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RFID 125kHz Template: Release October 14th, 2019

TEST REPORT

N°: 164827-746022-E

Version : 01

Subject

Radio spectrum matters
tests according to standards:
47 CFR Part 15.209 & Part 15.207 & RSS-Gen Issue 5^b

Issued to

MICROPORT CRM
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Apparatus under test

↪ Product	Pacemaker
↪ Trade mark	MICROPORT CRM
↪ Manufacturer	MICROPORT CRM s.r.l
↪ Model under test	BOREA DR 1500
↪ Serial number	N38GF05A
↪ FCC ID	YSG1614 & YSG1311
↪ IC	-

Conclusion

See Test Program chapter

Test date

: December 4, 2019 to December 5, 2019

Test location

Ecuelles

Test Site

6230B-1

Sample receipt date

December 4, 2019

Composition of document

18 pages

Document issued on

March 26, 2020

Written by :
Laurent DENEUX
Tests operator



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PUBLICATION HISTORY

Version	Date	Author	Modification
01	March 26th, 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

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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 f	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
AC Power Line Conducted Emission f	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA(2)	<input type="checkbox"/> NP(1)
Transmitter Radiated Emission f	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Receiver Radiated Emissions f	<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. INFORMATIONS

-Tests are performed on the product **BOREA DR 1500**, SN: N38GF05A. See Table below for difference between products.

BOREA DR 1500	ALIZEA DR 1600	CELEA DR 1400
Tested product	Embedded Software is slightly different from BOREA. But these differences do not impact the radio functionality of the implant. The hardware and mechanical structure are strictly the same than BOREA.	Embedded Software is slightly different from BOREA. But these differences do not impact the radio functionality of the implant. The hardware and mechanical structure are strictly the same than BOREA.

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

MICROPORT CRM BOREA DR 1500

Serial Number: N38GF05A



Equipment Under Test



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Auxiliary equipment



Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
-	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Inductive telemetry head	CPR3	-	SORIN
M10090 - A	CPR3	-	Ampli part
Antenna	-	-	MICROPORT CRM
Laptop	51181	-	DELL

Equipment information:

Frequency band:	[9-315] kHz		
Antenna Type:	<input checked="" type="checkbox"/> Integral	<input type="checkbox"/> External	<input type="checkbox"/> Dedicated
Transmit chains:	1		
Receiver chains:	1		
Equipment type:	<input checked="" type="checkbox"/> Production model		<input type="checkbox"/> Pre-production model
Operating temperature range:	Tmin:	<input type="checkbox"/> -20°C	<input type="checkbox"/> 0°C <input checked="" type="checkbox"/> 25°C
	Tnom:	27°C	
	Tmax:	<input type="checkbox"/> 35°C	<input type="checkbox"/> 55°C <input checked="" type="checkbox"/> 45°C
Type of power source:	<input type="checkbox"/> AC power supply	<input type="checkbox"/> DC power supply	<input checked="" type="checkbox"/> Battery
Operating voltage range:	Vnom:	<input type="checkbox"/> 120V/60Hz	<input checked="" type="checkbox"/> 3.2Vdc

Hardware information

Software (if applicable):	V. :	V2.5.1 Build 15
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2.3. RUNNING MODE

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

Test	Running mode	
Occupied Bandwidth	<input checked="" type="checkbox"/> Test mode 1 (1)	<input type="checkbox"/> Alternative test mode()
Transmitter Radiated Emission	<input checked="" type="checkbox"/> Test mode 1 (1)	<input type="checkbox"/> Alternative test mode()

2.4. EQUIPMENT LABELLING



2.5. EQUIPMENT MODIFICATION

None Modification:

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : January 10, 2020
Ambient temperature : 27°C
Relative humidity : 47%

3.2. TEST SETUP

- The Equipment Under Test is installed:

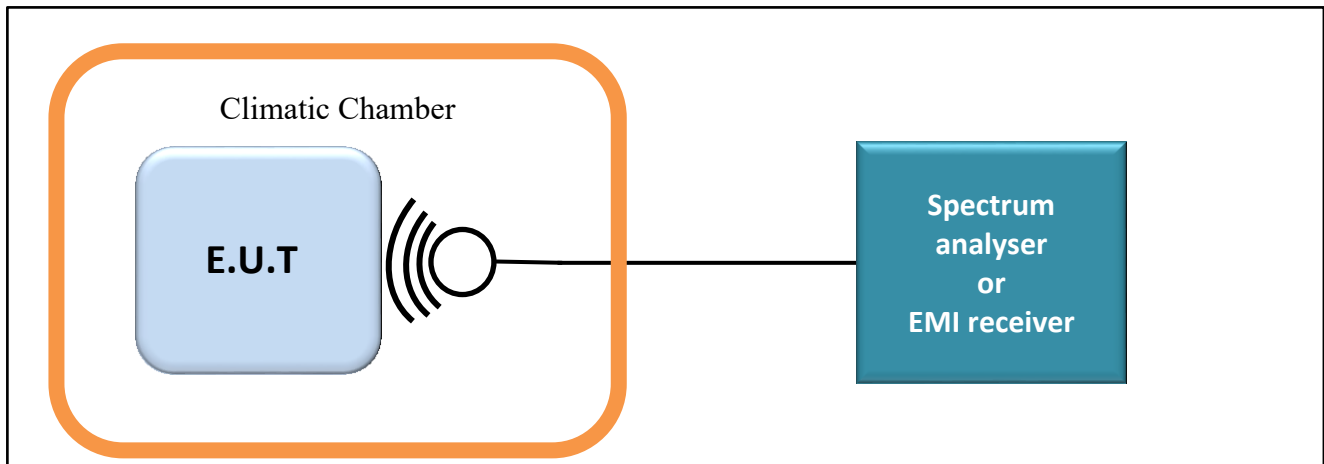
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

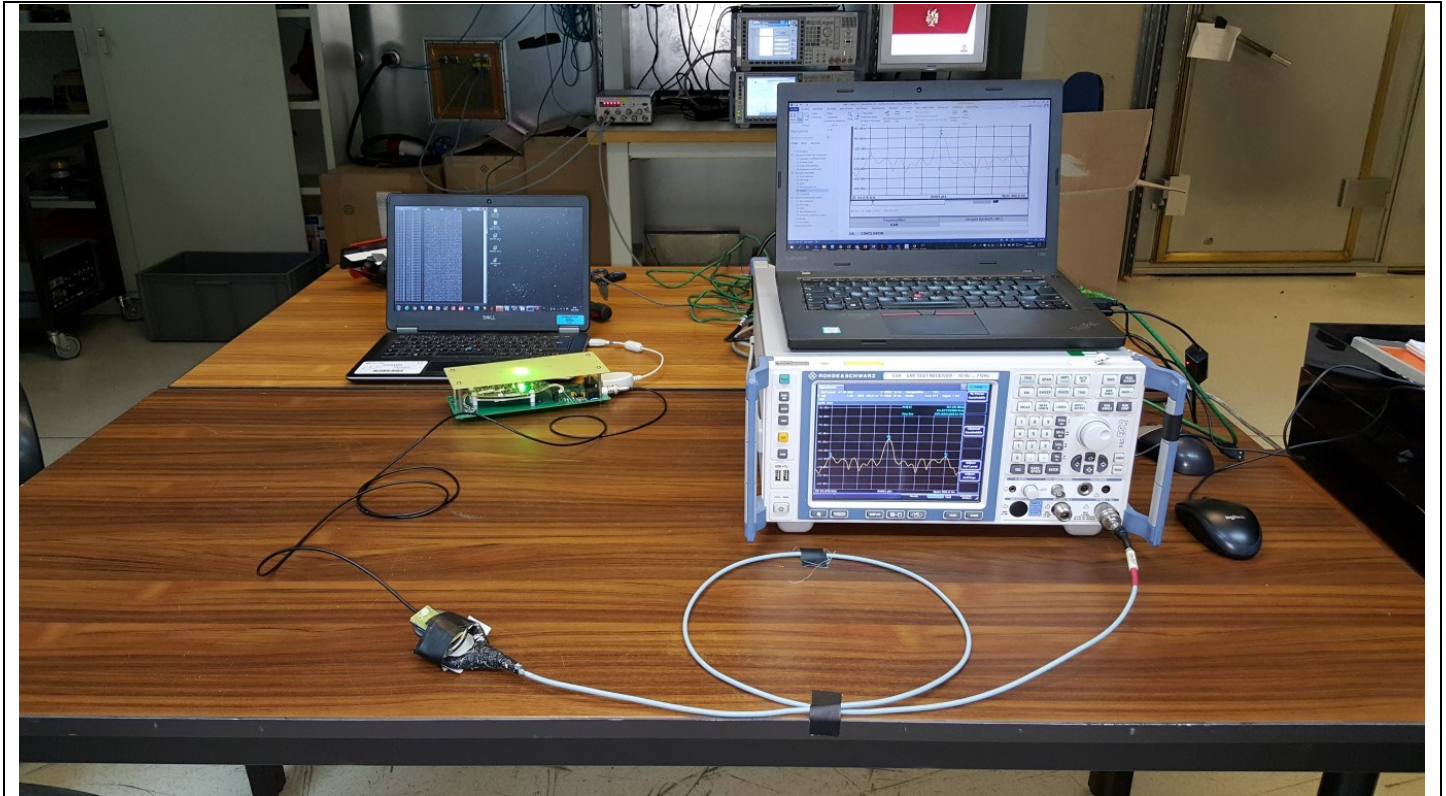
- Conducted Method
- Radiated Method

- 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

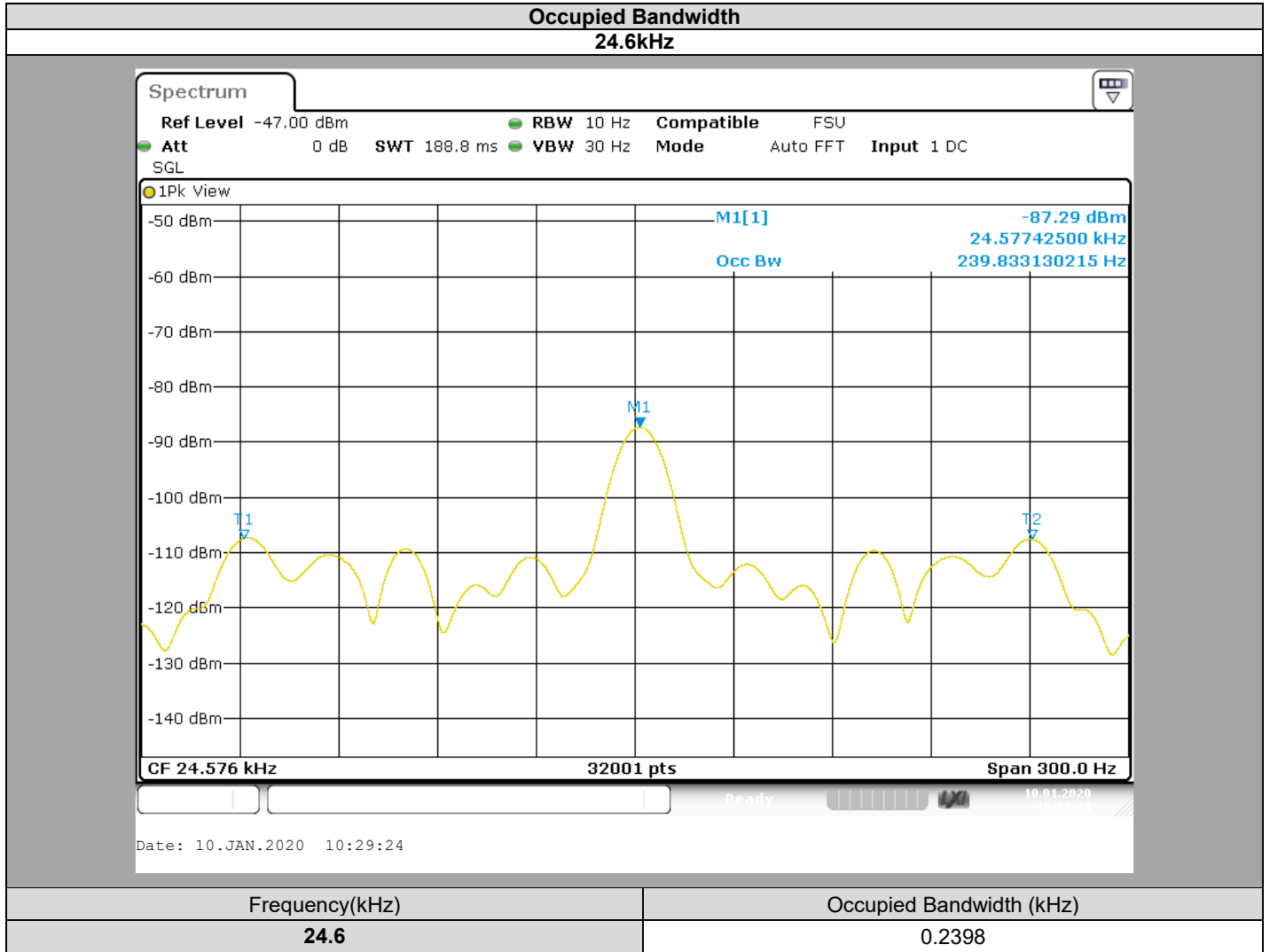
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
13,56MHz Test fixture Antenna	-	-	A5329422	See EMI receiver	See EMI receiver
EMI receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2019/01	2021/01

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



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3.5. RESULTS



3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **MICROPORT CRM BOREA DR 1500**, SN: **N38GF05A**, in configuration and description presented in this test report, show levels **compliant** to the **RSS-GEN ISSUE 5** limits.

4. TRANSMITTER RADIATED EMISSION

4.1. TEST CONDITIONS

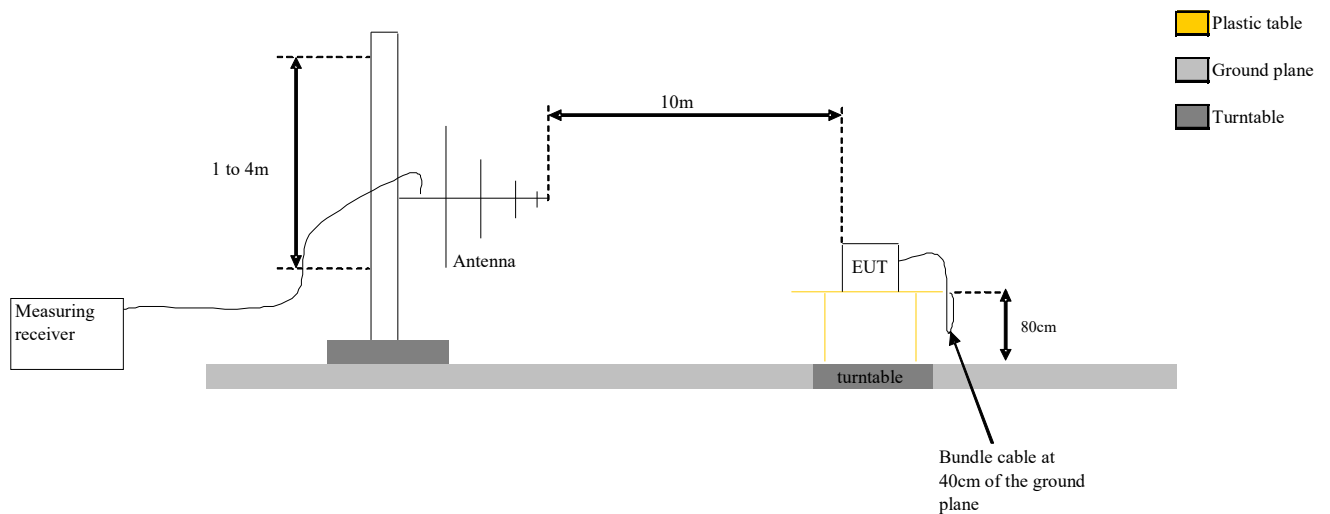
Test performed by : Laurent DENEUX
 Date of test : December 4, 2019 to December 5, 2019
 Ambient temperature : 10 °C
 Relative humidity : 45 %

4.2. 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



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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

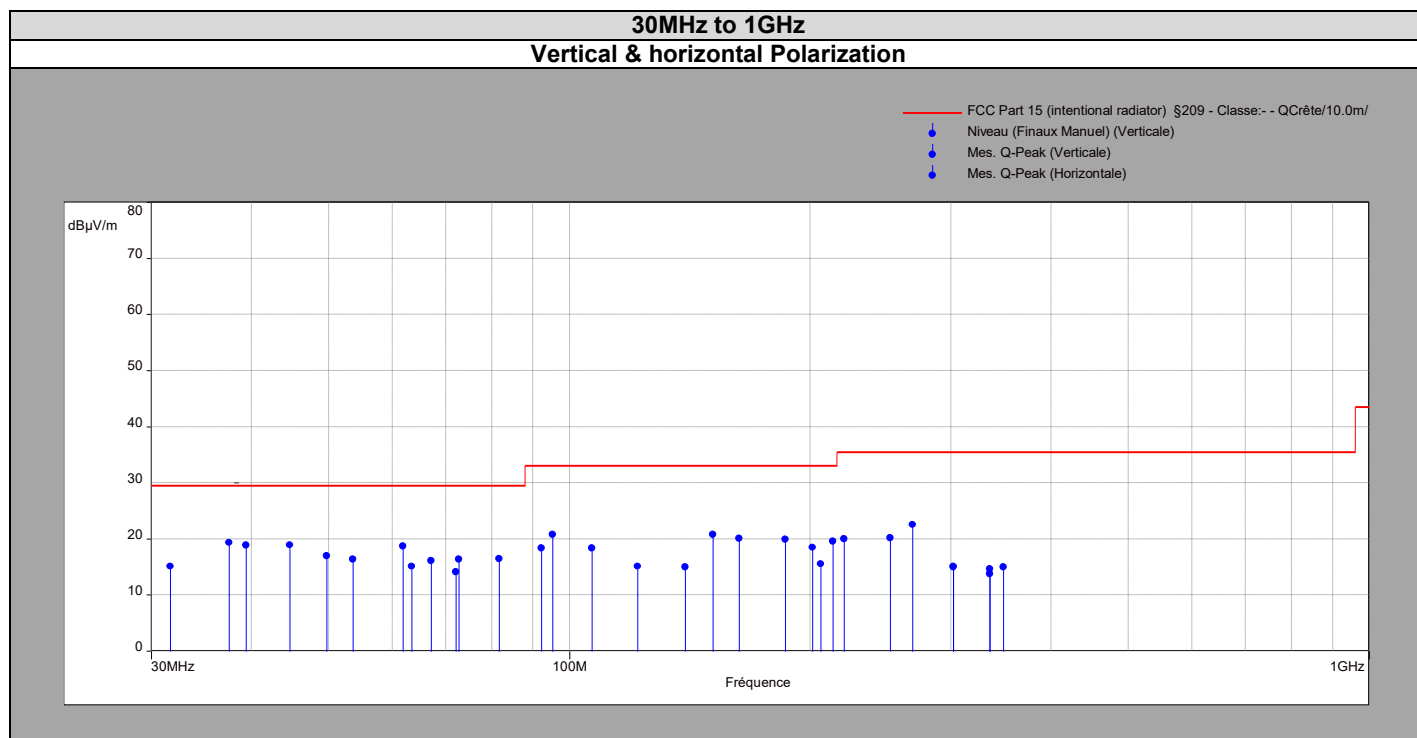
Test equipment used					
Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
Open test site	LCIE	-	F2000400	2019-06	2020-06
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2018-10	2020-10
Cable	-	-	A5329444	2019-12	2020-12
Bilog antenna	CHASE	CBL 6112A	C2040040	2019-04	2020-04
Cable	-	-	A5329442	2018-09	2019-09
Cable	-	-	A5329876	2018-11	2019-11
Preamplifier	HEWLETT PACKARD	8449B	A4069002	2018-04	2020-04
Horn	EMCO	3115	C2042016	2019-06	2020-06
loop antenna	RHODE & SCHWARZ	HFH2-Z2	C2040007	2018-11	2020-11
Cable	-	-	A5329416	2018-12	2019-12

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





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9kHz to 30MHz				
Polarization	Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	Limit (dBµV/m)
parallel	1.92	-	19.63	69.5
parallel	3.36	-	21.89	69.5
parallel	3.47	-	20.95	69.5
parallel	3.61	-	23.89	69.5
parallel	3.72	-	21.03	69.5
parallel	3.84	-	20.57	69.5
parallel	3.97	-	24.18	69.5
<i>Perpendicular</i>	3.28	-	22.42	69.5
<i>Perpendicular</i>	3.4	-	20.84	69.5
<i>Perpendicular</i>	3.53	-	21.58	69.5
<i>Perpendicular</i>	3.77	-	19.71	69.5
<i>Perpendicular</i>	3.89	-	19.41	69.5
<i>Perpendicular</i>	11	-	19.6	69.5
<i>Perpendicular</i>	14.42	-	22.82	69.5

30MHz to 1GHz				
Polarization	Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	Limit (dBµV/m)
Vertical	37.5	19.36	29.5	10.14
Vertical	39.4	18.84	29.5	10.66
Vertical	42.2	20.47	29.5	9.03
Vertical	48	19.58	29.5	9.92
Vertical	55.3	16.71	29.5	12.79
Vertical	186.1	19.87	33	13.13
Vertical	213.6	19.89	33	13.11
Vertical	251.9	20.16	35.5	15.34
horizontal	55	18.94	29.5	10.56
horizontal	61.9	18.72	29.5	10.78

Above 1GHz						
Polarization	Frequency (MHz)	Duty cycle correction (dB)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
all emissions were greater than 20 dB below the limit						

4.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the product **MICROPORT CRM BOREA DR 1500**, SN: **N38GF05A**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.209 & RSS-Gen ISSUE 5 limits.

5. UNCERTAINTIES CHART

47 CFR Part 15.209 & 15.207 Kind of test	Wide uncertainty laboratory (k=2) $\pm x(\text{dB}) / (\text{Hz}) /$ 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