



EMC Technologies (NZ) Ltd
PO Box 68-307, Newton
Auckland 1145
New Zealand
Phone 09 360 0862
Fax 09 360 0861
E-Mail Address: aucklab@emctech.co.nz
Web Site: www.emctech.co.nz

Test Report

Tru-Test XRS2i-1 and SRS2i-1 Handheld Low Frequency Electronic ID (EID) Reader

tested to

**47 Code of Federal Regulations
Part 15 - Radio Frequency Devices
Subpart A + B (Unintentional) and C (Intentional) Radiators**

and

**RSS-GEN, Issue 5, March 2019
RSS-210, Issue 10, December 2019**

for

Datamars SA

A handwritten signature in black ink, appearing to read "Andrew Cutler", is placed over a light blue rectangular background.

This Test Report is issued with the authority of: _____
Andrew Cutler - General Manager



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

Table of Contents

1. STATEMENT OF COMPLIANCE	3
2. RESULTS SUMMARY	3
3. INTRODUCTION	4
4. CLIENT INFORMATION	4
5. DESCRIPTION OF TEST SYSTEM	5
6. RESULTS	6
7. TEST EQUIPMENT USED	13
8. ACCREDITATIONS	13
9. PHOTOGRAPHS	14

1. STATEMENT OF COMPLIANCE

The **Tru-Test XRS2i-1 Handheld Low Frequency Electronic ID (EID) Readers** complies with FCC Part 15 Subpart C as an Intentional Radiator when the methods as described in ANSI C63.10 - 2020 are applied and complies with FCC Part 15 Subpart Subpart A + B as Class B devices when the methods as described in ANSI C63.4 - 2014

The product complies with RSS-GEN, Issue 5, March 2019 and RSS-210, Issue 10, December 2019 when the methods as described in ANSI C63.10 - 2020 are applied.

2. RESULTS SUMMARY

The results of the testing carried out on 19th January 2022 are summarised in the following table:

Sr.no	Parameter	Result
1	Equipment authorisation requirement	The product is certified by FCC ID: XOQXRS21 (XRS2i) XOQSRS21(SRS2i)
2	Antenna requirement	Complies. Antenna is internal to the device and is permanently attached
3	External PA and antenna modifications	Noted.
4	Restricted bands of operation	Complies. Device transmits on 134.2 kHz and contains a Bluetooth 2.4 GHz module transmitter.
5	Conducted limits	Not Tested
6	Radiated emission limits - Fundamental	Complies.
7	Radiated emission limits - Spurious emissions <30 MHz	Complies.
8	Radiated emission limits – Spurious emissions >30 MHz	Complies.

3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

The client selected the test sample.

This report relates only to the sample tested.

This report contains no erasures.

This report contains following corrections and replaces test report no: 211206.1b

- 1) Typographical corrections made to product FCC ID
- 2) Model no SRS2i has been added in the test report.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

4. CLIENT INFORMATION

Company Name	Datamars SA
Address	25 Carbine Road Mt. Wellington
City	Auckland 1060
Country	New Zealand
Contact	Mr Jacky Chou

5. TEST SAMPLE DESCRIPTION

Brand Name	Tru-Test
Model Number	XRS2i-1
Product Description	Handheld Low Frequency Electronic ID (EID) Reader
Serial Number	Not Serialized
Manufacturer	Datamars Ltd
Country of Origin	New Zealand
FCC ID	XOQXRS21
Supply Voltage	5V
Modulation	AM (FDX tag), FSK (HDX tag)
Bandwidth	10 kHz (Receiver bandwidth)
Frequencies	Processor 17.1776 MHz Transmitter 134.2 kHz Bluetooth 2402 - 2480 MHz
Duty Cycle	50 ms on, 4 ms off
Ports	USB
Firmware	1.4.10.15

Bluetooth Identification FCC ID: WAP3026 (IC ID: 7922A-3026)

The Tru-Test XRS2i-1 Handheld Low Frequency Electronic ID (EID) Reader is a dual mode FDX (AM) / HDX (FSK) tag reading device that is optimized for high performance with animal tags that comply with ISO 11784/11785.

The Reader operates on 134.2 kHz and is designed to operate with read distances of up to 0.5 m.

The Reader System identifies and reads electronic tags on individual animals.

The device has a USB port which can be used to power the device and to also charge the internal battery.

Data can be retrieved from the device using either the Bluetooth connection or the USB port.

The product is a FCC Certified product with FCC ID: XOQXRS21.

The device was earlier tested with Bluetooth module transmitter that has modular approval,

The FCC ID of this module is FCC ID: QOQWT11IA.

The Bluetooth module has been changed by the client to FCC ID: WAP3026 (IC ID: 7922A-3026) and to demonstrate continued compliance to FCC and ISED. The product has been retested for intentional emissions below 30 MHz and unintentional emissions from 30 MHz to 1 GHz.

The manufacturer has provided a Statement of Equipment Identification, which states that the XRS2i-1 and SRS2i-1 are electronically identical other than the keypads. Both keypads are made using same construction materials and methods.

The SRS2i-1 keypad has few conducting traces so will be no worse from an EMC radiated emissions or susceptibility perspective.

6. RESULTS

Standard, Methods and Procedures

The sample was tested in accordance with RSS-GEN, FCC Part 15, ANSI C63.4 – 2020 and ANSI C63.10-2020 where applicable.

Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is available for the 134.2 kHz EID transmitter.

The Bluetooth transmitter has modular approval.

Antenna requirement

This device operates using a permanently attached internal antenna

Result: Complies.

External radio frequency power amplifiers and antenna modifications

It is NOT possible to attach an external power amplifier to this transmitter.

Result: Complies.

Restricted bands of operation

The EID transmitter transmits on 134.2 kHz.

This falls between the restricted bands of 90 – 110 kHz and 495 – 505 kHz.

The Bluetooth transmitter module operates in the 2400.0 – 2483.5 MHz band.

Result: Complies.

Radiated emission limits, general requirements

Radiated emissions testing was carried out over the frequency range of 100 kHz to 1000 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand.

Testing was carried out when the device was powered with its internal battery.

Testing was carried out when the reader was continuously reading two RFID tags with the green LED flashing, an audible warning tone(s) being activated. The Bluetooth was active during the test.

The device was placed in the centre of the test table with the device being placed in the X, Y and Z planes as the device is hand held.

X plane: Laying flat with the LCD display facing the up
Y plane: Laying flat with the LCD display facing the test antenna
Z plane: Device standing up with the LCD display facing the test antenna

Below 30 MHz the centre of this loop antenna was placed 1 metre above the ground at a distance of 10 metres from the device under test with the loop antenna being placed in two orientations.

Above 30 MHz testing was carried out at the test site where emissions were measured in both vertical and horizontal antenna polarisations.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height, where appropriate, with an automated antenna tower.

The emission level was determined in field strength by taking the following into consideration:

Level (dB μ V/m) = Receiver Reading (dB μ V) + Antenna Factor (dB/m) + Coax Loss (dB)

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 1000 MHz) $\pm$ 4.1 dB
- Free radiation tests (100 kHz – 30 MHz) $\pm$ 4.8 dB

134.2 kHz Fundamental emission:

Measurements were made using a magnetic loop antenna and a receiver with an average detector and a peak detector both using a 9 kHz bandwidth

The measurement was carried out with device oriented in X, Y and Z axis, with the worst-case readings being tabulated as below:

Frequency (kHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Distance (metres)
134.200	83.6	84.1	0.5	Average	10
134.200	84.9	104.1	19.2	Peak	10

Measurements were made at a distance of 10 metres with the limit being determined by using the extrapolation factor of 40 dB per decade limit as detailed in section 15.31 f (2).

The 300 metre limit between 125 – 490 kHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The average limit at 300 m at 134.2 kHz is 17.8 uV/m or 25 dBuV/m and 45 dBuV/m in peak

$$= 25.0 \text{ dBuV/m} + 40 \text{ dB/decade} * (\log(300) - \log(10))$$

$$= 25.0 \text{ dBuV/m} + 40 \text{ dB/decade} * (2.477-1.000)$$

$$= 25.0 \text{ dBuV/m} + 40 \text{ dB/decade} * 1.477$$

$$= 25.0 \text{ dBuV/m} + 59.08$$

$$= 84.1 \text{ dBuV/m}$$

This gives a limit at 10 m at 134.2 kHz of 84.1 dBuV/m and 104.1 dBuV/m in peak

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz) ± 4.8 dB

Spurious Emissions (below 30 MHz)

Frequency (kHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Comment
268.400	40.8	79.0	38.2	Average	Noise floor
268.400	52.0	99.0	47.0	Peak	Noise floor
402.600	38.0	75.5	37.5	Average	Noise floor
402.600	48.0	95.5	47.5	Peak	Noise floor
536.800	48.0	53.0	5.0	Quasi Peak	Ambient
671.000	38.0	51.1	13.1	Quasi Peak	Noise floor
805.200	<44.0	49.5	-	Quasi Peak	Ambient
939.400	<42.0	48.1	-	Quasi Peak	Ambient
1073.600	<43.0	47.0	-	Quasi Peak	Ambient
1207.800	32.0	46.0	14.0	Quasi Peak	Noise floor
1342.000	34.0	45.0	11.0	Quasi Peak	Noise floor
1476.200	<40.0	44.2	-	Quasi Peak	Ambient
1610.400	29.0	43.5	14.5	Quasi Peak	Noise floor

No emissions were observed.

Magnetic loop measurements were made a distance of 10 metres.

At each frequency the measurement antenna was further adjusted to give the highest field strength.

A receiver with an average detector and a peak detector using a 9 kHz bandwidth was used between 110 – 490 kHz and a quasi peak detector with a 9 kHz bandwidth was used between 490 kHz – 30.0 MHz.

The 300 metre limit between 125 – 490 kHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2). The 30 metre limit between 490 – 1705 kHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The limit between 110 – 490 kHz was increased by 20 dB when the peak detector was used.

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz) ± 4.8 dB

Spurious Emissions (above 30 MHz)

Measurements between 30 –1000 MHz have been made at a distance of 3 metres.

A receiver with a quasi-peak detector with a 120 kHz bandwidth was used between 30 – 1000 MHz.

Measurements were carried out as the device contains a digital device that operates on 17.1776 MHz.

The device was tested transmitting continuously on 134.2 kHz while continuously reading 2 animal tags.

The Device was tested when powered through its internal battery.

The Bluetooth was turned on during the test.

Measurements were attempted with the device orientated in the X, Y and Z axis with the worst case levels being recorded.

The limits as described in Section 15.209 have been applied.

30 - 1000 MHz results

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result	Antenna
31.480	25.4	22.5	40.0	14.6	Pass	Vertical
43.800	24.6	23.7	40.0	15.4	Pass	Vertical
53.900	18.4	18.0	40.0	21.6	Pass	Vertical
75.800	18.3	16.1	40.0	21.7	Pass	Vertical
112.680	21.5	25.2	40.0	14.8	Pass	Horizontal
129.560	-	33.0	40.0	7.0	Pass	Horizontal
166.400	-	34.5	43.5	9.0	Pass	Horizontal
171.600	-	32.2	43.5	11.3	Pass	Horizontal
174.920	-	37.9	43.5	5.6	Pass	Horizontal
194.280	27.6	35.8	43.5	7.7	Pass	Horizontal
203.360	-	22.1	43.5	21.4	Pass	Horizontal
205.000	26.2	33.6	43.5	9.9	Pass	Horizontal
217.920	-	30.2	43.5	13.3	Pass	Horizontal
235.000	-	30.1	46.0	15.9	Pass	Horizontal
258.800	-	30.8	46.0	15.2	Pass	Horizontal
267.280	-	31.5	46.0	14.5	Pass	Horizontal
274.800	27.6	-	46.0	18.4	Pass	Vertical
280.240	-	33.1	46.0	12.9	Pass	Horizontal
311.600	-	36.7	46.0	9.3	Pass	Horizontal
320.080	-	39.5	46.0	6.5	Pass	Horizontal
330.280	-	42.6	46.0	3.4	Pass	Horizontal
335.040	26.7	35.2	46.0	10.8	Pass	Horizontal
340.120	-	38.3	46.0	7.7	Pass	Horizontal
345.920	-	36.2	46.0	9.8	Pass	Horizontal

30 - 1000 MHz results cont.

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result	Antenna
425.240	27.8	28.9	46.0	17.1	Pass	Horizontal
459.800	29.4	-	46.0	16.6	Pass	Vertical
498.640	30.5	30.0	46.0	15.5	Pass	Vertical
615.040	32.0	30.3	46.0	14.0	Pass	Vertical

All other emissions detected had a margin to limit that exceeded 20 dB when measurements were attempted up to 1 GHz using both vertical and horizontal polarisations.

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 1000 MHz) ± 4.1 dB



7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Period	Cal Due
AC Supply	APT	7008	4170003	-	-	Not applicable
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	-	Not applicable
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	-	Not applicable
Biconical Antenna	Schwarzbeck	BBA 9106	9594	E3680	4.5 years	29 Mar 2022
Log Periodic Antenna	Schwarzbeck	VUSLP 9111B	9111-112	EMC4025	4.5 years	25 Mar 22
Loop Antenna	EMCO	6502	9003-2485	E3798	4.5 years	12 Feb 2022
Receiver	R & S	ESIB-40	100295	E4030	2 year	3 Jun 2023
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	-	Not applicable
VHF Balun	Schwarzbeck	VHA 9103	-	E3696	4.5 years	29 Mar 2022

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd designation as a FCC Accredited Laboratory by International Accreditation New Zealand, designation number: NZ0002 under the APEC TEL MRA.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

International Accreditation New Zealand has International Laboratory Accreditation Council (ILAC) Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.

This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden).

Further details can be supplied on request.

9. PHOTOGRAPHS



Radiated emissions test set up

