

Certification Radio test report

According to the standard:

CFR 47 FCC PART 15

RSS GEN – Issue 5

RSS 210 - Issue 10

Equipment under test:

DAVEYTRONIC PROGRAMMING UNIT
PU

FCC ID: 2AUQC-PUDAVEY
IC NUMBER: 25586-PUDAVEY

Company:

DAVEY BICKFORD

Distribution: Mrs STOJANOVIC

(Company: DAVEY BICKFORD)

Number of pages: 24 with 1 appendix

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval	
			Name and Function	Visa
0	20-Feb-23	Creation	M. DUMESNIL, Radio Laboratory Manager	

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Information in italics are declared by the manufacturer/customer and are under his responsibility

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TESTING ACCREDITATIONS N° 1-0826, 1-0827, 1-1925, 1-2069, 1-2070, 1-2206, 1-2376 & 1-6086
LIST OF ACCREDITED SITES AND SCOPE
AVAILABLE ON WWW.COFRAC.FR

DESIGNATION OF PRODUCT: *DAVEYTRONIC PROGRAMMING UNIT*

Serial number (S/N): 2632

Reference / model (P/N): *PU*

Software version: *User interface 02.03.04
Driver 02.01.01
RTOS 1.60*

MANUFACTURER: *DAVEY BICKFORD*

COMPANY SUBMITTING THE PRODUCT:

Company: DAVEY BICKFORD

Address: LE MOULIN GASPARD
CHEMIN DE LA PYROTECHNIE
89550 HERY
FRANCE

Responsible: Mrs STOJANOVIC

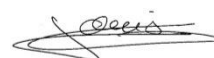
DATES OF TEST: From 24-Jan-22 to 1-Feb-22

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 "S. Louis", with a stylized flourish underneath.

WRITTEN BY: S. LOUIS

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REVISIONS HISTORY

Revision	Date	Modified pages	Modifications
0	10-Feb-22	/	Creation

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **DAVEYTRONIC PROGRAMMING UNIT PU**, in accordance with normative reference.

The device under test integrates:

- RFID Reader not already certified,

This report concerns only RFID Radio part.

The host device of certified module(s) shall be properly labeled to identify the module(s) within.

2. PRODUCT DESCRIPTION

Category of equipment (ISED): I

Class: B

Utilization: Industrial

Antenna type and gain: integral antenna (gain 0 dBi)

Operating frequency range: From 13.11 MHz to 14.01 MHz

Number of channels: 1

Channel spacing: Not concerned

Modulation: ASK

Power source: 3.65Vdc by li-ion rechargeable battery

The radio is not operational during charge mode.

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 (2022)	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-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
- Paragraph 215: Additional provisions to the general radiated emission limitations
- Paragraph 225: Operation within the band 13.110-14.010 MHz

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
- Annex B - Devices Operating in Frequency Bands for Any Application
 - Annex B.6 Band 13.110-14.010 MHz

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
6796	R&S FSP7	Spectrum Analyzer	30/07/2021	2	30/07/2023
7190	R&S HL223	Antenna	09/03/2019	3	08/03/2022
7240	Emco 3110	Biconical antenna	09/03/2019	3	08/03/2022
7279	SUCOFLEX SF104 N 1.5m	Cable	11/06/2020	2	11/06/2022
7566	Testo 608-H1	Meteo station	22/09/2020	2	22/09/2022
8528	Schwarzbeck VHA 9103	Biconical antenna	09/03/2019	3	08/03/2022
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)
8783	EMCO 3147	Log periodic antenna	09/03/2019	3	08/03/2022
8855	EMITECH	Turntable and mat controller	/	/	/
8864	Champ libre Juigné. V3.5	Software	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
9398	N-1.5m	cable	11/06/2020	2	11/06/2022
10730	Mini-circuit ZFL-1000LN	Low-noise amplifier	06/01/2022	1	06/01/2023
10759	COMTEST Cage 3	Anechoic chamber	/	/	/
10789	MATURO	Turntable and mat controller NCD	/	/	/
12912	Huber + Suhner N-5m	cable	11/06/2020	2	11/06/2022
14303	SUCOFLEX N-2m	cable	26/01/2021	2	26/01/2023
14304	SUCOFLEX N-2.5m	cable	26/01/2021	2	26/01/2023
14475	Oregon Scientific BAR206	Meteo station	27/10/2021	2	27/10/2023
14476	Fluke 177	Multimeter	03/11/2021	2	03/11/2023
14716	GMH 3710	Precision Thermometer - 30°C/+100°C	10/02/2021	1	10/02/2022
15666	R&S FSV40	Spectrum Analyzer	24/09/2020	2	24/09/2022
16059	CLIMATS EXCAL ² 1411-TA	Climatic chamber	30/11/2020	2	30/11/2022
17008	R&S ESW44	Test receiver	17/04/2020	2	17/04/2022
//	RS Commander V1.6.4	Software	/	/	/

(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

Test procedure	Description of test	Respected criteria?				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		Radio not operational in charging mode
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				Note 2
FCC part 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of §15.225 frequency bands	X				Note 3
	(c) 20 dB bandwidth and band-edge compliance	X				
FCC Part 15.225	OPERATION WITHIN THE BAND 13.110-14.010 MHZ					
	(a) Field strength within the band 13.553-13.567 MHz	X				
	(b) Field strength within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	X				
	(c) Field strength within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	X				
	(d) Field strength outside the band 13.110-14.010 MHz	X				
	(e) Carrier frequency tolerance	X				
	(f) Powered tags			X		

NAp: Not Applicable NAs: Not Asked

Note 1: Integral antenna without standard connector

Note 2: See FCC part 15.225 (d).

Note 3: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

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		Not operational in charging mode
§ 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 and unwanted emissions that are within the general field strength limits	X				
7.4	Cordless Telephones			X		
Annex B	Device Operating in Frequency Bands for Any Application					
Annex B.6	Band 13.110-14.010 MHz					
(a) i	Field strength within the band 13.553-13.567 MHz	X				
(a) ii	Field strength within the bands 13.410-13.553 MHz and 13.67-13.710 MHz	X				
(a) iii	Field strength within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	X				
(a) iv	Field strength outside the band 13.110-14.010 MHz	X				
(b)	Carrier frequency stability	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	$\pm 0.8\text{dB}$
Radiated emission valid to 26 GHz	
9kHz – 30MHz	$\pm 2.7. \text{ dB}$
30MHz – 1GHz	$\pm 5.0 \text{ dB}$
1GHz – 18GHz	$\pm 5.3 \text{ dB}$
18GHz – 40GHz	$\pm 6.1 \text{ dB}$
AC Power Lines conducted emissions	$\pm 3.4 \text{ dB}$
Temperature	$\pm 1 \text{ }^{\circ}\text{C}$
Humidity	$\pm 5 \%$

8. OCCUPIED BANDWIDTH**Temperature (°C) :** 19.7**Humidity (%HR):** 42**Date :** January 26, 2022**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-210**Test procedure:**

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

Test set up:

Test realized in near field.

Settings:

Measure	99% Bandwidth
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.

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (Vdc): 3.79

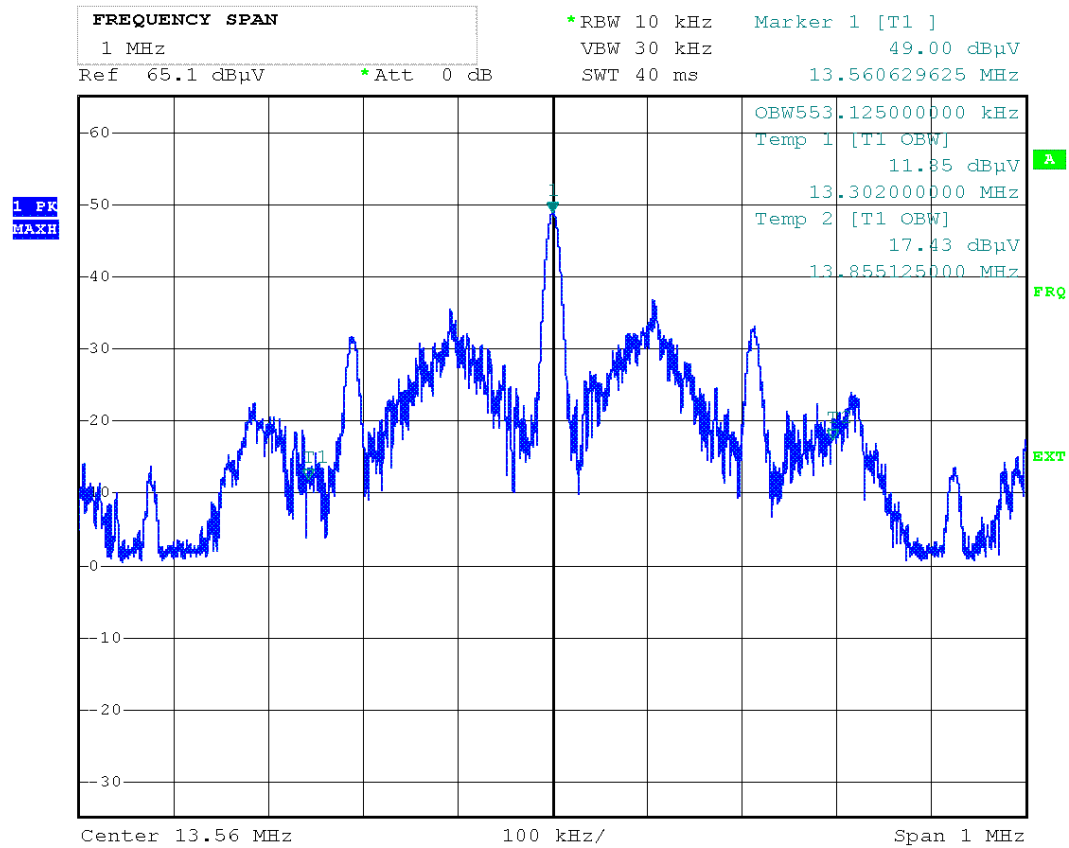
Voltage at the end of test (Vdc): 3.62

Percentage of voltage drop during the test (%): 4.48

Results:

Sample N° 1

99% bandwidth



Limit:

Measure realized for reporting only

9. BAND EDGE**Temperature (°C) :** 19.7**Humidity (%HR):** 42**Date :** January 26, 2022**Technician :** S. LOUIS**Standard:** FCC Part 15**Test procedure:**

For FCC Part 15: § 15.215

Method of § 6.10.6 of ANSI C63.10

Test set up:

Test realized in near field. All field strength measurements are correlated with the radiated maximum peak output power

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.

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (Vdc): 3.79

Voltage at the end of test (Vdc): 3.62

Percentage of voltage drop during the test (%): 4.48

Results:

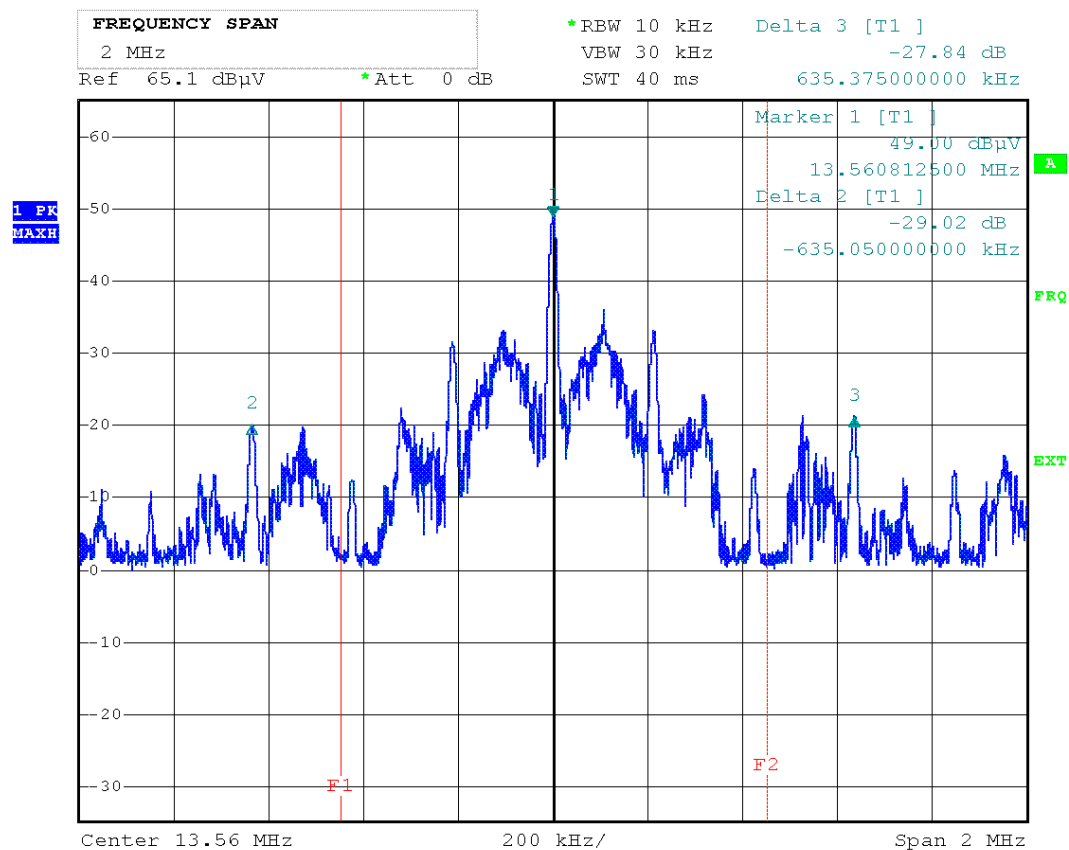
Lower Band Edge: From 13.090 MHz to 13.110 MHz

Upper Band Edge: From 14.010 MHz to 14.030 MHz

Sample N° 1:

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBμV/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
13.56	29.92	Peak	12.925	-29.02	0.90	48.63	47.73
13.56	29.92	Peak	14.195	-27.84	2.08	48.63	46.55

(1) Marker-Delta method



Test conclusion:

RESPECTED STANDARD

10. OPERATION WITHIN THE BAND 13.110 – 14.010 MHZ**Temperature (°C) :** 18.3 / 20.3**Humidity (%HR):** 38 / 46**Date :** January 26, 2022 and
February 1, 2022**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-210**Test procedure:**

For FCC Part 15: § 15.209, § 15.225 (a), (b), (c), (e)

For RSS-210: § Annex B.6 (a), (b), (c)

Method of § 6.3 of ANSI C63.10

Method of § 6.4 of ANSI C63.10

Method of § 6.8 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 appendix 2

The frequency stability measure is realized in near-field with the product in a climatic chamber.

Detection mode: Quasi-peak ($F < 1$ GHz)**Bandwidth:** 9 kHz ($150 \text{ kHz} < F < 30\text{MHz}$)**Distance of antenna:** 10 meters**Antenna height:** 1 meter**Antenna polarization:** oriented in the vertical plane. The lowest point of the loop is 1m above ground level.**Equipment under test operating condition:**

The equipment under test is blocked in alternance of emission and reception mode with tag.

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.

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (Vdc): 3.79

Voltage at the end of test (Vdc): 3.62

Percentage of voltage drop during the test (%): 4.48

Results:

Sample N° 1:

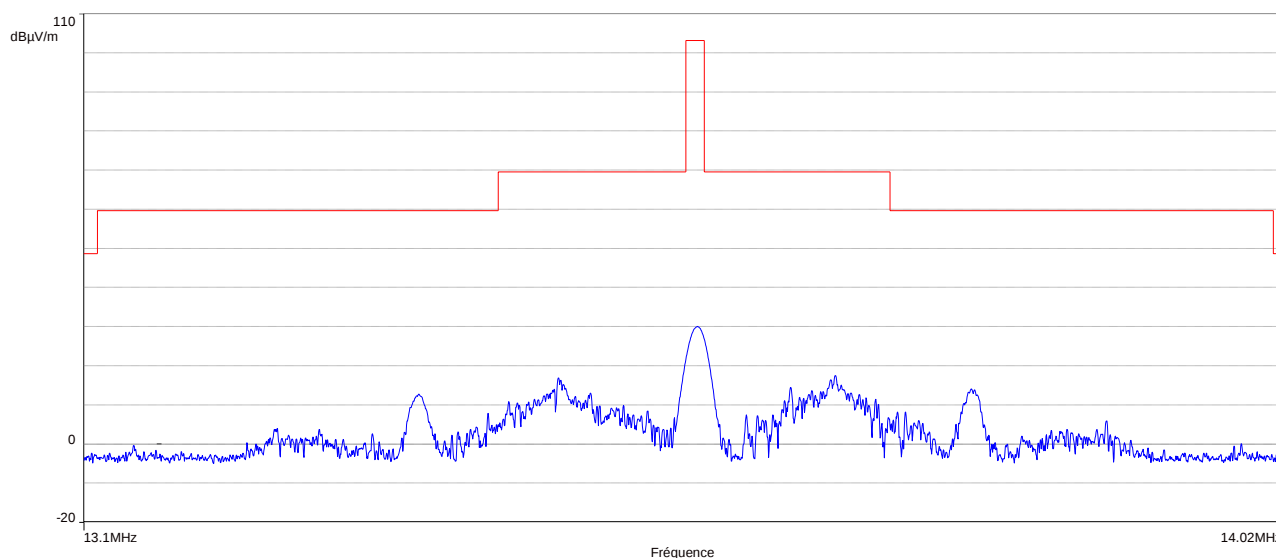
Carrier field strength

	Field strength (dB μ V/m) at frequency: 13.56 MHz
Normal test conditions measure at 10 m	29.92
Normal test conditions correlated at 30 m	10.84
Limits at 30m (dB μ V/m)	84
Margin (dB)	73.16

Polarization of test antenna: perpendicular at the equipment at 0 degree.

Position of equipment: Position 3 - see photos in appendix 2 (azimuth: 45°)

Field strength within the band 13.110-14.010 MHz



Frequency stability

Results for temperature variation

Realized with a power source at 3.65Vdc by an external source.

Temperature (°C)	Measure at startup		Measure at 2 min		Measure at 5 min		Measure at 10 min		Drift limit (kHz)
	Frequency measured (MHz)	Frequency drift (kHz)	Frequency measured (MHz)	Frequency drift (kHz)	Frequency measured (MHz)	Frequency drift (kHz)	Frequency measured (MHz)	Frequency drift (kHz)	
50	13.560564	0.564	13.560562	0.562	13.560562	0.562	13.560562	0.562	± 1.356 (a)
40	13.560587	0.587	13.560582	0.582	13.560577	0.577	13.560577	0.577	
30	13.560615	0.615	13.560610	0.610	13.560605	0.605	13.560605	0.605	
20	13.560648	0.648	13.560640	0.640	13.560638	0.638	13.560635	0.635	
10	13.560659	0.659	13.560661	0.661	13.560658	0.658	13.560656	0.656	
0	13.560673	0.673	13.560673	0.673	13.560674	0.674	13.560675	0.675	
-10	13.560666	0.666	13.560671	0.671	13.560673	0.673	13.560674	0.674	
-20	13.560642	0.642	13.560645	0.645	13.560650	0.650	13.560651	0.651	

(a) ±0.01% of the operating frequency

Results for power supply variation

Realized at +20 °C

Power supply (Vac)	Frequency measured (MHz)	Frequency drift (kHz)	Drift limit (kHz)
3.1025	13.560636	0.636	± 1.356 (b)
3.65	13.560635	0.635	
4.1975	13.560635	0.635	

(b) ±0.01% of the operating frequency

Test conclusion:

RESPECTED STANDARD

11. FIELD STRENGTH OUTSIDE THE BAND 13.110-14.01 MHZ**Temperature (°C) :** 21.9**Humidity (%HR):** 23**Date :** January 27, 2022**Technician :** S. LOUIS**Standard:** FCC Part 15**Standard:** FCC Part 15
RSS-210**Test procedure:**

For FCC Part 15: § 15.209, § 15.225 (d)

For RSS-210: § Annex B.6 (d)

Method of § 6.3 of ANSI C63.10

Method of § 6.4 of ANSI C63.10

Method of § 6.5 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 measure is realized on open area test site under 1 GHz.

When the system is tested in an open area test site (OATS), 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.

See photos in appendix 2.

Frequency range: From 9 kHz to 140MHz - 10th harmonic of the highest fundamental frequency (13.56MHz)**Detection mode:** Quasi-peak ($F < 1$ GHz)**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 under test is blocked in alternance of emission and reception mode without tag.

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (Vdc): 3.79

Voltage at the end of test (Vdc): 3.62

Percentage of voltage drop during the test (%): 4.48

Results:

Sample N° 1:

Below 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization (Parallel Perpendicular Horizontal)	Field strength Measured at 10 m (dBμV/m)	Field strength Computed at 30 m (dBμV/m)	Limits (dBμV/m)	Margin (dB)
27.12 (1)	QP	100	0	10	Perpendicular	16.24	-2.84	29.54	32.38

(1) Noise floor

Above 30 MHz

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBμV/m)	Field strength Computed at 3 m (dBμV/m)	Limits (dBμV/m) or (dBm)	Margin (dB)
40.68	QP	173	307	100	V	21.69	32.09	40	7.91
67.8	QP	142	0	100	V	21.13	31.53	40	8.47
122.04	QP	135	189	100	V	20.35	30.75	43.5	12.75

P= Peak, QP=Quasi-peak, Av=Average

Applicable limits:

for 9 kHz ≤ F ≤ 490 kHz :	2400/F(kHz) at 300 meters
for 490 kHz < F ≤ 1.705 MHz :	24000/F(kHz) at 30 meters
for 1.705 MHz < F ≤ 30 MHz :	29.5 dBμV/m at 30 meters
for 30 MHz < F ≤ 88 MHz :	40 dBμV/m at 3 meters
for 88 MHz < F ≤ 216 MHz :	43.5 dBμV/m at 3 meters
for 216 MHz < F ≤ 960 MHz :	46 dBμV/m at 3 meters
Above 960 MHz :	54 dBμV/m at 3 meters

Test conclusion:

RESPECTED STANDARD

□□□ End of report, 1 appendix to be forwarded □□□

APPENDIX 1: Test equipment list

Occupied bandwidth

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Loop antenna 6502	EMCO	1406
N-1.5M Cable	SUCOFLEX	7279
Power source FTN 2515B	Fontaine	8775
Multimeter 177	Fluke	14476
Meteo station WS-9232	La Crosse Technology	8750
Software	RS Commander	//

Band edge

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Loop antenna 6502	EMCO	1406
N-1.5M Cable	SUCOFLEX	7279
Power source FTN 2515B	Fontaine	8775
Multimeter 177	Fluke	14476
Meteo station WS-9232	La Crosse Technology	8750
Software	RS Commander	//

Operation within the band 13.110 – 14.010 MHz

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Turntable and mat controller	EMITECH	8855
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESW44	Rohde & Schwarz	17008
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Loop antenna 6502	EMCO	1406
Climats EXCAL ² 1411-TA	CLIMATS	16059
Precision thermometer GMH 3710	GHM Greisinger	14716
N-1.5M Cable	SUCOFLEX	9398
N-2M Cable	SUCOFLEX	14303
N-2.5M Cable	SUCOFLEX	14304
N-5M Cable	Huber + Suhner	12912
Power source FTN 2515B	Fontaine	8775
Multimeter 177	Fluke	14476
Meteo station 608-H1	Testo	7566
Meteo station BAR206	Oregon Scientific	14475
Software	BAT-EMC V3.18.0.26	0000
Software	Champ libre Juigné. V3.5	8864

Field strength outside the band 13.110-14.010 MHz

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Turntable and mat controller	EMITECH	8855
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESW44	Rohde & Schwarz	17008
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Loop antenna 6502	EMCO	1406
Biconical antenna VHA 9103	Schwarzbeck	8528
Biconical antenna 3110	Emco	7240
Log periodic antenna 3147	EMCO	8783
Log periodic antenna HL223	Rohde & Schwarz	7190
Low-noise amplifier ZFL-1000LN	Mini-circuit	10730
N-1.5M Cable	SUCOFLEX	9398
N-2M Cable	SUCOFLEX	14303
N-2.5M Cable	SUCOFLEX	14304
N-5M Cable	Huber + Suhner	12912
Power source FTN 2515B	Fontaine	8775
Multimeter 177	Fluke	14476
Meteo station 608-H1	Testo	7566
Meteo station BAR206	Oregon Scientific	14475
Software	BAT-EMC V3.18.0.26	0000
Software	Champ libre Juigné. V3.5	8864