
# Report On

FCC Testing of the
McMurdo Limited
SmartFind S5 AIS SART

COMMERCIAL-IN-CONFIDENCE

FCC ID: KLS-S5

Document 75907213 Report 03 Issue 1 March 2010

TUV Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk



**REPORT ON**

FCC Testing of the
McMurdo Limited
SmartFind S5 AIS SART

Document 75907213 Report 03 Issue 1

March 2010

**PREPARED FOR**

McMurdo Limited
Silver Point
Airport Service Road
Hilsea
Portsmouth
Hampshire
PO3 5PB

**PREPARED BY**

**N Bennett**
Senior Administrator

**APPROVED BY**

**C Gould**
Authorised Signatory

**M J Hardy**
Authorised Signatory

**DATED** 12 March 2010

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 2, 15B and 80. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

B Airs

A R Hubbard

UKAS TESTING 0141

Product Service

**CONTENTS**

Product Service

**SECTION 1**

**REPORT SUMMARY**

FCC Testing of the
McMurdo Limited
SmartFind S5 AIS SART

Product Service

## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the McMurdo Limited SmartFind S5 AIS SART to the requirements of FCC CFR 47 Part 2, 15B and 80.

| | |
|---|---|
| Objective | To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification for the series of tests carried out. |
| Manufacturer | McMurdo Limited |
| Model Number(s) | S5 |
| Serial Number(s) | 970 00 000<br>75902713–TUV0007 |
| Software Version | 1.1.60 |
| Hardware Version | Issue 1 |
| Number of Samples Tested | Three |
| Test Specification/Issue/Date | FCC CFR 47 Part 2: 2008<br>FCC CFR 47 Part 15: 2008<br>FCC CFR 47 Part 80: 2008 |
| Disposal<br>Reference Number<br>Date | Held Pending Disposal<br>Not Applicable<br>Not Applicable |
| Order Number<br>Date | PC0003713<br>22 July 2009 |
| Start of Test | 29 October 2009 |
| Finish of Test | 06 November 2009 |
| Name of Engineer(s) | B Airs<br>A R Hubbard |
| Related Document(s) | ANSI 63.4: 2003 |

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## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 2, 15B and 80, is shown below.

| Section | Spec Clause | | | Test Description | Mode | Mod State | Result | Base Standard |
|---|---|---|---|---|---|---|---|---|
| | Part 2 | Part 15B | Part 80 | | | | | |
| 2.1 | 2.1055 | - | 80.209(a) | Frequency Stability Under Voltage Variations | Active | 0 | Pass | |
| | | | | | Idle | | N/A | |
| 2.2 | 2.1055 | - | 80.209(a) | Frequency Stability Under Temperature Variations | Active | 0 | Pass | |
| | | | | | Idle | | N/A | |
| 2.3 | 2.1051, 2.1053 | - | 80.211(f)(1)(2) | Emission Limitations – Emission Mask | Active | 0 | Pass | |
| | | | | | Idle | | N/A | |
| 2.4 | 2.1049 | - | 80.205(a) | Occupied Bandwidth | Active | 0 | Pass | |
| | | | | | Idle | | N/A | |
| 2.5 | 2.1046 | - | 80.215 (a)(5) | Transmitter Power – AIS Transmission | Active | 0 | Pass | |
| | | | | | Idle | | N/A | |
| 2.6 | 2.1047 | - | 80.213 | Modulation Characteristics | Active | 0 | Pass | |
| | | | | | Idle | | N/A | |
| 2.7 | - | 15.109 | - | Radiated Emissions | Active | | N/A | |
| | | | | | Idle | 0 | Pass | |

N/A – Not Applicable

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## 1.3 DECLARATION OF BUILD STATUS

| MAIN EUT | |
|---|---|
| **MANUFACTURING DESCRIPTION** | OEM |
| **MANUFACTURER** | McMurdo Limited |
| **TYPE** | SmartFind S5 AIS SART |
| **PART NUMBER** | 92-001-001A |
| **SERIAL NUMBER** | 970 00 0001 |
| **HARDWARE VERSION** | Issue 1 |
| **SOFTWARE VERSION** | 1.1.60 |
| **TRANSMITTER OPERATING RANGE** | 161.975MHz to 162.025MHz |
| **RECEIVER OPERATING RANGE** | Not applicable |
| **COUNTRY OF ORIGIN** | United Kingdom |
| **INTERMEDIATE FREQUENCIES** | Not applicable |
| **ITU DESIGNATION OF EMISSION** | 16K0GXW |
| **HIGHEST INTERNALLY GENERATED FREQUENCY** | 162.025MHz |
| **OUTPUT POWER (W or dBm)** | 32.5 dBm nominal |
| **FCC ID** | KLS-S5 |
| **INDUSTRY CANADA ID** | IC6913A-S5 |
| **TECHNICAL DESCRIPTION (a brief description of the intended use and operation)** | Used as part of the GMDSS, AIS SART has a unique ID code and will receive its position via an internal GPS module; this data is combined and transmitted using the international AIS channels (AIS 1 – 161.975MHz and AIS 2 – 162.025MHz) in the maritime VHF band. |
| **BATTERY/POWER SUPPLY** | |
| **MANUFACTURING DESCRIPTION** | OEM |
| **MANUFACTURER** | Varta micro battery or Panasonic |
| **TYPE** | CR 2/3 AH (Varta) / CR123A (Panasonic) |
| **PART NUMBER** | CR 2/3 AH |
| **VOLTAGE** | 6v nominal |
| **COUNTRY OF ORIGIN** | Germany (Varta micro battery ) or USA (Panasonic) |

**Signature** Neil Jordan

**Date** 19 December 2009

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.

No responsibility will be accepted by TÜV Product Service as to the accuracy of the information declared in this document by the manufacturer.

Product Service

## 1.4 APPLICATION FORM

| APPLICANT'S DETAILS | |
|---|---|
| COMPANY NAME : | McMurdo Limited |
| ADDRESS : | Silver Point, Airport Service Road<br>Hilsea, Portsmouth, PO2 5PB |
| NAME FOR CONTACT PURPOSES : | Neil Jordan |
| TELEPHONE NO: 02392 623934 | FAX NO: 02392 623997 E-MAIL: neiljordan@mcmurdo.co.uk |

**EQUIPMENT INFORMATION**

Equipment designator:
Model name/number S5 AIS SART…….. Identification number ……..……

Supply Voltage:

| | | | |
|---|---|---|---|
| [ ] | AC mains | State AC voltage …… V | and AC frequency …… Hz |
| [ ] | DC (external) | State DC voltage …… V | and DC current ……7mA average. A |
| [ X ] | DC (internal) | State DC voltage …6.0.. V | and Battery type …Li MnO2…… |

Frequency characteristics:
Frequency range …161.975……. MHz to …162.025……. MHz Channel spacing ……N/A….
(if channelized)
Designated test frequencies:
Bottom: ……161.975… MHz Middle: …… MHz Top: …162.025……. MHz

Power characteristics:
Maximum transmitter power ……1.8…… W Minimum transmitter power …… W
(if variable)
[ ] Continuous transmission
[ X ] Intermittent transmission State duty cycle …0.32%……
If intermittent, can transmitter be set to continuous transmit test mode? No

Antenna characteristics:

| | | |
|---|---|---|
| [ ] | Antenna connector | State impedance …… ohm |
| [ ] | Temporary antenna connector | State impedance …… ohm |
| [ X ] | Integral antenna | State gain ……0…… dBi |

Modulation characteristics:

| | | | |
|---|---|---|---|
| [ ] | Amplitude | [ X ] | Other |
| [ ] | Frequency | Details: …GMSK…….. | |
| [ ] | Phase | | |

Can the transmitter operate un-modulated? Yes
ITU Class of emission: …… 16K0GXW……

Extreme conditions: McMurdo Limited has assumed this with the AIS SART running, The stowage temperature for the device is -30C to +70C:

| | | | |
|---|---|---|---|
| Maximum temperature | …+55…ºC | Minimum temperature | …-20... ºC |
| Maximum supply voltage | …6.0…..V | Minimum supply voltage | …5.5…. V |

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

Signature: Held on file at TÜV Product Service Ltd
Name: Neil Jordan Position held: Engineering Manager
Date: 01 October 2009

TÜV Product Service Ltd formally certifies that the manufacturer's declaration as typed out in this report, is a true and accurate record of the original received from the applicant.

## 1.5 PRODUCT INFORMATION

### 1.5.1 Technical Description

The Equipment Under Test (EUT) was a McMurdo Limited SmartFind S5 AIS SART as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.


Equipment Under Test

### 1.5.2 Test Configuration

The EUT was configured in accordance with FCC CFR 47 Part 2, 15B and 80.

### 1.5.3 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Mode 1 – Active
Mode 2 – Idle

Information on the specific test modes utilised are detailed in the test procedure for each individual test.

### 1.5.4 Battery Voltages

The SmartFind S5 AIS SART is powered from an internal battery. In order to complete the testing at extreme voltages, as required by the standard, the battery voltage usage was accelerated to obtain a battery with an equivalent 92 hours of usage.

McMurdo Limited declared that in order to achieve a battery in a state nearing the end of its useful life (V min), a resistive load of 130 ohms could be placed across the battery terminals for 16 hours and that this condition would equate to 92 hours of battery use. This method was used for all of the tests that indicate Vmin was used.

## 1.6 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, test laboratories or an open test area as appropriate.

The EUT was powered from a 6V internal battery unless otherwise stated.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

## 1.7 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

## 1.8 MODIFICATION RECORD

No modifications were made to the EUT during testing.

Product Service

**SECTION 2**

**TEST DETAILS**

FCC Testing of the
McMurdo Limited
SmartFind S5 AIS SART

## 2.1 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

### 2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 80, Clause 80.209(a)

### 2.1.2 Equipment Under Test

SmartFind S5 AIS SART, S/N: 970 00 000

### 2.1.3 Date of Test and Modification State

06 November 2009 - Modification State 0

### 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

The EUT was set to transmit an unmodulated carrier on channels AIS 1 and AIS 2 at maximum power. Using a frequency counter, the frequency error was measured and the result recorded.

### 2.1.6 Environmental Conditions

| | 06 November 2009 |
|---|---|
| Ambient Temperature | 25°C |
| Relative Humidity | 32% |

### 2.1.7 Test Results

| Test Conditions | | Frequency Error (kHz) | |
|---|---|---|---|
| | | AIS 1 | AIS 2 |
| | | 161.975 MHz | 162.025 MHZ |
| $T_{nom}$ (22°C) | $V_{nom}$ (6.0V) | -0.123 | -0.037 |
| | $V_{min}$ (5.7 V) | -0.405 | -0.263 |
| | $V_{max}$ (6.43V) | -0.174 | -0.082 |
| Maximum Frequency Error (Hz) | | -405 | -263 |
| Measurement Uncertainty (Hz) | | ± 11 | |

Limit

| |
|---|
| ± 1.61975kHz for AIS 1 and ± 1.62025 kHz for AIS 2 or 10ppm |

## 2.2 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

### 2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 80, Clause 80.209(a)

### 2.2.2 Equipment Under Test

SmartFind S5 AIS SART, S/N: 970 00 000

### 2.2.3 Date of Test and Modification State

06 November 2009 - Modification State 0

### 2.2.4 Test Equipment Used

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

### 2.2.5 Test Procedure

The EUT was set to transmit an unmodulated carrier on channels AIS 1 and AIS 2 at maximum power. Using a frequency counter, the frequency error was measured and the result recorded. The temperature was adjusted between -20° and +55° in 10° steps.

### 2.2.6 Environmental Conditions

| | 06 November 2009 |
|---|---|
| Ambient Temperature | 25°C |
| Relative Humidity | 33% |

Product Service

### 2.2.7 Test Results

| Temperature Intervals | Frequency Error (kHz) | |
|---|---|---|
| | AIS 1 | AIS 2 |
| | 161.975 MHz | 162.025 MHz |
| -20 | -0.017 | +0.036 |
| -10 | -0.077 | +0.046 |
| 0 | -0.217 | +0.012 |
| +10 | -0.097 | -0.027 |
| +20 | -0.138 | -0.050 |
| +30 | -0.153 | -0.064 |
| +40 | -0.171 | -0.125 |
| +50 | -0.147 | -0.169 |
| +55 | -0.137 | -0.205 |
| Maximum Frequency Error (Hz) | -217 | -205 |
| Measurement Uncertainty (Hz) | ± 11 | |

Limit:

| |
|---|
| ± 1.61975kHz for AIS 1 and ± 1.62025 kHz for AIS 2 or 10ppm |

## 2.3 EMISSION LIMITATIONS (EMISSION MASK)

### 2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051 and 2.1053
FCC CFR 47 Part 80, Clause 80.211(f)(1)(2)

### 2.3.2 Equipment Under Test

SmartFind S5 AIS SART, S/N: 970 00 000

### 2.3.3 Date of Test and Modification State

06 November 2009 - Modification State 0

### 2.3.4 Test Equipment Used

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

### 2.3.5 Test Procedure

The EUT transmitting on full power was then connected to a Spectrum Analyser via a 30dB of attenuation. The modulated carrier was checked for channels AIS 1 and AIS 2 against the emission mask.

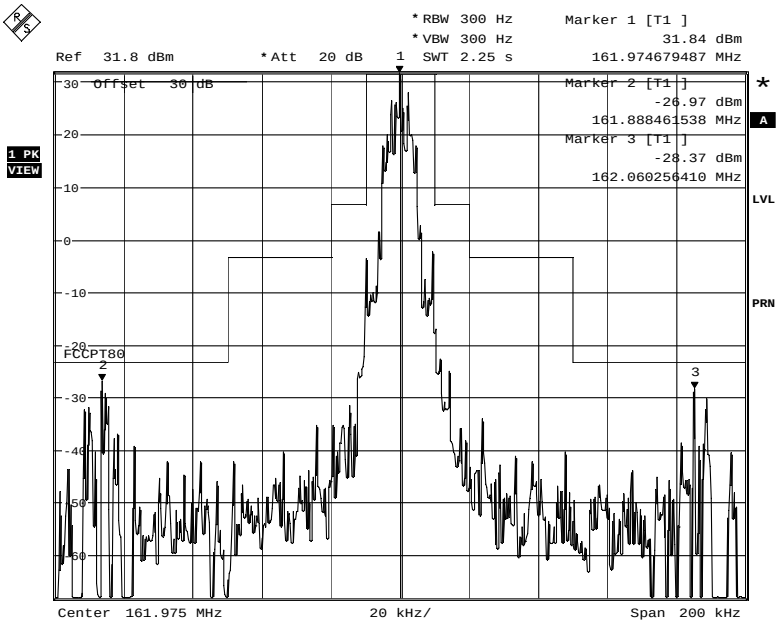
The Path Loss was recorded and the worst case loss was entered as a Reference Level Offset.

### 2.3.6 Environmental Conditions

| | 06 November 2009 |
|---|---|
| Ambient Temperature | 23°C |
| Relative Humidity | 34% |

### 2.3.7 Test Results

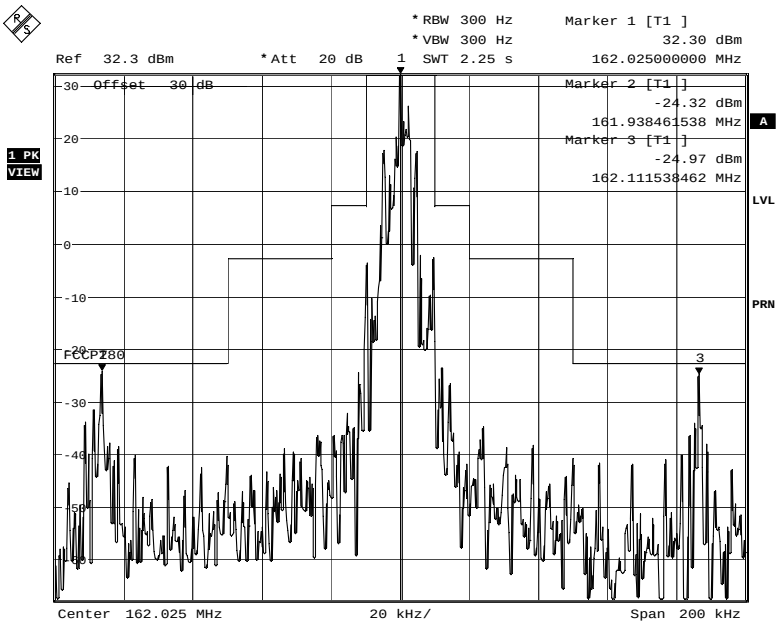
AIS 1 Frequency 161.975 MHz




Date: 6.NOV.2009 14:59:55

Note: The emission mask applied was for 80.211 (f) (1) (2): this was a more stringent mask than the emission mask for 80.211 (d) (1) (2). 80.211 (f) (2): "*On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorised bandwidth: At least 35 dB".* 80.211 (d) (2): *On any frequency removed from the assigned frequency by more than 100 percent of the authorised bandwidth: At least 30 dB".* By complying with 80.211 (f) (2), which is the worst case, this ensures compliance with 80.211 (d) (2).

AIS 2 Frequency 162.025 MHz




Note: The emission mask applied was for 80.211 (f) (1) (2): this was a more stringent mask than the emission mask for 80.211 (d) (1) (2). 80.211 (f) (2): "*On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorised bandwidth: At least 35 dB".* 80.211 (d) (2): *On any frequency removed from the assigned frequency by more than 100 percent of the authorised bandwidth: At least 30 dB".* By complying with 80.211 (f) (2), which is the worst case, this ensures compliance with 80.211 (d) (2).

| Frequency MHz | Antenna Polarisation | Antenna Height cm | EUT Arc degrees | Result Peak dBm | Limit dBm | Margin dB | Result |
|---|---|---|---|---|---|---|---|
| 324.046 | Vertical | 124 | 240 | -17.80 | -13.00 | -4.80 | Pass |
| 485.927 | Vertical | 125 | 60 | -28.15 | -13.00 | -15.15 | Pass |
| 647.892 | Vertical | 200 | 300 | -25.54 | -13.00 | -12.24 | Pass |
| 809.881 | Vertical | 151 | 300 | -17.13 | -13.00 | -4.13 | Pass |
| 971.850 | Vertical | 200 | 330 | -24.09 | -13.00 | -11.09 | Pass |
| 1457.769 | Vertical | 124 | 300 | -25.59 | -13.00 | -12.59 | Pass |
| 1943.673 | Horizontal | 124 | 270 | -26.03 | -13.00 | -13.03 | Pass |

Limit

| |
|---|
| On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB<br><br>On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB. |

Product Service

## 2.4 OCCUPIED BANDWIDTH

### 2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 80, Clause 80.205(a)

### 2.4.2 Equipment Under Test

SmartFind S5 AIS SART, S/N: 970 00 000

### 2.4.3 Date of Test and Modification State

05 November 2009 - Modification State 0

### 2.4.4 Test Equipment Used

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

### 2.4.5 Test Procedure

The EUT has been tested with an emission designator of: 16K0GXW.

The Modulation Analyser was then replaced with a Spectrum Analyser and the 99% Bandwidth was measured. The measurements were performed on channels AIS 1 and AIS 2 on maximum power levels.

### 2.4.6 Environmental Conditions

| | 05 November 2009 |
|---|---|
| Ambient Temperature | 23°C |
| Relative Humidity | 30% |

### 2.4.7 Test Results

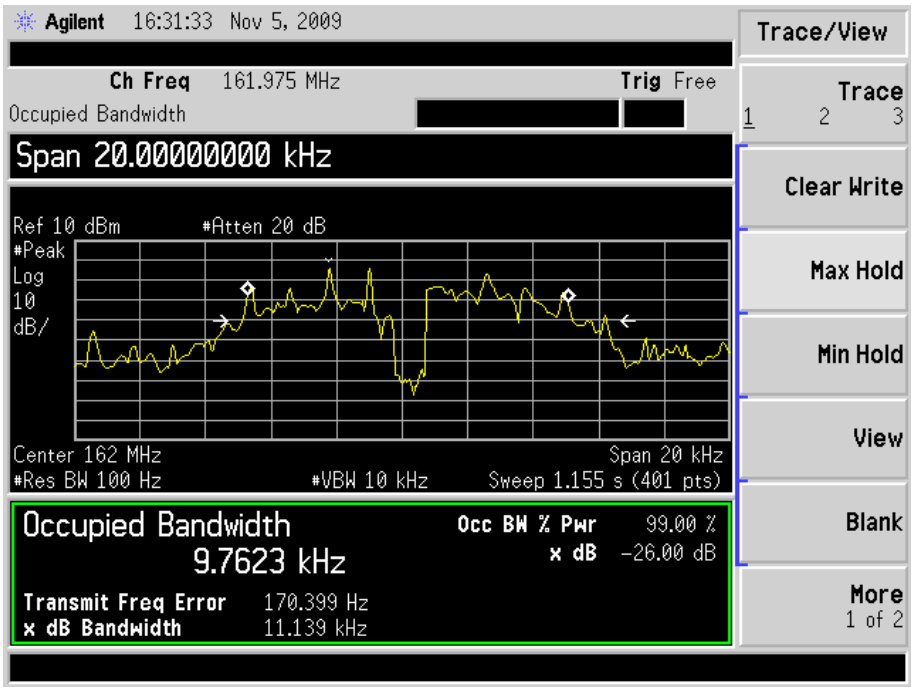
| Channel Number/Frequency | Result (kHz) | Authorised Bandwidth (kHz) |
|---|---|---|
| AIS 1 / 161.975MHz | 9.762 | 20 |
| AIS 2 / 162.025MHz | 9.462 | 20 |

Limit

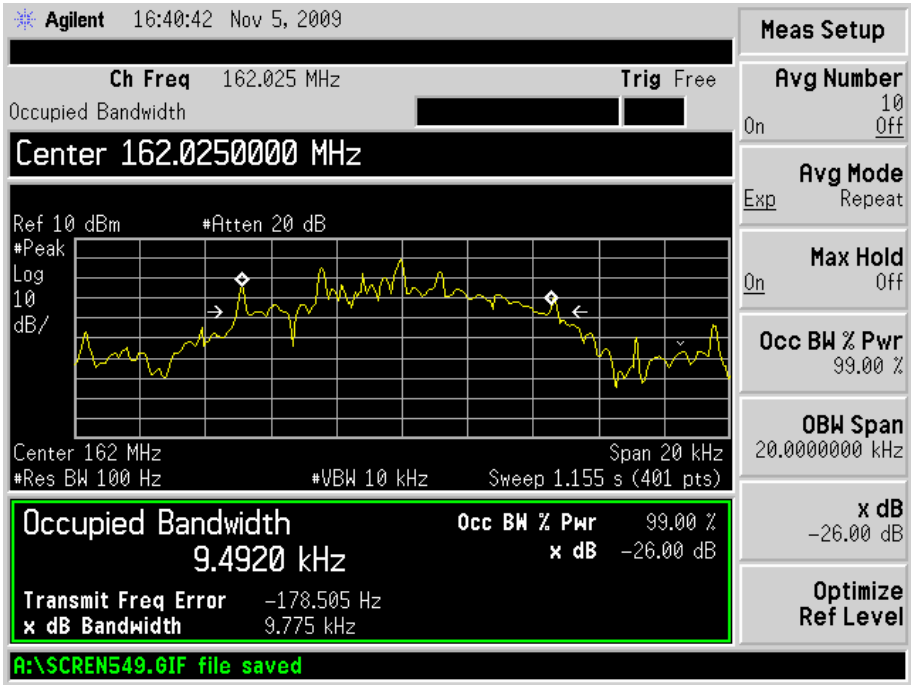
| |
|---|
| The nominal authorised channel bandwidth is 20kHz |

Product Service

AIS1: Frequency 161.975 MHz




AIS 2: Frequency 162.025 MHz



## 2.5 TRANSMITTER POWER – AIS TRANSMISSION

### 2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 80, Clause 80.215(a)(5)

### 2.5.2 Equipment Under Test

SmartFind S5 AIS SART, S/N: 970 00 000

### 2.5.3 Date of Test and Modification State

05 November 2009 - Modification State 0

### 2.5.4 Test Equipment Used

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

### 2.5.5 Test Procedure

The EUT was connected via a 30dB attenuator to a Spectrum analyser. The path loss between the EUT and the Spectrum Analyser was measured on a Network Analyser and recorded. The measurement was noted and offset by the path loss value.

The Carrier Power was measured in a modulated state at maximum power on channels AIS 1 and AIS 2.

### 2.5.6 Environmental Conditions

| | 05 November 2009 |
|---|---|
| Ambient Temperature | 25°C |
| Relative Humidity | 31% |

Product Service

### 2.5.7 Test Results

Conducted

| Frequency (MHz) | Result (dBm) Unmodulated | Result (W) Modulated | Result (W) Unmodulated | Result (dBm) Modulated |
|---|---|---|---|---|
| AIS 1 / 161.975 MHz | - | 2.173 | - | +33.37 |
| AIS 2 / 162.025 MHz | - | 2.070 | - | +33.16 |

Radiated

| Frequency MHz | Antenna Polarisation | Antenna Height cm | EUT Arc degrees | Result Peak dBm | Limit dBm | Margin dB | Result |
|---|---|---|---|---|---|---|---|
| 161.974 | Vertical | 275 | 150 | +33.31 | +34.78 | -1.47 | Pass |
| 162.026 | Vertical | 275 | 150 | +33.03 | +34.78 | -1.75 | Pass |

Limit

| |
|---|
| < 3.006 W or < 34.78 dBm |

## 2.6 MODULATION CHARACTERISTICS

### 2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047
FCC CFR 47 Part 80, Clause 80.213

### 2.6.2 Equipment Under Test

SmartFind S5 AIS SART, S/N: 970 00 000

### 2.6.3 Date of Test and Modification State

05 November 2009 - Modification State 0

### 2.6.4 Test Equipment Used

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

### 2.6.5 Test Procedure

The EUT was connected to a spectrum analyser via a 30dB Attenuator Using the FM demodulation function various test signals were analysed and the peak deviation recorded. Testing was performed on the bottom channel at a declared power level.

### 2.6.6 Environmental Conditions

| | 05 November 2009 |
|---|---|
| Ambient Temperature | 25°C |
| Relative Humidity | 31% |

### 2.6.7 Test Results

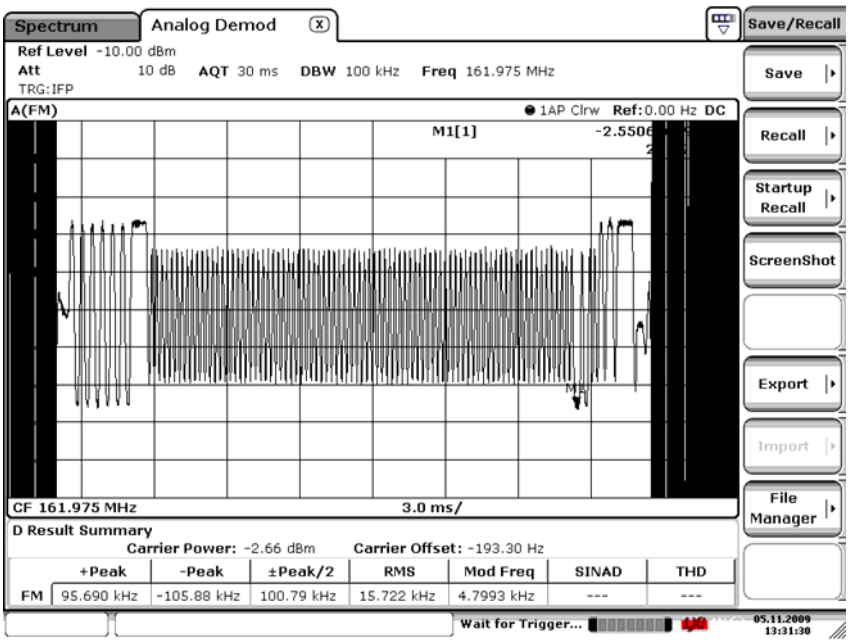
| Test signal | Peak Frequency (kHz) |
|---|---|
| 10101010 | 2.55 |
| 11110000 | -2.57 |
| Psuedo Random | -2.56 |

Limit

| |
|---|
| Ship and coast station transmitters operating in the 156–162 MHz and 216–220 bands must be capable of proper operation with a frequency deviation that does not exceed ±5 kHz. |

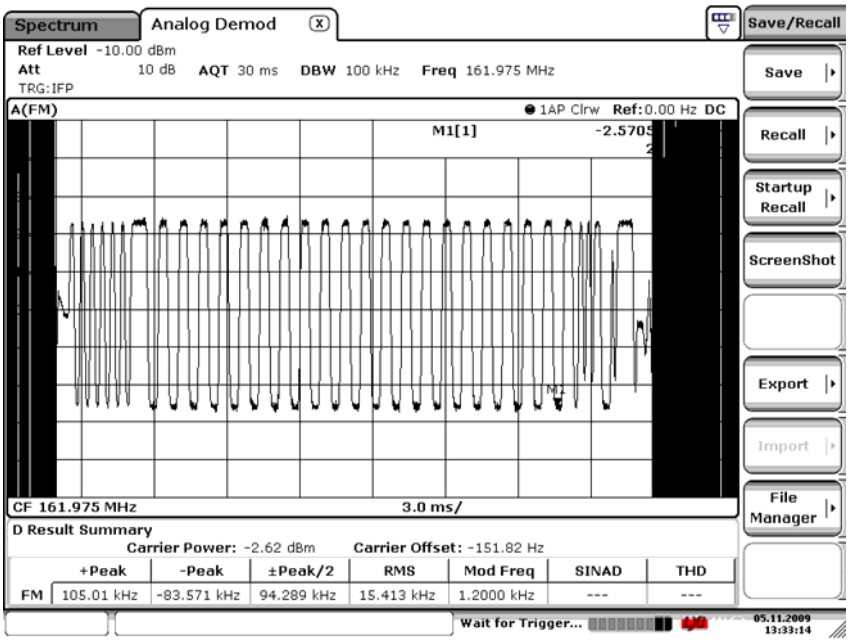
Product Service

10101010




Date: 5.NOV.2009 13:31:30

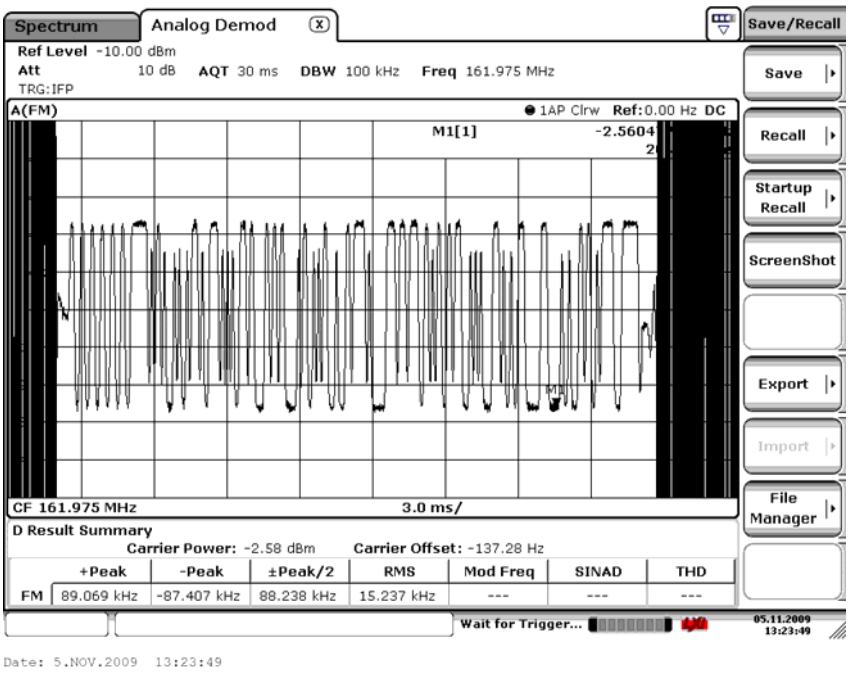
11110000




Date: 5.NOV.2009 13:33:14

Product Service

Psuedo Random



Product Service

## 2.7 RADIATED EMISSIONS

### 2.7.1 Specification Reference

FCC CFR 47 Part 15B, Clause 15.109

### 2.7.2 Equipment Under Test

SmartFind S5 AIS SART, S/N: 75902713–TUV0007

### 2.7.3 Date of Test and Modification State

29 October 2009 - Modification State 0

### 2.7.4 Test Equipment Used

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

### 2.7.5 Test Procedure

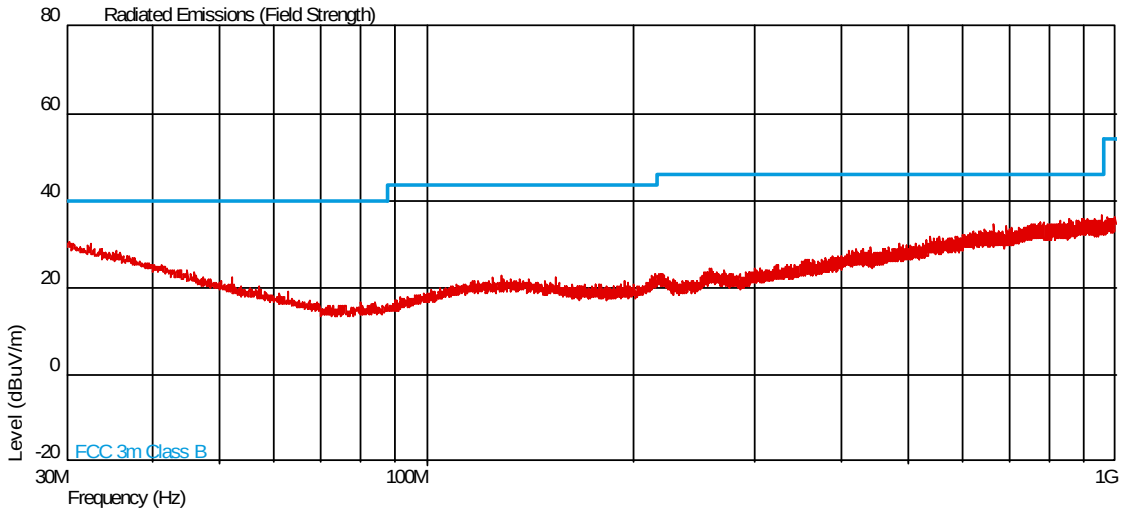
The test was applied in accordance with the test method requirements of ANSI C63.4.

### 2.7.6 Environmental Conditions

| | 29 October 2009 |
|---|---|
| Ambient Temperature | 22°C |
| Relative Humidity | 32% |
| Atmospheric Pressure | 1018mbar |

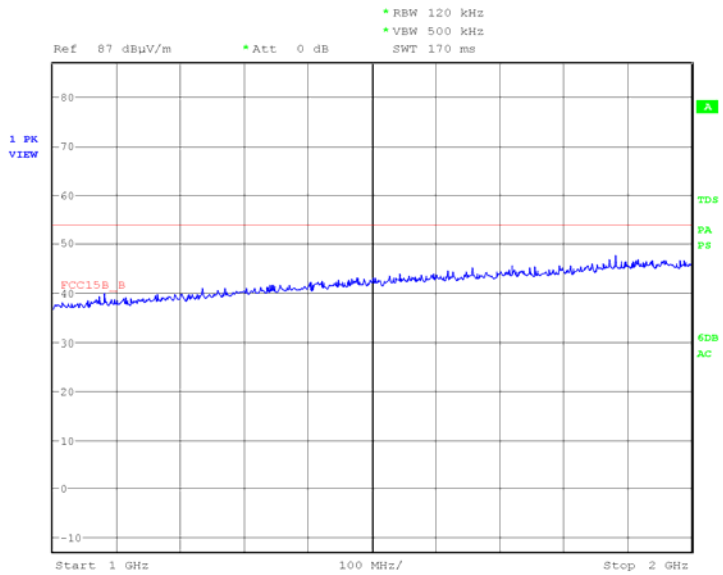
Product Service

### 2.7.7 Test Results




No emissions were detected within 10dB of the limit.

1GHz to 2GHz




Date: 29.OCT.2009 15:02:27

Product Service

**SECTION 3**

**TEST EQUIPMENT USED**

Product Service

## 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 and 2.2 Radio (Tx) - Frequency Characteristics** | | | | | |
| Counter | Hewlett Packard | 53181A | 159 | 12 | 26-May-2010 |
| Attenuator 20dB/2W | Weinschel | Model 2 | 379 | 12 | 25-Nov-2009 |
| Temperature Chamber | Montford | 2F3 | 467 | - | O/P Mon |
| Attenuator (10dB, 10W) | Texscan | HFP-50N | 468 | 12 | 24-Jun-2010 |
| GPS Frequency Standard | Rapco | GPS-804/3 | 1312 | 6 | 4-Mar-2010 |
| Digital Temperature Indicator | Fluke | 51 | 2267 | 12 | 23-Jun-2010 |
| Hygrometer | Rotronic | I-1000 | 3220 | 12 | 17-Apr-2010 |
| ESA-E Series Spectrum Analyser | Agilent | E4402B | 3348 | 12 | 23-Apr-2010 |
| **Section 2.3 Radio (Tx) - Emission Mask** | | | | | |
| Attenuator 20dB/2W | Weinschel | Model 2 | 379 | 12 | 25-Nov-2009 |
| Attenuator (10dB, 10W) | Texscan | HFP-50N | 468 | 12 | 24-Jun-2010 |
| GPS Frequency Standard | Rapco | GPS-804/3 | 1312 | 6 | 4-Mar-2010 |
| Spectrum Analyser | Rohde & Schwarz | FSU26 | 2747 | 12 | 2-Nov-2010 |
| Hygrometer | Rotronic | I-1000 | 3220 | 12 | 17-Apr-2010 |
| Signal Generator: 10MHz to 20GHz | Rohde & Schwarz | SMR20 | 3475 | 12 | 28-Nov-2009 |
| **Section 2.4 Radio (Tx) - Occupied Bandwidth** | | | | | |
| Attenuator 20dB/2W | Weinschel | Model 2 | 379 | 12 | 25-Nov-2009 |
| Attenuator (10dB, 10W) | Texscan | HFP-50N | 468 | 12 | 24-Jun-2010 |
| GPS Frequency Standard | Rapco | GPS-804/3 | 1312 | 6 | 4-Mar-2010 |
| Hygrometer | Rotronic | I-1000 | 3220 | 12 | 17-Apr-2010 |
| ESA-E Series Spectrum Analyser | Agilent | E4402B | 3348 | 12 | 23-Apr-2010 |
| Signal Generator, 9kHz to 3GHz | Rohde & Schwarz | SMA 100A | 3494 | 12 | 22-Dec-2009 |
| **Section 2.5 Radio (Tx) - Modulation Characteristics** | | | | | |
| Signal Generator | Rohde & Schwarz | SMX | 115 | 12 | 24-Jun-2010 |
| Attenuator 20dB/2W | Weinschel | Model 2 | 379 | 12 | 25-Nov-2009 |
| Attenuator (10dB, 10W) | Texscan | HFP-50N | 468 | 12 | 24-Jun-2010 |
| GPS Frequency Standard | Rapco | GPS-804/3 | 1312 | 6 | 4-Mar-2010 |
| Hygrometer | Rotronic | I-1000 | 3220 | 12 | 17-Apr-2010 |
| Spectrum Analyser | Rohde & Schwarz | FSQ | 3545 | 12 | 4-May-2010 |
| **Section 2.6 Radio (Tx) - Power Characteristics** | | | | | |
| Counter | Hewlett Packard | 53181A | 159 | 12 | 26-May-2010 |
| Attenuator 20dB/2W | Weinschel | Model 2 | 379 | 12 | 25-Nov-2009 |
| Temperature Chamber | Montford | 2F3 | 467 | - | O/P Mon |
| Attenuator (10dB, 10W) | Texscan | HFP-50N | 468 | 12 | 24-Jun-2010 |
| GPS Frequency Standard | Rapco | GPS-804/3 | 1312 | 6 | 4-Mar-2010 |
| Digital Temperature Indicator | Fluke | 51 | 2267 | 12 | 23-Jun-2010 |
| Hygrometer | Rotronic | I-1000 | 3220 | 12 | 17-Apr-2010 |
| ESA-E Series Spectrum Analyser | Agilent | E4402B | 3348 | 12 | 23-Apr-2010 |
| Signal Generator: 10MHz to 20GHz | Rohde & Schwarz | SMR20 | 3475 | 12 | 28-Nov-2009 |
| Signal Generator, 9kHz to 3GHz | Rohde & Schwarz | SMA 100A | 3494 | 12 | 22-Dec-2009 |

| Instrument | Manufacturer | Type No. | TE No. | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| **Section 2.7 EMC - Radiated Emissions** | | | | | |
| Antenna (Double Ridge Guide, 1GHz-18GHz) | EMCO | 3115 | 234 | 12 | 12-Oct-2010 |
| Antenna (Bilog) | Schaffner | CBL6143 | 287 | 24 | 21-Jan-2010 |
| Screened Room (5) | Rainford | Rainford | 1545 | 36 | 11-Feb-2011 |
| Mast Controller | Inn-Co GmbH | CO 1000 | 1606 | - | TU |
| Turntable/Mast Controller | EMCO | 2090 | 1610 | - | TU |
| EMI Test Receiver | Rohde & Schwarz | ESU40 | 3506 | 12 | 1-Sep-2010 |

TU – Traceability Unscheduled
OP Mon – Output monitored using calibrated equipment

## 3.2 MEASUREMENT UNCERTAINTY

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

| Test Discipline | Frequency / Parameter | MU |
|---|---|---|
| Radiated Emissions, Bilog Antenna, AOATS | 30MHz to 1GHz Amplitude | 5.1dB* |
| Radiated Emissions, Horn Antenna, AOATS | 1GHz to 40GHz Amplitude | 6.3dB* |
| Conducted Emissions, LISN | 150kHz to 30MHz Amplitude | 3.2dB* |
| Conducted Emissions, ISN | 150kHz to 30MHz Amplitude | 2.1dB |
| Substitution Antenna, Radiated Field | 30MHz to 18GHz Amplitude | 2.6dB |
| Discontinuous Interference | 150kHz to 30MHz Amplitude | 3.0dB* |
| Interference Power | 30MHz to 300MHz Amplitude | 3.0dB* |
| Radiated E-Field Susceptibility | 26MHz to 2.5GHz Test Amplitude | 1.4dB† |
| Conducted Susceptibility | 100kHz to 250MHz Amplitude | 1.8dB† |
| DC Input Ripple Immunity | Current<br>Voltage | 0.45%<br>0.91% |
| Power Frequency Magnetic Field | 50Hz/60Hz Amplitude | 0.45% |
| Magnetic Emissions | 9kHz to 30MHz Amplitude | 3.4dB* |
| Magnetic Field/Flux iaw EN 50366 | 10Hz to 400kHz | 2.64% |
| Harmonics and Flicker | The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3 | — |
| Mains Voltage Variations and Interrupts | The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11 | — |
| Fast Transient Burst | The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4 | — |
| Electrostatic Discharge | The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2 | — |
| Surge | The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5 | — |
| Vehicle Transients | The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2 | — |
| Compass Safe Distance | Azimuth Accuracy | 0.10° |

Worst case error for both Time and Frequency measurement 12 parts in $10^6$.

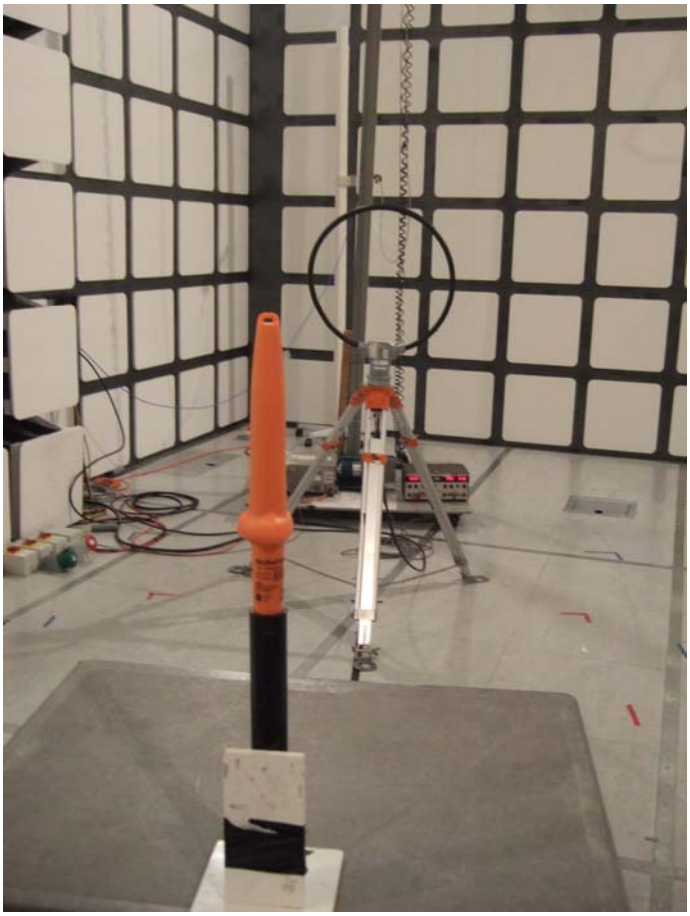
* In accordance with CISPR 16-4
† In accordance with UKAS Lab 34

Product Service

## SECTION 4

## PHOTOGRAPHS

## 4.1 TEST SET UP PHOTOGRAPHS



Radiated Emissions (Enclosure Port)

Product Service

## SECTION 5

## ACCREDITATION, DISCLAIMERS AND COPYRIGHT

## 5.1 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).