

Radio test report

According to the standard:

CFR 47 FCC PART 15
RSS GEN – Issue 5
RSS 210 – Issue 10

Equipment under test:

RM5 MODULE

FCC ID: NQY-RM5
IC NUMBER: 4246A-RM5

Company:
Allflex USA, Inc.

Distribution: Mr LANGOUET

(Company: ALLFLEX EUROPE SAS)

Number of pages: 26 with 2 annexes

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval	
			Name and Function	Visa
0	5-May-21	Creation	T. LEDRESSEUR, Radio Technician	

Duplication of this document is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.
This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.
Information in italics are declared by the manufacturer/customer and are under his responsibility



DESIGNATION OF PRODUCT: *RM5 MODULE*

Serial number (S/N): 611486

Reference / model (P/N): AALRM5

Software version: V2.1 26682M

Firmware version: 1.00

MANUFACTURER: ALLFLEX EUROPE SAS

COMPANY SUBMITTING THE PRODUCT:

Company: ALLFLEX EUROPE SAS

Address: ROUTE DES EAUX
BP 90219
35502 VITRE CEDEX
FRANCE

Responsible: Mr LANGOUET

DATE(S) OF TEST: From 14-Apr-21 to 15-Apr-21

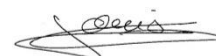
TESTING LOCATION: EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE

FCC Accredited under US-EU MRA Designation Number: FR0009
Test Firm Registration Number: 873677

ISED Accredited under CANADA-EU MRA Designation Number: FR0001
Industry Canada Registration Number: 4452A

TESTED BY: S. LOUIS

VISA:

A handwritten signature in black ink, appearing to read "Louis", with a stylized flourish at the end.

WRITTEN BY: S. LOUIS

CONTENTS

TITLE	PAGE
1. INTRODUCTION	4
2. PRODUCT DESCRIPTION	4
3. NORMATIVE REFERENCE	5
4. TEST METHODOLOGY	5
5. TEST EQUIPMENT CALIBRATION DATES	6
6. TESTS RESULTS SUMMARY	7
7. MEASUREMENT UNCERTAINTY	9
8. AC CONDUCTED EMISSION	10
9. RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS	19
APPENDIX 1: TEST EQUIPMENT LIST	25
APPENDIX 2: 99% BANDWIDTH	26

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **RM5 Module**, in accordance with normative reference.

The equipment under test is a LF module not already certified tested with 4 different antennas. This module was tested on a workbench.

All tests have been performed with the 4 antennas described below.

Antennas tested:

- NX-AW100
- NX-AP6040
- NX-AP9045
- NX-12060

2. PRODUCT DESCRIPTION

Category of equipment (ISED): I

Class: B

Utilization: Module

Antenna characteristics:

NX-AP6040	118.32 uH	187
NX-AP9045	117.67 uH	188
NX-AP12060	118.11 uH	122
NX-AW50	115.76 uH	1700

Operating frequency range: 134.2 kHz

Number of channels: 1

Channel spacing: Not concerned

Modulation: ASK

Power source: From 12Vdc to 15Vdc

Power level, frequency range and channels characteristics are not user adjustable.
The details pictures of the product and the circuit boards are joined with this file.

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below.

They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

CFR 47 FCC Part 15 (2021)	Radio Frequency Devices
ANSI C63.10	2013 Procedures for Compliance Testing of Unlicensed Wireless Devices.
RSP-100	Issue 12, August 2019 Certification of Radio Apparatus
RSS-Gen	Issue 5, April 2018 General Requirements for Compliance of Radio Apparatus
RSS-102	Issue 5, March 2015 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
RSS-210	Issue 10, December 2019 Licence-Exempt Radio Apparatus: Category I equipment.

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

Subpart C – Intentional Radiators

- Paragraph 203: Antenna requirement
- Paragraph 205: Restricted bands of operation
- Paragraph 207: Conducted limits
- Paragraph 209: Radiated emission limits; general requirements

Radio performance tests procedures given in RSS-Gen:

- Paragraph 2 - General
- Paragraph 3 - Normative publications and related documents
- Paragraph 4 - Labelling requirements
- Paragraph 6 - General administrative and technical requirements
- Paragraph 8 - Licence-exempt Radio Apparatus

Radio performance tests procedures given in RSS-210:

- Paragraph 5 – RSS-Gen compliance
- Paragraph 7 - General Requirements

5. TEST EQUIPMENT CALIBRATION DATES

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
0	BAT-EMC V3.18.0.26	Software	/	/	/
1406	EMCO 6502	Loop antenna	13/04/2021	1	13/04/2022
8508	California instruments 1251RP	Power source	(1)	(1)	(1)
8578	N-2GHz	Cable	11/06/2020	2	11/06/2022
8590	RG214 N-5m	Cable	25/02/2020	2	24/02/2022
8635	R&S EZ-25	High-pass filter	03/09/2021	3	03/09/2024
8719	Thurbly Thandar Instruments 1600	LISN	26/02/2020	2	25/02/2022
8732	Emitech	OATS	03/07/2019	3	02/07/2022
8750	La Crosse Technology WS-9232	Meteo station	22/09/2020	2	22/09/2022
8775	Fontaine FTN 2515B	Power source	(1)	(1)	(1)
8855	EMITECH	Turntable and mat controller	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
9489	Absorber sheath current	Emitech	20/04/2020	2	20/04/2022
10788	Emitech	Outside room Hors cage	/	/	/
14475	Oregon Scientific BAR206	Meteo station	24/09/2019	2	23/09/2021
14831	Fluke 177	Multimeter	25/02/2020	2	24/02/2022
17008	R&S ESW44	Test receiver	17/04/2020	2	17/04/2022

(1) The equipment is not verified; instead, the output voltage is checked before each measurement with the calibrated multimeter.

6. TESTS RESULTS SUMMARY

6.1 CFR 47 part 15 requirements (subpart C)

Test procedure	Description of test	Criteria respected?				Comment
		Yes	No	NAP	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				Note 1
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS	X				
FCC Part 15.209	RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS	X				

NAP: Not Applicable

NAs: Not Asked

Note 1: Radio module

6.2 RSS-Gen requirements

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAP	NAs	
Paragraph 2	General	X				
Paragraph 3	Normative publications and related documents	X				
Paragraph 4	Labelling requirements			X		
Paragraph 6	General administrative and technical requirements	X				
Paragraph 8	Licence-exempt radio apparatus					
§ 8.1	Measurement Bandwidths and Detector Functions	X				
§ 8.2	Pulsed operation	X				
§ 8.3	Prohibition of amplifiers	X				
§ 8.4	User manual notice	X				
§ 8.5	Measurement of licence-exempt devices on-site (in-situ)			X		
§ 8.6	Operating frequency range of devices in master/slave networks	X				
§ 8.7	Radio frequency identification (RFID) devices	X				
§ 8.8	AC power line conducted emissions limits	X				
§ 8.9	Transmitter emission limits	X				
§ 8.10	Restricted frequency bands	X				
§ 8.11	Frequency stability			X		

NAP: Not Applicable

NAs: Not Asked

6.3 RSS-210 requirements

Test Procedure RSS-210	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
Paragraph 5	RSS-Gen compliance	X				
Paragraph 7	Technical Specifications					
7.1	Emission Falling Within Restricted Frequency Bands	X				
7.2	General Field Strength Limits	X				
7.3	Transmitters With Wanted Emissions That are Within the General Field Strength Limits	X				
7.4	Cordless Telephones (general Conditions)			X		

NAp: Not Applicable

NAs: Not Asked

7. MEASUREMENT UNCERTAINTY

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the result(s)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage probability of approximately 95%.

Parameter	Emitech Uncertainty
RF power, conducted	$\pm 0.75\text{dB}$
Radiated emission valid to 26 GHz	
F < 62.5 MHz:	$\pm 5.14\text{ dB}$
62.5 MHz < F < 1 GHz:	$\pm 5.13\text{ dB}$
1 GHz < F < 40 GHz:	$\pm 5.16\text{ dB}$
AC Power Lines conducted emissions	$\pm 3.38\text{ dB}$
Temperature	$\pm 1\text{ }^{\circ}\text{C}$
Humidity	$\pm 5\text{ \%}$

8. AC CONDUCTED EMISSION**Temperature (°C) :** 20.2**Humidity (%HR):** 42**Date :** September 30, 2021**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-GEN**Test procedure:**

For FCC Part 15: Paragraph 15.207

For RSS-Gen: Paragraph 8.8

Method of paragraph 6.2 of ANSI C63.10

Limits: Class B**Software used:** BAT-EMC V3.18.0.26**Test set up:**

The EUT is isolated and placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane.

The equipment is powered with the AC power operating voltage of 120 V / 60 Hz.

The power source used is referenced:

MEAN WELL Model: DR-4512

Input: 100-240Vac, 50/60Hz, 1.5A

Output: 12Vdc, 3.5A

Frequency range: 150 kHz - 30 MHz**Detection mode:** Peak / Quasi-peak / Average**Bandwidth:** 10 kHz / 9 kHz**Equipment under test operating condition:**

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

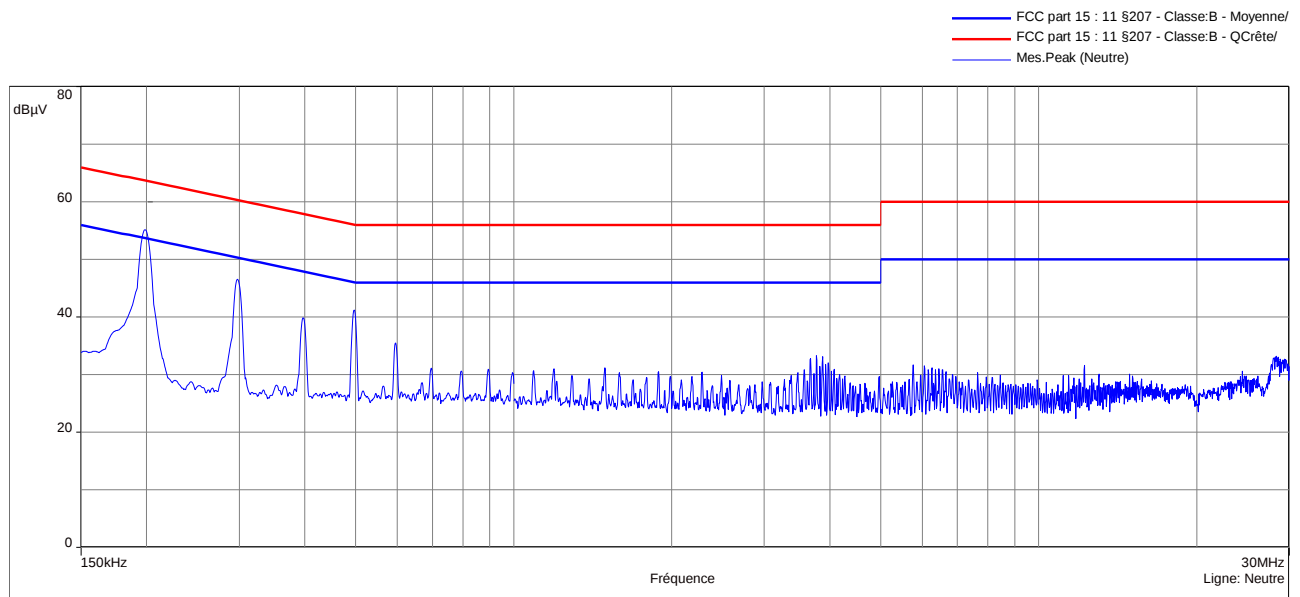
Results:

Sample N° 1 with NX-AW100 Antenna

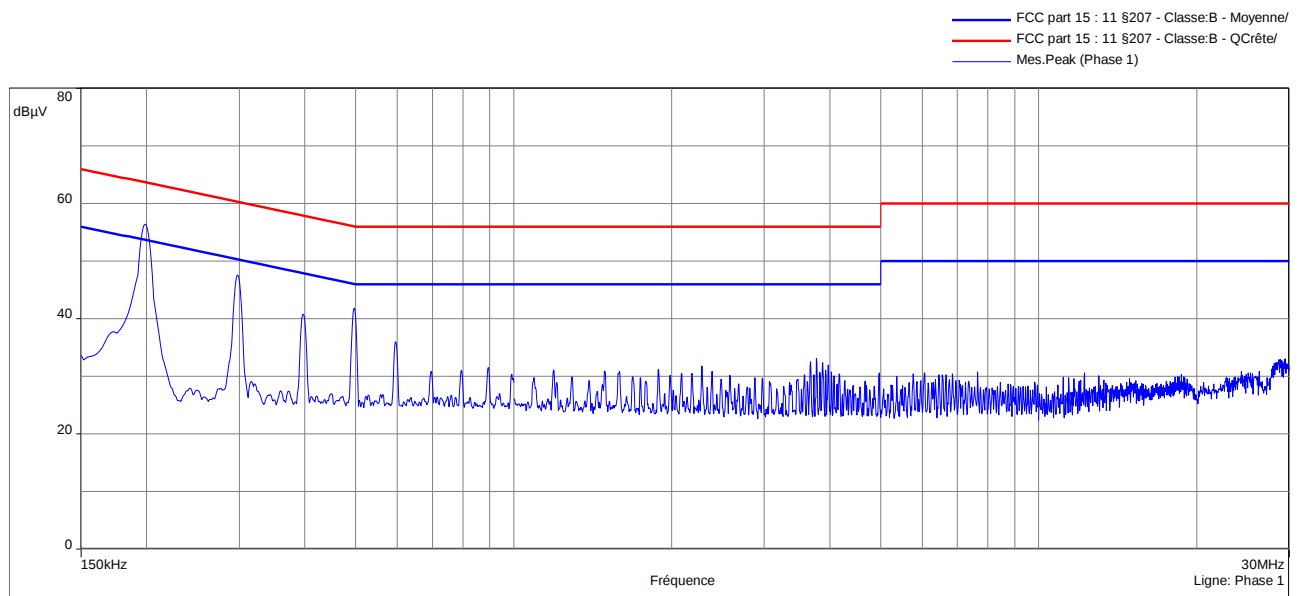
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 1: measurement on the Neutral with peak detector



Curve N° 2: measurement on the Line with peak detector



The highest frequencies are then analyzed with Quasi-peak detector and Average detector

Table N° 1: measurement on the Neutral, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.199	55.18	63.7	8.49
0.298	46.07	60.3	14.23
0.397	39.08	57.9	18.83
0.497	40.54	56.0	15.51
0.596	35.05	56.0	20.95
3.773	30.54	56.0	25.46

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.199	40.39	53.7	13.28
0.298	33.25	50.3	17.05
0.397	26.78	47.9	21.13
0.497	32.70	46.0	13.35
0.596	27.50	46.0	18.50
3.773	26.43	46.0	19.57

Table N° 2: measurement on the Line, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.199	55.23	63.7	8.44
0.298	45.99	60.3	14.31
0.398	39.57	57.9	18.33
0.499	38.77	56.0	17.25
0.596	34.94	56.0	21.06
3.774	29.11	56.0	26.89

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.199	41.36	53.7	12.31
0.298	33.49	50.3	16.81
0.398	27.25	47.9	20.65
0.499	30.28	46.0	15.74
0.596	27.63	46.0	18.37
3.774	24.41	46.0	21.59

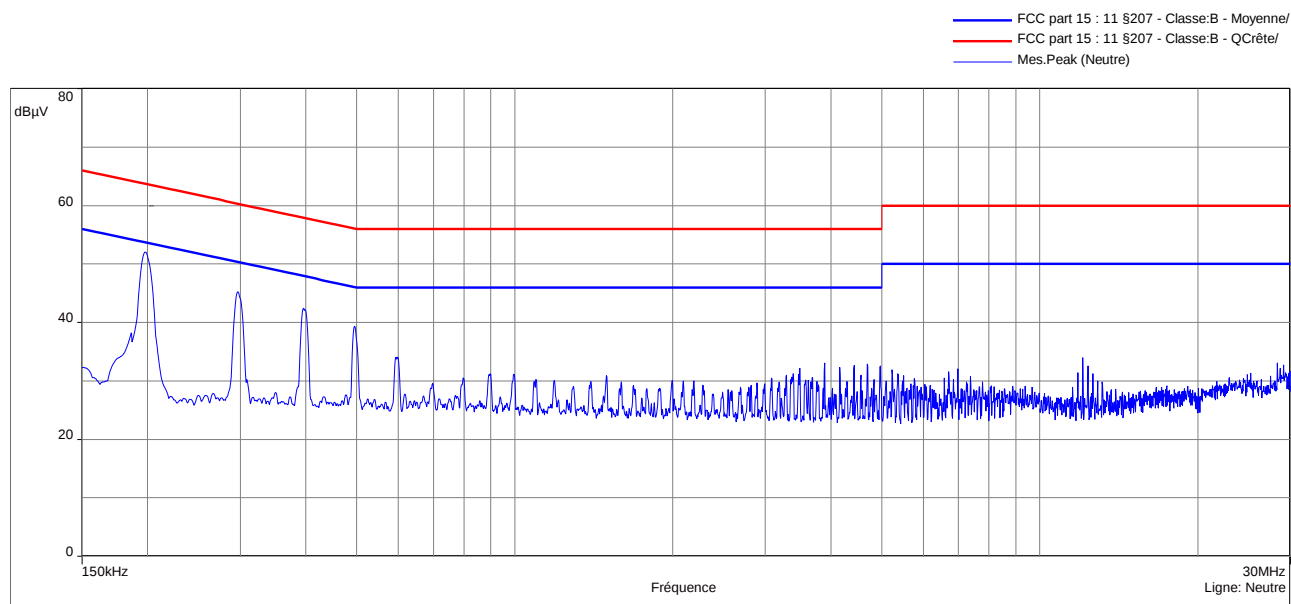
Results:

Sample N° 1 with NX-AP6040 Antenna

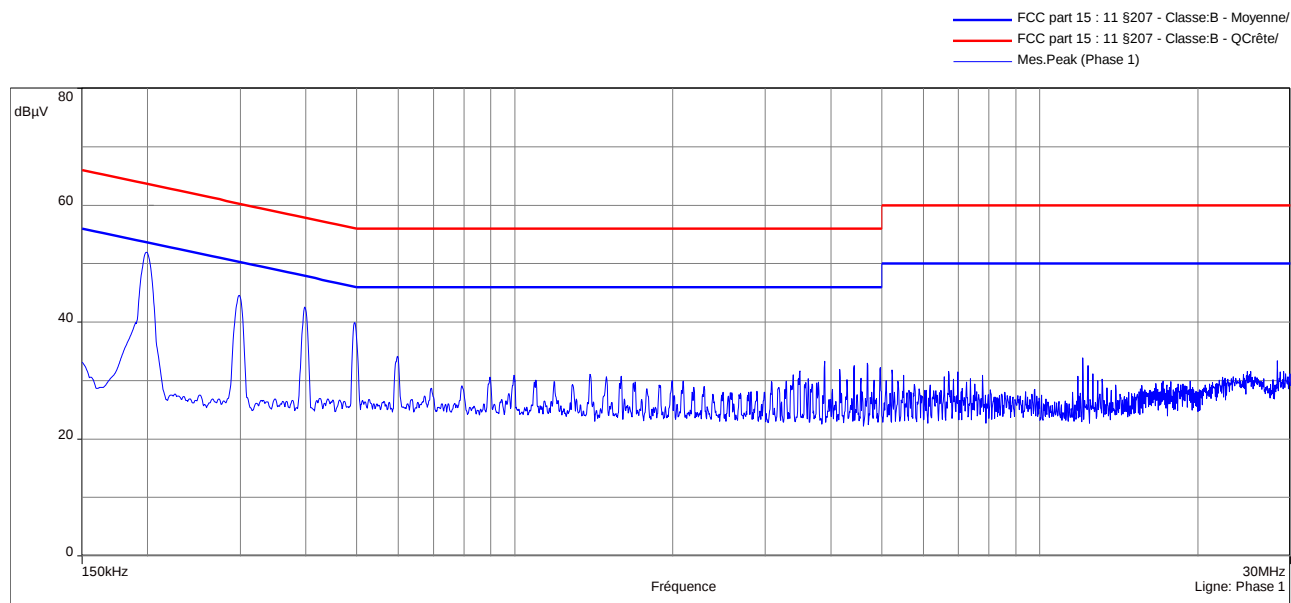
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 3: measurement on the Neutral with peak detector



Curve N° 4: measurement on the Line with peak detector



The highest frequencies are then analyzed with Quasi-peak detector and Average detector

Table N° 3: measurement on the Neutral, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.198	49.21	63.7	14.49
0.297	41.42	60.3	18.91
0.396	38.33	57.9	19.61
0.495	36.40	56.1	19.68
0.598	31.60	56.0	24.40
3.891	31.03	56.0	24.97

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.198	35.31	53.7	18.39
0.297	29.24	50.3	21.09
0.396	28.45	47.9	19.49
0.495	28.81	46.1	17.27
0.598	27.46	46.0	18.54
3.891	26.89	46.0	19.11

Table N° 4: measurement on the Line, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.199	50.36	63.7	13.30
0.299	42.92	60.3	17.36
0.398	40.65	57.9	17.24
0.496	36.76	56.1	19.31
0.598	31.76	56.0	24.24
3.891	31.26	56.0	24.74

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.199	37.29	53.7	16.37
0.299	30.06	50.3	20.22
0.398	30.09	47.9	17.80
0.496	28.66	46.1	17.41
0.598	27.70	46.0	18.30
3.891	27.06	46.0	18.94

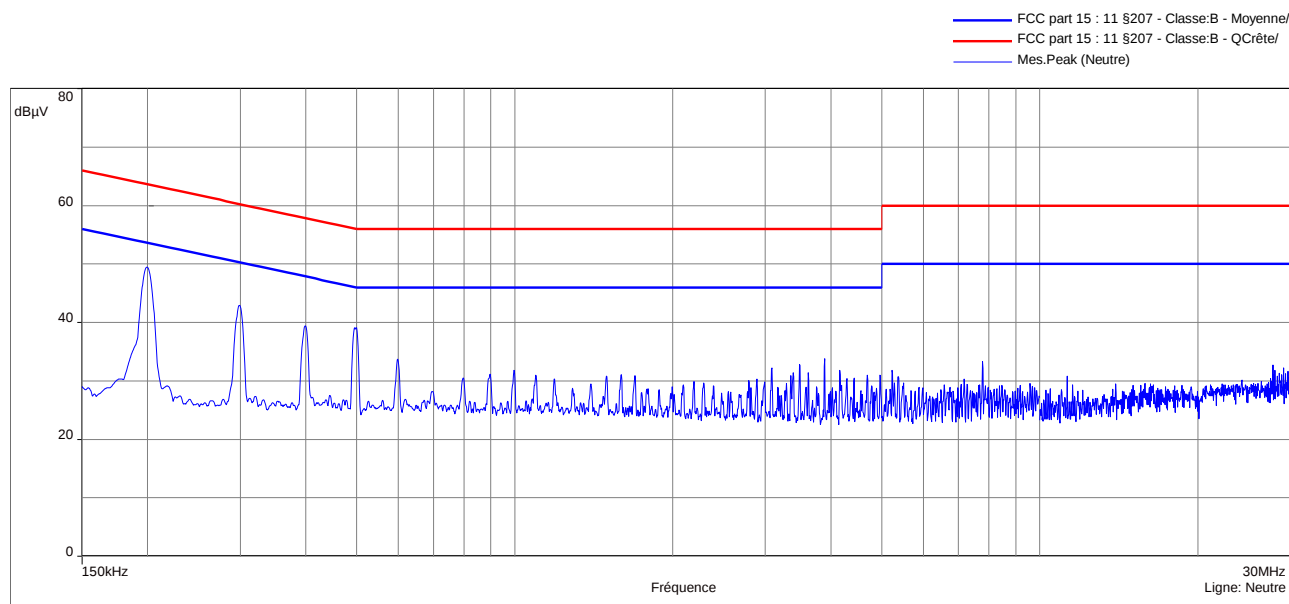
Results:

Sample N° 1 with NX-AP9045 Antenna

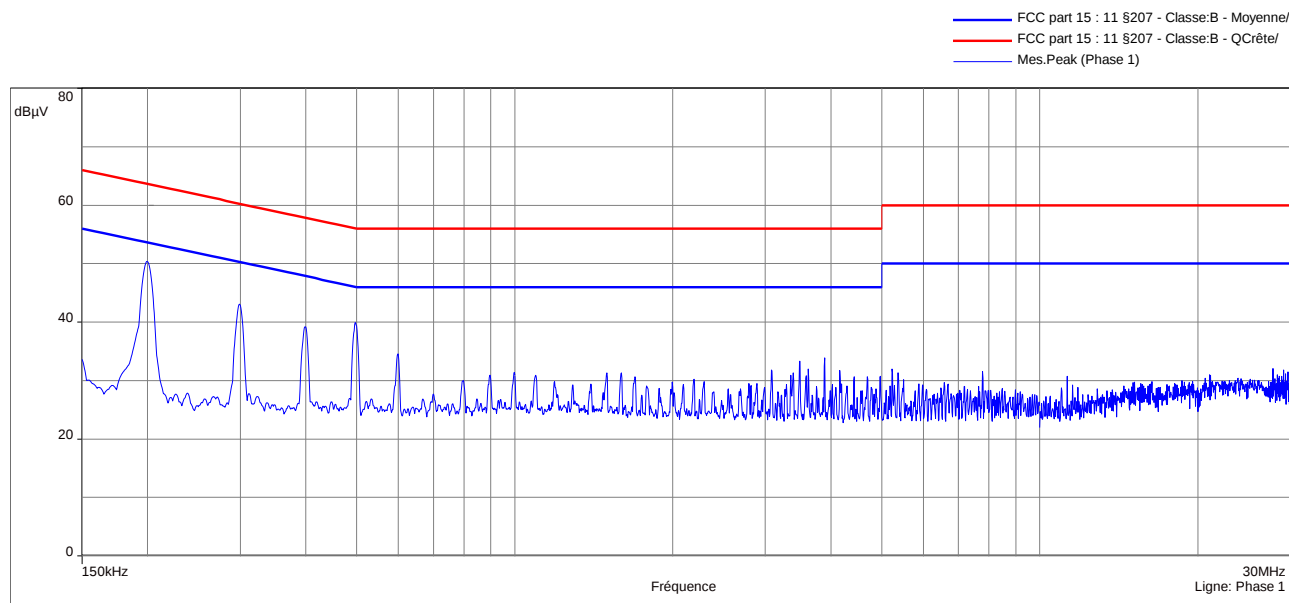
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 5: measurement on the Neutral with peak detector



Curve N° 6: measurement on the Line with peak detector



The highest frequencies are then analyzed with Quasi-peak detector and Average detector

Table N° 5: measurement on the Neutral, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.200	48.17	63.6	15.42
0.299	41.37	60.3	18.90
0.399	38.68	57.9	19.19
0.499	37.85	56.0	18.17
0.598	30.69	56.0	25.31
3.892	31.71	56.0	24.29

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.200	34.10	53.6	19.49
0.299	29.50	50.3	20.77
0.399	27.17	47.9	20.70
0.499	32.83	46.0	13.19
0.598	26.76	46.0	19.24
3.892	27.91	46.0	18.09

Table N° 6: measurement on the Line, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.199	48.76	63.6	14.88
0.299	41.15	60.3	19.12
0.399	38.11	57.9	19.76
0.497	37.76	56.1	18.30
0.599	31.11	56.0	24.89
3.891	31.91	56.0	24.09

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.199	36.18	53.6	17.46
0.299	29.00	50.3	21.27
0.399	27.10	47.9	20.77
0.497	32.08	46.1	13.98
0.599	27.33	46.0	18.67
3.891	28.09	46.0	17.91

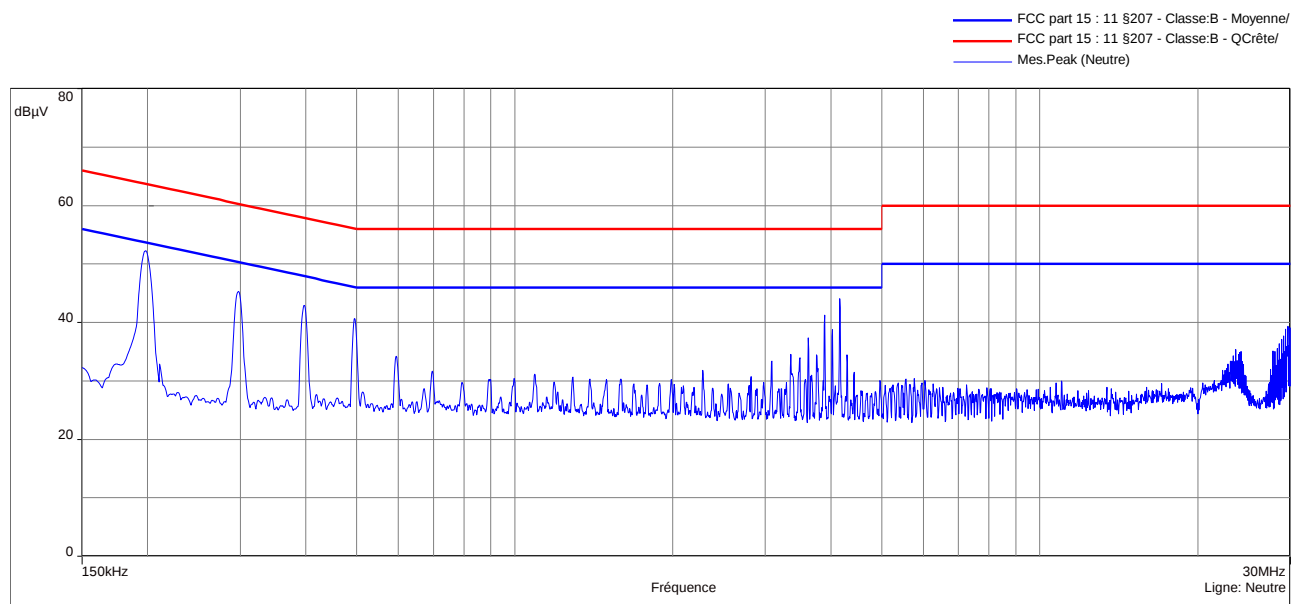
Results:

Sample N° 1 with NX-AP12060 Antenna

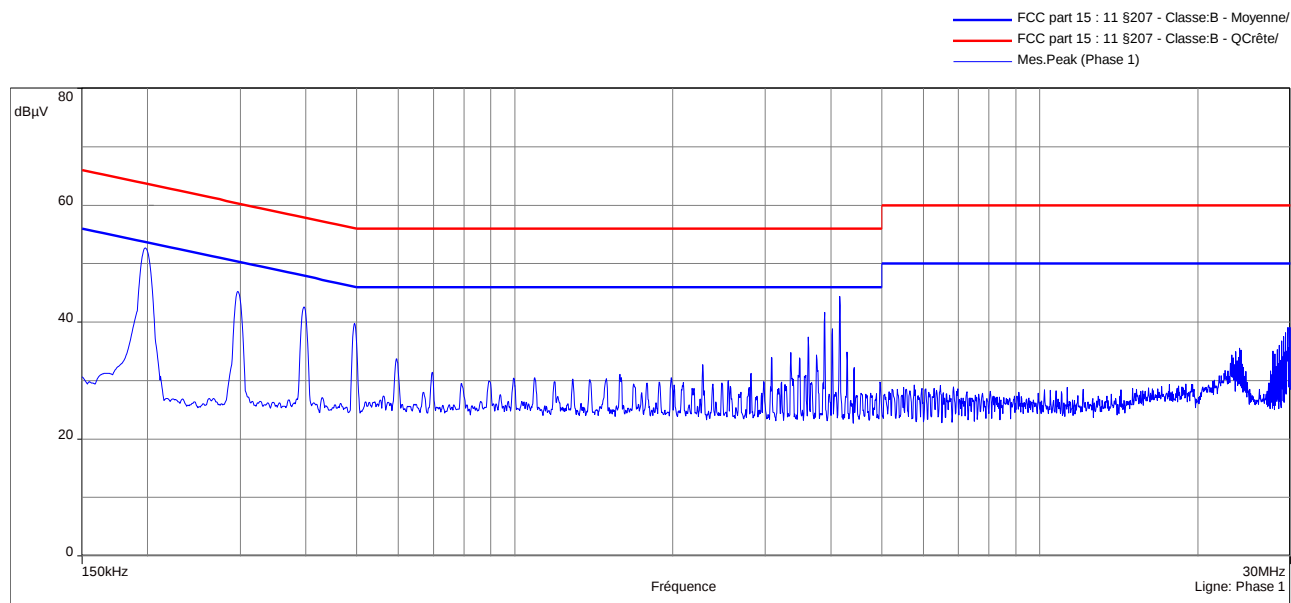
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 7: measurement on the Neutral with peak detector



Curve N° 8: measurement on the Line with peak detector



The highest frequencies are then analyzed with Quasi-peak detector and Average detector

Table N° 7: measurement on the Neutral, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.198	50.57	63.7	13.11
0.298	43.46	60.3	16.85
0.397	40.91	57.9	17.00
0.496	36.89	56.1	19.18
3.891	40.22	56.0	15.78
4.160	43.26	56.0	12.74

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.198	36.46	53.7	17.22
0.298	30.74	50.3	19.57
0.397	30.61	47.9	17.30
0.496	29.93	46.1	16.14
3.891	38.26	46.0	7.74
4.160	41.39	46.0	4.61

Table N° 8: measurement on the Line, for the frequency range:

Frequency (MHz)	Quasi-peak (dBμV)	QP Limit (dBμV)	QP margin (dB)
0.198	51.18	63.7	12.52
0.297	43.57	60.3	16.76
0.397	40.91	57.9	17.00
0.495	37.25	56.1	18.83
3.891	40.44	56.0	15.56
4.160	43.45	56.0	12.55

Frequency (MHz)	Average (dBμV)	Average Limit (dBμV)	Average margin (dB)
0.198	37.84	53.7	15.86
0.297	30.79	50.3	19.54
0.397	30.49	47.9	17.42
0.495	29.73	46.1	16.35
3.891	38.47	46.0	7.53
4.160	41.56	46.0	4.44

Test conclusion:

RESPECTED STANDARD

9. RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS**Temperature (°C) :** 20.2**Humidity (%HR):** 42**Date :** April 15, 2021**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-210**Test procedure:** FCC Part 15: § 15.209,
RSS-210
§ 6.4 of ANSI C63.10**Test set up:**

First an exploratory radiated measurement was performed. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The system is tested in an open area test site (OATS). The EUT is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

See photos in Test setup document

Frequency range: From 9 kHz to 1 GHz**Detection mode:** Quasi-peak ($F < 1$ GHz)

Except for the frequency bands 9-90kHz, 110-490kHz. Radiated emission limits in these three bands are based on measurements employing an average detector

Bandwidth: 200Hz ($9 \text{ kHz} < F < 150\text{kHz}$)
9 kHz ($150 \text{ kHz} < F < 30\text{MHz}$)
120 kHz ($30 \text{ MHz} < F < 1 \text{ GHz}$)**Distance of antenna:** 10 meters (in open area test site)**Antenna height:** 1 to 4 meters (in open area test site)**Antenna polarization:** vertical and horizontal (only the highest level is recorded)**Equipment under test operating condition:**

The equipment is blocked in discontinuous modulated transmission mode by an internal data signal at the highest power level at which the transmitter is intended to operate. The duty cycle is set to 80% on time and 20% off time.

Power source: 12 Vdc by an external power supply**Percentage of voltage variation during the test (%):** ± 1 **Limits (%):** ± 1

Results:

Sample N° 1 with NX-AW100 Antenna

Sample N° 1: Carrier = 134.2 kHz

According to paragraph 6.4.4.4 of ANSI C63.10, the carrier was extrapolated to 300 meter with a factor from two points (3meters and 10 meters)

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength measured at 3 meters dBμV/m	Field strength measured at 10 meters dBμV/m	Extrapolation factor N dB/decade (1)	Field strength extrapolated at 300 meters dBμV/m (2)	Limits 300m dBμV/m	Margin (dB)
134.2	P	116.46	89.93	50.74	14.98	45	30.02
134.2	Av	113.45	86.92	50.74	11.97	25	13.03

With antenna height: 100 cm; Azimuth: 180°; Polarization antenna: Parallel - Position 2

(1) The factor N is calculated as follow: $N = 20 \frac{\log(\frac{E_{3m}}{E_{10m}})}{\log(\frac{3}{10})}$

(2) Field strength extrapolated at 300 meters using N fall off

Sample 1: Harmonics and spurious:

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dBμV/m (3)	Field strength at 300 meters dBμV/m (4)	Limits 300m dBμV/m	Margin (dB)
268.4	P	34.7	-24.38	39	63.38
268.4	Av	31.7	-21.38	19	40.38
402.6	P	36.6	-22.48	35.5	52.12
402.6	Av	33.6	-25.48	15.5	33.46

(3) Field strength measured at 10 meters

(4) Field strength extrapolated at 300 meters using 40dB/decade fall off

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dBμV/m (5)	Field strength at 30 meters dBμV/m (6)	Limits 30m dBμV/m	Margin (dB)
671.0	QP	33.1	14.02	31.07	17.05
939.4	QP	35.8	16.72	28.15	11.43
1207.8	QP	34.7	15.62	25.96	10.34
1476.2	QP	36.3	17.22	29.54	12.32
1744.6	QP	33.6	14.52	29.54	15.02
2013.0	QP	31.6	12.52	29.54	17.02
2281.4	QP	26.2	7.12	29.54	22.42
2549.8	QP	25.4	6.32	29.54	23.22
2818.2	QP	22.6	3.52	29.54	26.02

(5) Field strength measured at 10 meters

(6) Field strength extrapolated at 30 meters using 40dB/decade fall off

Results:

Sample N° 1 with NX-AP6040 Antenna

Sample N° 1: Carrier = 134.2 kHz

According to paragraph 6.4.4.4 of ANSI C63.10, the carrier was extrapolated to 300 meter with a factor from two points (3meters and 10 meters)

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength measured at 3 meters dBμV/m	Field strength measured at 10 meters dBμV/m	Extrapolation factor N dB/decade (1)	Field strength extrapolated at 300 meters dBμV/m (2)	Limits 300m dBμV/m	Margin (dB)
134.2	P	125.2	98.83	50.43	24.34	45	20.66
134.2	Av	122.19	95.82	50.43	21.33	25	3.67

With antenna height: 100 cm; Azimuth: 180°; Polarization antenna: Parallel - Position 2

(1) The factor N is calculated as follow: $N = 20 \frac{\log(\frac{E_{3m}}{E_{10m}})}{\log(\frac{3}{10})}$

(2) Field strength extrapolated at 300 meters using N fall off

Sample 1: Harmonics and spurious:

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dBμV/m (3)	Field strength at 300 meters dBμV/m (4)	Limits 300m dBμV/m	Margin (dB)
268.4	P	35.5	-23.58	39	62.58
268.4	Av	32.5	-26.58	19	45.58
402.6	P	48.7	-10.38	35.5	45.88
402.6	Av	45.7	-13.38	15.5	28.88

(3) Field strength measured at 10 meters

(4) Field strength extrapolated at 300 meters using 40dB/decade fall off

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dBμV/m (5)	Field strength at 30 meters dBμV/m (6)	Limits 30m dBμV/m	Margin (dB)
671.0	QP	37.6	18.52	31.07	12.55
939.4	QP	39.0	19.92	28.15	8.23
1207.8	QP	39.6	20.52	25.96	5.44
1476.2	QP	37.9	18.82	29.54	10.72
1744.6	QP	36.4	17.32	29.54	12.22
2013.0	QP	32.3	13.22	29.54	16.32
2281.4	QP	27.8	8.72	29.54	20.82
2549.8	QP	25.0	5.92	29.54	23.62
2818.2	QP	23.5	4.42	29.54	25.12

(5) Field strength measured at 10 meters

(6) Field strength extrapolated at 30 meters using 40dB/decade fall off

Results:

Sample N° 1 with NX-AP9045 Antenna

Sample N° 1: Carrier = 134.2 kHz

According to paragraph 6.4.4.4 of ANSI C63.10, the carrier was extrapolated to 300 meter with a factor from two points (3meters and 10 meters)

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength measured at 3 meters dB μ V/m	Field strength measured at 10 meters dB μ V/m	Extrapolation factor N dB/decade (1)	Field strength extrapolated at 300 meters dB μ V/m (2)	Limits 300m dB μ V/m	Margin (dB)
134.2	P	122.48	96.01	50.62	21.23	45	23.77
134.2	Av	119.47	93	50.62	18.22	25	6.78

With antenna height: 100 cm; Azimuth: 180°; Polarization antenna: Parallel - Position 2

(1) The factor N is calculated as follow: $N = 20 \frac{\log(\frac{E_{3m}}{E_{10m}})}{\log(\frac{3}{10})}$

(2) Field strength extrapolated at 300 meters using N fall off

Sample 1: Harmonics and spurious:

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dB μ V/m (3)	Field strength at 300 meters dB μ V/m (4)	Limits 300m dB μ V/m	Margin (dB)
268.4	P	34.7	-24.38	39	63.38
268.4	Av	31.7	-27.38	19	46.38
402.6	P	49.9	-9.18	35.5	44.68
402.6	Av	46.9	-12.18	15.5	27.68

(3) Field strength measured at 10 meters

(4) Field strength extrapolated at 300 meters using 40dB/decade fall off

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dB μ V/m (5)	Field strength at 30 meters dB μ V/m (6)	Limits 30m dB μ V/m	Margin (dB)
671.0	QP	44.4	25.32	31.07	5.75
939.4	QP	42.7	23.62	28.15	4.53
1207.8	QP	40.6	21.52	25.96	4.44
1476.2	QP	39.5	20.42	29.54	9.12
1744.6	QP	39.4	20.32	29.54	9.22
2013.0	QP	36.6	17.52	29.54	12.02
2281.4	QP	34.4	15.32	29.54	14.22
2549.8	QP	32.9	13.82	29.54	15.72
2818.2	QP	33.4	14.32	29.54	15.22

(5) Field strength measured at 10 meters

(6) Field strength extrapolated at 30 meters using 40dB/decade fall off

Results:

Sample N° 1 with NX-AP12060 Antenna

Sample N° 1: Carrier = 134.2 kHz

According to paragraph 6.4.4.4 of ANSI C63.10, the carrier was extrapolated to 300 meter with a factor from two points (3meters and 10 meters)

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength measured at 3 meters dBμV/m	Field strength measured at 10 meters dBμV/m	Extrapolation factor N dB/decade (1)	Field strength extrapolated at 300 meters dBμV/m (2)	Limits 300m dBμV/m	Margin (dB)
134.2	P	128.32	101.85	50.62	27.07	45	17.93
134.2	Av	125.31	98.84	50.62	24.06	25	0.94

With antenna height: 100 cm; Azimuth: 180°; Polarization antenna: Parallel - Position 2

(1) The factor N is calculated as follow: $N = 20 \frac{\log(\frac{E_{3m}}{E_{10m}})}{\log(\frac{3}{10})}$

(2) Field strength extrapolated at 300 meters using N fall off

Sample 1: Harmonics and spurious:

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dBμV/m (3)	Field strength at 300 meters dBμV/m (4)	Limits 300m dBμV/m	Margin (dB)
268.4	P	36.5	-22.58	39	61.58
268.4	Av	33.5	-25.58	19	44.58
402.6	P	57.3	-1.78	35.5	37.28
402.6	Av	54.3	-4.78	15.5	20.28

(3) Field strength measured at 10 meters

(4) Field strength extrapolated at 300 meters using 40dB/decade fall off

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dBμV/m (5)	Field strength at 30 meters dBμV/m (6)	Limits 30m dBμV/m	Margin (dB)
671.0	QP	50.0	30.92	31.07	0.15
939.4	QP	47.1	28.02	28.15	0.13
1207.8	QP	44.9	25.82	25.96	0.14
1476.2	QP	45.7	26.62	29.54	2.92
1744.6	QP	43.7	24.62	29.54	4.92
2013.0	QP	41.5	22.42	29.54	7.12
2281.4	QP	38.7	19.62	29.54	9.92
2549.8	QP	38.0	18.92	29.54	10.62
2818.2	QP	37.1	18.02	29.54	11.52

(5) Field strength measured at 10 meters

(6) Field strength extrapolated at 30 meters using 40dB/decade fall off

Applicable limits:	for $9 \text{ kHz} \leq F \leq 490 \text{ kHz}$:	$2400/F(\text{kHz})$ at 300 meters
	for $490 \text{ kHz} < F \leq 1.705 \text{ MHz}$:	$24000/F(\text{kHz})$ at 30 meters
	for $1.705 \text{ MHz} < F \leq 30 \text{ MHz}$:	$29.5 \text{ dB}\mu\text{V/m}$ at 30 meters
	for $30 \text{ MHz} < F \leq 88 \text{ MHz}$:	$40 \text{ dB}\mu\text{V/m}$ at 3 meters
	for $88 \text{ MHz} < F \leq 216 \text{ MHz}$:	$43.5 \text{ dB}\mu\text{V/m}$ at 3 meters
	for $216 \text{ MHz} < F \leq 960 \text{ MHz}$:	$46 \text{ dB}\mu\text{V/m}$ at 3 meters
	Above 960 MHz :	$54 \text{ dB}\mu\text{V/m}$ at 3 meters

Test conclusion:

RESPECTED STANDARD

□□□ End of report, 2 appendixes to be forwarded □□□

APPENDIX 1: Test equipment list

AC conducted emissions

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	10788
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESW44	Rohde & Schwarz	17008
LISN 1600	Thurbly Thandar Instruments	8719
High-pass filter EZ-25	Rohde & Schwarz	8635
Absorber sheath current	Emitech	9489
Cable N-5m RG214	GYL Technologies	8590
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14831
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.18.0.26	0000

Radiated emission limits; general requirements

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Turntable and mat controller	EMITECH	8855
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESW44	Rohde & Schwarz	17008
Loop antenna 6502	EMCO	1406
Cable	EMITECH	8578
Power source FTN 2515B	Fontaine	8775
Multimeter 177	Fluke	14831
Meteo station BAR 206	Oregon Scientific	14475
Software	BAT-EMC V3.18.0.26	0000

APPENDIX 2: 99% Bandwidth

