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# Report On

Limited FCC and Industry Canada Testing of the  
VECTRONIC Aerospace GmbH Survey VERTEX PLUS  
In accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2,  
Industry Canada RSS-170 and Industry Canada RSS-GEN

**COMMERCIAL-IN-CONFIDENCE**

**FCC ID: XZ5VERTEXPLUS  
IC: 8020A-13604SURVEY**

**Document 75934743 Report 01 Issue 2**

**August 2016**



Product Service

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Document 75934743 Report 01 Issue 2

August 2016

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Authorised Signatory

**DATED**

31 August 2016

**This report has been up-issued to Issue 2 to include the FCC and Industry Canada ID's.**

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**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 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

  
\_\_\_\_\_  
J Tuckwell





## CONTENTS

| <b>Section</b> |  | <b>Page No</b> |
|----------------|--|----------------|
| <b>1</b>       | <b>REPORT SUMMARY .....</b>                          | <b>3</b>       |
| 1.1            | Introduction .....                                   | 4              |
| 1.2            | Brief Summary of Results .....                       | 5              |
| 1.3            | Application Form .....                               | 6              |
| 1.4            | Product Information .....                            | 9              |
| 1.5            | Test Conditions .....                                | 9              |
| 1.6            | Deviations from the Standard .....                   | 9              |
| 1.7            | Modification Record .....                            | 9              |
| <b>2</b>       | <b>TEST DETAILS .....</b>                            | <b>10</b>      |
| 2.1            | Radiated Spurious Emissions .....                    | 11             |
| 2.2            | Radiated Output Power .....                          | 18             |
| <b>3</b>       | <b>TEST EQUIPMENT USED .....</b>                     | <b>20</b>      |
| 3.1            | Test Equipment Used .....                            | 21             |
| 3.2            | Measurement Uncertainty .....                        | 22             |
| <b>4</b>       | <b>ACCREDITATION, DISCLAIMERS AND COPYRIGHT.....</b> | <b>23</b>      |
| 4.1            | Accreditation, Disclaimers and Copyright.....        | 24             |



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## **SECTION 1**

### **REPORT SUMMARY**

Limited FCC and Industry Canada Testing of the  
VECTRONIC Aerospace GmbH Survey VERTEX PLUS

In accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and  
Industry Canada RSS-GEN



## 1.1 INTRODUCTION

The information contained in this report is intended to show the verification of Limited FCC and Industry Canada Testing of the VECTRONIC Aerospace GmbH Survey VERTEX PLUS to the requirements of FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and Industry Canada RSS-GEN.

|                               |   |
|-------------------------------|---|
| Objective                     | To perform Limited 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                  | VECTRONIC Aerospace GmbH  |
| Model Number(s)               | Survey VERTEX PLUS  |
| Serial Number(s)              | 60105 0-2317134   |
| Number of Samples Tested      | 1   |
| Test Specification/Issue/Date | FCC 47 CFR Part 25 (2015)<br>FCC 47 CFR Part 2 (2015)<br>Industry Canada RSS-170 (Issue 3, 2015)<br>Industry Canada RSS-GEN (Issue 4, 2014)                                     |
| Incoming Release Date         | Application Form<br>9 May 2016  |
| Disposal Reference Number     | Held Pending Disposal   |
| Date                          | Not Applicable  |
| Order Number                  | 201604274   |
| Date                          | 27 April 2016   |
| Start of Test                 | 14 June 2016  |
| Finish of Test                | 14 June 2016  |
| Name of Engineer(s)           | J Tuckwell  |



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and Industry Canada RSS-GEN is shown below.

| Section  | Specification Clause |        |         |         | Test Description            | Result | Comments/Base Standard |
|----------|----------------------|--------|---------|---------|-----------------------------|--------|------------------------|
|          | Part 25              | Part 2 | RSS-170 | RSS-GEN |                             |        |                        |
| Transmit |                      |        |         |         |                             |        |                        |
| 2.1      | 25.202(f)            | 2.1053 | 5.4.3.1 | 6.13    | Radiated Spurious Emissions | Pass   |                        |
| 2.2      | 25.204               | -      | 5.3     | -       | Radiated Output Power       | Pass   |                        |



## 1.3 APPLICATION FORM

| EQUIPMENT DESCRIPTION   |   |
|---|---|
| Model Name/Number   | Survey VERTEX PLUS  |
| Part Number   | 60105   |
| Hardware Version  | 5.1   |
| Software Version  | 2.5.4   |
| FCC ID (if applicable)  | To be supplied  |
| Industry Canada ID (if applicable)  | To be supplied  |
| Technical Description (Please provide a brief description of the intended use of the equipment) | The Survey VERTEX PLUS collar has been designed for long-term survey and survival studies on wild animals with regular GPS data updates using GLOBALSTAR satellite communication. |

| POWER SOURCE  |  |             |   |
|---|--|-------------|---|
| <input type="checkbox"/> AC mains                     | State voltage  |             |   |
| AC supply frequency                                   | (Hz)   |             |   |
| VAC   |  |             |   |
| Max Current   |  |             |   |
| Hz  |  |             |   |
| <input type="checkbox"/> Single phase                 | <input type="checkbox"/> Three phase                   |             |   |
| And / Or  |  |             |   |
| <input type="checkbox"/> External DC supply           |  |             |   |
| Nominal voltage                                       | V  | Max Current | A |
| Extreme upper voltage                                 | V  |             |   |
| Extreme lower voltage                                 | V  |             |   |
| Battery   |  |             |   |
| <input type="checkbox"/> Nickel Cadmium               | <input type="checkbox"/> Lead acid (Vehicle regulated) |             |   |
| <input type="checkbox"/> Alkaline                     | <input type="checkbox"/> Leclanche                     |             |   |
| <input checked="" type="checkbox"/> Lithium           | <input type="checkbox"/> Other Details :               |             |   |
| 3.6   | Volts nominal.   |             |   |
| End point voltage as quoted by equipment manufacturer | 2.7  | V           |   |



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| FREQUENCY INFORMATION                      |                         |                   |  |
|--|-------------------------|-------------------|--|
| Frequency Range                            | 1611.25<br>to1618.75    | MHz               |  |
| Channel Spacing (where applicable)         | 2.5 MHz                 |                   |  |
| Receiver Frequency Range<br>(if different) | to                      | MHz               |  |
| Channel Spacing (if different)             |                         |                   |  |
| Test Frequencies*                          | Bottom<br>Middle<br>Top | MHz<br>MHz<br>MHz | Channel Number (if applicable)<br>Channel Number (if applicable)<br>Channel Number (if applicable) |
| Intermediate Frequencies                   |                         | MHz               |  |
| Highest Internally Generated Frequency :   |                         | MHz               |  |

| POWER CHARACTERISTICS            |              |                                     |     |
|----------------------------------|--------------|-------------------------------------|-----|
| Maximum TX power                 | 0.1          | W                                   |     |
| Minimum TX power                 | 0.040        | W (if variable)                     |     |
| Is transmitter intended for :    |              |                                     |     |
| Continuous duty                  |              | <input type="checkbox"/>            | Yes |
| Intermittent duty                |              | <input checked="" type="checkbox"/> | Yes |
| If intermittent state DUTY CYCLE |              | <input type="checkbox"/>            | No  |
| Transmitter ON                   | 1.44 seconds |                                     |     |
| Transmitter OFF                  | 300 seconds  |                                     |     |

| ANTENNA CHARACTERISTICS                              |                      |                 |          |
|--|----------------------|-----------------|----------|
| <input type="checkbox"/> Antenna connector           |                      | State impedance | Ohm      |
| <input type="checkbox"/> Temporary antenna connector |                      | State impedance | Ohm      |
| <input checked="" type="checkbox"/> Integral antenna | Type PA251633025SBLF | State impedance | 3.51 dBi |
| <input type="checkbox"/> External antenna            | Type                 | State impedance | dB       |

| MODULATION CHARACTERISTICS                |           |                                     |   |
|---|-----------|-------------------------------------|---|
| <input type="checkbox"/>                  | Amplitude | <input type="checkbox"/>            | Frequency   |
| <input type="checkbox"/>                  | Phase     | <input checked="" type="checkbox"/> | Other (please provide details): DSSS, BPSK                          |
| Can the transmitter operate un-modulated? |           |                                     | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |

| CLASS OF EMISSION USED                                   |                   |  |  |
|--|-------------------|--|--|
| ITU designation or Class of Emission:                    |                   |  |  |
| 1  | 2M50G1D           |  |  |
|  | (if applicable) 2 |  |  |
|  | (if applicable) 3 |  |  |
| If more than three classes of emission, list separately: |                   |  |  |



| <b>BATTERY POWER SUPPLY</b> |       |                            |        |
|-----------------------------|-------|----------------------------|--------|
| Model name/number           | LSH20 | Identification/Part number | LSH20  |
| Manufacturer                | SAFT  | Country of Origin          | France |

| <b>ANCILLARIES (If applicable)</b> |                            |
|------------------------------------|----------------------------|
| Model name/number                  | Identification/Part number |
| Manufacturer                       | Country of Origin          |

| EXTREME CONDITIONS          |     |    |                             |     |    |  |
|-----------------------------|-----|----|-----------------------------|-----|----|--|
| Extreme test voltages (Max) | 3.6 | V  | Extreme test voltages (Mix) | 2.7 | V  |  |
| Nominal DC Voltage          | 3.3 | V  | DC Maximum Current          | 0.6 | A  |  |
| Maximum temperature         | 50  | °C | Minimum temperature         | -40 | °C |  |

I hereby declare that the information supplied is correct and complete.

Name: Robert Schulte Position held: CEO  
Date: 2016-05-09



## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a VECTRONIC Aerospace GmbH Survey VERTEX PLUS. 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 3.6 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 and Industry Canada Testing of the  
VECTRONIC Aerospace GmbH Survey VERTEX PLUS

In accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and  
Industry Canada RSS-GEN



## 2.1 RADIATED SPURIOUS EMISSIONS

### 2.1.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(f)  
 FCC 47 CFR Part 2, Clause 2.1053  
 Industry Canada RSS-170, Clause 5.4.3.1  
 Industry Canada RSS-GEN, Clause 6.13

### 2.1.2 Equipment Under Test and Modification State

Survey VERTEX PLUS S/N: 60105 0-2317134 - Modification State 0

### 2.1.3 Date of Test

14 June 2016

### 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

For radiated testing, 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 | 18.9 - 19.1°C |
| Relative Humidity   | 63.0 - 64.0%  |



### 2.1.7 Test Results

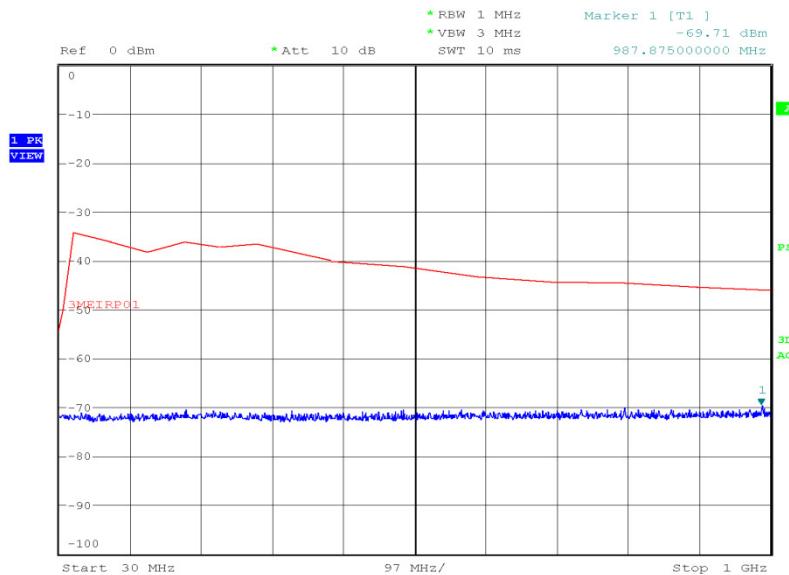
#### 3.6 V DC Supply

##### Transmit, 1611.250 MHz, 30 MHz to 18 GHz, Radiated Spurious Emissions Results

| Frequency (MHz) | Emission Results (dBm) |
|-----------------|------------------------|
| *               |                        |

\*No emissions were detected within 20 dB of the limit.

##### Transmit, 1611.250 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot

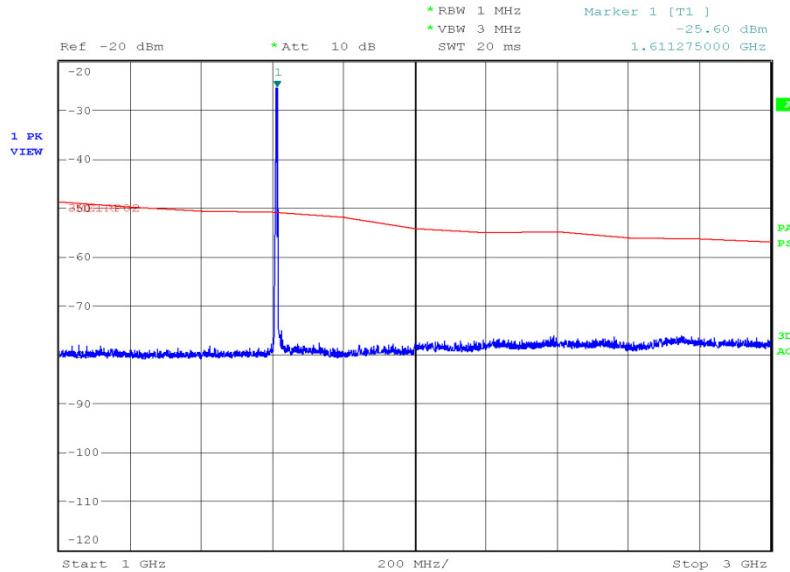


Date: 14.JUN.2016 10:06:35



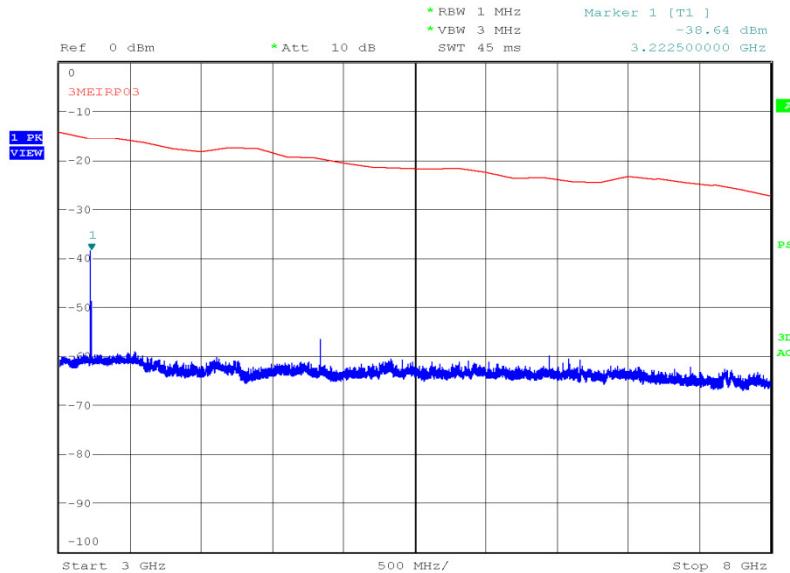
Product Service

### Transmit, 1611.250 MHz, 1 GHz to 3 GHz, Radiated Spurious Emissions Plot



Date: 13.JUN.2016 15:01:06

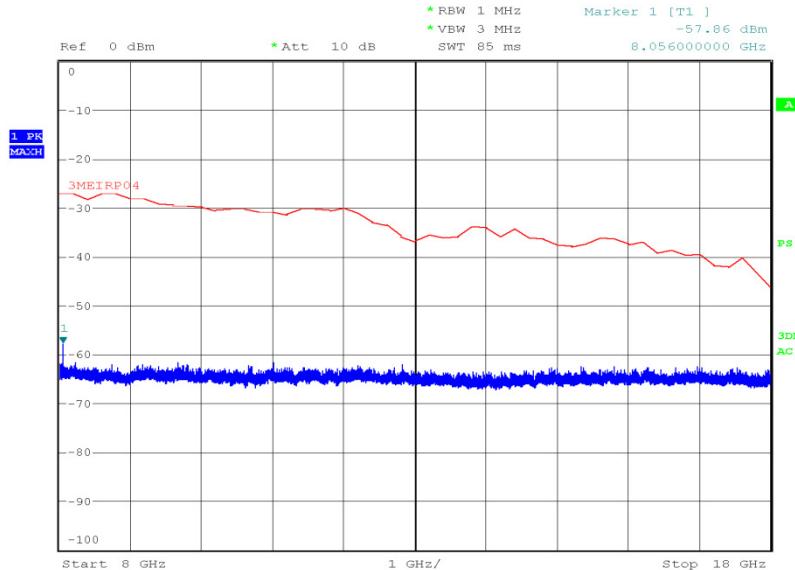
### Transmit, 1611.250 MHz, 3 GHz to 8 GHz, Radiated Spurious Emissions Plot



Date: 14.JUN.2016 09:19:39



Product Service

Transmit, 1611.250 MHz, 8 GHz to 18 GHz, Radiated Spurious Emissions Plot

Date: 13.JUN.2016 16:30:47

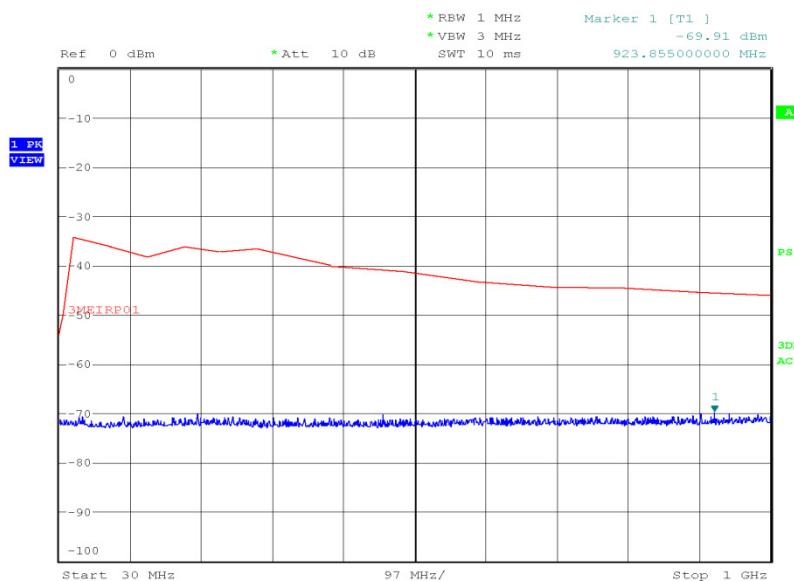


Product Service

Transmit, 1616.250 MHz, 30 MHz to 18 GHz, Radiated Spurious Emissions Results

| Frequency (MHz) | Emission Results (dBm) |
|-----------------|------------------------|
| *               |                        |

\*No emissions were detected within 20 dB of the limit.

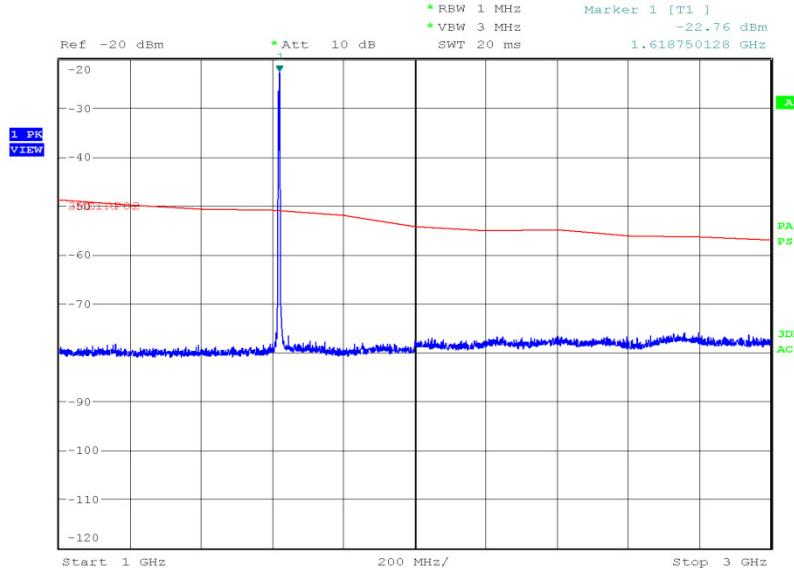
Transmit, 1618.750 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot

Date: 14.JUN.2016 10:14:42



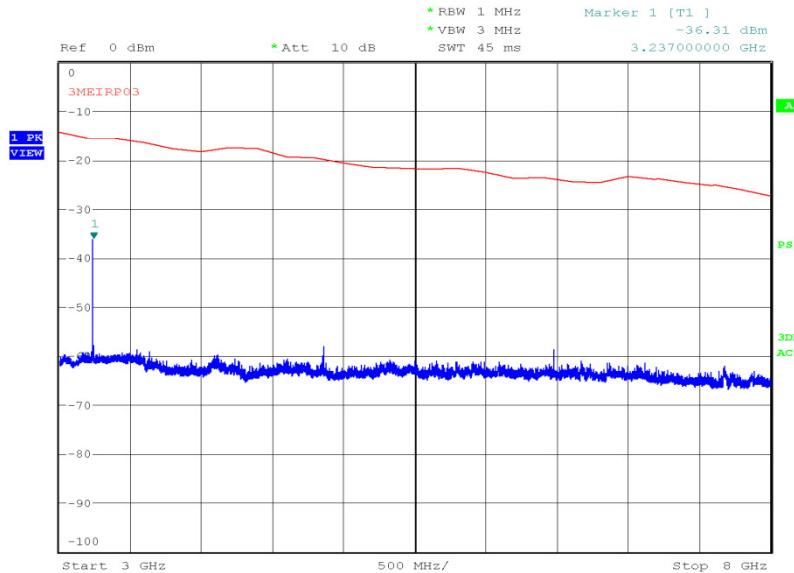
Product Service

### Transmit, 1616.250 MHz, 1 GHz to 3 GHz, Radiated Spurious Emissions Plot



Date: 13.JUN.2016 14:49:06

### Transmit, 1616.250 MHz, 3 GHz to 8 GHz, Radiated Spurious Emissions Plot

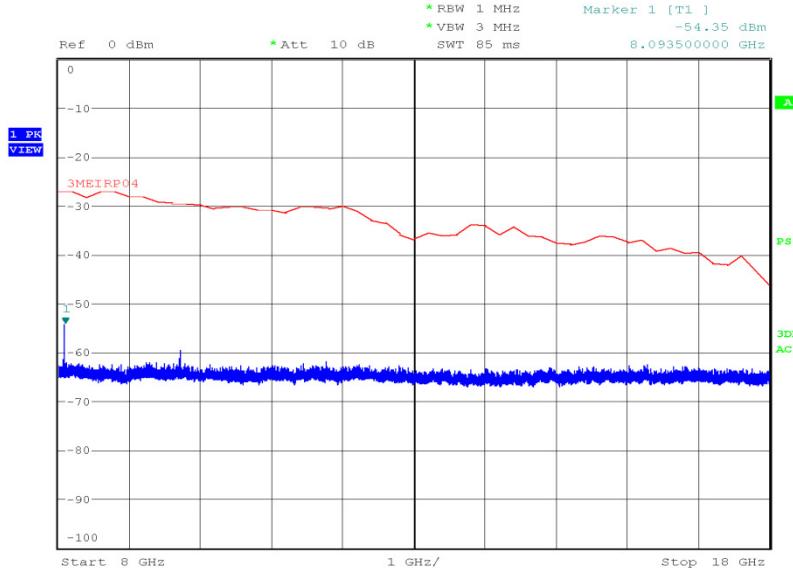


Date: 14.JUN.2016 09:08:22



Product Service

### Transmit, 1616.250 MHz, 8 GHz to 18 GHz, Radiated Spurious Emissions Plot



Date: 14.JUN.2016 09:39:22

### FCC 47 CFR Part 2, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power,  $P(\text{dBW})$ , of the transmitter, as specified below:

- 1)  $43 + 10 \log p$  (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

### Industry Canada RSS-170, Limit Clause 5.4.3.1

The average power of unwanted emissions shall be attenuated below the average output power,  $P(\text{dBW})$ , of the transmitter, as specified below:

- 1)  $43 + 10 \log p$  (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the occupied bandwidth or necessary bandwidth, whichever is greater.



## 2.2 RADIATED OUTPUT POWER

### 2.2.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.204  
Industry Canada RSS-170, Clause 5.3

### 2.2.2 Equipment Under Test and Modification State

Survey VERTEX PLUS S/N: 60105 0-2317134 - Modification State 0

### 2.2.3 Date of Test

14 June 2016

### 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

For radiated power, the EUT was transmitted at maximum power via a cable to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen and a resolution bandwidth and video bandwidth of 1 MHz were used to perform the measurement. The level on the spectrum analyser was maximised by rotating the EUT through 360° and a height search of the measuring antenna. A substitution was then performed using a suitable calibrated antenna and signal generator.

This level was maximised by adjusting the height of the measuring antenna once more. The level from the signal generator was then adjusted to achieve the same raw result as with the EUT. This level was then corrected to account for cable loss and antenna factor.

A calculation was then performed to obtain the final figure.

### 2.2.6 Environmental Conditions

|                     |        |
|---------------------|--------|
| Ambient Temperature | 21.3°C |
| Relative Humidity   | 63.0%  |



## 2.2.7 Test Results

3.6 V DC Supply

### Transmit, EIRP, Radiated, Power Limits Results

|              |              |
|--------------|--------------|
| 1611.250 MHz | 1618.750 MHz |
| dBW          | dBW          |
| 15.23        | 15.00        |

### FCC 47 CFR Part 25, Limit Clause 25.204

+40 dBW in any 4 kHz band for  $\theta \leq 0^\circ$

+40 + 3θ dBW in any 4 kHz band for  $0^\circ < \theta \leq 5^\circ$

For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.

### Industry Canada RSS-170, Limit Clause 5.3

The application for MES certification shall state the MES e.i.r.p. that is necessary for satisfactory communication. The maximum permissible e.i.r.p. will be the stated necessary e.i.r.p. plus a 2 dB margin. If a detachable antenna is used, the certification application shall state the recommended antenna type and manufacturer, the antenna gain and the maximum transmitter output power at the antenna terminal.



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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 |
|--|--------------------------|------------------------|--------|-----------------------------|-----------------|
| <b>Section 2.1 - Radiated Spurious Emissions</b> |                          |                        |        |                             |                 |
| Antenna (Double Ridge Guide, 1GHz-18GHz)         | EMCO                     | 3115                   | 234    | 12                          | 29-Apr-2017     |
| Antenna (Double Ridge Guide, 1GHz-18GHz)         | EMCO                     | 3115                   | 235    | 12                          | 27-Nov-2016     |
| Pre-Amplifier                                    | Phase One                | PS04-0086              | 1533   | 12                          | 30-Jul-2016     |
| Screened Room (5)                                | Rainford                 | Rainford               | 1545   | 36                          | 20-Dec-2017     |
| Turntable Controller                             | Inn-Co GmbH              | CO 1000                | 1606   | -                           | TU              |
| EMI Test Receiver                                | Rohde & Schwarz          | ESU40                  | 3506   | 12                          | 2-Nov-2016      |
| Tilt Antenna Mast                                | maturo GmbH              | TAM 4.0-P              | 3916   | -                           | TU              |
| Mast Controller                                  | maturo GmbH              | NCD                    | 3917   | -                           | TU              |
| 1GHz to 8GHz Low Noise Amplifier                 | Wright Technologies      | APS04-0085             | 4365   | 12                          | 6-Oct-2016      |
| Suspended Substrate Highpass Filter              | Advance Power Components | 11SH10-3000/X18000-O/O | 4412   | 12                          | 23-Mar-2017     |
| <b>Section 2.2 - Radiated Output Power</b>       |                          |                        |        |                             |                 |
| Antenna (Double Ridge Guide, 1GHz-18GHz)         | EMCO                     | 3115                   | 234    | 12                          | 29-Apr-2017     |
| Antenna (Double Ridge Guide, 1GHz-18GHz)         | EMCO                     | 3115                   | 235    | 12                          | 27-Nov-2016     |
| Screened Room (5)                                | Rainford                 | Rainford               | 1545   | 36                          | 20-Dec-2017     |
| Turntable Controller                             | Inn-Co GmbH              | CO 1000                | 1606   | -                           | TU              |
| EMI Test Receiver                                | Rohde & Schwarz          | ESU40                  | 3506   | 12                          | 2-Nov-2016      |
| 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   |
|-----------------------------|--|
| Radiated Output Power       | ± 6.3 dB   |
| Radiated Spurious Emissions | 30 MHz to 1 GHz: ± 5.1 dB<br>1 GHz to 17 GHz: ± 6.3 dB |



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## SECTION 4

### ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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Results of tests not covered by our UKAS Accreditation Schedule are marked NUA  
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