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Report On

FCC and Industry Canada Testing of the
Johnson Outdoors Marine Electronics
Humminbird TX AIS, Class B AIS Transceiver
In accordance with FCC CFR 47 Part 80
and Industry Canada RSS-182

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2AAHS-4220002

IC ID: 4397C-4220002B

Document 75924295 Report 04 Issue 1

December 2013



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BA3 4BS

PREPARED BY

Natalie Bennett
Senior Administrator, Technical Solutions

APPROVED BY

Simon Bennett
Authorised Signatory

DATED

13 December 2013

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 80 and Industry Canada RSS-182. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

T Guy

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SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Johnson Outdoors Marine Electronics
Humminbird TX AIS, Class B AIS Transceiver
In accordance with FCC CFR 47 Part 80 and Industry Canada RSS-182



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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC and Industry Canada Testing of the Johnson Outdoors Marine Electronics Humminbird TX AIS, Class B AIS Transceiver to the requirements of FCC CFR 47 Part 80 and Industry Canada RSS-182.

| | |
|--------------------------------|---|
| Objective | To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. |
| Manufacturer | Johnson Outdoors Marine Electronics |
| Model Number(s) | TX AIS |
| Serial Number(s) | P323-FTU03-TX |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | FCC CFR 47 Part 80 (2012) and Industry Canada RSS-182 (Issue 5, 2012) |
| Incoming Release Date | Application Form 03 December 2013 |
| Disposal Reference Number Date | Held Pending Disposal Not Applicable Not Applicable |
| Order Number Date | POR004215 25 September 2013 |
| Start of Test | 30 November 2013 |
| Finish of Test | 30 November 2013 |
| Name of Engineer(s) | T Guy |



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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 80 and Industry Canada RSS-182 is shown below.

| Section | Spec Clause | | Test Description | Result | Comments/Base Standard |
|----------|-------------|---------|----------------------|--------|------------------------|
| | Pt 80 | RSS-182 | | | |
| Transmit | | | | | |
| 2.1 | 80.211 | 7.9 | Emission Limitations | Pass | |



1.3 APPLICATION FORM

| APPLICANT'S DETAILS | |
|--|--|
| COMPANY NAME : | Johnson Outdoors Marine Electronics |
| ADDRESS : | 678 Humminbird Lane Eufaula, AL 36027.....USA |
| NAME FOR CONTACT PURPOSES : | Greg Massey |
| TELEPHONE NO: ...770-888-6292 Ext: 1045 | FAX NO: |
| E-MAIL: gmassey@johnsonoutdoors.com | |

| EQUIPMENT INFORMATION | | | |
|---|---|-------------------------------------|-----------------------------|
| Model name/number | Humminbird TX-AIS | Identification/Part number | 422-0002 |
| Hardware Version | v1 | Software Version | 040200.01.11.00 |
| Manufacturer | Johnson Outdoors Marine Elec. | Country of Origin | Hungary |
| FCC ID | 2AAHS-4220002 | Industry Canada ID | 4397C-4220002B |
| Technical description (a brief description of the intended use and operation) | | | |
| AIS Class B Transceiver, Maritime Navigation | | | |
| <u>Supply Voltage:</u> | | | |
| <input type="checkbox"/> | AC mains | State AC voltage | V and AC frequency Hz |
| <input checked="" type="checkbox"/> | DC (external) | State DC voltage 12/24 V | and DC current 200m A |
| <input type="checkbox"/> | DC (internal) | State DC voltage | V and Battery type |
| <u>Frequency characteristics:</u> | | | |
| Transmitter Frequency range | 156.025. MHz to 162.025. MHz | Channel spacing | 25kHz |
| | | (if channelized) | |
| Receiver Frequency range (if different) | MHz to MHz | Channel spacing | (if channelized) |
| <u>Designated test frequencies:</u> | | | |
| Bottom: ...156.025 MHz | Middle:159.025... MHz | Top:162.025 MHz | |
| Intermediate Frequencies : 19.655 and 29.255 MHz | | | |
| Highest Internally Generated Frequency : 191.28 MHz | | | |
| <u>Power characteristics:</u> | | | |
| Maximum transmitter power | ...2..... W | Minimum transmitter power | W |
| | | (if variable) | |
| <input type="checkbox"/> | Continuous transmission | | |
| <input type="checkbox"/> | Intermittent transmission | State duty cycle | <1% |
| | If intermittent, can transmitter be set to continuous transmit test mode? | Y/N (Low power only) | |
| <u>Antenna characteristics:</u> | | | |
| <input checked="" type="checkbox"/> | Antenna connector | State impedance | 50... ohm |
| <input type="checkbox"/> | Temporary antenna connector | State impedance | ohm |
| <input type="checkbox"/> | Integral antenna Type | State gain | dBi |
| <input checked="" type="checkbox"/> | External Antenna Type Quarter wave vertical.... | State gain | 3..... dBi |
| <u>Modulation characteristics:</u> | | | |
| <input type="checkbox"/> | Amplitude | <input checked="" type="checkbox"/> | Other |
| <input type="checkbox"/> | Frequency | Details: ...GMSK..... | |
| <input type="checkbox"/> | Phase | (GMSK, QSPK etc) | |
| Can the transmitter operate un-modulated? | | Y/N (In test mode only) | |
| ITU Class of emission: 12K5GXW | | | |
| <u>Battery/Power Supply</u> | | | |
| Model name/number | N/A..... | Identification/Part number | |
| Manufacturer | | Country of Origin | |
| <u>Ancillaries (if applicable)</u> | | | |
| Model name/number | N/A..... | Identification/Part number | |
| Manufacturer | | Country of Origin | |
| <u>Extreme conditions:</u> | | | |
| Maximum temperature | +55 °C | Minimum temperature | -15 °C |
| Maximum supply voltage | 31.2 V | Minimum supply voltage | 9.6V |



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I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

A handwritten signature in black ink, appearing to be 'Richard McMahon'.

Signature :

Name : Richard McMahon Engineer

Position held : Certification Engineer

Date : 03/12/13



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1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Johnson Outdoors Marine Electronics Ltd Humminbird TX AIS, Class B AIS Transceiver. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 12 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards were made during testing

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



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SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
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In accordance with FCC CFR 47 Part 80 and Industry Canada RSS-182



2.1 EMISSION LIMITATIONS

2.1.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.211
Industry Canada RSS-182, Clause 7.9

2.1.2 Equipment Under Test and Modification State

TX AIS S/N: P323-FTU03-TX - Modification State 0

2.1.3 Date of Test

30 November 2013

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

A preliminary profile of the Spurious Radiated Emissions were obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth. A measurement bandwidth of 1 MHz was used (greater than 30 kHz as defined by RSS-182). This represents a worst case test scenario.

The EUT was set to transmit on maximum power with both channels operating simultaneously.

For any emissions found the EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gain and cable loss.

The measurements were performed at a 3m distance unless otherwise stated.

2.1.6 Environmental Conditions

| | |
|---------------------|--------|
| Ambient Temperature | 19.5°C |
| Relative Humidity | 29.0% |



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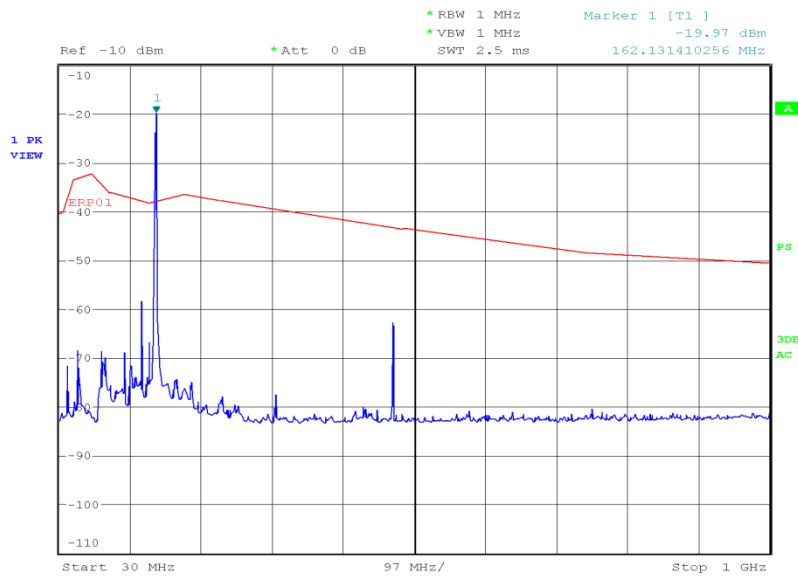
2.1.7 Test Results

12 V DC Supply

AIS - Radiated

161.975 MHz and 162.025 MHz

30 MHz to 1 GHz

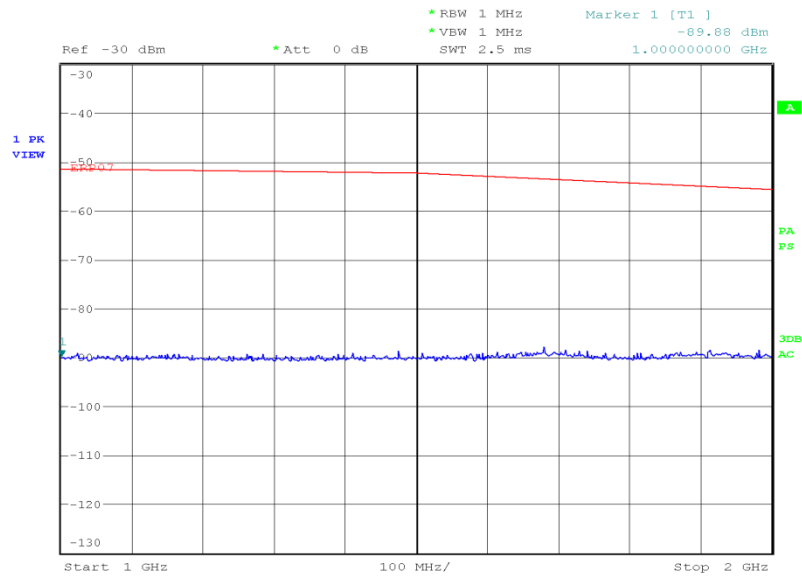


Date: 30.NOV.2013 16:38:11

Note: The emission shown exceeding the limit line was the fundamental.



1 GHz to 2 GHz



Date: 30.NOV.2013 17:26:37

Limit Clause FCC Part 80.211 and Industry Canada RSS-182, Clause 7.9.1

>250 % of authorised bandwidth $43+10 \log P$ **OR** -13 dBm



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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

| Instrument | Manufacturer | Type No. | TE No. | Calibration Period (months) | Calibration Due |
|---|-----------------|-----------|--------|-----------------------------|-----------------|
| Section 2.1 - Emission Limitations | | | | | |
| Antenna (Double Ridge Guide, 1GHz-18GHz) | EMCO | 3115 | 234 | 12 | 3-Apr-2014 |
| Antenna (Bilog) | Schaffner | CBL6143 | 287 | 24 | 18-Jan-2014 |
| Termination (50ohm) | Diamond Antenna | DL-30N | 337 | 12 | 9-Oct-2014 |
| Attenuator (20dB, 250W) | Weinschel | 45-20-43 | 473 | 12 | 10-Jan-2014 |
| Attenuator (10dB) | Weinschel | 45-10-43 | 509 | 12 | 8-Oct-2014 |
| Signal Generator | Rohde & Schwarz | SML01 | 1590 | 12 | 16-Apr-2014 |
| Turntable Controller | Inn-Co GmbH | CO 1000 | 1606 | - | TU |
| Power Supply | Iso-tech | IPS 2010 | 2439 | - | O/P Mon |
| Antenna (Bilog) | Chase | CBL6143 | 2904 | 24 | 10-Jun-2015 |
| GPS/SBAS Simulator | Spirent | STR4500 | 3056 | - | TU |
| EMI Test Receiver | Rohde & Schwarz | ESU40 | 3506 | 12 | 22-Oct-2014 |
| Tilt Antenna Mast | maturu GmbH | TAM 4.0-P | 3916 | - | TU |
| Mast Controller | maturu GmbH | NCD | 3917 | - | TU |
| 20dB Attenuator | Weinschel | 45-20-43 | 4321 | 12 | 18-Jun-2014 |

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



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3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

| Test Discipline | MU |
|----------------------|--|
| Emission Limitations | Radiated: ± 3.08 dB Conducted: ± 3.454 dB |



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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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