

Certification Radio test report

According to the standard:

CFR 47 FCC PART 15

Equipment under test:

UWSR+ REACH

FCC ID: WMQ-30017

Company:

ALLFLEX USA, Inc

Distribution: Mr LANGOUET

(Company: ALLFLEX USA, Inc)

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DESIGNATION OF PRODUCT: UWSR+ Reach

Serial number (S/N): C11009975

Reference / model (P/N): UWSR+ Reach

Software version: 1.15.00

MANUFACTURER: ALLFLEX USA, Inc

COMPANY SUBMITTING THE PRODUCT:

Company: ALLFLEX USA, Inc

Address: 2805 East 14th Street
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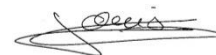
Responsible: Mr LANGOUET

DATE(S) OF TEST: From 9-Oct-17 to 11-Oct-17

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

TESTED BY: S. LOUIS

VISA:



WRITTEN BY: S. LOUIS

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1. INTRODUCTION

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

The device under test integrates a RFID radio part and a Bluetooth module
The E.U.T is supplied by 7.2Vdc batteries.
This report concerns only RFID radio part.

2. PRODUCT DESCRIPTION

Class:	B
Utilization:	RFID Handheld control terminals
Antenna type and gain:	integral antenna, gain unknown Whip antenna, gain unknown
Frequencies tested:	125kHz and 134.2kHz
Number of channels:	2
Channel spacing:	Not concerned
Frequency generation:	A microcontroller with its 24 MHz crystal and an oscillator circuitry with a 17.1776 MHz crystal
Power source:	7.2 Vdc Ni-MH batteries

The applicant declares that the equipment can't emit during the recharge of batteries.
The applicant declares that the highest local oscillator used is 24MHz.

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 (2019) Radio Frequency Devices

ANSI C63.4 2014
Methods of Measurement of Radio-Noise Emissions from Low-Voltage
Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.10 2013
Procedures for Compliance Testing of Unlicensed Wireless Devices.

447498 D01 General RF RF Exposure procedures and equipment authorization policies for mobile and
Exposure Guidance v06 portable 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

5. TEST EQUIPMENT CALIBRATION DATES

Equipment	Model	Type	Last verification	Next verification	Validity
0000	BAT-EMC V3.6.0.32	Software	/	/	/
1406	EMCO 6502	Loop antenna	13/04/2017	2	13/04/2019
4088	R&S FSP40	Spectrum Analyzer	29/10/2015	2	29/10/2017
7190	R&S HL223	Antenna	15/03/2016	3	15/03/2019
7240	Emco 3110	Biconical antenna	15/03/2016	3	15/03/2019
8528	Schwarzbeck VHA 9103	Biconical antenna	15/03/2016	3	15/03/2019
8707	R&S ESI7	Test receiver	07/06/2016	2	07/06/2018
8732	Emitech	OATS	11/10/2016	3	11/10/2019
8749	La Crosse Technology WS-9232	Meteo station	23/09/2016	2	23/09/2018
8750	La Crosse Technology WS-9232	Meteo station	23/09/2016	2	23/09/2018
8783	EMCO 3147	Log periodic antenna	15/03/2016	3	15/03/2019
8864	Champ libre Juigné. V3.4	Software	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
10317	Fluke 177	Multimeter	24/10/2015	2	24/10/2017
10730	Mini-circuit ZFL-1000LN	Low-noise amplifier	21/11/2016	1	21/11/2017

6. TESTS RESULTS SUMMARY

6.1 intentional radiator (subpart C)

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENTS	X				Note 1
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS			X		Note 2
FCC Part 15.209	RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS	X				

NAp: Not Applicable

NAs: Not Asked

Note 1: Integral antenna without standard connector.

Note 2: The applicant declares that the equipment does not emit during charge of batteries.

RF EXPOSURE:

134.2 kHz:

In accordance with KDB 447498 D01 General RF Exposure Guidance v06, Paragraph 4.3.1.

The product must respect the exclusion limit for 10-g extremity SAR and a separation distances less than 50mm:

Maximum measured power = 81.08 dBμV/m = 37.7 x 10⁻⁶ mW at 134.2kHz

with $P = (E \times d)^2 / (30 \times G_p)$ with $d = 10$ m and $G_p = 1$

The power threshold determined by the equation in 4.3.1.c) 1) for 50 mm and 100 MHz is multiplied by ½

According this formula:

Power threshold, mW =

$$P(mW) < \frac{\frac{7.5 * 50(mm)}{\sqrt{0.1(GHz)}} * (1 + \log\left(\frac{100}{F(MHz)}\right))}{2}$$

$$P(mW) < \frac{\frac{7.5 * 50(mm)}{\sqrt{0.1(GHz)}} * (1 + \log\left(\frac{100}{0.1342}\right))}{2}$$

Power threshold, mW = 2295.96mW

The equipment fulfils the requirements on maximum conducted or equivalent isotropically radiated power (e.i.r.p) for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310

125 kHz:

Maximum measured power = 0.374 mW at 125kHz

In accordance with KDB 447498 D01 General RF Exposure Guidance v06, Paragraph 4.3.1.

The product must respect the exclusion limit for 10-g extremity SAR and a separation distances less than 50mm:

Maximum measured power = 78.48 dBμV/m = 28 x 10⁻⁶ mW at 125kHz

with $P = (E \times d)^2 / (30 \times G_p)$ with $d = 10$ m and $G_p = 1$

The power threshold determined by the equation in 4.3.1.c) 1) for 50 mm and 100 MHz is multiplied by ½

According this formula:

Power threshold, mW =

$$P(mW) < \frac{\frac{7.5 * 50(mm)}{\sqrt{0.1(GHz)}} * (1 + \log\left(\frac{100}{F(MHz)}\right))}{2}$$

$$P(mW) < \frac{\frac{7.5 * 50(mm)}{\sqrt{0.1(GHz)}} * (1 + \log\left(\frac{100}{0.1342}\right))}{2}$$

Power threshold, mW = 2314.25mW

The equipment fulfils the requirements on maximum conducted or equivalent isotropically radiated power (e.i.r.p) for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310

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 < 26 GHz:	$\pm 5.16\text{ dB}$
AC Power Lines conducted emissions	$\pm 3.38\text{ dB}$
Temperature	$\pm 1\text{ }^{\circ}\text{C}$
Humidity	$\pm 5\%$

8. RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS**Temperature (°C) :** 23**Humidity (%HR):** 54**Date :** October 10, 2017**Technician :** S. LOUIS**Standard:** FCC Part 15**Test procedure:** paragraph 209**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.

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 1GHz (the highest local oscillator frequency used is 24MHz)

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 ($30 \text{ MHz} < F < 1 \text{ GHz}$)
1 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 device's radio modules are blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Test is performed with internal and external antenna.

Ambient temperature (°C): 23

Relative humidity (%): 54

Power source:

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

Voltage at the beginning of test (Vdc): 7.41

Voltage at the end of test (Vdc): 7.22

Percentage of voltage drop during the test (%): 2.56

Results: With internal antenna

Sample N° 1: Carrier = 134.2kHz

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)
134.2	P	76.50	17.42	45.05	27.63
134.2	Av	74.48	15.40	25.05	9.65

With antenna height: 100 cm; Azimuth: 260°; Polarization antenna: Parallel° - Position 1

(1) Field strength measured at 10 meters

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

Sample 1: Harmonics:

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)
402.6	P	53.8	-5.28	35.5	40.78
402.6	Av	51.78	-7.3	15.5	22.80

(1) Field strength measured at 10 meters

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

Frequencies (kHz)	Detector QP: Q-Peak	Field strength at 10 meters dB μ V/m ⁽¹⁾	Field strength at 30 meters dB μ V/m ⁽²⁾	Limits 30m dB μ V/m	Margin (dB)
536.8	QP	49.30 ⁽³⁾	30.22	33	2.78
671	QP	46.10 ⁽³⁾	27.02	31.07	4.05

(1) Field strength measured at 10 meters

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

(3) Noise Floor

Sample N° 1: Carrier = 125kHz

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	77.20	18.12	45.67	27.55
125	Av	75.18	16.10	25.67	9.57

With antenna height: 100 cm; Azimuth: 260°; Polarization antenna: Parallel° - Position 1

(1) Field strength measured at 10 meters

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

Sample 1: Harmonics:

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)
375	P	52.4	-6.68	36.12	42.80
375	Av	50.38	-8.70	16.12	24.82

(1) Field strength measured at 10 meters

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

Frequencies (kHz)	Detector QP: Q-Peak	Field strength at 10 meters dB μ V/m ⁽¹⁾	Field strength at 30 meters dB μ V/m ⁽²⁾	Limits 30m dB μ V/m	Margin (dB)
500	QP	50.1 ⁽³⁾	31.02	33.62	2.60
625	QP	48.3 ⁽³⁾	29.22	31.69	2.47

(1) Field strength measured at 10 meters

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

(3) Noise Floor

Results: With external antenna

Sample N° 1: Carrier = 134.2kHz

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)
134.2	P	83.10	24.02	45.05	21.03
134.2	Av	81.08	22.00	25.05	3.05

With antenna height: 100 cm; Azimuth: 290°; Polarization antenna: Parallel° - Position 1

(1) Field strength measured at 10 meters

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

Sample 1: Harmonics:

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)
402.6	P	53.8	-5.28	35.5	40.78
402.6	Av	51.78	-7.3	15.5	22.80

(1) Field strength measured at 10 meters

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

Frequencies (kHz)	Detector QP: Q-Peak	Field strength at 10 meters dB μ V/m ⁽¹⁾	Field strength at 30 meters dB μ V/m ⁽²⁾	Limits 30m dB μ V/m	Margin (dB)
536.8	QP	49.9 ⁽³⁾	30.82	33	2.18
671	QP	46.6 ⁽³⁾	27.52	31.07	3.55

(1) Field strength measured at 10 meters

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

(3) Noise Floor

Sample N° 1: Carrier = 125kHz

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	80.5	21.42	45.67	24.25
125	Av	78.48	19.4	25.67	6.27

With antenna height: 100 cm; Azimuth: 290°; Polarization antenna: Parallel° - Position 1

(1) Field strength measured at 10 meters

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

Sample 1: Harmonics:

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)
375	P	52.7	-6.38	36.12	42.50
375	Av	50.68	-8.40	16.12	24.52

(1) Field strength measured at 10 meters

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

Frequencies (kHz)	Detector QP: Q-Peak	Field strength at 10 meters dB μ V/m ⁽¹⁾	Field strength at 30 meters dB μ V/m ⁽²⁾	Limits 30m dB μ V/m	Margin (dB)
500	QP	49.4 ⁽³⁾	30.32	33.62	3.30
625	QP	48.3 ⁽³⁾	29.22	31.69	2.47

(1) Field strength measured at 10 meters

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

(3) Noise Floor

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

Test conclusion:

RESPECTED STANDARD

□□□ End of report, 4 appendixes to be forwarded □□□

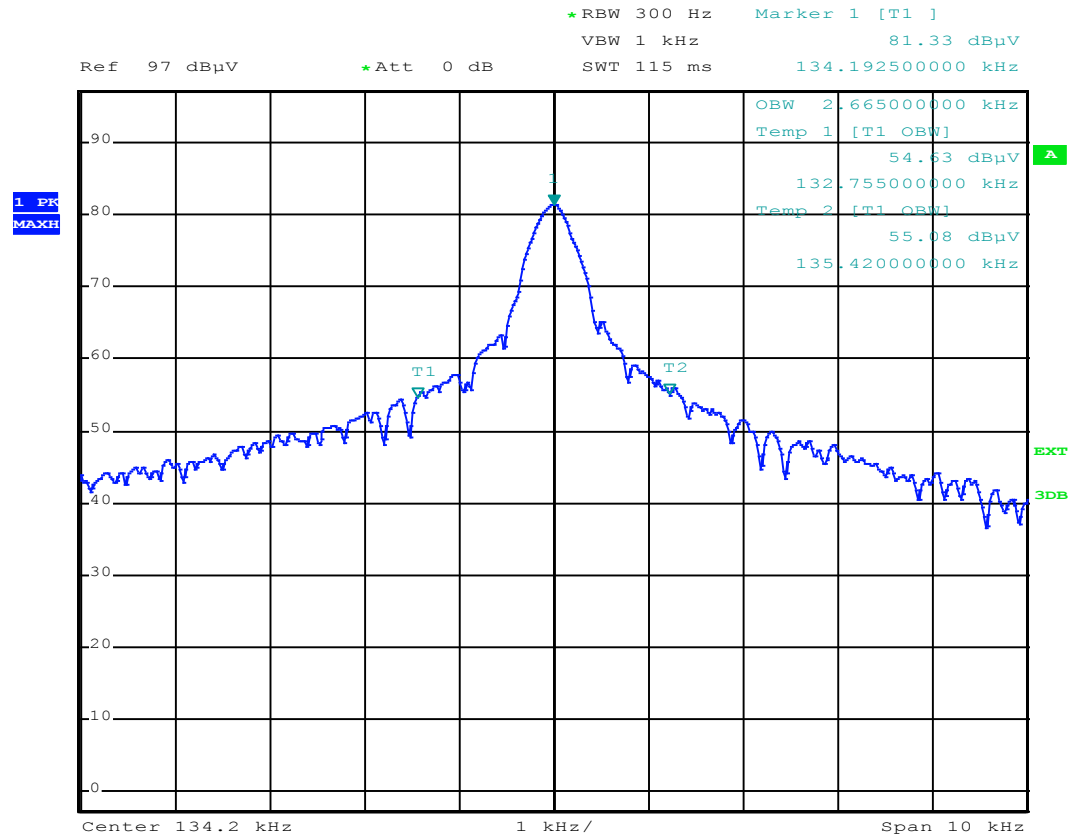
APPENDIX 1: Test equipment list

Radiated emission limits; general requirements

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Full anechoic chamber	EMITECH	10759
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna 3110	Emco	7240
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna HL223	Rohde & Schwarz	7190
Log periodic antenna 3147	EMCO	8783
Low-noise amplifier ZFL-1000LN	Mini-circuit	10730
Multimeter 177	Fluke	10317
Meteo station WS-9232	La Crosse Technology	8749
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000
Software	Champ libre Juigné. V3.5	8864

APPENDIX 2: 99% Bandwidth

Carrier: 134.2kHz



Carrier: 125 kHz

