hardware information		
Software (if applicable):	V. :	2.7.2

2.2. RUNNING MODE

Test mode	Description of test mode
Test mode 1	Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
Test mode 2	Permanent reception

Test	Running mode	
Occupied Bandwidth	<input checked="" type="checkbox"/> Test mode 1 (1)	<input type="checkbox"/> Alternative test mode()
Frequency Tolerance	<input checked="" type="checkbox"/> Test mode 1 (1)	<input type="checkbox"/> Alternative test mode()
AC Power Line Conducted Emission	<input checked="" type="checkbox"/> Test mode 1 (1)	<input type="checkbox"/> Alternative test mode()
Field strength within the band 13.110-14.010MHz	<input checked="" type="checkbox"/> Test mode 1 (1)	<input type="checkbox"/> Alternative test mode()
Field strength outside of the bands 13.110-14.010 MHz	<input checked="" type="checkbox"/> Test mode 1 (1)	<input type="checkbox"/> Alternative test mode()
Receiver Radiated Emissions	<input checked="" type="checkbox"/> Test mode 2 (2)	<input type="checkbox"/> 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.

(2) Note: The test can't be performed because the transmitter and receiver are operating at the same frequency and the transmitter cannot be switched off as the carrier is used as receiver injection signal



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2.3. EQUIPMENT LABELLING





2.4. EQUIPMENT MODIFICATION

None Modification:

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

Assume a receiver reading of 52.5dB μ V 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 dB μ V/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m.}$$

2.6. 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

3. AC POWER LINE CONDUCTED EMISSIONS

3.1. TEST CONDITIONS

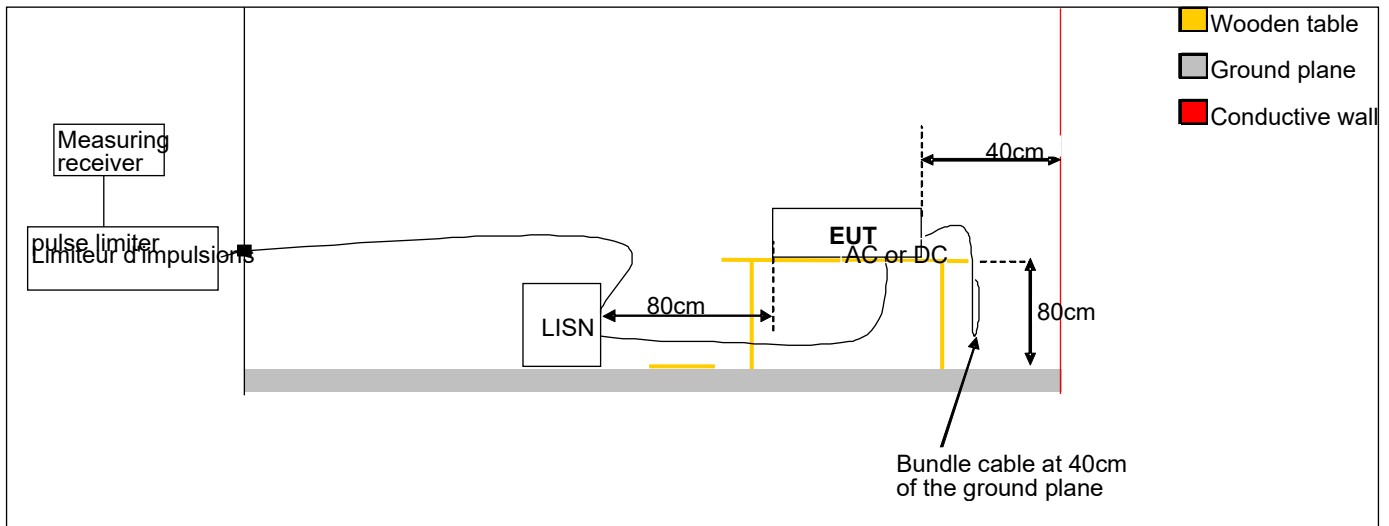
Test performed by : Laurent DENEUX
 Date of test : April 4, 2022
 Ambient temperature : 20 °C
 Relative humidity : 41 %

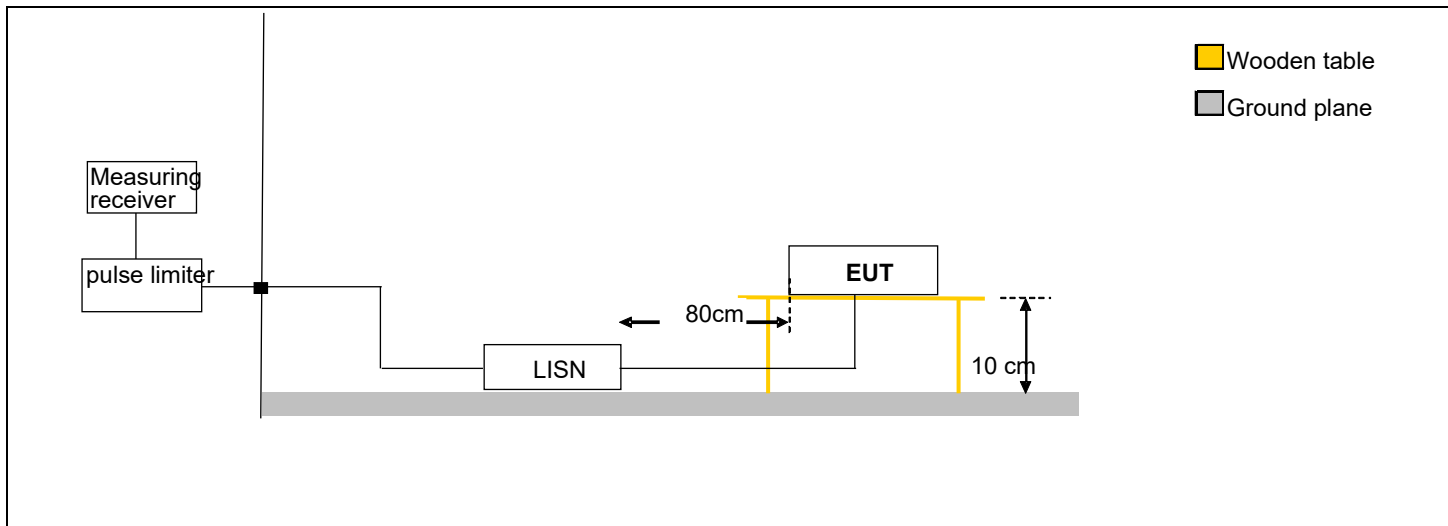
3.2. TEST SETUP

The product has been tested according to ANSI C63.10 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.

Voltage table used (for Power Line Conducted Emissions):

Type	Measurement performed:	
<input checked="" type="checkbox"/> AC / <input checked="" type="checkbox"/> DC (Auxiliary used)	<input checked="" type="checkbox"/> 120VAC/60Hz	<input checked="" type="checkbox"/> 240VAC/50Hz
<input type="checkbox"/> USB (Laptop auxiliary)	<input type="checkbox"/> 120VAC/60Hz (Laptop auxiliary)	<input type="checkbox"/> 240VAC/50Hz(Laptop auxiliary)





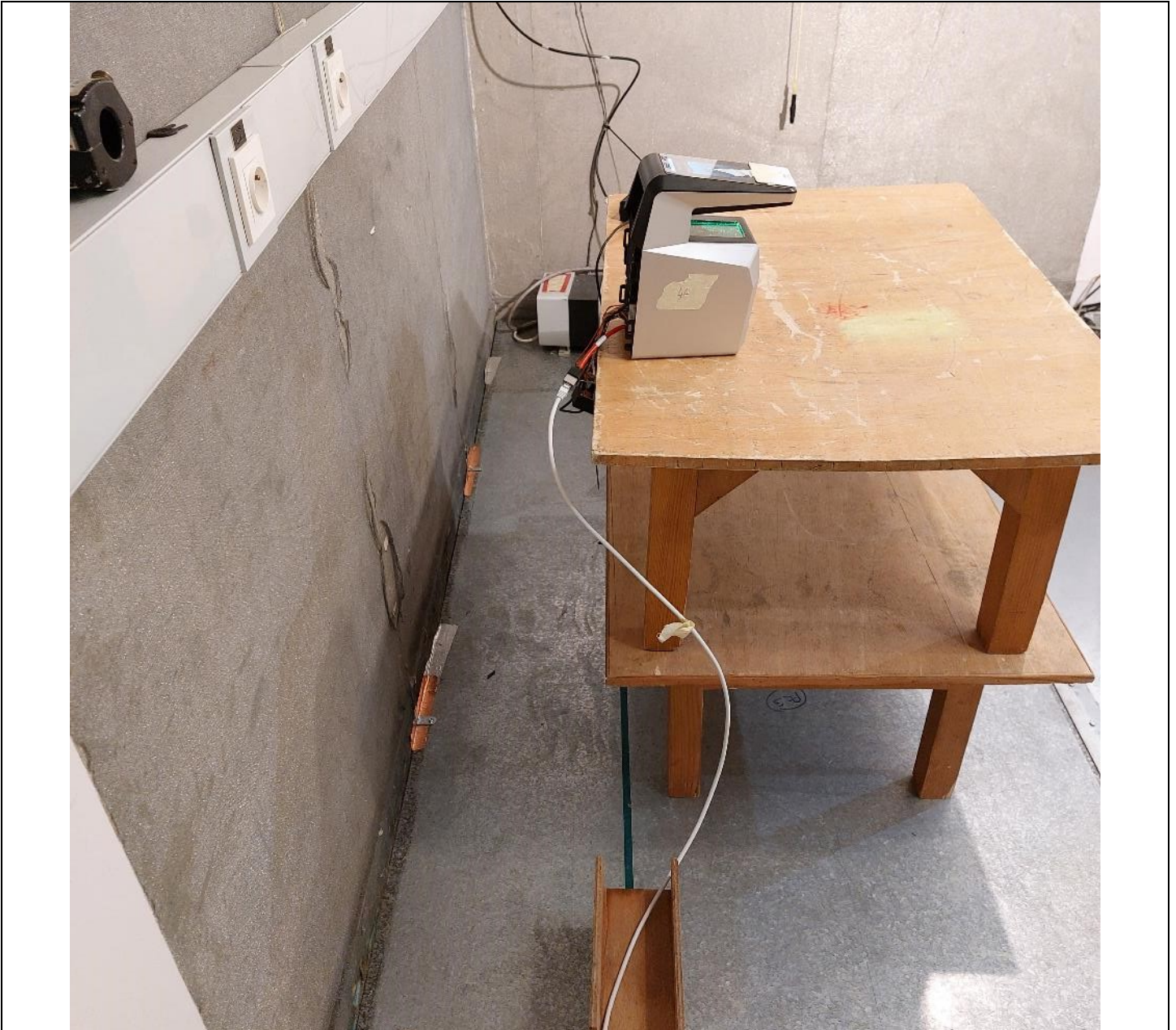
Test set up of AC Power Line Conducted Emissions



Photograph for AC Power Line Conducted Emissions (Mode DC)



L C I E



Photograph for AC Power Line Conducted Emissions (mode DC)



Photograph for AC Power Line Conducted Emissions (mode POE)



L C I E



Photograph for AC Power Line Conducted Emissions (mode POE)



3.3. LIMIT

Frequency range	Level	Detector
0,15kHz to 0,5MHz	66dB μ V to 56 μ V*	QPeak
	56dB μ V to 46 μ V*	Average
0,5MHz to 5MHz	56dB μ V	QPeak
	46dB μ V	Average
5MHz to 30MHz	60B μ V	QPeak
	50dB μ V	Average

*Decreases with the logarithm of the frequency

3.4. TEST EQUIPMENT LIST

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Receiver	RHODE & SCHWARZ	ESU	A2642018	2020/10	2022/10
V ISLN	ROHDE & SCHWARZ	ESH2-Z5	C2322001	2021/10	2022/10
Pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	A2649008	2021/06	2022/06
Cable	-	-	A5329417	2021/11	2022/11
Cable	-	-	A5329589	2021/11	2022/11
Reference ground plan 2 x 3m	L.C.I.E.	-	-	-	-

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

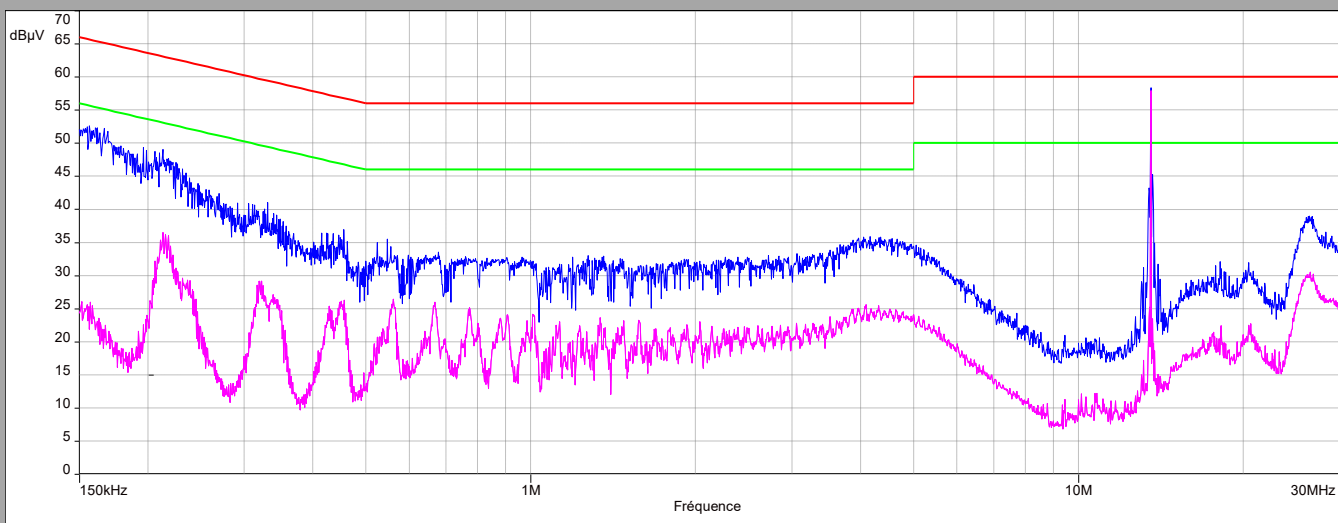
3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

3.6. RESULTS

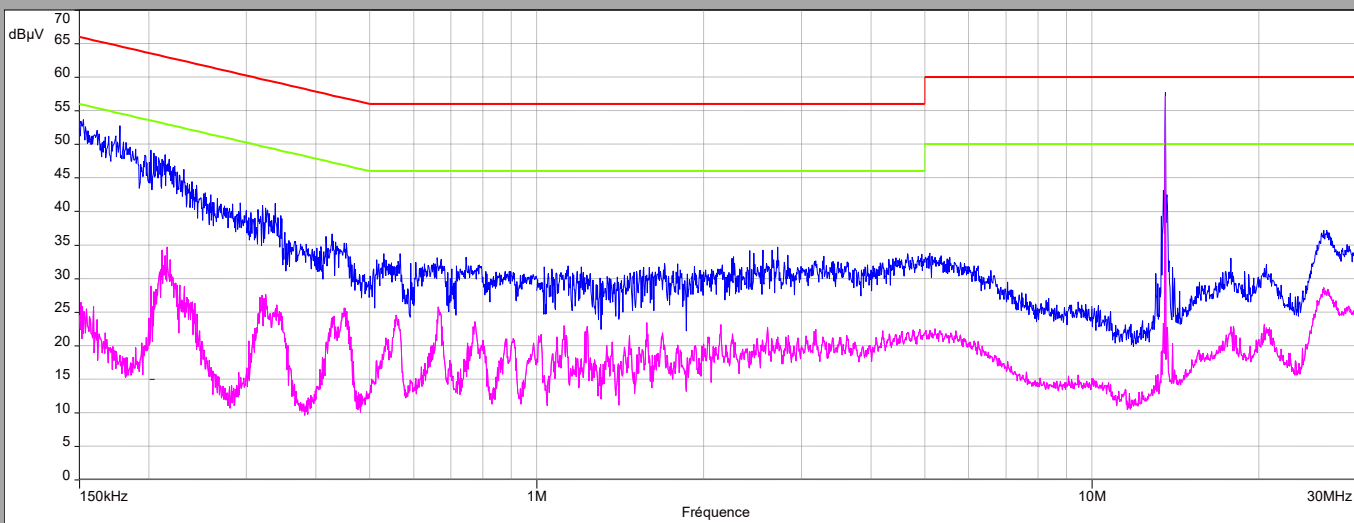
AC Power Line Conducted Emission-mode DC with antenna Phase 120V-60Hz

- FCC PART 15 classe B - Classe:B - Moyenne/
- FCC PART 15 classe B - Classe:B - QCrête/
- Mes.Peak (Phase 1)
- Mes.Avg (Phase 1)



Line 120V-60Hz

- FCC PART 15 classe B - Classe:B - Moyenne/
- FCC PART 15 classe B - Classe:B - QCrête/
- Mes.Peak (Neutre)
- Mes.Avg (Neutre)





L C I E

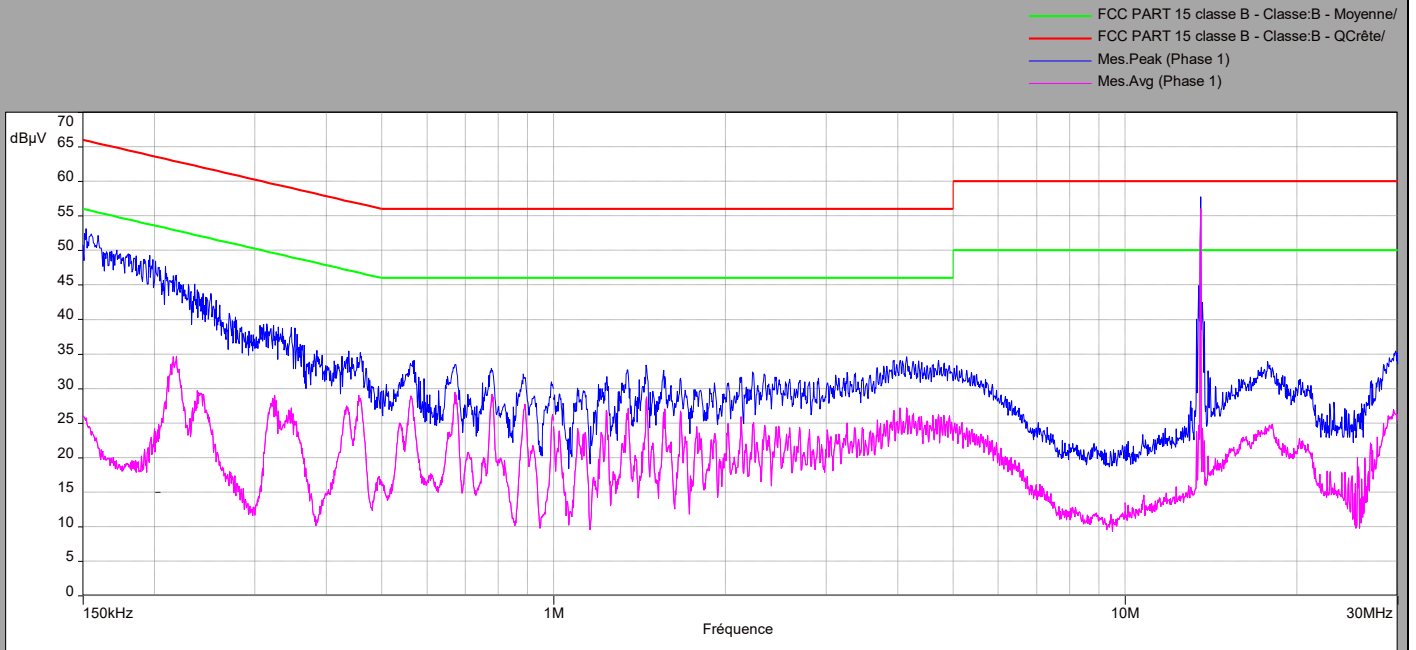
Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	51.8	-	66	14.2	26	46	20
0.56	32.2	-	56	23.8	26.4	46	19.6
4.31	35.4	-	56	20.6	25.4	46	20.6
13.56	58.4	-	60	1.6	58	50	2
26.25	39	-	60	21	28.8	50	21.2

Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	53.4	-	66	12.6	26.4	56	29.6
0.55	31.7	-	56	24.3	24.5	46	21.5
2.6	31	-	56	25	22.6	46	23.4
13.56	58	-	60	2	57	50	-7
26.15	37.2	-	60	22.8	37.4	50	12.6

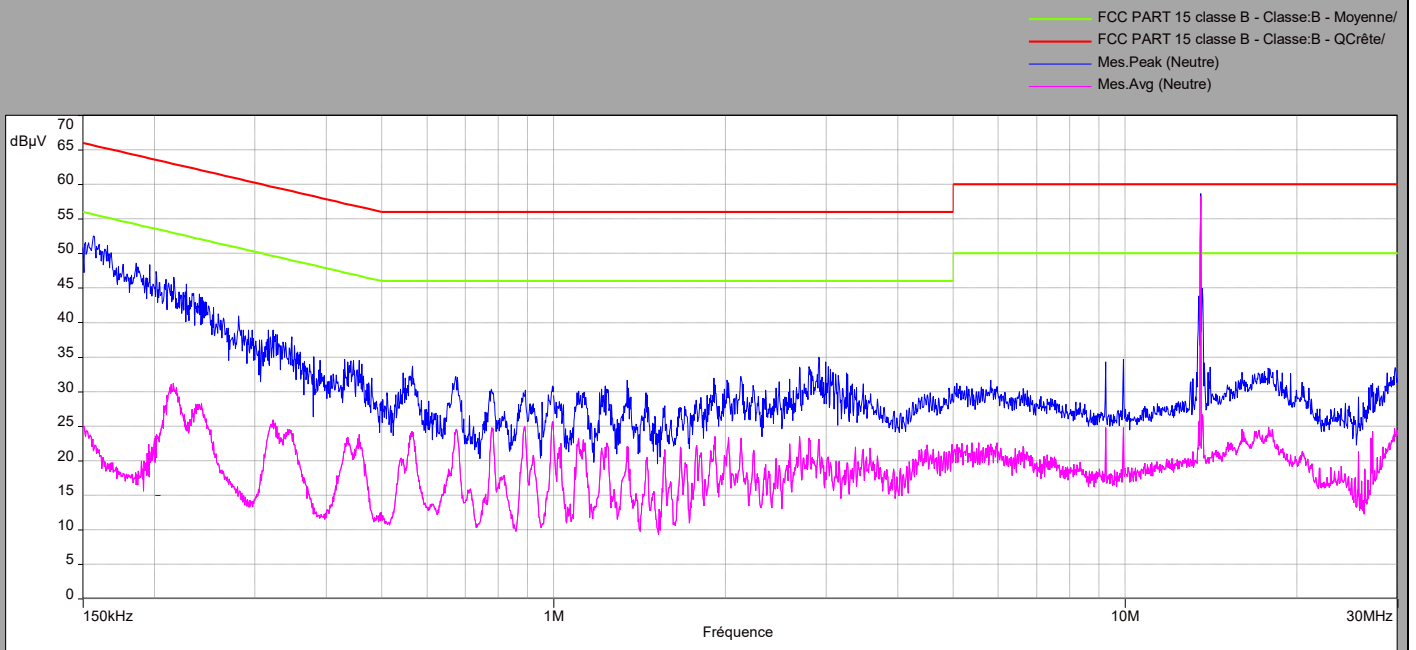


L C I E

AC Power Line Conducted Emission –mode DC with antenna Phase 240V-50Hz



Line 240V-50Hz





L C I E

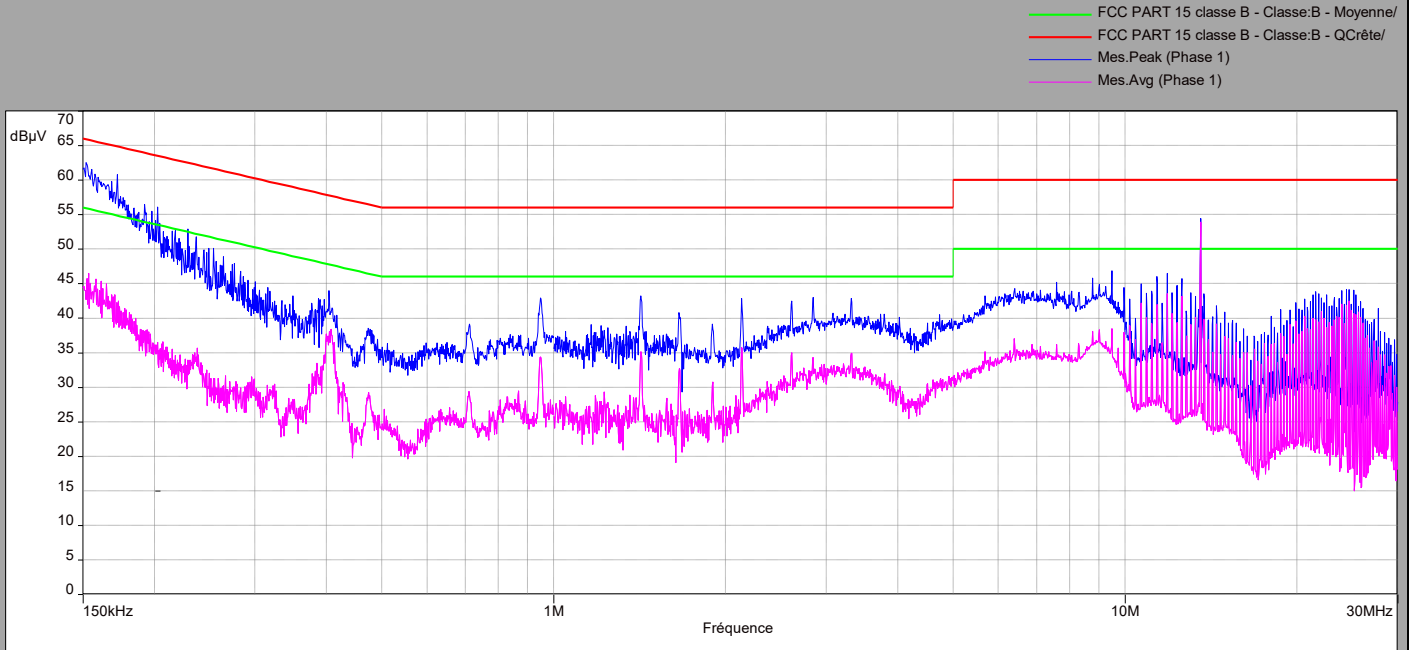
Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	50.7	-	66	15.3	26	56	30
0.56	33	-	56	23	29	46	17
1.45	33.3	-	56	22.7	28.2	46	17.8
4.14	34.2	-	56	21.8	27.2	46	18.8
13.56	57.7	-	60	2.3	56	50	-6

Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	51	-	66	15	24.8	56	31.2
0.56	33	-	56	23	23	46	23
2.91	35	-	56	21	22.7	46	23.3
13.56	58.6	-	60	1.4	58.2	50	-8.2
27.12	31	-	60	29	24	50	26

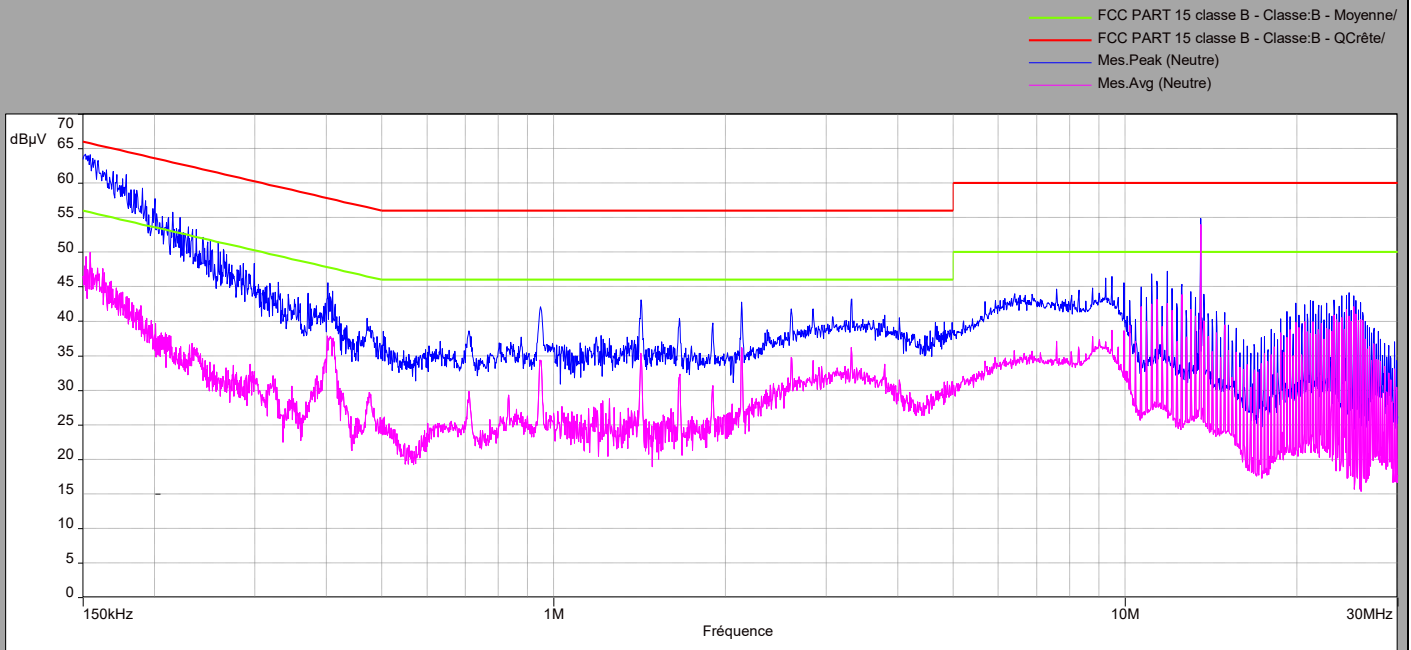


L C I E

AC Power Line Conducted Emission – mode POE with antenna Phase 120V-60Hz



Line 120V-60Hz





L C I E

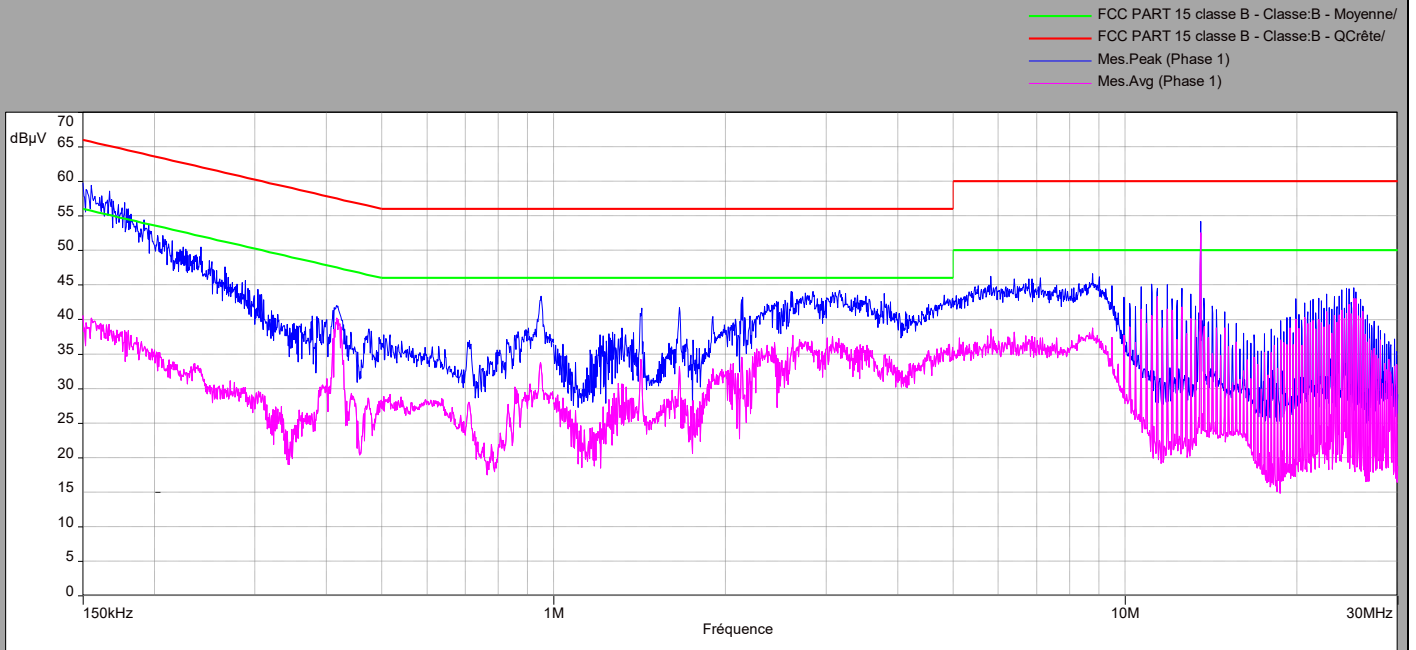
Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	62.3	-	66	3.7	47.3	56	8.7
0.4	44	-	57.7	13.7	38.4	47.7	9.3
1.42	42.7	-	56	13.3	35	46	11
13.56	54.4	-	60	5.6	54	50	-4
24.65	44.2	-	60	15.8	42.4	50	7.6

Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	64.2	-	66	1.8	50	56	6
0.4	44.5	-	57.7	13.2	37.5	47.7	10.2
1.42	43	-	56	13	35.3	46	10.7
13.56	54.5	-	60	5.5	54	50	-4
24.41	43.7	-	60	16.3	41.6	50	8.4

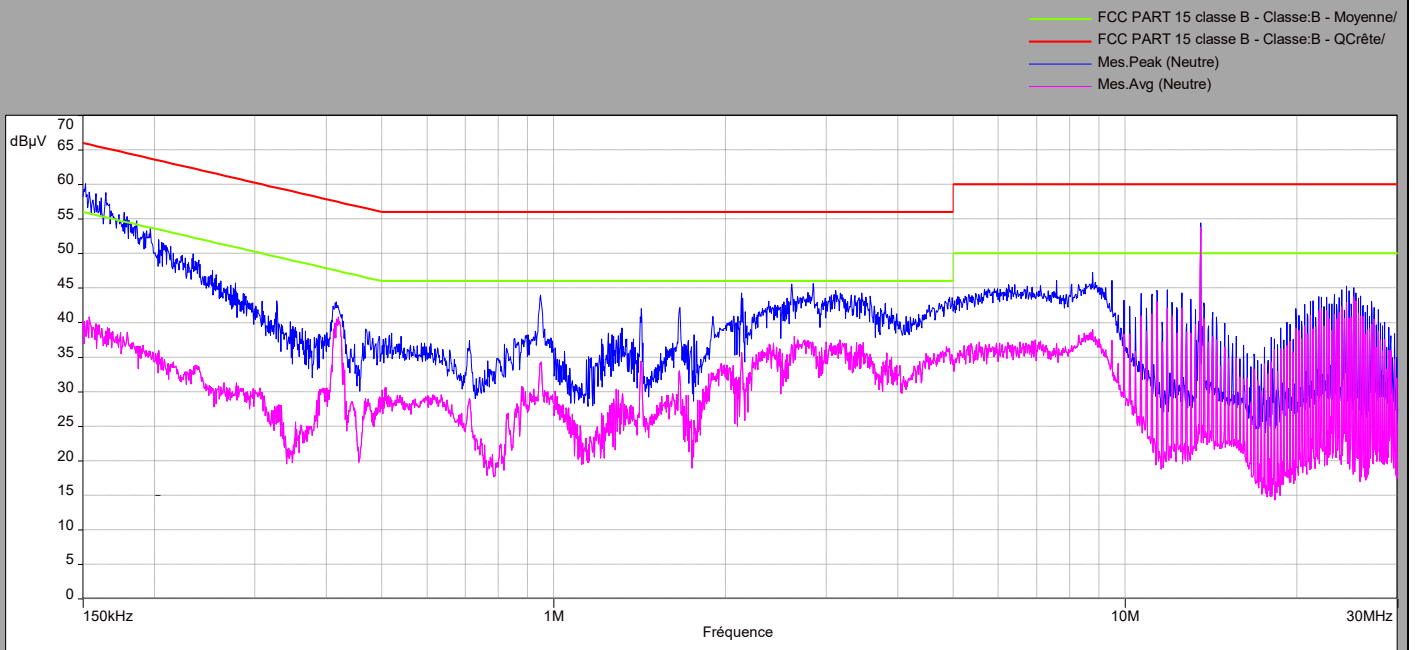


L C I E

AC Power Line Conducted Emission - mode POE with antenna Phase 240V-50Hz



Line 240V-50Hz





L C I E

Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	59.7	-	66	6.3	40.5	56	15.5
0.4	42	-	57.7	15.7	40.2	47.7	7.5
2.13	42.8	-	56	13.2	34.5	46	11.5
13.56	53	-	60	7	52.5	50	-2.5
25.13	44.5	-	60	15.5	41.8	50	8.2

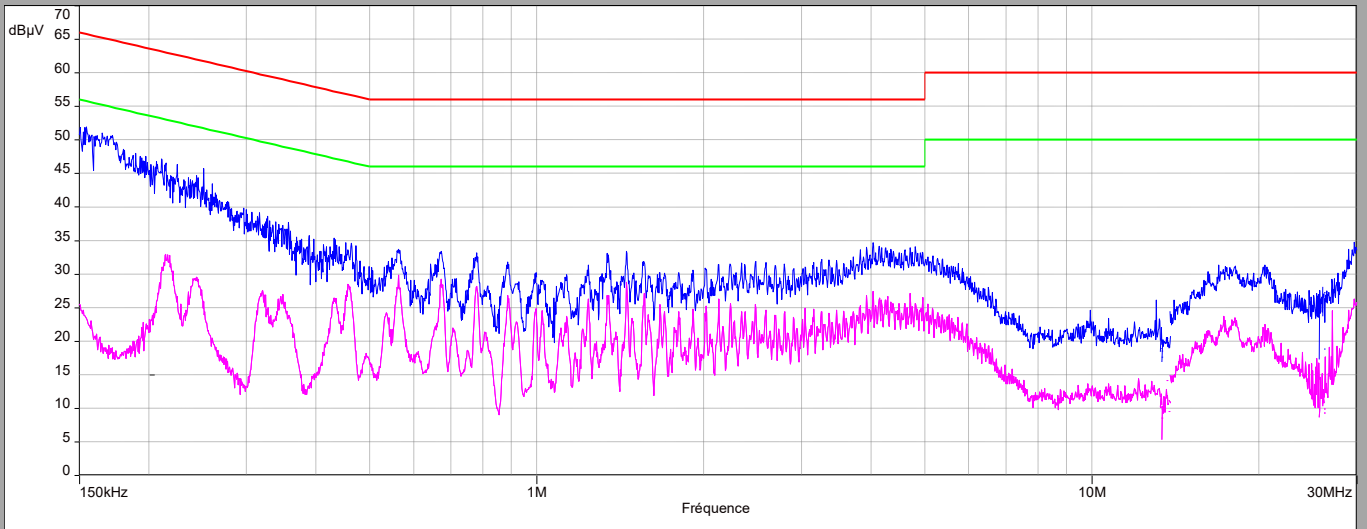
Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	59	-	66	7	50	56	6
0.4	42	-	56	14	40.7	46	5.3
2.13	44.3	-	56	11.7	35.6	46	10.4
13.56	54.2	-	60	5.8	53.7	50	-3.7
25.13	45	-	60	15	43.6	50	6.4



L C I E

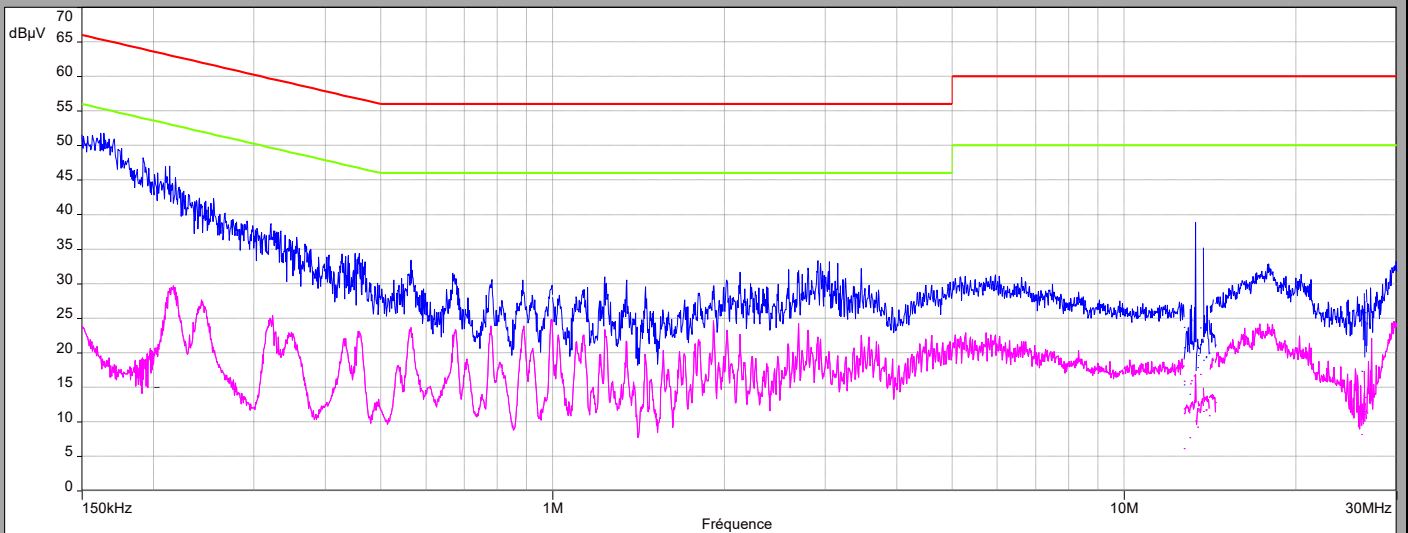
AC Power Line Conducted Emission –mode DC without antenna Phase 120V-60Hz

- FCC PART 15 classe B - Classe:B - Moyenne/
- FCC PART 15 classe B - Classe:B - QCrête/
- Mes.Peak (Phase 1)
- Mes.Avg (Phase 1)



Line 120V-60Hz

- FCC PART 15 classe B - Classe:B - Moyenne/
- FCC PART 15 classe B - Classe:B - QCrête/
- Mes.Peak (Neutre)
- Mes.Avg (Neutre)





L C I E

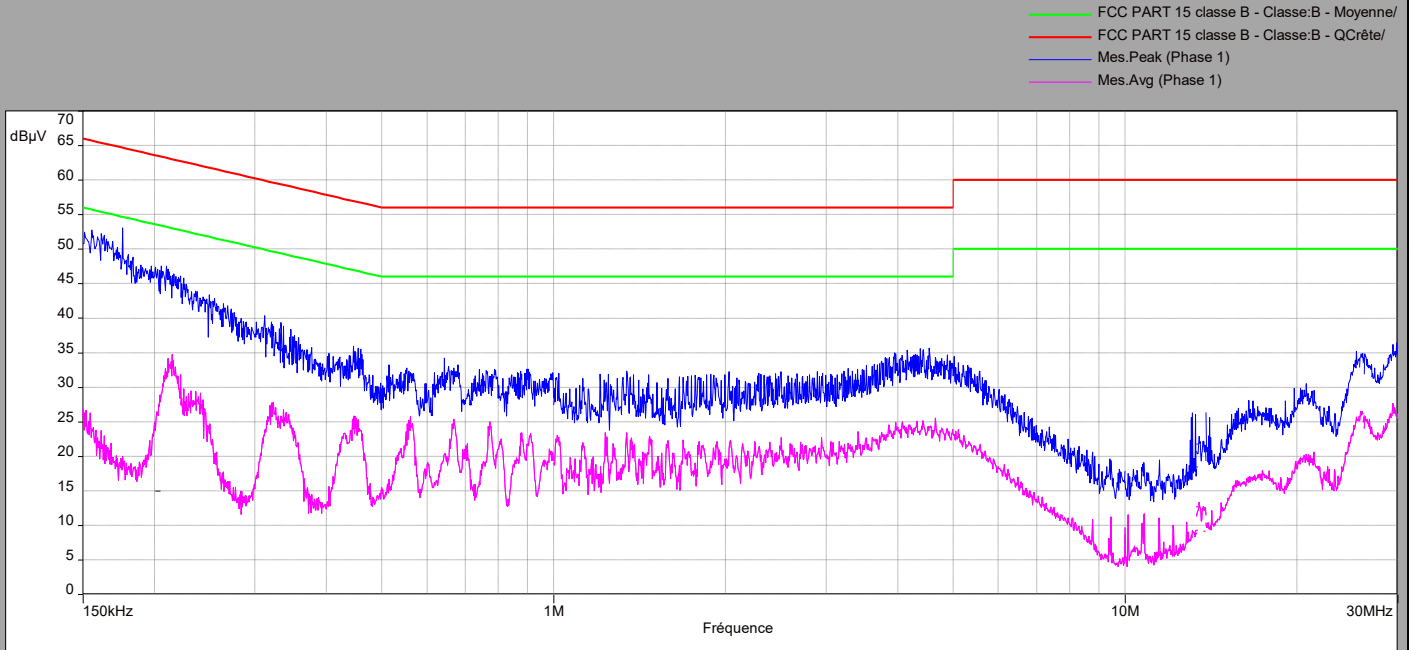
Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	51.2	-	66	14.8	24.6	46	21.4
0.56	33.6	-	56	22.4	29.8	46	16.2
1.44	33.1	-	56	22.9	28.7	46	17.3
4	34.6	-	56	27.4	58	46	12
20.6	31.4	-	60	28.6	22.4	50	27.6

Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	51.5	-	66	14.5	23.8	56	32.2
0.55	33.4	-	56	22.6	23.3	46	22.7
1.23	31	-	56	25	23.3	46	22.7
13.34	39	-	56	17	16.9	46	29.1
29.9	33.5	-	60	26.5	24.8	50	25.2

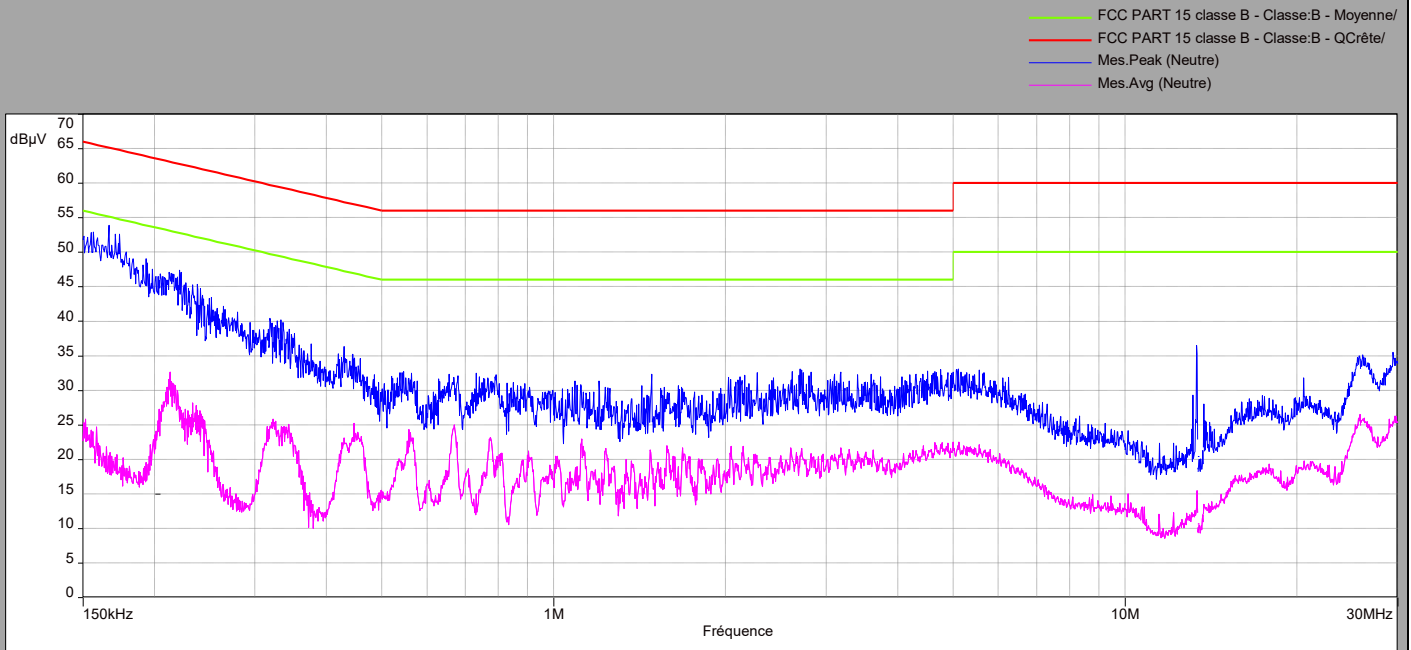


L C I E

AC Power Line Conducted Emission - mode DC without antenna Phase 240V-50Hz



Line 240V-50Hz





L C I E

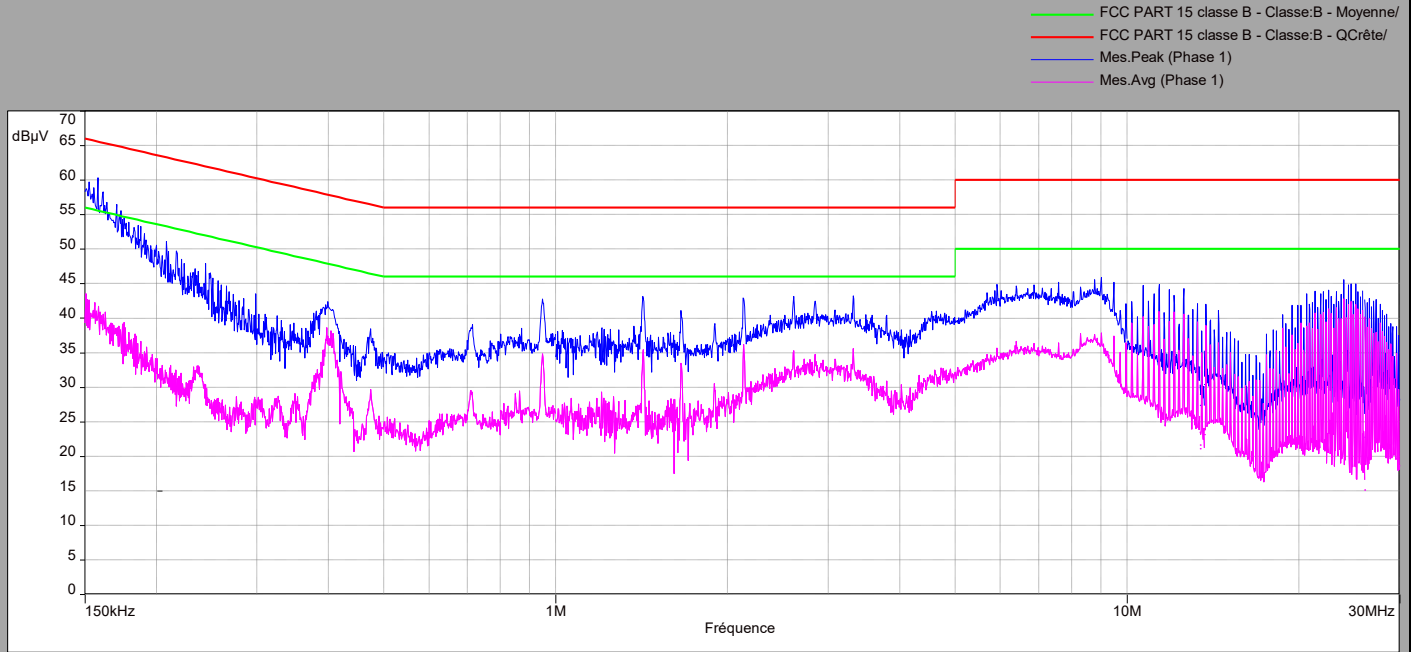
Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	52.6	-	66	13.4	26	56	30
0.56	31.4	-	56	24.6	25.7	46	20.3
1.45	33.3	-	56	22.7	28.2	46	17.8
4.54	35.6	-	56	20.4	23	46	23
26	35	-	60	25	26	50	24

Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	51.7	-	66	14.3	22.6	56	33.4
0.56	32.1	-	56	23.9	24.1	46	21.9
2.71	32	-	56	21.5	22.7	46	23.3
13.35	36.5	-	60	23.5	10	50	40
24.5	34.5	-	60	25.5	26.5	50	23.5

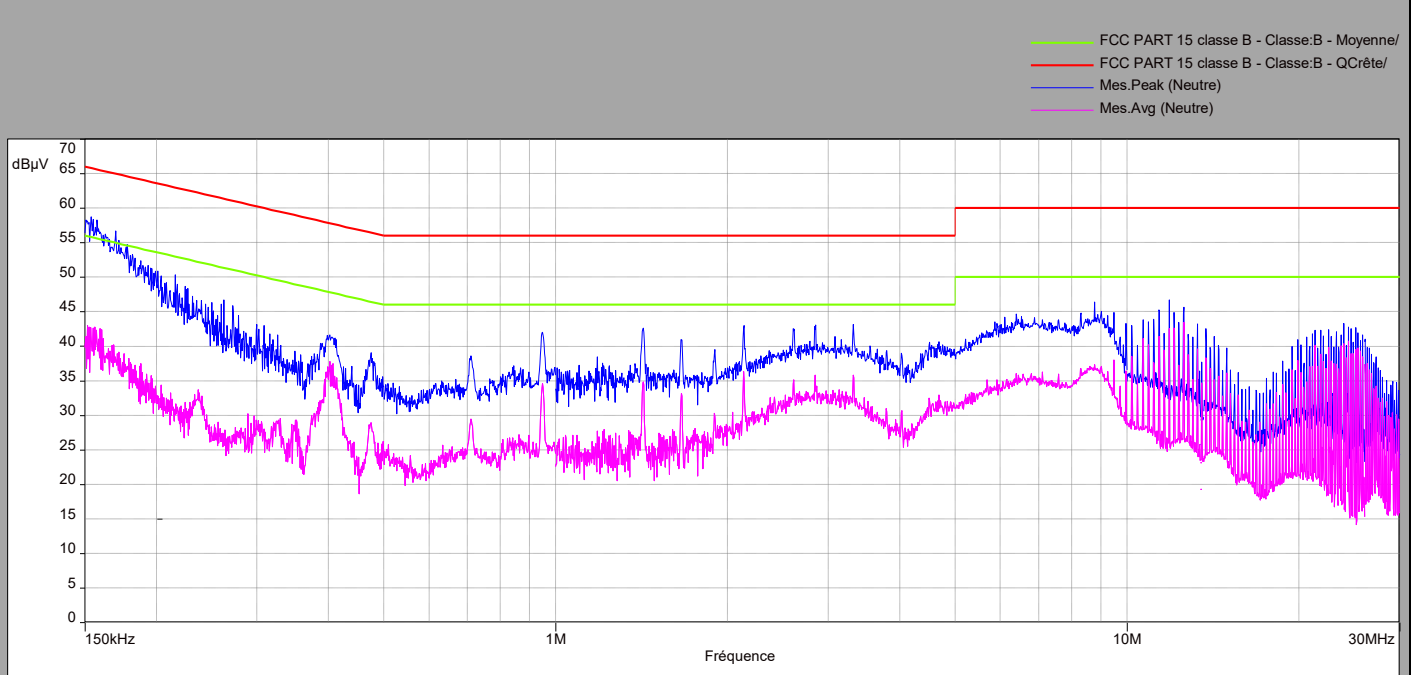


L C I E

AC Power Line Conducted Emission –mode POE without antenna Phase 120V-60Hz



Line 120V-60Hz





L C I E

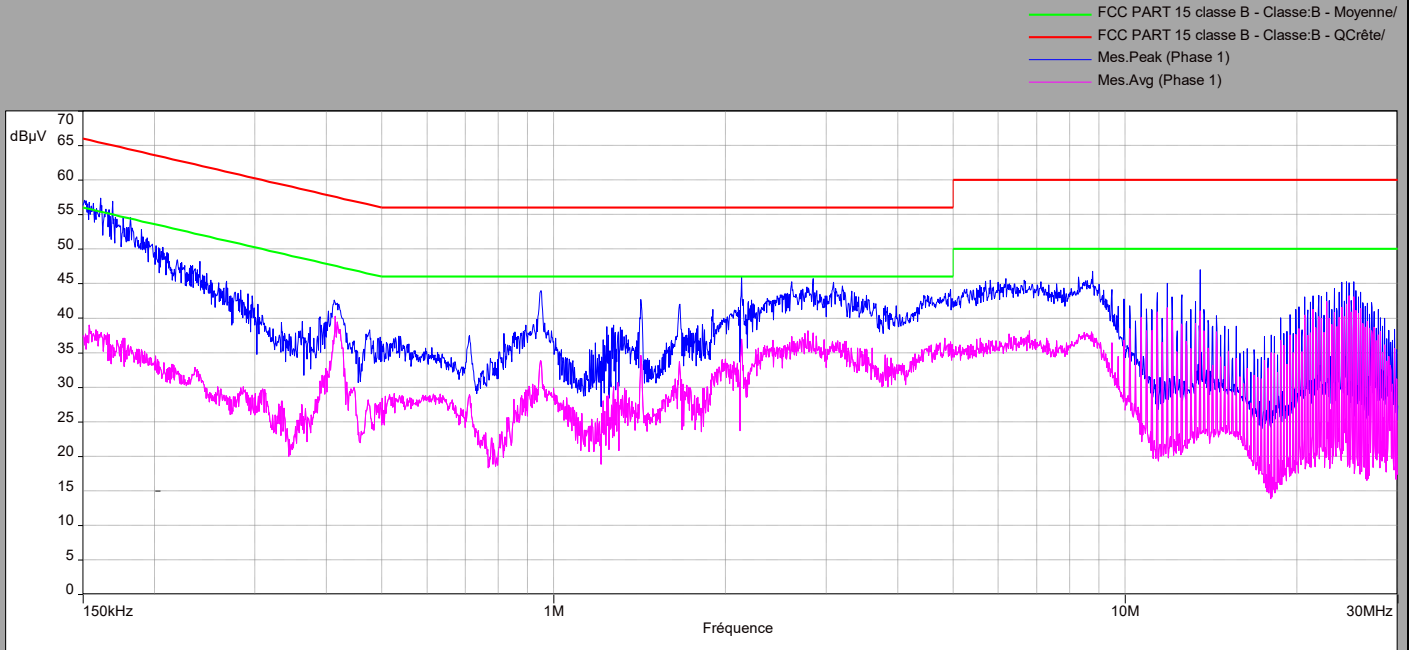
Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	59.7	-	66	6.3	43.5	56	12.5
0.4	42.4	-	57.7	15.3	38.6	47.7	9.1
1.42	42.8	-	56	13.2	35.4	46	10.6
12.56	44.3	-	60	15.7	40.6	50	9.4
23.95	45.5	-	60	14.5	42.7	50	7.3

Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	58.2	-	66	7.8	43	56	13
0.4	41.2	-	56	14.8	37.4	46	8.6
1.42	42.6	-	56	13.4	34.8	46	11.2
12.56	45.6	-	60	14.4	43.4	50	6.6
23.96	42.7	-	60	17.3	40.4	50	9.6

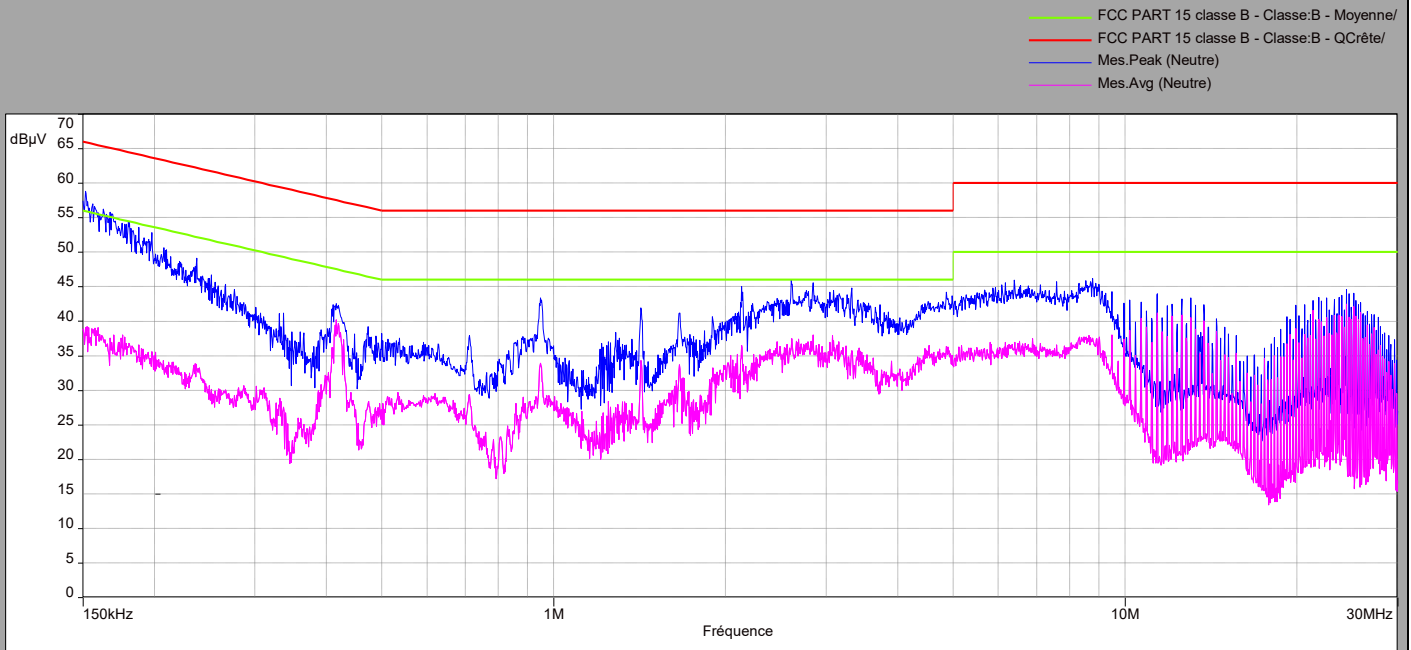


L C I E

AC Power Line Conducted Emission - mode POE without antenna Phase 240V-50Hz



Line 240V-50Hz





Phase Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	56.8	-	66	9.2	38.9	56	17.1
0.4	42.2	-	57.7	15.5	40.2	47.7	7.5
1.42	42.7	-	56	13.3	34.5	46	11.5
13.54	47	-	60	13	41	50	9
24.42	44.6	-	60	15.4	42	50	8

Neutral Line							
Frequency (MHz)	Peak Level (dB μ V)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Margin Quasi-Peak (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)	Margin Average (dB μ V)
0.15	58.4	-	66	7.6	38.7	56	17.3
0.4	42.5	-	57.7	15.2	40	47.7	7.7
1.42	41.4	-	56	14.6	34.4	46	11.6
11.38	43.7	-	60	16.3	41.2	50	8.8
24.4	44.3	-	60	15.7	42.2	50	7.8

3.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product **IDEMIA MPH-AC004A**, SN: **2208SMP0000013**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS Gen limits.

4. FIELD STRENGTH OUTSIDE OF THE BANDS 13.110-14.010 MHz

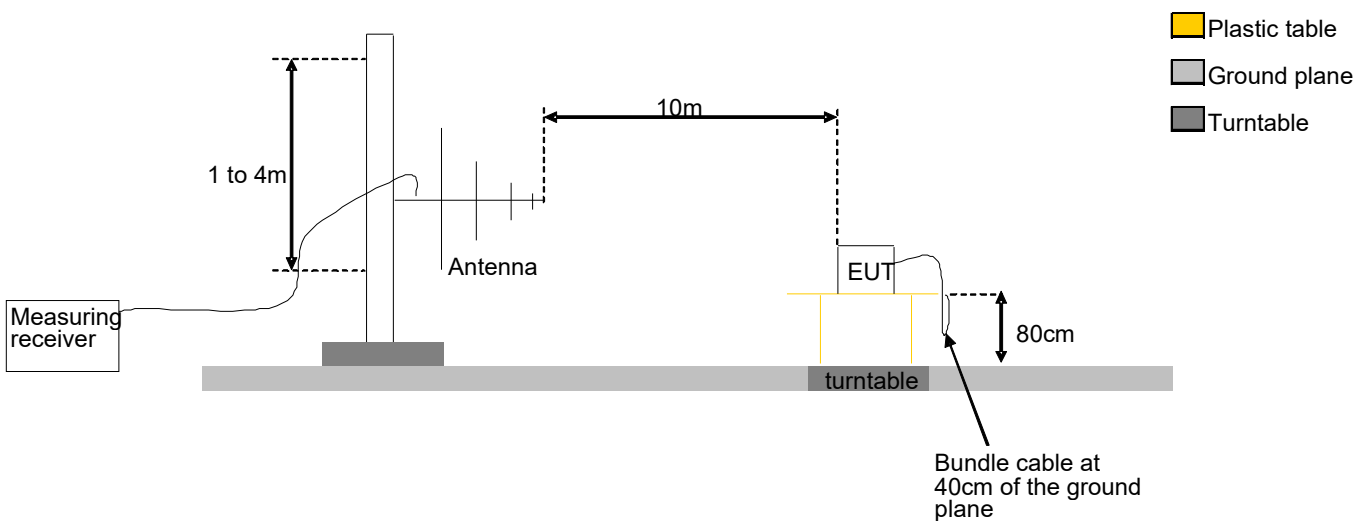
4.1. TEST CONDITIONS

Test performed by : Laurent DENEUX
 Date of test : March 23, 2022 to April 4, 2022
 Ambient temperature : 20 °C
 Relative humidity : 46 %

4.2. TEST SETUP

The product has been tested according to ANSI C63.10 and FCC part 15 subpart C:

Frequency range :	Below 30MHz	From 30MHz to 1GHz	Above 1GHz
Antenna Polarization :	Parallel, Perpendicular And Ground parallel	Horizontal And Vertical	Horizontal And Vertical
Antenna Height :	1m	Varied from 1m to 4m	Varied from 1m to 4m
Antenna Type :	Loop	Bi-Log	Horn
RBW Filter :	200Hz below 150kHz 9kHz above 150kHz	120kHz	1MHz
Maximization :	Turntable rotation of 360 degrees range		
EUT height :	0.8m		1.5m
Test site :	Open Aera Test Site	Open Aera Test Site	Open Aera Test Site
Distance EUT-Antenna :	3m	10m	10m





L C I E



Photograph for Field strength outside of the bands 13.110-14.010 MHz



Photograph for Field strength outside of the bands 13.110-14.010 MHz



L C I E

4.3. LIMIT

Measure at 300m		
Frequency range	Level	Detector
9kHz-490kHz	67.6dB μ V/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	Level	Detector
490kHz-1.705MHz	87.6dB μ V/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dB μ V/m	QPeak
Measure at 10m		
Frequency range	Level	Detector
30MHz to 88MHz	29.5dB μ V/m	QPeak
88MHz to 216MHz	33dB μ V/m	QPeak
216MHz to 960MHz	35.5B μ V/m	QPeak
960MHz to 1000MHz	43.5dB μ V/m	QPeak
Above 1000MHz	63.5dB μ V/m	Peak
	43.5dB μ V/m	Average
Measure at 3m		
Frequency range	Level	Detector
30MHz to 88MHz	40dB μ V/m	QPeak
88MHz to 216MHz	43.5dB μ V/m	QPeak
216MHz to 960MHz	46B μ V/m	QPeak
960MHz to 1000MHz	54dB μ V/m	QPeak
Above 1000MHz	74dB μ V/m	Peak
	54dB μ V/m	Average



4.4. TEST EQUIPMENT LIST

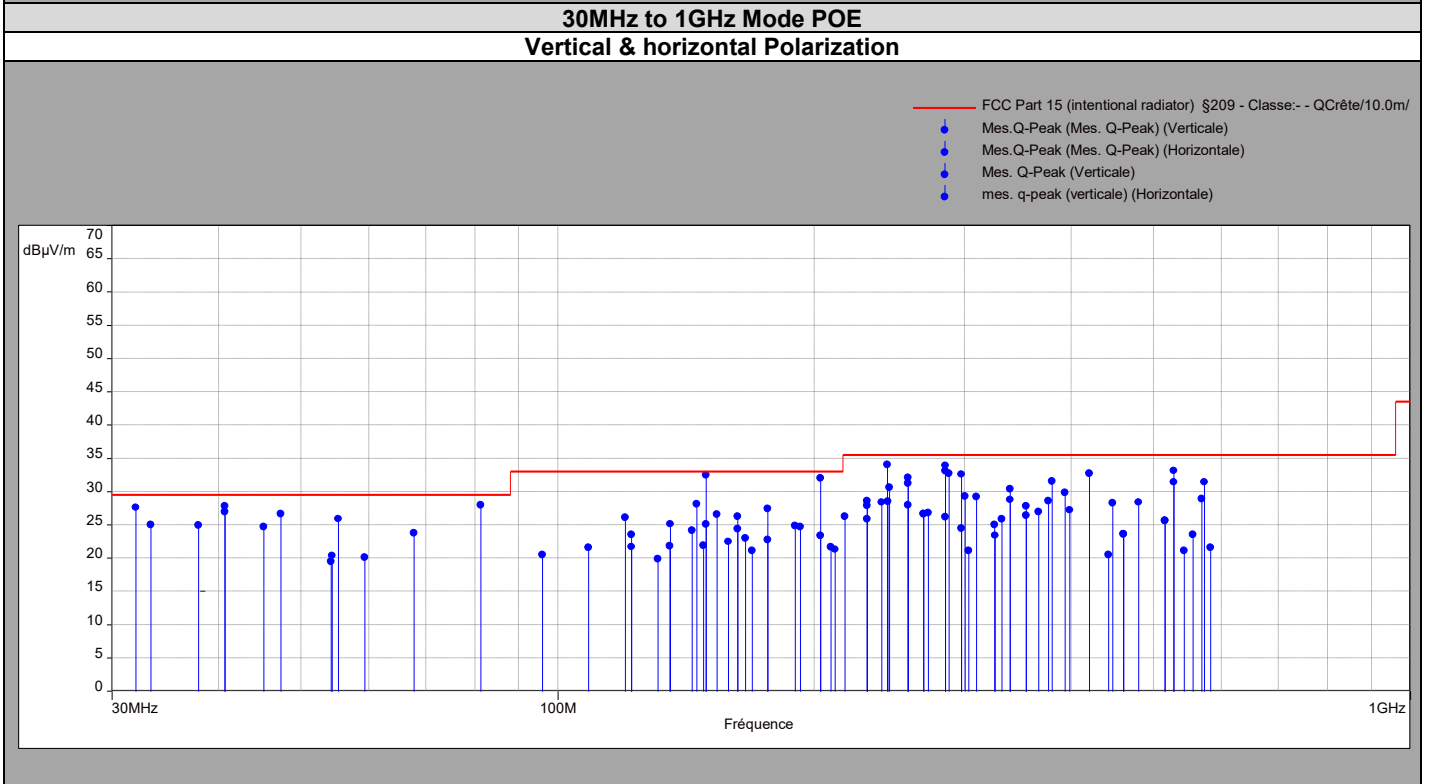
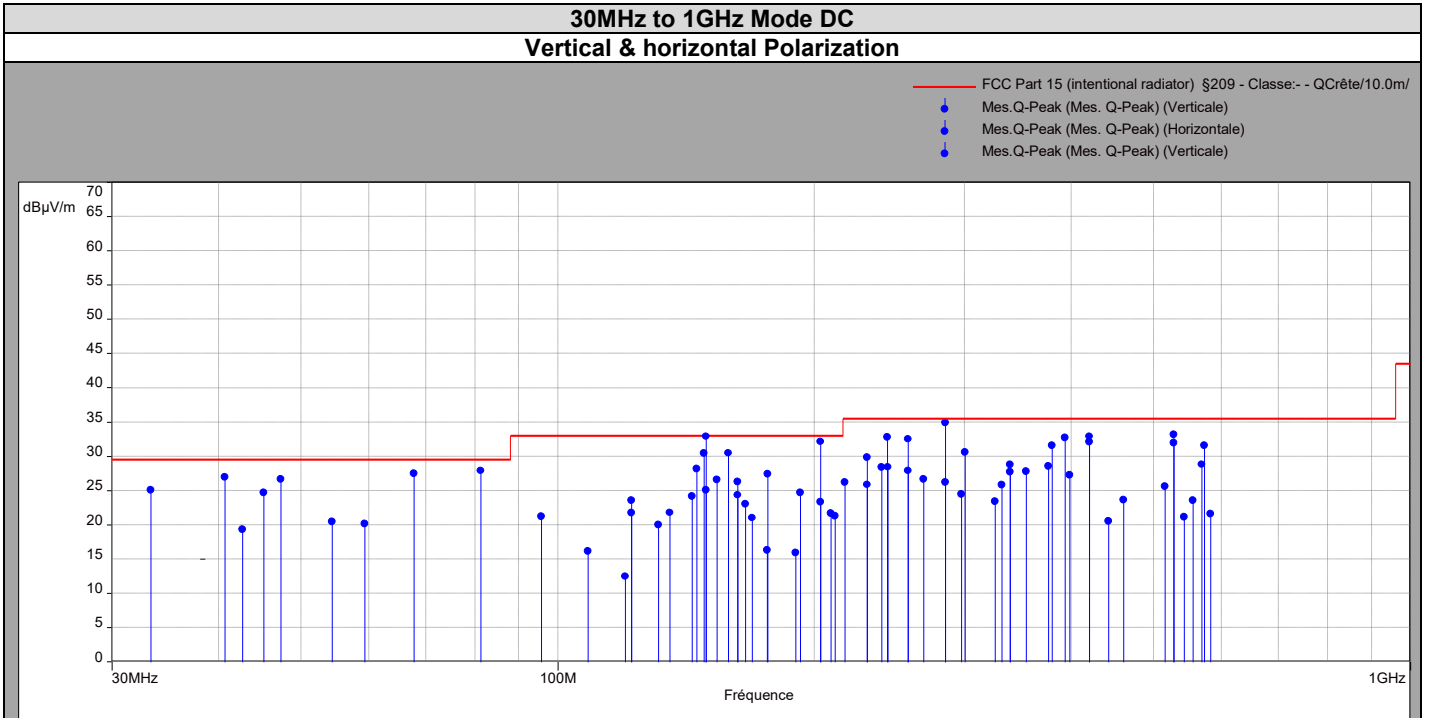
Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
Open test site	LCIE	-	F2000400	2022-02	2023-02
EMI Test Receiver	ROHDE & SCHWARZ	ESU	A2642018	2020-10	2022-10
Cable	-	-	A5329416	2022-02	2023-02
Cable	-	-	A5329442	2021-12	2022-12
Loop antenna	R&S	HFH2-Z2	C2040269	2020-09	2022-09
Dipole large bande	R&S	HUF-Z1	C2040011	2020-05	2022-05
Logperiodic antenna	R&S	HL 023 A2	C2040001	2020-05	2022-05
Signal Generator	R&S	SMR20	A5444002	2020-07	2022-07
Antenne bilog	CHASE	CBL 6112A	C2040040	2021-04	2022-04
Cable	-	-	A5329876	2021-12	2022-12
Cable	-	-	A5329449	2021-12	2022-12

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

4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

4.6. RESULTS

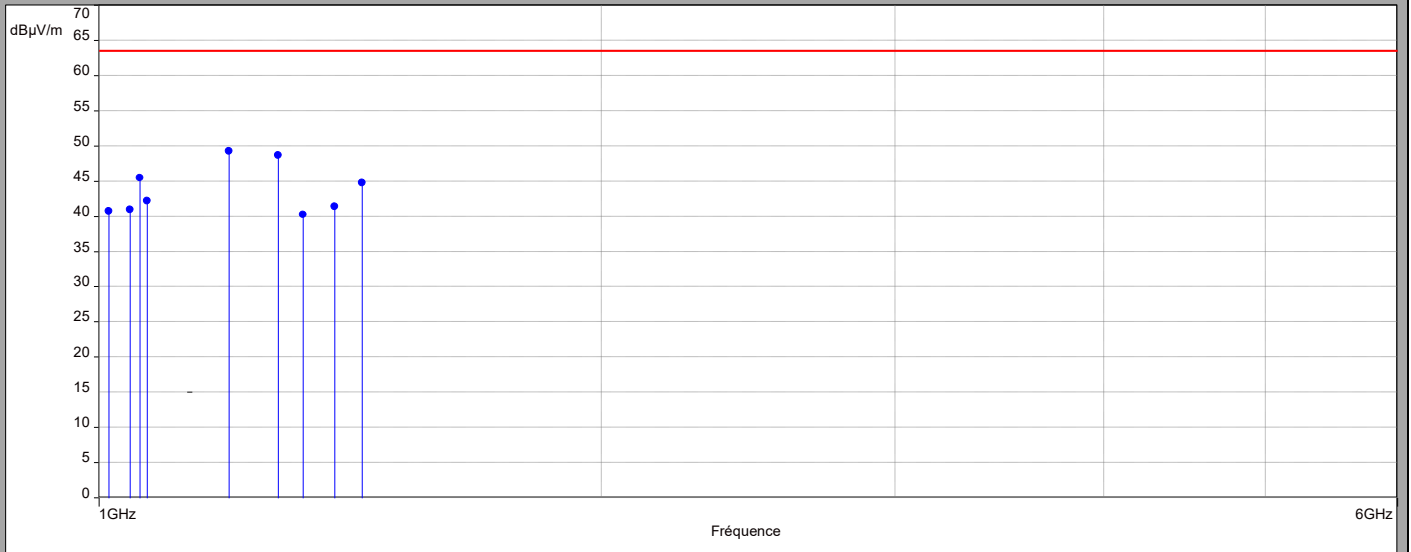




L C I E

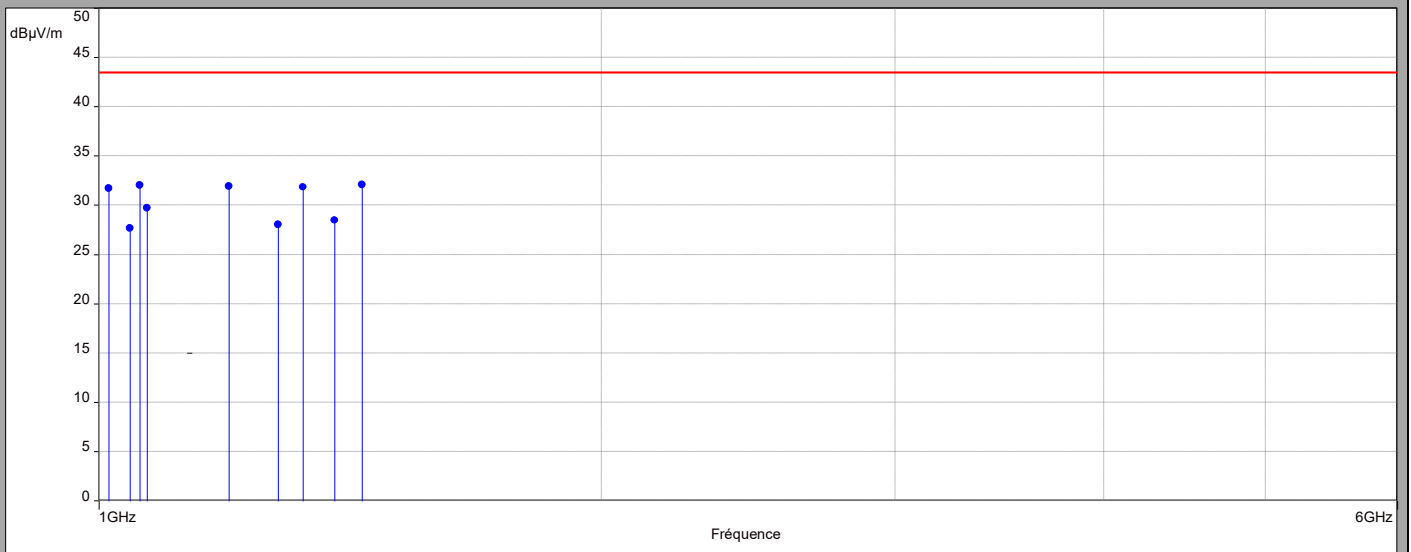
1GHz to 6GHz Mode DC (Peak measurement) Vertical & horizontal Polarization

— FCC Part 15 class B (unintentional radiator) §109 - Classe:- - Crête/10.0m/
• Mes. peak (Verticale)
• Mes. peak (Horizontale)



1GHz to 6GHz Mode DC (average value) Vertical & horizontal Polarization

— FCC Part 15 class B (unintentional radiator) §109 - Classe:- - Moyenne/10.0m/
• Mes. Avg (Verticale)
• Mes. Avg (Horizontale)





L C I E

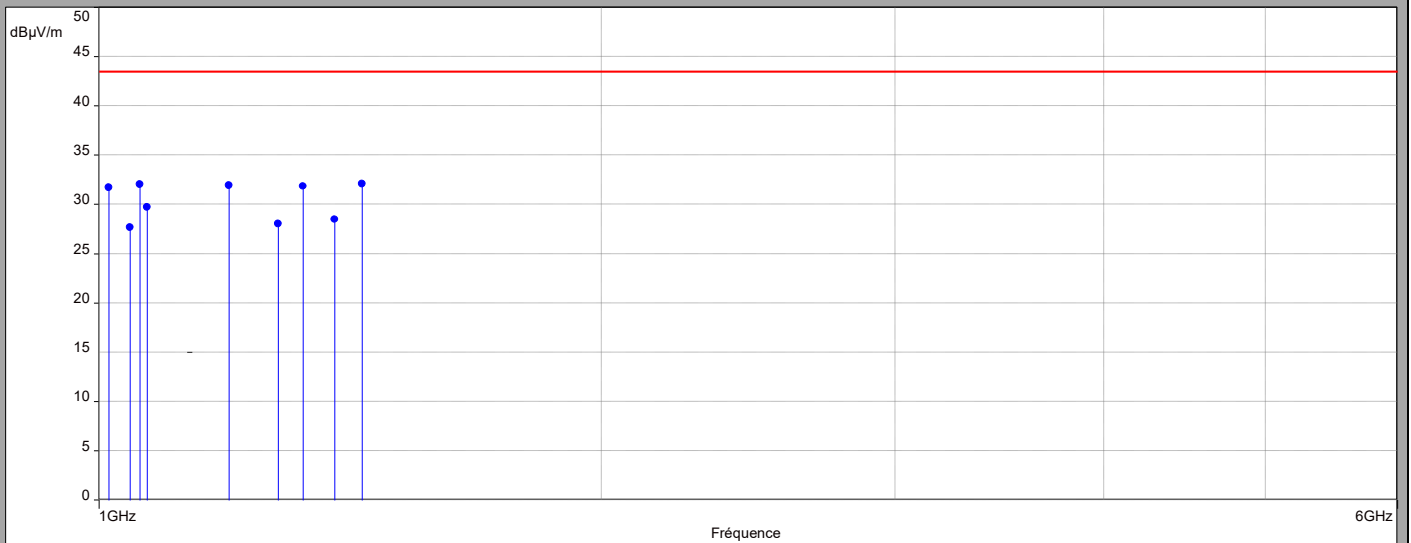
1GHz to 6GHz Mode POE (Peak measurement) Vertical & horizontal Polarization

— FCC Part 15 class B (unintentional radiator) §109 - Classe:- - Crête/10.0m/
• Mes. peak (Verticale)
• Mes. peak (Horizontale)



1GHz to 6GHz Mode POE (average value) Vertical & horizontal Polarization

— FCC Part 15 class B (unintentional radiator) §109 - Classe:- - Moyenne/10.0m/
• Mes. Avg (Verticale)
• Mes. Avg (Horizontale)





L C I E

Final measurement mode DC
9kHz to 30MHz

9kHz to 30MHz					
Polarization	Frequency (MHz)	Peak Level (dB μ V/m)	QPeak Level (dB μ V/m)	Limit (dB μ V/m)	Margin QPeak (dB μ V/m)
Parallel	0.39602244	-	41.58	95.6	54,02
Parallel	0.44891026	-	39.74	94.6	54,86
Parallel	0.5105	-	35.13	96.7	61,57
Parallel	0.54901923	-	42.2	95.1	52,9
Parallel	0.62099359	-	39.4	95.7	56,3
Parallel	0.72	-	32.9	97.2	64,3
Parallel	0.842	-	33.3	97.2	63,9
Parallel	27.1198397	-	31.9	69.5	37,6
Perpendicular	0.36702885	-	43.47	96.3	52,83
Perpendicular	0.424	-	41.12	95.1	53,98
Perpendicular	0.4755	-	38.04	94.1	56,06
Perpendicular	0.5315	-	33.81	73.09	39,28
Perpendicular	0.60299679	-	30.98	71.99	41,01
Perpendicular	0.6625	-	29.85	71.18	41,33
Perpendicular	0.7525	-	32.06	70.07	38,01
Perpendicular	0.849	-	33.33	69.02	35,69
Perpendicular	0.9235	-	33.2	68.29	35,09
Perpendicular	1.038	-	32.28	67.28	35
Perpendicular	16.228	-	25.15	69.5	44,35
Perpendicular	27.12	-	39.98	69.5	29,52
Ground parallel	2.837044872	-	38.14	69.5	31,36
Ground parallel	2.950557692	-	41.34	69.5	28,16
Ground parallel	3.064076923	-	36.34	69.5	33,16
Ground parallel	3.67	-	24.11	69.5	45,39



L C I E

Final measurement mode DC:
30MHz to 1000MHz

	Frequency (MHz)	level (dB μ V/m)	limit FCC class B	Marge/ Fcc Part class B
Vertical	40.7	26.93	29.5	2.57
Vertical	45.2	24.69	29.5	4.81
Vertical	47.3	26.64	29.5	2.86
Vertical	67.79847756	27.44	29.5	2.06
Vertical	81.2	27.92	29.5	1.58
Vertical	145.6	28.12	33	4.88
Vertical	148.4	30.45	33	2.55
Vertical	149.1567308	32.95	33	0.05
Vertical	158.5	30.49	33	2.51
Vertical	203.4	32.15	33	0.85
Vertical	243.4	32.78	35.5	2.72
Vertical	257.6336538	32.55	35.5	2.95
Vertical	284.7535256	34.89	35.5	0.61
Vertical	300.5	30.55	35.5	4.95
Vertical	393.26	32.7	35.5	2.8
Vertical	420.3504006	32.09	35.5	3.41
Vertical	528	33.17	35.5	2.33
Vertical	573.3	31.57	35.5	3.93
Horizontal	149.1567308	25.04	33	7.96
Horizontal	162.4884615	26.25	33	6.75
Horizontal	379.7	31.54	35.5	3.96
Horizontal	420.3535256	32.95	35.5	2.55
Horizontal	528	31.96	35.5	3.54



Final measurement mode DC:
1GHz to 6GHz

	Frequency (MHz)	level peak (dB μ V/m)	level average (dB μ V/m)	limit peak FCC class B	Marge peak Fcc Part class B	limit average FCC class B	MargeAverage Fcc Part class B
Vertical	1069	42.2	29.7	63.5	21.3	43.5	13.8
Vertical	1196.9	49.25	31.93	63.5	14.25	43.5	11.57
Vertical	1280.5	48.65	28.03	63.5	14.85	43.5	15.47
Vertical	1325.5	40.25	31.85	63.5	23.25	43.5	11.65
Vertical	1384.1	41.36	28.51	63.5	22.14	43.5	14.99
Horizontal	1013.7	40.72	31.68	63.5	22.78	43.5	11.82
Horizontal	1057.8	45.48	32.03	63.5	18.02	43.5	11.47



L C I E

Final measurement mode POE

9kHz to 30MHz

9kHz to 30MHz					
Polarization	Frequency (MHz)	Peak Level (dB μ V/m)	QPeak Level (dB μ V/m)	Limit (dB μ V/m)	Margin QPeak (dB μ V/m)
Parallel	1.658	<i>parallel</i>	38.95	95,8	51,35
Parallel	2.136	<i>parallel</i>	35.34	95,3	50,81
Parallel	2.612	<i>parallel</i>	31.68	93,9	50,22
Parallel	3.318	<i>parallel</i>	29.47	72,49	33,96
Parallel	3.794	<i>parallel</i>	29.89	71,18	39,26
Parallel	4.506	<i>parallel</i>	34.27	70,06	39,5
Parallel	5.216	<i>parallel</i>	40.87	69,414	36,274
Parallel	5.69	<i>parallel</i>	43.68	68,31	37,42
Parallel	6.402	<i>parallel</i>	43.67	65,37	35,29
Parallel	7.112	<i>parallel</i>	34.25	64,19	26,19
Parallel	8.062	<i>parallel</i>	27.74	69,5	35,99
Parallel	9.246	<i>parallel</i>	28.44	69,5	35
Perpendicular	1.42	<i>Perpendicular</i>	38.52	96,8	53,39
Perpendicular	2.134	<i>Perpendicular</i>	37.33	95,9	51,61
Perpendicular	2.604	<i>Perpendicular</i>	37.61	95,1	50,85
Perpendicular	3.318	<i>Perpendicular</i>	30.51	94	50,36
Perpendicular	3.792	<i>Perpendicular</i>	30.69	73,04	30,47
Perpendicular	5.216	<i>Perpendicular</i>	46.89	71,81	35,06
Perpendicular	5.688	<i>Perpendicular</i>	43.62	70,88	37,58
Perpendicular	6.87	<i>Perpendicular</i>	27.91	70,164	38,024
Perpendicular	7.584	<i>Perpendicular</i>	39.41	69,43	34,58
Perpendicular	9.482	<i>Perpendicular</i>	24.26	68,587	34,967
Perpendicular	10.664	<i>Perpendicular</i>	23.94	68	33,87
Perpendicular	11.144	<i>Perpendicular</i>	29.34	67,04	35,12
Perpendicular	11.854	<i>Perpendicular</i>	33.65	65,51	35,4
Perpendicular	12.324	<i>Perpendicular</i>	24.77	64,75	33,39
Perpendicular	13.038	<i>Perpendicular</i>	27.09	69,5	35,82
Perpendicular	14.224	<i>Perpendicular</i>	26.69	69,5	26,2
Ground parallel	15.408	<i>Perpendicular</i>	44.6	69,5	31,36
Ground parallel	16.122	<i>Perpendicular</i>	27.95	69,5	28,16
Ground parallel	27.11	<i>Perpendicular</i>	36.52	69,5	33,16



L C I E

Final measurement mode POE:
30MHz to 1000MHz

	Frequency (MHz)	level (dB μ V/m)	limit FCC class B	Marge/ Fcc Part class B
Vertical	40.7	27.84	29.5	1.66
Vertical	45.2	24.69	29.5	4.81
Vertical	47.3	26.64	29.5	2.86
Vertical	55.3	25.92	29.5	3.58
Vertical	81.2	27.92	29.5	1.58
Vertical	145.6	28.12	33	4.88
Vertical	149.1567308	32.48	33	0.52
Vertical	203.4	31.98	33	1.02
Vertical	243.4	34	35.5	1.5
Vertical	257.6336538	32.11	35.5	3.39
Vertical	284.7535256	33.93	35.5	1.57
Vertical	287.6240385	32.68	35.5	2.82
Vertical	297.6	32.62	35.5	2.88
Vertical	338.9919872	30.36	35.5	5.14
Vertical	420.3775641	32.71	35.5	2.79
Vertical	528	33.2	35.5	2.3
Vertical	573.3	31.5	35.5	4
Horizontal	176.3	27.42	33	5.58
Horizontal	379.6711538	31.55	35.5	3.95
Horizontal	447.4695513	28.29	35.5	7.21
Horizontal	528	31.43	35.5	4.07



Final measurement mode POE:
1GHz to 6GHz

	Frequency (MHz)	level peak (dB μ V/m)	level average (dB μ V/m)	limit peak FCC class B	Marge peak Fcc Part class B	limit average FCC class B	MargeAverage Fcc Part class B
Vertical	1044	40.93	27.67	63.5	22.57	43.5	15.83
Vertical	1069	42.2	29.7	63.5	21.3	43.5	13.8
Vertical	1196.9	49.25	31.93	63.5	14.25	43.5	11.57
Vertical	1325.5	40.25	31.85	63.5	23.25	43.5	11.65
Vertical	1384.1	41.36	28.51	63.5	22.14	43.5	14.99
Vertical	1437.8	44.73	32.08	63.5	18.77	43.5	11.42
Horizontal	1013.7	40.72	31.68	63.5	22.78	43.5	11.82

4.7. CONCLUSION

Field strength outside of the bands 13.110-14.010 MHz measurement performed on the sample of the product **IDEMIA MPH-AC004A**, SN: **2208SMP0000013**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS-Gen limits.

5. FIELD STRENGTH WITHIN THE BAND 13.110-14.010MHZ

5.1. TEST CONDITIONS

Test performed by : Laurent DENEUX
 Date of test : April 5, 2022
 Ambient temperature : 18 to 20 °C
 Relative humidity : 46 to 51 %

5.2. TEST SETUP

Measurement procedure:

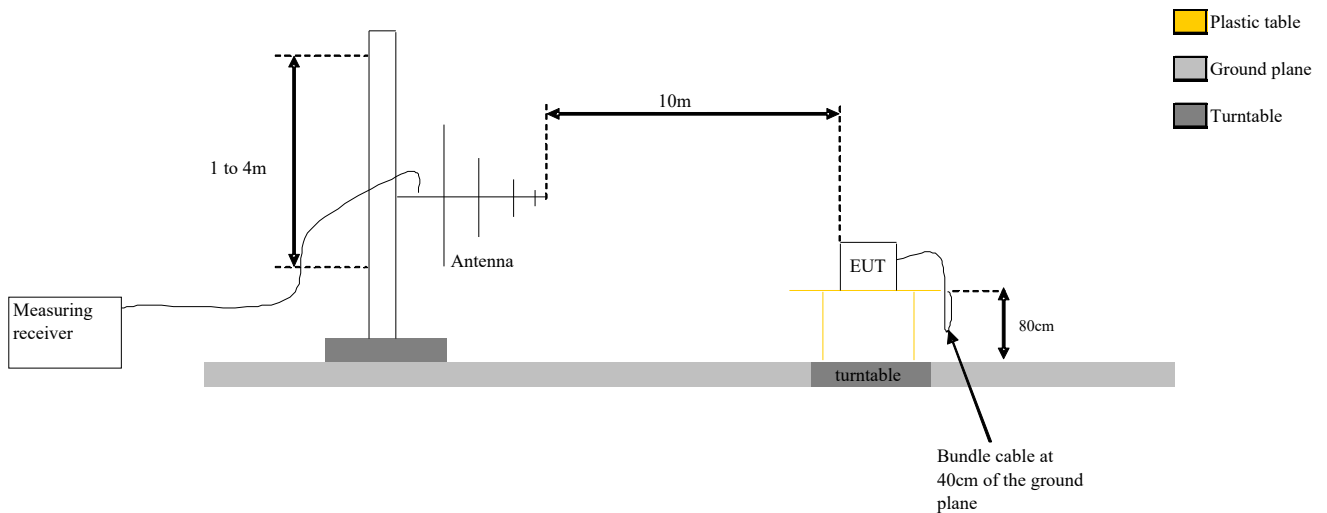
- Open Area Test Site
- Open Area Test Site + Test fixture in climatic chamber

The product has been tested according to ANSI C63.10.

The EUT is placed **on an open area test site**. Distance between measuring antenna and the EUT is **Distance**.

Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz.

Measurement bandwidth was 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 search was performed from 1 to 4m. The EUT is placed at 0.8m.



Test Set up for radiated measurement in open area test site

For measurement with test fixture is used, the power level calibration of the spectrum analyzer shall then be related to the power level or field strength measured with temperature during OATS measure taking in consideration in climatic chamber. The calculation will be used to calculate the absolute level of the sideband power.

Frequency band 13.110-14.010MHz

Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector. The graphs are obtained with a measuring receiver.



Photograph for Field strength within the band 13.110-14.010MHz



5.3. LIMIT

Frequency (MHz)	Field strength ($\mu\text{V/m}$) @30m	Field strength ($\text{dB}\mu\text{V/m}$) @30m	Field strength ($\text{dB}\mu\text{V/m}$) @3m
13.553-13.567	15 848	84.0	124.0
13.410-13.553 13.567-13.710	334.0	50.5	90.5
13.110-13.410 13.710-14.010	106.0	40.5	80.5
Below 13.110MHz Above 14.010MHz	30.0	29.5	69.5

5.4. TEST EQUIPMENT LIST

Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
Open test site	LCIE	-	F2000400	2022-02	2023-02
EMI Test Receiver	ROHDE & SCHWARZ	ESU	A2642018	2020-10	2022-10
Cable	-	-	A5329416	2022-02	2023-02
Cable	-	-	A5329442	2021-12	2022-12
Loop antenna	R&S	HFH2-Z2	C2040269	2020-09	2022-09
Cable	-	-	A5329449	2021-12	2022-12

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

5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:



L C I E

5.6. RESULTS

Mode DC

Parallel Axis			
Frequency (MHz)	Peak Level (dB μ V/m) (3m)	QPeak Level (dB μ V/m) (3m)	Limit (dB μ V/m) (3m)
Below 13.110	-	28.7	69.5
13.110 to 13.410	-	32.2	80.5
13.410 to 13.553	--	34.3	90.5
13.553 to 13.567	-	57.5	124.0
13.567 to 13.710	-	35.6	90.5
13.710 to 14.010	-	32.3	80.5
Above 14.010	-	29.7	69.5

Ground Parallel Axis			
Frequency (MHz)	Peak Level (dB μ V/m) (3m)	QPeak Level (dB μ V/m) (3m)	Limit (dB μ V/m) (3m)
Below 13.110	-	27.9	69.5
13.110 to 13.410	-	31.1	80.5
13.410 to 13.553	-	33.9	90.5
13.553 to 13.567	-	53.2	124.0
13.567 to 13.710	-	33.2	90.5
13.710 to 14.010	-	31.7	80.5
Above 14.010	-	29.4	69.5

Perpendicular Axis			
Frequency (MHz)	Peak Level (dB μ V/m) (3m)	QPeak Level (dB μ V/m) (3m)	Limit (dB μ V/m) (3m)
Below 13.110	-	28.8	69.5
13.110 to 13.410	-	31.4	80.5
13.410 to 13.553	-	36.4	90.5
13.553 to 13.567	-	67.9	124
13.567 to 13.710	-	37.4	90.5
13.710 to 14.010	-	32.4	80.5
Above 14.010	-	28.4	69.5



Mode POE

Parallel Axis			
Frequency (MHz)	Peak Level (dB μ V/m) (3m)	QPeak Level (dB μ V/m) (3m)	Limit (dB μ V/m) (3m)
Below 13.110	-	31.2	69.5
13.110 to 13.410	-	34.5	80.5
13.410 to 13.553	-	40.1	90.5
13.553 to 13.567	-	55.9	124.0
13.567 to 13.710	-	39.5	90.5
13.710 to 14.010	-	37.1	80.5
Above 14.010	-	33.2	69.5

Ground Parallel Axis			
Frequency (MHz)	Peak Level (dB μ V/m) (3m)	QPeak Level (dB μ V/m) (3m)	Limit (dB μ V/m) (3m)
Below 13.110	-	29.8	69.5
13.110 to 13.410	-	32.4	80.5
13.410 to 13.553	-	34.9	90.5
13.553 to 13.567	-	51.4	124.0
13.567 to 13.710	-	34.6	90.5
13.710 to 14.010	-	32.7	80.5
Above 14.010	-	30.4	69.5

Perpendicular Axis			
Frequency (MHz)	Peak Level (dB μ V/m) (3m)	QPeak Level (dB μ V/m) (3m)	Limit (dB μ V/m) (3m)
Below 13.110	-	32.6	69.5
13.110 to 13.410	-	35.9	80.5
13.410 to 13.553	-	38.9	90.5
13.553 to 13.567	-	63	124
13.567 to 13.710	-	38.8	90.5
13.710 to 14.010	-	34.4	80.5
Above 14.010	-	30.5	69.5

5.7. CONCLUSION

Field strength within the band 13.110-14.010MHz measurement performed on the sample of the product **IDEMIA MPH-AC004A**, SN: **2208SMP0000013**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

6. UNCERTAINTIES CHART

47 CFR Part 15.209 & 15.207 Kind of test	Wide uncertainty laboratory (k=2) ±x(dB) / (Hz)/ ms	Uncertainty limit
Measurement of conducted disturbances in voltage on the AC power port (9 kHz – 150 kHz)	2,67	3.8
Measurement of conducted disturbances in voltage on the AC power port (150 kHz – 30 MHz)	2,67	3.4
Measurement of conducted disturbances in voltage on the telecommunication port. (AAN)	3,67	5.0
Measurement of conducted disturbances in current (current clamp)	2,73	2.9
Measurement of disturbance power	2,67	4.5
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC V01	4,48	/
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC C01	4,48	/
Measurement of radiated electric field from 30 to 1000MHz in horizontal position on the OATS (Ecuellas)	4,88	6.3
Measurement of radiated electric field from 1 to 18GHz on the Ecuellas site	5.16	/
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the OATS (Ecuellas)	4,99	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC C01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC C01	5,16	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC V01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC V01	5,15	6.3
Measurement of radiated electric field from 1 to 6 GHz C01	5,1	5.2
Measurement of radiated electric field from 1 to 6 GHz V01	4,85	5.2
Measurement of radiated magnetic field from 10kHz to 30MHz on the OATS (Ecuellas)	4,48	/

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report