TEST REPORT

N°: 165236-747020-B **Version : 01**

Subject	**Radio spectrum matters** **tests according to standards:** **47 CFR Part 15.209 & Part 15.207 & RSS-Gen Issue 5**
Issued to	**MICROPORT CRM** Parc d'Affaires NOVEOS - 4 avenue Réaumur 92143-Clamart France
Apparatus under test	
Product	CPR3H
Trade mark	MICROPORT CRM
Manufacturer	MICROPORT CRM s.r.l
Model under test	CPR3H (inductive head)
Serial number	08031627017013 (inductive head)
FCC ID	**YSGGB78**
IC	**10270A-GB78**
Conclusion	See Test Program chapter
Test date	: January 16, 2020 to January 21, 2020
Test location	Fontenay Aux Roses & Ecuelles
Test Site	6230B-1
Sample receipt date	January 16, 2020
Composition of document	27 pages
Document issued on	June 18, 2020

Written by :	**Approved by :**
Laurent DENEUX	Arnaud FAYETTE
Tests operator	**Technical manager**

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	June 18th, 2020	Laurent DENEUX	Creation of the document

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

1. TEST PROGRAM 4
2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER) 5
3. OCCUPIED BANDWIDTH 9
4. AC POWER LINE CONDUCTED EMISSIONS 12
5. TRANSMITTER RADIATED EMISSION 20
6. UNCERTAINTIES CHART 27

1. TEST PROGRAM

References

- **47 CFR Part 15.209 & 15.207**
- **RSS Gen Issue 5**
- **ANSI C63.10-2013**

Radio requirement:

Clause (47CFR Part 15.209 & 15.207 & RSS-Gen Issue 5) Test Description	Test result - Comments			
Occupied Bandwidth	☑ **PASS**	☐ **FAIL**	☐ **NA**	☐ **NP(1)**
AC Power Line Conducted Emission	☑ **PASS**	☐ **FAIL**	☐ **NA(2)**	☐ **NP(1)**
Transmitter Radiated Emission	☑ **PASS**	☐ **FAIL**	☐ **NA**	☐ **NP(1)**
Receiver Radiated Emissions	☑ **PASS (3)**	☐ **FAIL**	☐ **NA**	☐ **NP(1)**
This table is a summary of test report, see conclusion of each clause of this test report for detail.				

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

MICROPORT CRM CPR3H (inductive head) **Serial Number:** 08031627017013
(inductive head)

Equipment Under Test

Auxiliary equipment

Power supply:

During all the tests, EUT is supplied by V_{nom}: 5VDC

Voltage table used (for Power Line Conducted Emissions):

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

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	Power supply	2	☑	☐	☑	HPU63A-107
2	Adapter USB/RS232	0.3	☑	☑	☑	
3	CPR3H	2.5	☑	☑	☑	

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
tablet	V167	TPAC000742	-
DOCKING STATION	V174	GSV0000780	-
IMPLANT	SonR CRT-D 1811	J02DL02B	-
Power supply (Tablet)	HPU63A-107	1915001217	-

Equipment information:

Frequency band:	[9-315] kHz			
Number of Channel:	1			
Antenna Type:	☑ Integral	☐ External	☐ Dedicated	
Transmit chains:	1			
Receiver chains	1			
Type of equipment:	☐ Stand-alone	☑ Plug-in	☐ Combined	
Equipment type:	☑ Production model	☐ Pre-production model		
Operating temperature range:	Tmin:	☐ -20°C	☑ 0°C	☐ X°C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☑ 55°C	☐ X°C
Type of power source:	☐ AC power supply	☑ DC power supply	☐ Battery	
Operating voltage range:	Vnom:	☐ 120V/60Hz	☑ 5Vdc	

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	Running mode	
Occupied Bandwidth	☑ Test mode 1	☐ Alternative test mode()
AC Power Line Conducted Emission	☑ Test mode 1	☐ Alternative test mode()
Transmitter Radiated Emission	☑ Test mode 1	☐ Alternative test mode()

2.3. EQUIPMENT LABELLING

2.4. EQUIPMENT MODIFICATION

☑ None ☐ Modification:

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

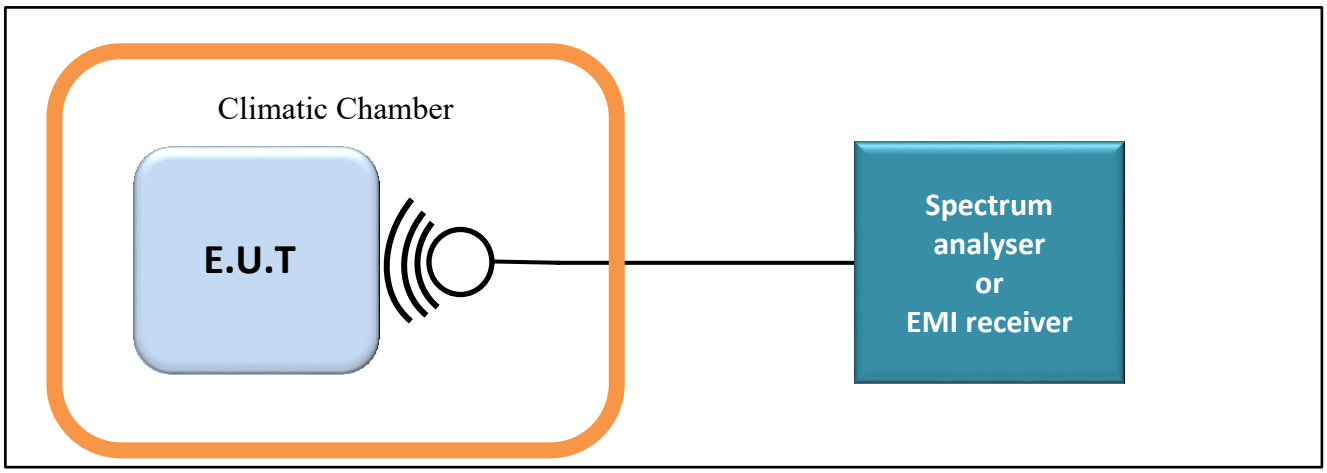
Test performed by	: Julien Palard
Date of test	: January 21, 2020
Ambient temperature	: 24 °C
Relative humidity	: 34 %

3.2. TEST SETUP

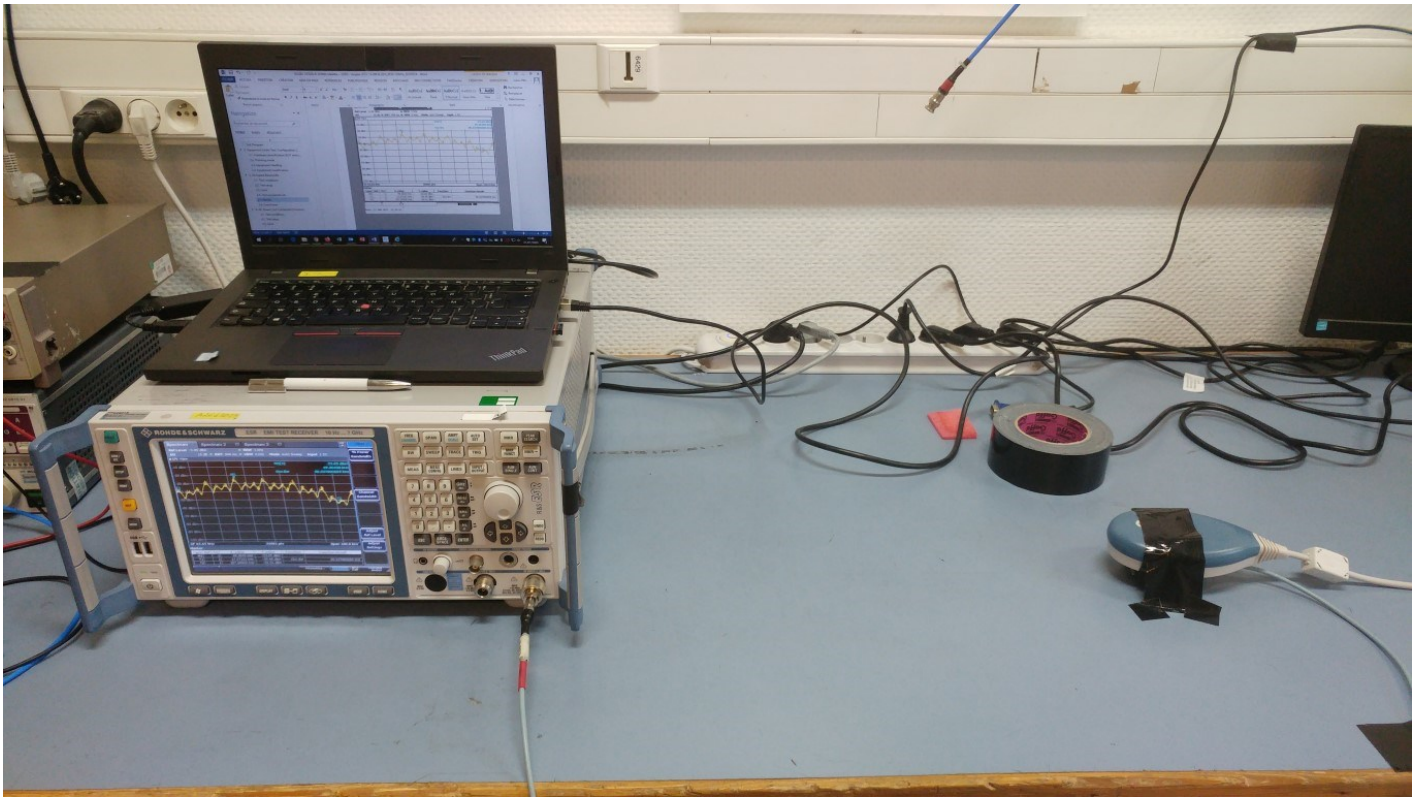
- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

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

- Test Procedure:
☑ RSS-Gen Issue 5 § 6.7



Test set up of Occupied Bandwidth



Photograph for Occupied bandwidth

3.3. LIMIT

None

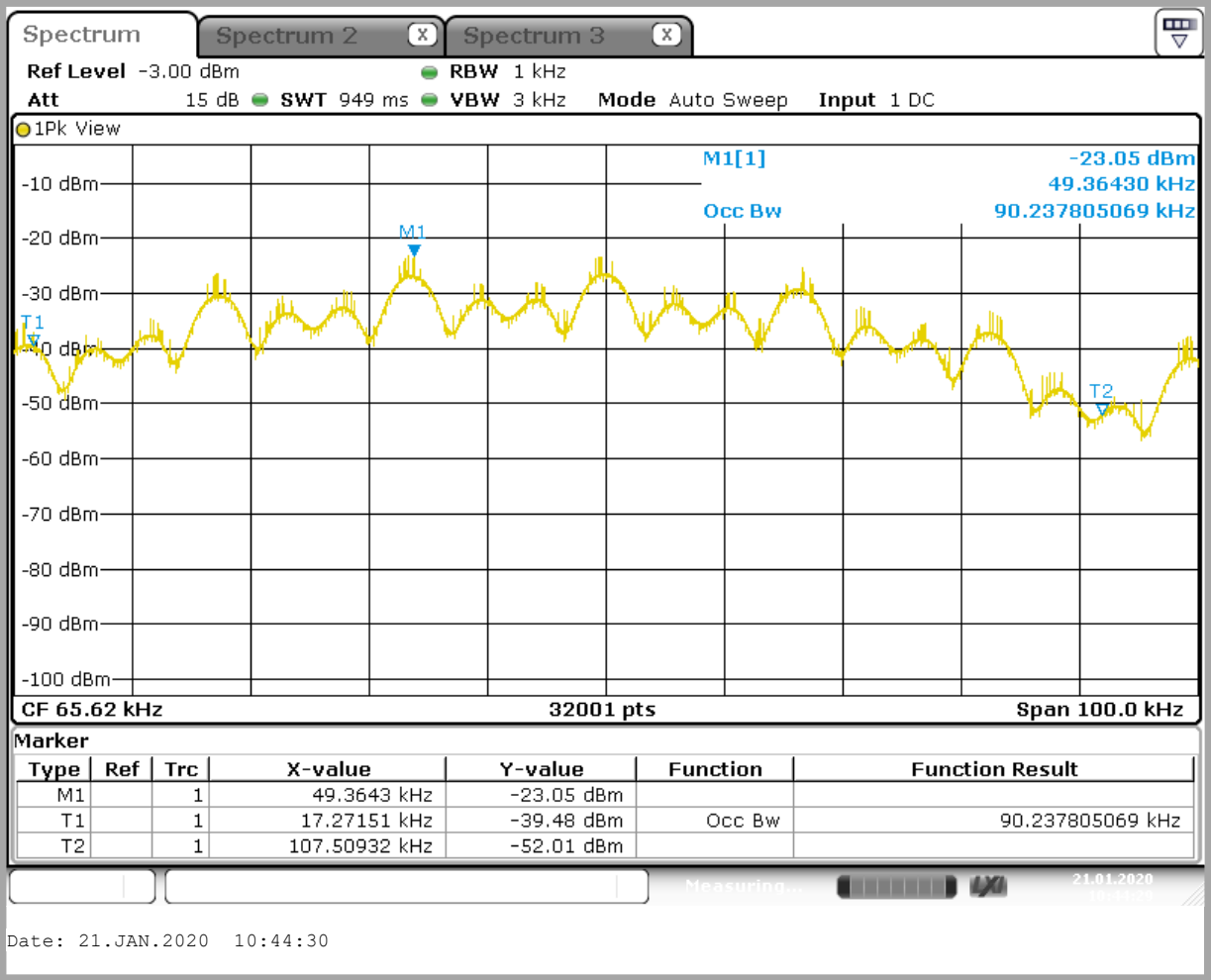
3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
13,56MHz Test fixture Antenna	-	-	A5329422	Cal with EMI receiver	
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2019/01	2021/01

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

3.5. RESULTS

Occupied Bandwidth
65,63kHz



Frequency(kHz)	Occupied Bandwidth (kHz)
65.63	90.24

3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **MICROPORT** CRM CPR3H (inductive head) , SN: **08031627017013** (inductive head), in configuration and description presented in this test report, show levels **compliant** to the **RSS-GEN ISSUE 5** limits.

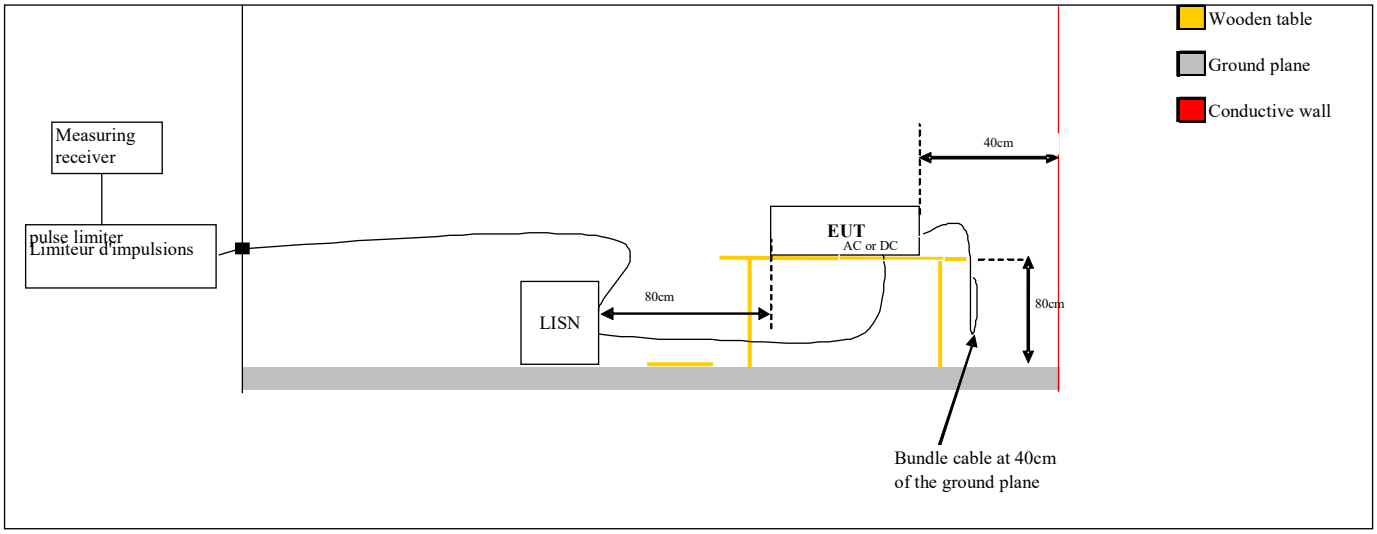
4. AC POWER LINE CONDUCTED EMISSIONS

4.1. TEST CONDITIONS

Test performed by	: Laurent DENEUX
Date of test	: January 16, 2020
Ambient temperature	: 21 °C
Relative humidity	: 53 %

4.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013) method. The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm. Auxiliaries are powered by another LISN. The cable has been shorted to 1meter length. The EUT is powered through the LISN. Measurement is made with a receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50µH. Interconnecting cables and equipment's were moved to position that maximized emission.



Photograph for AC Power Line Conducted Emissions (Front view)

Photograph for AC Power Line Conducted Emissions (Rear view)

4.3. 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

4.4. TEST EQUIPMENT LIST

Test equipment used					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Calibration date**	**Calibration due date**
Open test site	LCIE	-	F2000400	2019/06	2020/06
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2018/10	2020/10
V ISLN	ROHDE & SCHWARZ	ESH2-Z5	C2322002	2019/08	2020/08
Pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	A2649008	2019/03	2020/03
Cable	-	-	A5329417	2019/12	2020/12
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

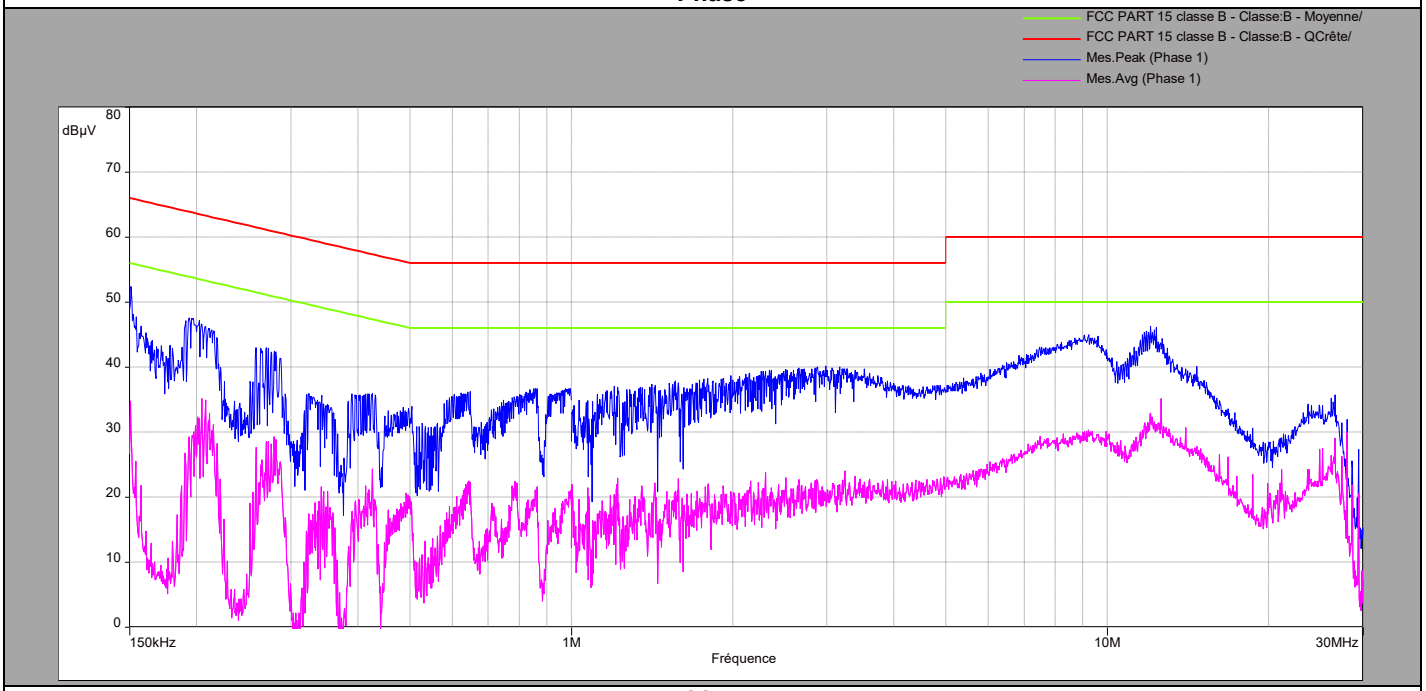
4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

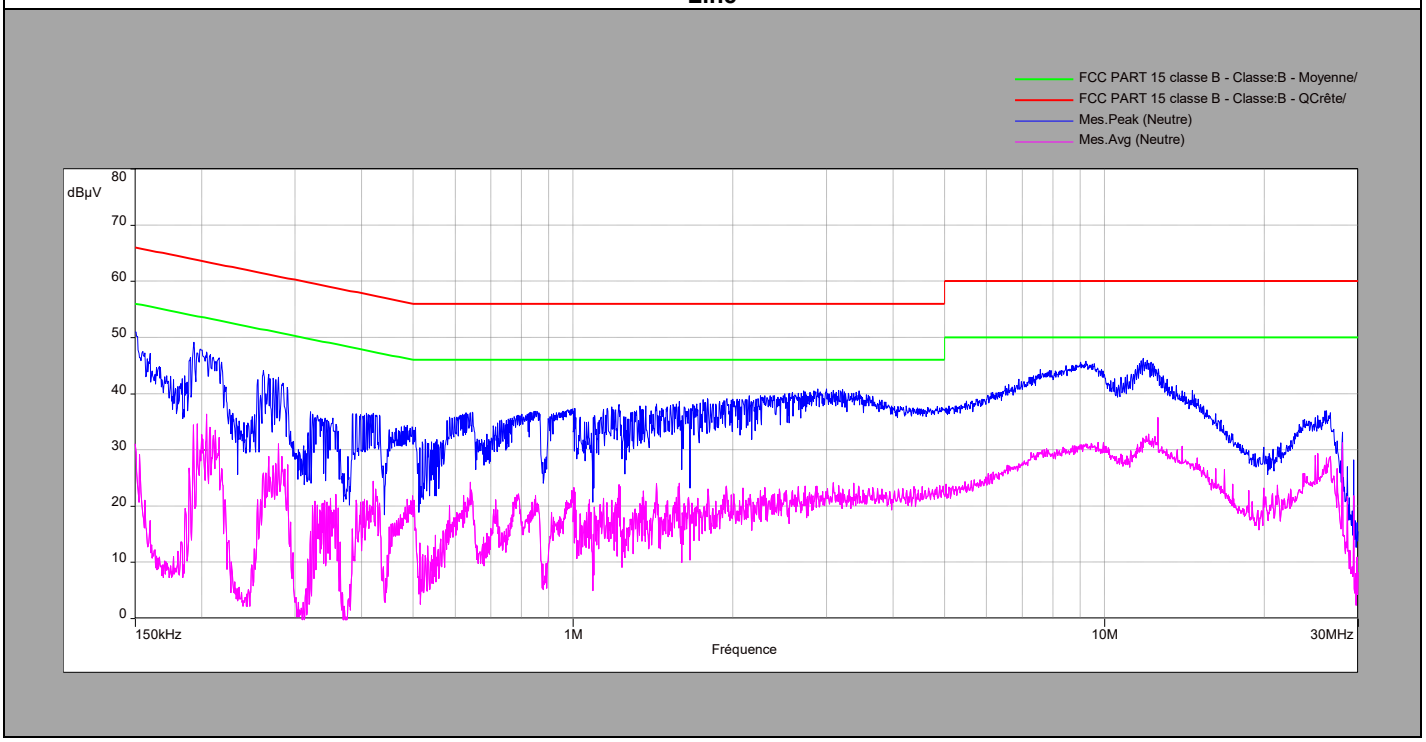
4.6. RESULTS

AC Power Line Conducted Emission 120V-60Hz

Phase



Line



Phase

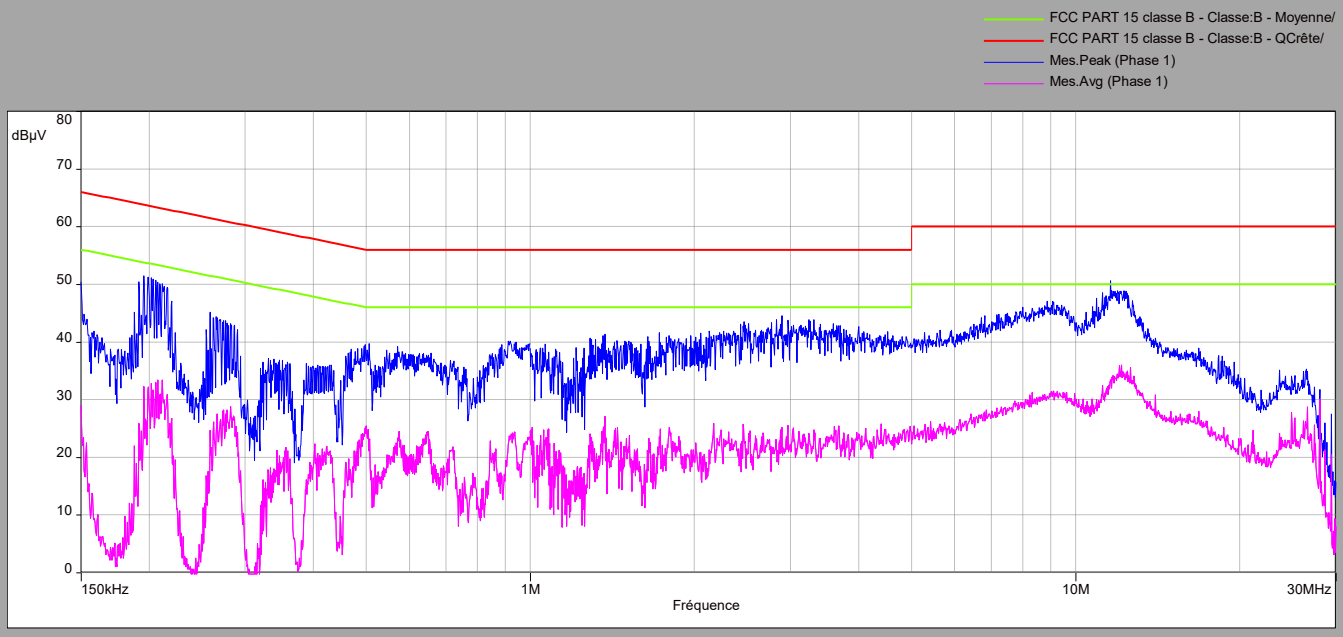
Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Margin peak/Quasi Peak (dB)	Average Level (dBµV)	Average Limit (dBµV)	Margin Avg/Avg (dB)
0.15	52.3	-	66	13.7	34.4	56	21.6
0.2	46.6	-	63.4	16.8	35.2	53.4	18.2
0.67	35.8	-	56	20.2	22.4	46	23.6
3	40.2	-	56	15.8	22	46	24
12.6	42.3	-	60	17.7	35.2	50	14.8

Neutral

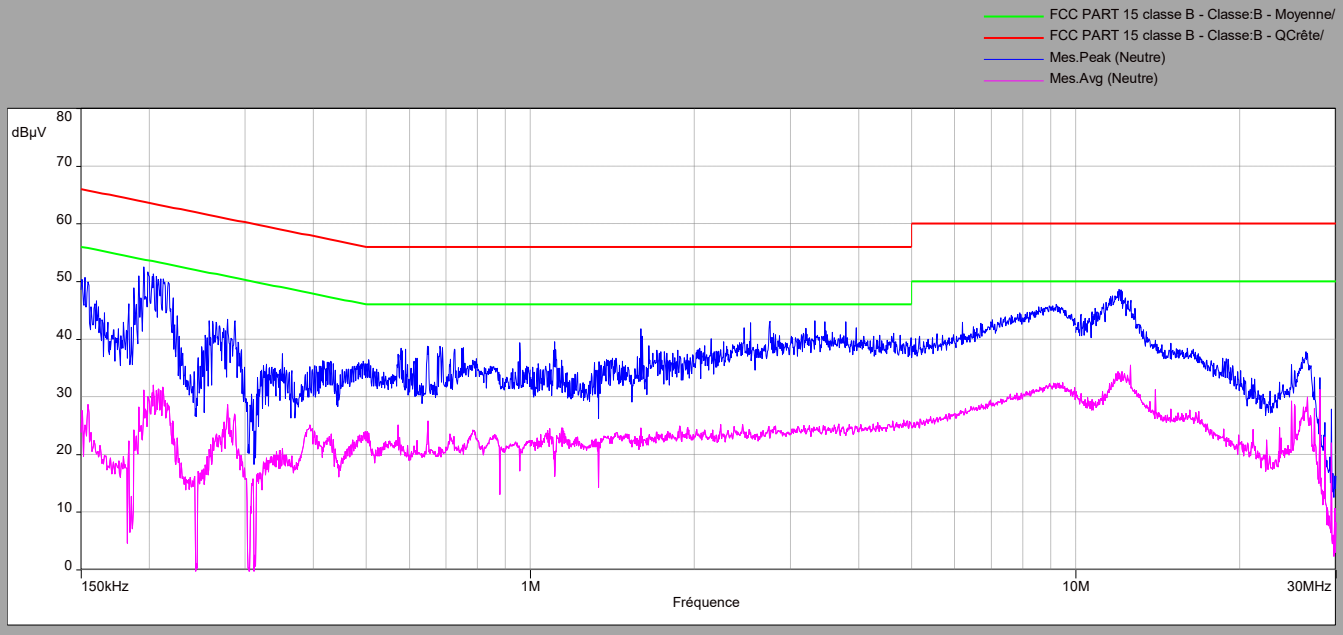
Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Margin peak/Quasi Peak (dB)	Average Level (dBµV)	Average Limit (dBµV)	Margin Avg/Avg (dB)
0.15	51	-	66	15	51	56	5
0.2	47.4	-	63.4	16	36.5	53.4	16.9
0.64	36.6	-	56	19.4	24.2	46	21.8
3	41	-	56	15	22.2	46	23.8
12.6	43.4	-	60	16.6	33.7	50	16.3

AC Power Line Conducted Emission 240V-50Hz

Phase



Line



Phase

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Margin peak/Quasi Peak (dB)	Average Level (dBµV)	Average Limit (dBµV)	Margin Avg/Avg (dB)
0.15	50.4	-	66	15.6	29	56	27
0.2	50.3	-	63.6	13.3	33.4	53.6	20.2
0.5	39	-	56	17	25.4	46	20.6
2.9	43.7	-	56	12.3	25.5	46	20.5
11.59	50.6	-	60	9.4	33.3	50	16.7

Neutral

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Margin peak/Quasi Peak (dB)	Average Level (dBµV)	Average Limit (dBµV)	Margin Avg/Avg (dB)
0.15	50.3	-	64	13.7	27.5	39	11.5
0.2	51.3	-	63.6	12.3	32	53.6	21.6
0.65	37.3	-	56	18.7	26	46	20
2.74	41.7	-	56	14.3	24.8	46	21.2
12.1	48.5	-	60	11.5	32.3	50	17.7

4.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product **MICROPORT** CRM CPR3H (inductive head) , SN: **08031627017013** (inductive head), in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.207 & RSS Gen ISSUE 5 limits.

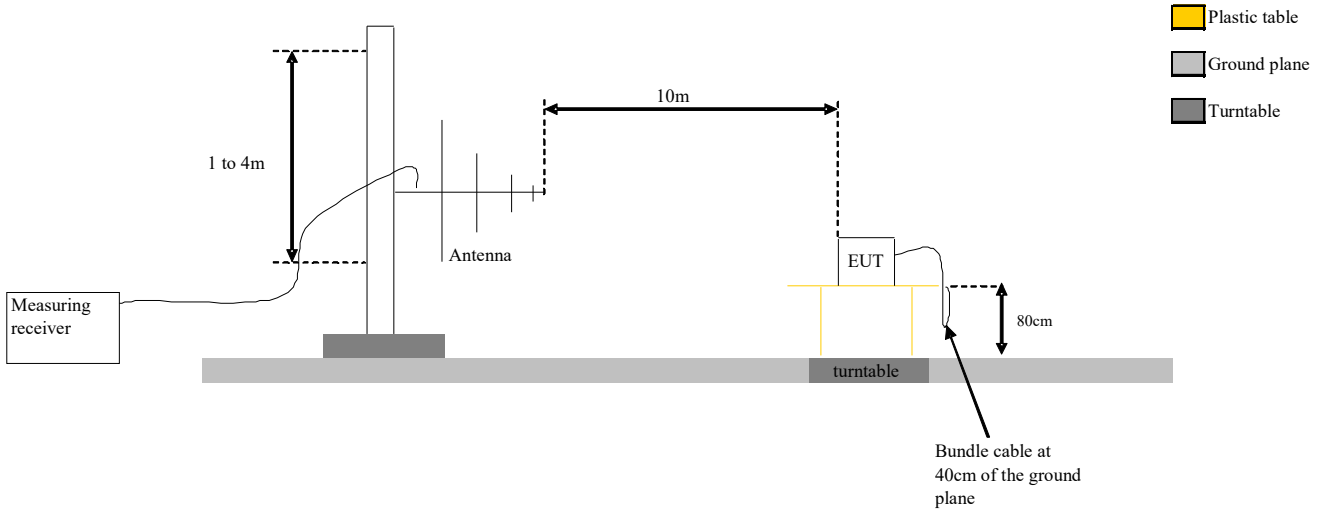
5. TRANSMITTER RADIATED EMISSION

5.1. TEST CONDITIONS

Test performed by	: Laurent DENEUX
Date of test	: January 16, 2020 to January 17, 2020
Ambient temperature	: 20e °C
Relative humidity	: 49 %

5.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013).
Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz. Measurement bandwidth was 200Hz below 150kHz and 9kHz between 150kHz & 30MHz. The level has been maximised by the turntable rotation of 360 degrees range on the 3 axis of EUT. Antenna height was 1m. The EUT is placed **on an open area test site**. Distance between measuring antenna and the EUT is **3m**.
Test is performed in horizontal (H) and vertical (V) polarization with **bilog** between 30MHz & 1GHz and with a horn antenna above 1GHz. Measurement bandwidth was 120kHz below 1GHz and 1MHz above 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on the 3 axis of EUT. Antenna height search was performed from 1 to 4m. The EUT is place at 1.5m high above 1GHz and at 0.8m high under 1GHz. The EUT is placed **on an open area test site** above 1GHz and **on an open area test site** from 30MHz to 1GHz. Distance between measuring antenna and the EUT is **10m**.



Test Set up for radiated measurement in open area test site

Photograph for Transmitter Radiated Emission

5.3. 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

5.4. TEST EQUIPMENT LIST

Test equipment used					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Calibration date**	**Calibration due date**
Open test site	LCIE	-	F2000400	2019-06	2020-06
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2018-10	2020-10
Cable	-	-	A5329444	2019-12	2020-12
Bilog antenna	CHASE	CBL 6112A	C2040040	2019-04	2020-04
Cable	-	-	A5329442	2019-129	2020-12
Cable	-	-	A5329876	2019-12	2020-12
Cable	-	-	A5329542	2019-08	2020-08
Preamplifier	HEWLETT PACKARD	8449B	A4069002	2018-04	2020-04
loop antenna	RHODE & SCHWARZ	HFH2-Z2	C2040007	2018-11	2020-11
Cable	-	-	A5329416	2019-12	2020-12

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

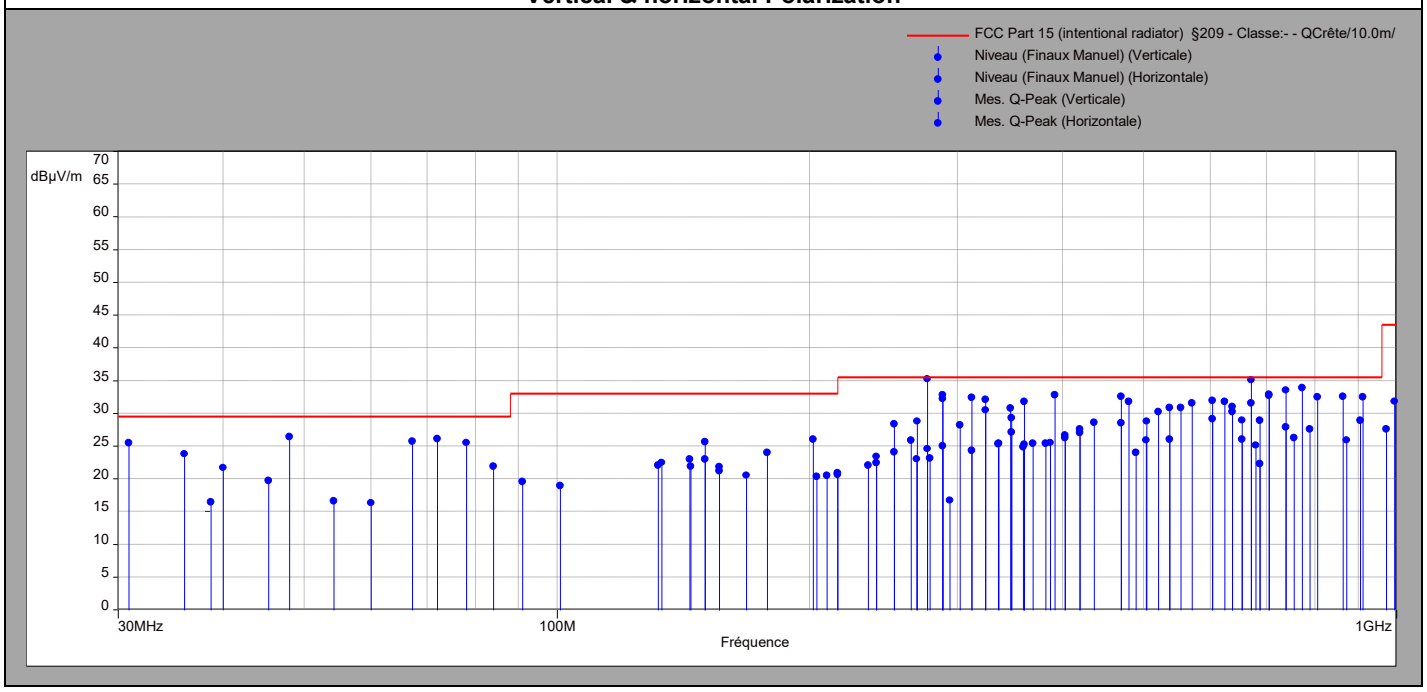
5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

5.6. RESULTS

30MHz to 1GHz

Vertical & horizontal Polarization



9kHz to 30MHz				
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
parallel	16	-	46,5	123.5
parallel	24.6	-	52.7	119.8
parallel	32	-	43,5	117.5
parallel	40.2	-	35,5	115.5
parallel	60.8	-	37,5	111.9
parallel	102.1	-	34,5	107.4
parallel	128.9	-	44,6	105.4
parallel	232	-	42,5	100.3
parallel	345	-	45.2	96.8
parallel	411	-	38.9	95.3
parallel	595	-	39.7	72.1
parallel	621	-	43	71.7
parallel	1078		43	67.0
parallel	3420	-	32.1	69.5
parallel	3.48	-	36.4	69.5
parallel	3.472	-	38.9	69.5
parallel	3.454	-	42.3	69.5
parallel	7251	-	38	69.5
Perpendicular	12.6	-	42.3	125.6
Perpendicular	16	-	41.3	123.5
Perpendicular	24.6	-	41.9	119.8
Perpendicular	28.5	-	39.2	118.5
Perpendicular	32	-	41	117.5
Perpendicular	60.5	-	45	112.0
Perpendicular	71.5	-	38	110.5
Perpendicular	129	-	38.5	105.4
Perpendicular	234	-	41	100.2
Perpendicular	345	-	37.5	96.8
Perpendicular	485	-	30.8	93.9
Perpendicular	698	-	40.3	70.7
Perpendicular	910	-	32	68.4
Perpendicular	1080	-	35	66.9
Perpendicular	1216	-	34	65.9
Perpendicular	1354	-	31.5	65.0
Perpendicular	3312	-	33.2	69.5
Perpendicular	3412	-	28.4	69.5
Perpendicular	3465	-	30.2	69.5

30MHz to 1GHz				
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
Vertical	48	-	26.38	29.5
Vertical	276	-	35.29	35.5
Vertical	288	-	32.78	35.5
Vertical	312	-	32.38	35.5
Vertical	392	-	32.75	35.5
Vertical	436.2	-	28.56	35.5
Vertical	469.8	-	32.58	35.5
Vertical	671.1	-	35.1	35.5
Vertical	704.6	-	32.83	35.5
Vertical	738.2	-	33.54	35.5
Vertical	771.8	-	33.9	35.5
horizontal	324	-	32.11	35.5
horizontal	624	-	31.77	35.5
horizontal	872.4	-	25.96	35.5
horizontal	906	-	28.9	35.5

5.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the product **MICROPORT** CRM CPR3H (inductive head) , SN: **08031627017013** (inductive head), in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.209 & RSS-Gen ISSUE 5 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 (Ecuelles)	4,88	6.3
Measurement of radiated electric field from 1 to 18GHz on the Ecuelles site	5.16	/
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the OATS (Ecuelles)	4,99	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC C01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC C01	5,16	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC V01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC V01	5,15	6.3
Measurement of radiated electric field from 1 to 6 GHz C01	5,1	5.2
Measurement of radiated electric field from 1 to 6 GHz V01	4,85	5.2
Measurement of radiated magnetic field from 10kHz to 30MHz on the OATS (Ecuelles)	4,48	/

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