Report On

Limited FCC Testing of the True Heading AB True Heading / Seapilot Graphene and Graphene+ WiFi
In accordance with FCC CFR 47 Part 80 and
Industry Canada RSS-182

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2AC79-GRAPHENE174
IC: 9502A-GRAPHENE174

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REPORT ON Limited FCC Testing of the True Heading AB True Heading / Seapilot Graphene and Graphene+ WiFi
In accordance with FCC CFR 47 Part 80
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Document 75928833 Report 02 Issue 2

October 2015

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DATED 08 October 2015

This report has been revised to issue 2 to correct the FCC ID.

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);

G Lawler

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SECTION 1

REPORT SUMMARY

Limited FCC Testing of the
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1.1 INTRODUCTION

The information contained in this report is intended to show the verification of Limited FCC Testing of the True Heading AB True Heading / Seapilot Graphene and Graphene+ WiFi to the requirements of FCC CFR 47 Part 80 and Industry Canada RSS-182.

Objective	To perform Limited FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	True Heading AB
Model Number(s)	GRAPHENE +
Serial Number(s)	0005
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 80 (2013) Industry Canada RSS-182 (Issue 5, 2012)
Incoming Release Date	Declaration of Build Status 31 October 2014
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	ML/148191 REV1 12 December 2014
Start of Test	8 February 2015
Finish of Test	8 February 2015
Name of Engineer(s)	G Lawler

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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	

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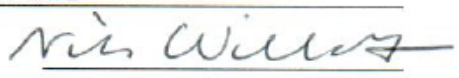
1.3 DECLARATION OF BUILD STATUS

DECLARATION OF BUILD STATUS

Manufacturer	True Heading AB
Country of origin	Sweden
Technical Description	Marine AIS class B transponder
Model No	True Heading / Seapilot Graphene+ WiFi
Part No	0012-004-000 / 0017-004-000
Serial No	#3
Drawing Number	TH140221-1.1
Build Status	Production sample
Software Issue	Ver. 1.10
Hardware Issue	Ver. 3
FCC ID	2AC79-GRAPHENE174
IC ID	9502A
Highest Operating Frequency	162 MHz and 2440 MHz
Signature	
Date	21 January 2015
D of B S Serial No	31 October 2014

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a True Heading AB True Heading / Seapilot Graphene and Graphene+ WiFi. 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 Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard 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

Limited FCC Testing of the
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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

GRAPHENE + S/N: 0005 - Modification State 0

2.1.3 Date of Test

8 February 2015

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 was 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.

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	20.3°C
Relative Humidity	23.0%

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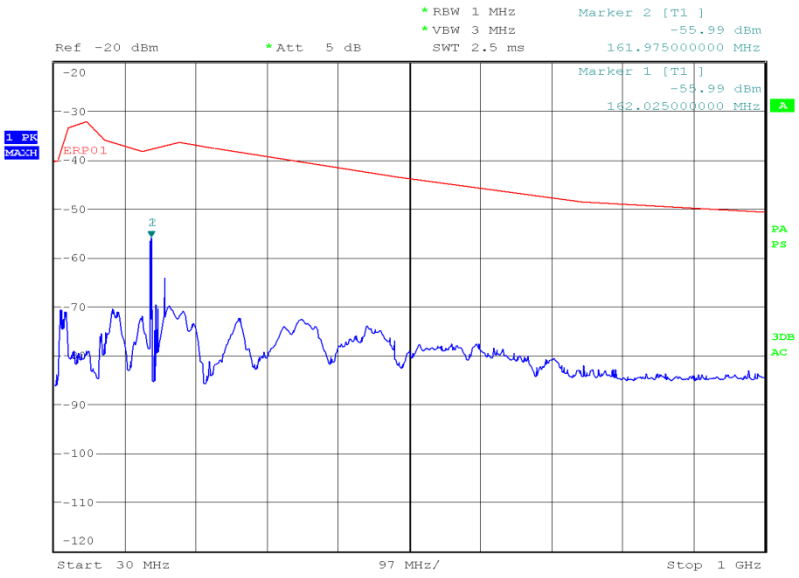
2.1.7 Test Results

12 V DC Supply

Radiated

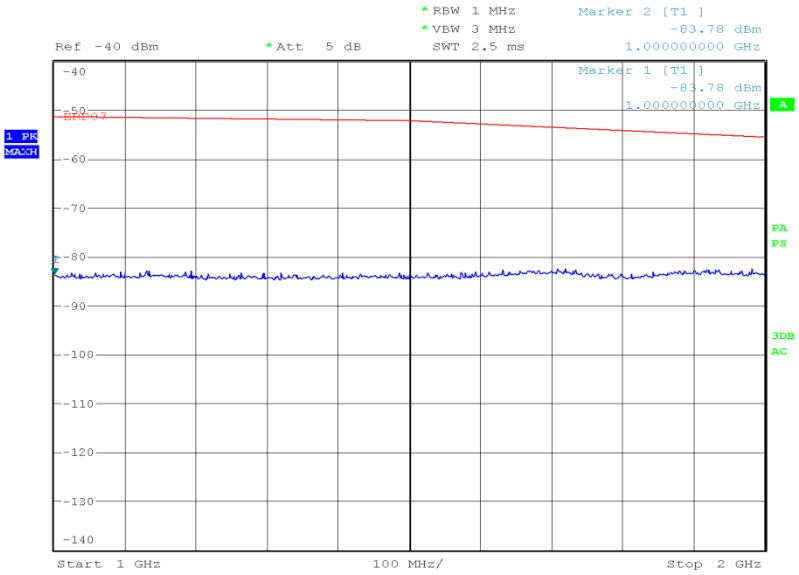
161.975 MHz

30 MHz to 1 GHz



Date: 8.FEB.2015 09:12:53

1 GHz to 2 GHz



Date: 8.FEB.2015 10:43:28

Limit Clause 80.211

Outside the Emission Mask

>250 % of authorised bandwidth 43+10 Log P **OR** -13 dBm

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SECTION 3

TEST EQUIPMENT USED

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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	2-May-2015
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	22	28-Nov-2015
Screened Room (5)	Rainford	Rainford	1545	24	10-Feb-2015
Signal Generator (1GHz to 40GHz)	Rohde & Schwarz	SMR40	1589	12	1-Apr-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	10-Jun-2015
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU

TU – Traceability Unscheduled

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

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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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).