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# Test Report

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

*tested to*

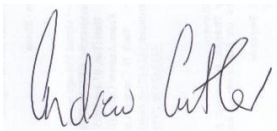
## 47 Code of Federal Regulations Part 15 - Radio Frequency Devices Subpart A + B (Unintentional) and C (Intentional) Radiators

***and***

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

*for*

## Datamars SA



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

ACCREDITED IANZ TESTING LABORATORY

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



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# 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. |



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# 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<br>Mt. Wellington |
| **City** | Auckland 1060 |
| **Country** | New Zealand |
| **Contact** | Mr Jacky Chou |



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# 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<br>Transmitter 134.2 kHz<br>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.



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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.



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# 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.



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**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 (dBµV/m) = Receiver Reading (dBµV) + Antenna Factor (dB/m) + Coax Loss (dB)

**Result:** Complies

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (30 – 1000 MHz) ± 4.1 dB
- Free radiation tests (100 kHz – 30 MHz) ± 4.8 dB


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**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 dBuV/m + 40 dB/decade * (log (300) - log (10))
= 25.0 dBuV/m + 40 dB/decade * (2.477-1.000)
= 25.0 dBuV/m + 40 dB/decade * 1.477
= 25.0 dBuV/m + 59.08
= 84.1 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


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**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



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**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 |



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**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

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# 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.



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# 9. PHOTOGRAPHS

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Radiated emissions test set up

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