

RRA-EMIESS24A523TEX-01Av0

Certification Radio test report

According to the standard:

CFR 47 FCC PART 15

RSS GEN – Issue 5

RSS 210 - Issue 10

Equipment under test:

TPMS-RH21

FCC ID: *2BCPN-RH21*


Company:

TEXYS INTERNATIONAL

Distribution: Mr DAGNET Thibault

(Company: TEXYS INTERNATIONAL)

Number of pages: 19 with 2 annexes

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval	
			Name and Function	Visa
0	7-Jun-24	Creation	JC. BOGA, Laboratory Manager	

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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: *TPMS-RH21*

Serial number (S/N): *U24020698*

Reference / model (P/N): *TPMS-RH21*

Software version: *V2.14*

MANUFACTURER: Texys International

COMPANY SUBMITTING THE PRODUCT:

Company: Texys International

Address: ZA des Chamonds 16 rue Edouard Branly
58640 Varennes-Vauzelles
FRANCE

Responsible: Mr DAGNET Thibault

DATE(S) OF TEST: From 8-Apr-24 to 26-Apr-24

TESTING LOCATION: EMITECH LYON laboratory at CHASSIEU (69) FRANCE

FCC Accredited under US-EU MRA Designation Number: FR0013
Test Firm Registration Number: 807590

ISED Accredited under CANADA-EU MRA Designation Number: FR0007
Industry Canada Registration Number: 4379D

TESTED BY: T. LEDRESSEUR

VISA:



WRITTEN BY: T. LEDRESSEUR

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REVISIONS HISTORY

Revision	Date	Modified pages	Modifications
0	31-May-24	/	Creation

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **TPMS-RH21**, in accordance with normative reference.

The equipment under test integrates:

- SRD receiver (433.98MHz).
- RFID transceiver (125 kHz)

This report concerns only the RFID part.

2. PRODUCT DESCRIPTION

Category of equipment (ISED): I

Class: B

Utilization: TPMS Sensor system

Antenna type and gain: Integral antenna (unknown gain)

Operating frequency range: 125 kHz

Number of channels: 1

Channel spacing: Not concerned

Modulation: ASK

Power source: Internal battery Li-ion 2250 mAh. Rechargeable
by AC/DC Adapter 100-240Vac to 12Vdc

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 (2024) 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 and Broadcasting equipment

RSS-Gen Issue 5, April 2018
General Requirements for Compliance of Radio Apparatus

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 - Technical specifications

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	/	/	/
5609	EMCO 3146A	Log periodic antenna	14/12/2021	3	14/12/2024
5625	EMCO 3104	Biconical antenna	06/02/2023	3	06/02/2026
6155	EMCO 6502	Loop antenna	17/05/2023	2	17/05/2025
6217	Rohde & Schwarz ESH3-Z5	LISN	27/07/2023	1	27/07/2024
6290	HAEFELY PHF555	Power source	(1)	(1)	(1)
7651	SIDT Cage	Anechoic chamber	/	/	/
10952	Agilent 34401A	Multimeter	21/07/2023	2	21/07/2025
11316	Agilent N9010A	Receiver	05/09/2023	1	05/09/2024
11855	EMITECH	Outside room	/	/	/
15775	RFPA INT-BA011000-25	Low-noise amplifier	29/02/2024	1	29/02/2025
15776	Rohde & Schwarz FSV40	Spectrum Analyzer	22/02/2024	1	22/02/2025
15790	Testo 608-H1	Meteo station	20/11/2023	1	20/11/2024
15892	HUBER et SUHNER N 18GHz 3m	Cable	31/05/2023	2	31/05/2025
15905	HUBER et SUHNER N 18GHz 4.5m	Cable	31/05/2023	2	31/05/2025
15907	HUBER et SUHNER N 18GHz 3.5m	Cable	31/05/2023	2	31/05/2025
15934	HUBER et SUHNER N 18GHz 2.5m	Cable	31/05/2023	2	31/05/2025
17207	COM-POWER LIT-930A	Transient limiter	02/09/2021	3	02/09/2024
17829	Emitech	Absorber sheath current	01/06/2023	2	01/06/2025
/	EMITECH	Open test site	/	/	/

(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: Integral antenna without standard connector

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				
§ 6.7	Occupied bandwidth (or 99% emission bandwidth) and x dB bandwidth	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				see certification documents
§ 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				Permissive change report Note 1
§ 8.9	Transmitter emission limits	X				Permissive change report
§ 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 and unwanted emissions that are within the general field strength limits	X				
7.4	Cordless Telephones			X		

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	$\pm 0.8\text{dB}$
Radiated emission valid to 26 GHz	
9kHz – 30MHz	$\pm 2.7. \text{ dB}$
30MHz – 1GHz	$\pm 5.0 \text{ dB}$
1GHz – 18GHz	$\pm 5.3 \text{ dB}$
AC Power Lines conducted emissions	$\pm 3.4 \text{ dB}$
Temperature	$\pm 1 \text{ }^{\circ}\text{C}$
Humidity	$\pm 5 \%$

8. AC CONDUCTED EMISSION

Temperature (°C) : 21

Humidity (%HR): 42

Date : April 10, 2024

Technician : T. LEDRESSEUR

Standard: FCC Part 15
RSS-GEN

Test procedure:

For FCC Part 15: Paragraph 15.207

For RSS-Gen: Paragraph 8.8

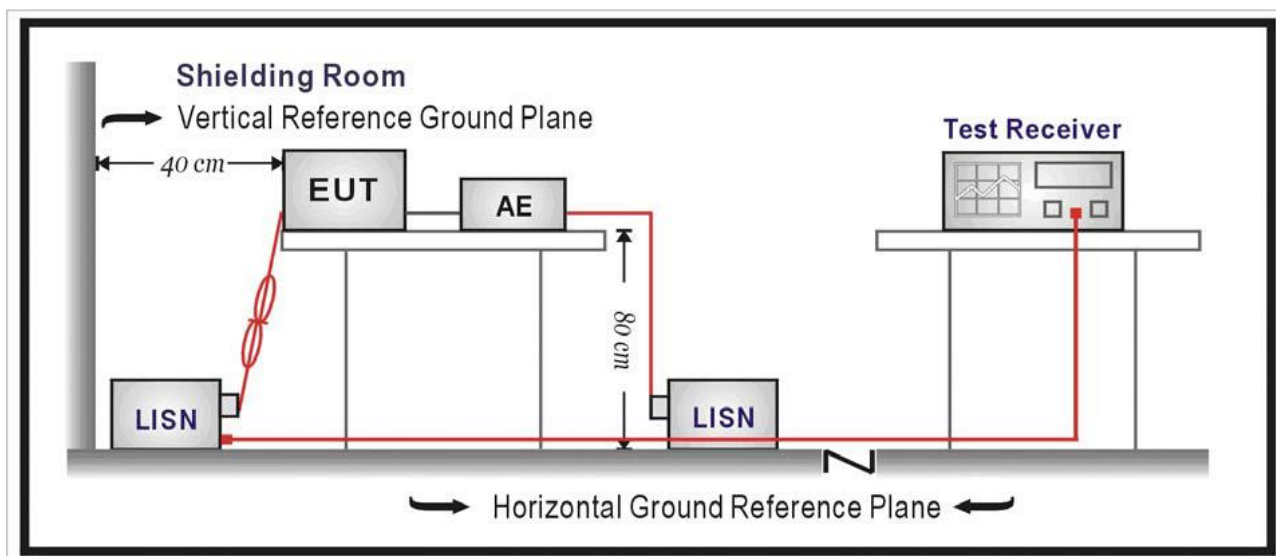
Method of paragraph 6.2 of ANSI C63.10

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.



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.

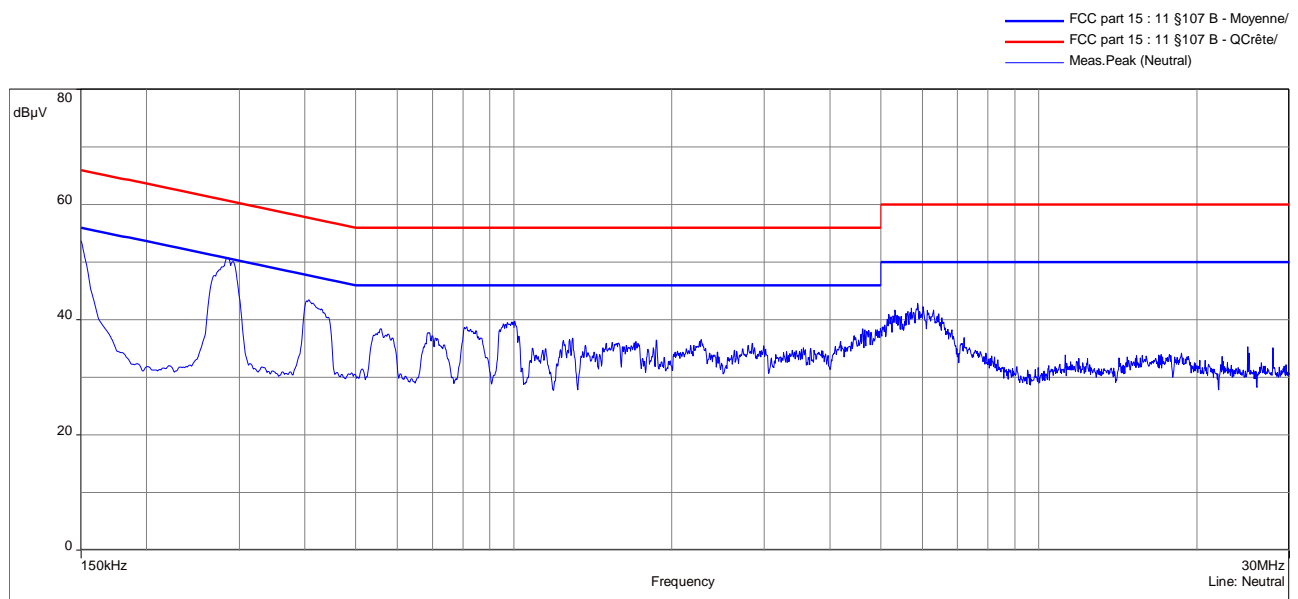
Results:

Sample N° 1

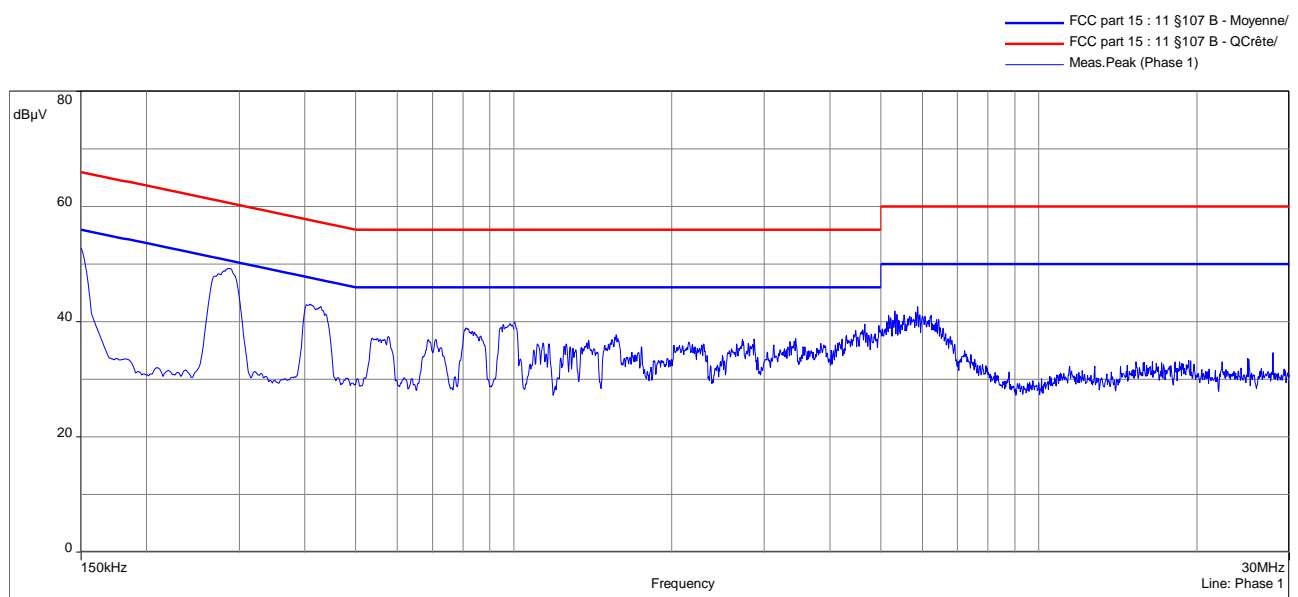
Measurement on the mains power supply:

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	Quasi-peak	QP Limit	QP margin	Frequency	Average	Average Limit	Average margin
(MHz)	(dBμV)	(dBμV)	(dB)	(MHz)	(dBμV)	(dBμV)	(dB)
0.150	40.41	66.0	25.59	0.150	22.22	56.0	33.78
0.285	41.39	60.7	19.27	0.285	26.99	50.7	23.67
0.407	37.61	57.7	20.09	0.407	26.82	47.7	20.88
0.813	33.65	56.0	22.35	0.813	24.67	46.0	21.33
1.005	33.18	56.0	22.82	1.005	19.12	46.0	26.88
5.874	31.54	60.0	28.46	5.874	19.83	50.0	30.17

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

Frequency	Quasi-peak	QP Limit	QP margin	Frequency	Average	Average Limit	Average margin
(MHz)	(dBμV)	(dBμV)	(dB)	(MHz)	(dBμV)	(dBμV)	(dB)
0.150	41.5	66.0	24.50	0.150	22.67	56.0	33.33
0.287	43.46	60.6	17.15	0.287	23.9	50.6	26.71
0.409	38.58	57.7	19.09	0.409	23.52	47.7	24.15
0.811	32.81	56.0	23.19	0.811	22.09	46.0	23.91
1.004	32.15	56.0	23.85	1.004	15.59	46.0	30.41
1.798	38.32	56.0	17.68	1.798	26.78	46.0	19.22
1.906	38.77	56.000	17.230	1.906	27.58	46.000	18.420
2.305	39.4	56.000	16.600	2.305	27.51	46.000	18.490
2.845	37.64	56.000	18.360	2.845	26.24	46.000	19.760

Test conclusion:

RESPECTED STANDARD

9. OCCUPIED BANDWIDTH

Temperature (°C) : 22

Humidity (%HR): 45

Date : April 16, 2024

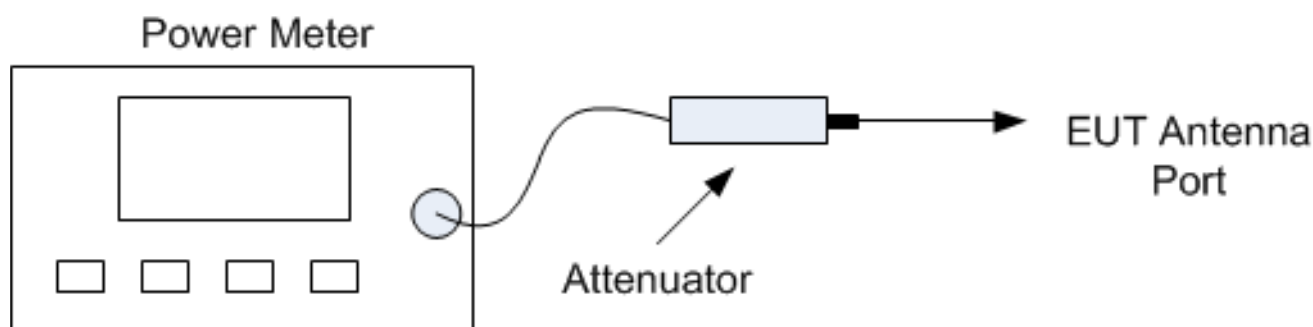
Technician : T. LEDRESSEUR

Standard: FCC Part 15
RSS-GEN

Test procedure:

Method of paragraphs 6.9.3 of ANSI C63.10 (99% Measurement)

Test set up:



Radiated test

Test realized in near field.

Setting:

Measure	99%
Center frequency	The centre frequency of the channel under test
Detector	Peak
Span	1.5 to 5 times the OBW
RBW	1% to 5% of the OBW
VBW	3 x RBW
Trace	Max hold
Sweep	Auto

Test operating condition of the equipment:

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.

Power source: 120 Vac by an external power supply

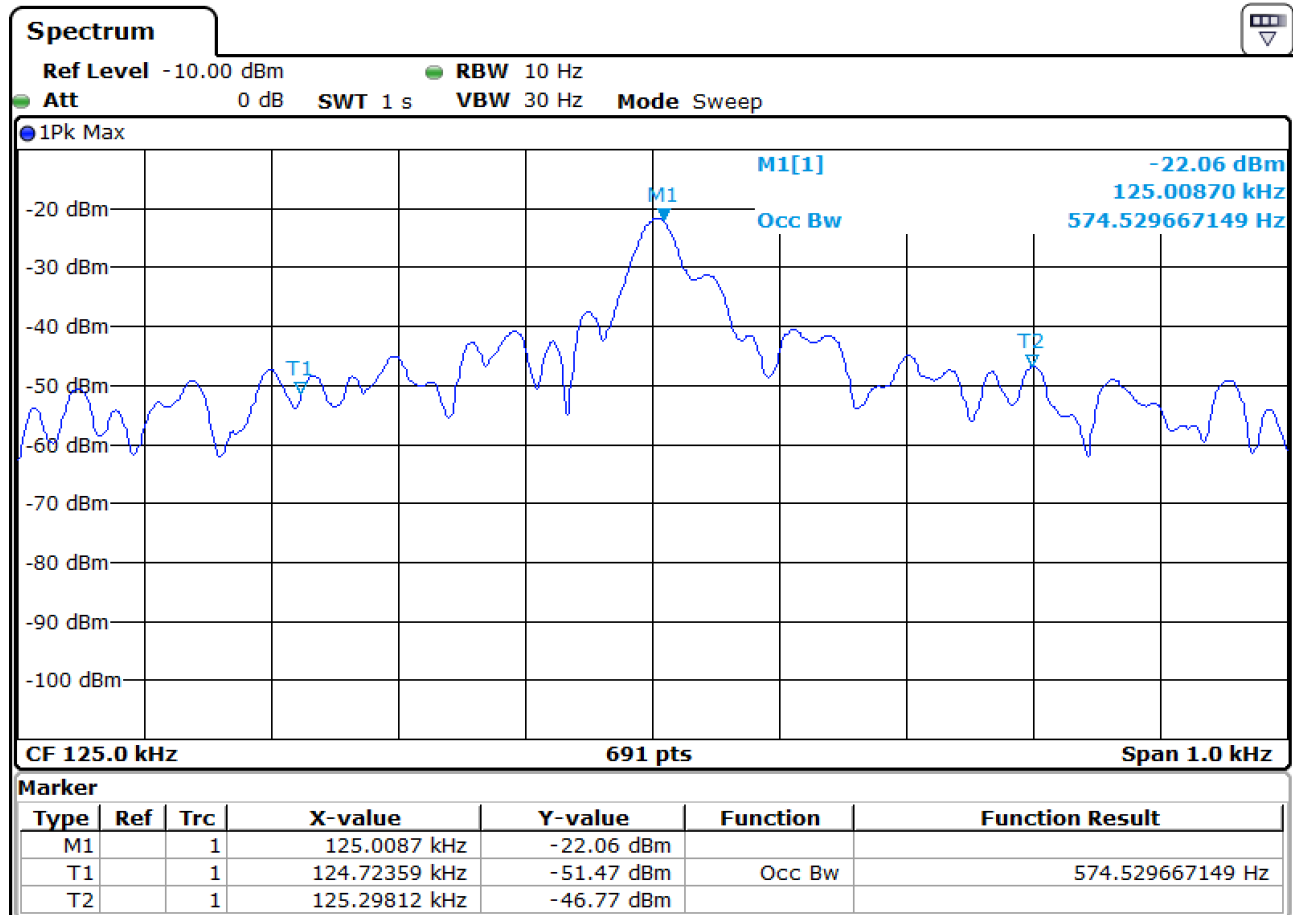
Percentage of voltage variation during the test (%):

± 1

Results:

Sample N° 1

99% bandwidth


Limit:

Measure realized for reporting only

Test conclusion:

RESPECTED STANDARD

10. RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS**Temperature (°C) :** 20 to 23**Humidity (%HR):** 39 to 45**Date :** April 8, 2024 to
April 16, 2024**Technician :** T. LEDRESSEUR**Standard:** FCC Part 15
RSS-GEN
RSS-210**Test procedure:** For FCC Part 15: paragraph 209
For RSS-GEN: paragraph 8.9
For RSS-210: paragraph 7.2
Method of § 6.4 of ANSI C63.10
Method of § 6.5 of ANSI C63.10**Test set up:** (Refer Appendix 2)

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 measure is realized on open area test site under 30 MHz and in anechoic chamber above .

The EUT is placed on a rotating table, 0.8m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

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

Except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000MHz. Radiated emission limits in these 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) / 3 meters (in anechoic room)**Antenna height:** 1 meter (below 30 MHz), 1 to 4 meters (above 30 MHz)**Antenna polarization:** vertical and horizontal (only the highest level is recorded)

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.

Power source: 120 Vac by an external power supply

Percentage of voltage variation during the test (%): ± 1

Results:

Sample N° 1:

Sample N° 1: Carrier = 125 kHz

Frequencies (kHz)	Detector P: Peak Av: Average	Field strength at 10 meters dB μ V/m ⁽¹⁾	Field strength at 300 meters dB μ V/m ⁽²⁾	Limits 300m dB μ V/m	Margin (dB)
125	P	52..3	-6.79	45.67	52.46
125	Av	45.5	-13.58	25.67	39.25

With antenna height: 100 cm; Azimuth: 0°; Polarization antenna: Perpendicular° - Position 1

(1) Field strength measured at 10 meters

(2) Field strength extrapolated at 300 meters using 40dB/decade 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)
250	P	41.41	-17.67	39.65	57.32
250	Av	32.76	-26.32	19.65	45.97
375	P	51.23	-7.85	36.12	43.97
375	Av	40.85	-18.23	16.12	34.35

(3) Noise Floor measured at 10 meters

(4) Noise Floor extrapolated at 300 meters using 40dB/decade fall off

Frequencies (kHz)	Detector QP: Quasi-Peak	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)
500	QP	43.40	24.32	33.62	9.30
625	QP	42.33	23.25	31.69	8.44
750	QP	40.63	21.55	30.10	8.55
875	QP	39.94	20.86	28.76	7.90

(5) Noise Floor measured at 10 meters

(6) Noise Floor extrapolated at 300 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	Emitech	11855
Test receiver N9010A	Agilent	11316
Transient limiter LIT-930A	COM-POWER	17207
LISN ESH3-Z5	Rohde & Schwarz	6217
Absorber sheath current	Emitech	17829
N-3M Cable	Huber + Suhner	15892
Power source PHF555	HAEFELY	6290
Multimeter 34401A	Agilent	10952
Meteo station 608-H1	Testo	15790
Software	BAT-EMC V3.18.0.26	0000

Occupied bandwidth

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum Analyzer FSV40	Rohde & Schwarz	15776
Power source PHF555	HAEFELY	6290
N-3M Cable	Huber + Suhner	15892
Multimeter 34401A	Agilent	10952
Meteo station 608-H1	Testo	15790

Radiated emission limits; general requirements

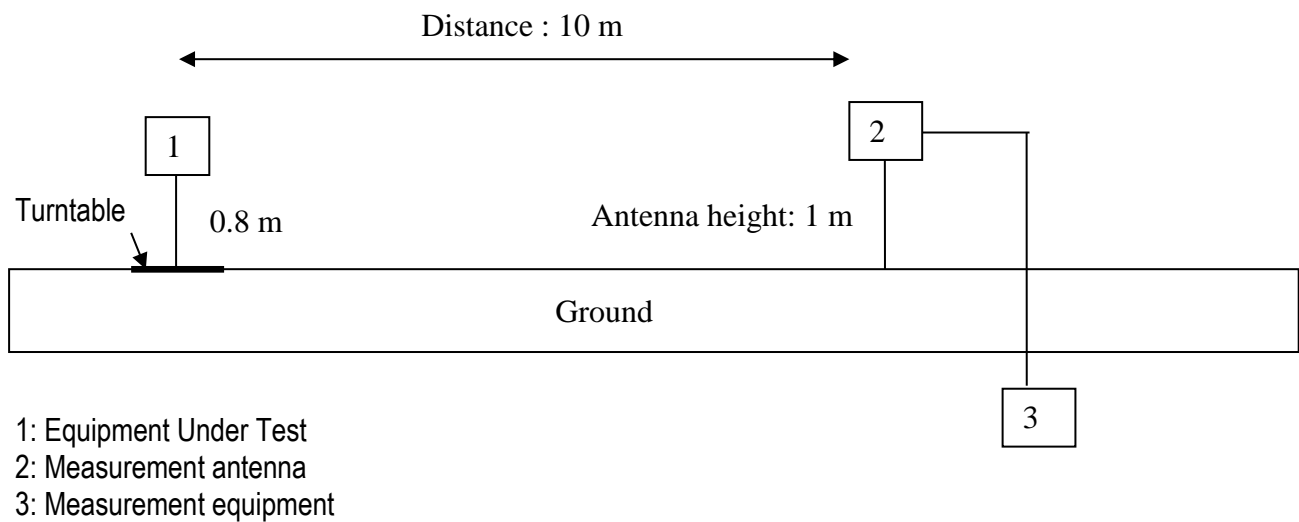
TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	/
Anechoic Chamber	Siepel	7651
Test receiver N9010A	Agilent	11316
Spectrum Analyzer FSV40	Rohde & Schwarz	15776
Active loop antenna 6502	Emco	6155
Biconical antenna 3104	EMCO	5625
Log periodic antenna 3146A	EMCO	5609
Low-noise amplifier INT-BA011000-25	RFPA	15775
N-3M Cable	Huber + Suhner	15892
N-4.5M Cable	Huber + Suhner	15905
N-3.5M Cable	Huber + Suhner	15907
N-2.5M Cable	Huber + Suhner	15934
Power source PHF555	HAEFELY	6290
Multimeter 34401A	Agilent	10952
Meteo station 608-H1	Testo	15790
Software	BAT-EMC V3.18.0.26	0000

APPENDIX 2: Radiated Test Setup

Anechoic chamber setup

Open area setup

Below 30 MHz



Between 30 MHz and 1 GHz

