



# **TRaC RADIO TEST REPORT**

**FOR**

**Ubisense**

**ON**

**UWB Watch Location Device  
(model number UBIWATCH21, FCC ID SEAWATCH21)**

**DOCUMENT NO. TRA-011589-W-US-1**

## **HULL**

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**TRaC Wireless Test Report** : TRA-010248-W-US-1

**Applicant** : Ubisense

**Apparatus** : UWB Watch Location Device (model number UBIWATCH21)

**Specification(s)** : CFR47 Part 15 F 15.517: October 2012

**FCCID** : SEAWATCH21

**Purpose of Test** : Certification

**Authorised by** :

A handwritten signature in black ink, reading "John Charters", is displayed on a light gray rectangular background.

: Radio Product Manager

**Issue Date** : **22<sup>nd</sup> March 2013**

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**Contents**

|                                                                                             |    |
|---------------------------------------------------------------------------------------------|----|
| Section 1: Introduction                                                                     | 4  |
| 1.1 General                                                                                 | 4  |
| 1.2 Tests Requested By                                                                      | 5  |
| 1.3 Manufacturer                                                                            | 5  |
| 1.4 Apparatus Assessed                                                                      | 6  |
| 1.5 Test Result Summary                                                                     | 7  |
| 1.6 Notes Relating To The Assessment                                                        | 8  |
| 1.7 Deviations from Test Standards                                                          | 8  |
| Section 2: Measurement Uncertainty                                                          | 9  |
| 2.1 Measurement Uncertainty Values                                                          | 9  |
| Section 3: Modifications                                                                    | 10 |
| 3.1 Modifications Performed During Assessment                                               | 10 |
| Appendix A: Formal Emission Test Results                                                    | 11 |
| A1 Transmitter Bandwidth                                                                    | 12 |
| A2 Transmit Radiated Emissions below 960MHz                                                 | 13 |
| A3 Transmit Radiated Emissions above 960MHz                                                 | 15 |
| A4 Radiated Peak Emissions                                                                  | 17 |
| A5 Unintentional Radiated Electric Field Emissions - 15.109<br>(Receiver/Digital circuitry) | 18 |
| A6 ac Power Line Conducted Emissions 15.107 (Receiver/Digital<br>circuitry)                 | 20 |
| Appendix B: Supporting Graphical Data                                                       | 21 |
| Appendix C: Additional Test and Sample Details                                              | 31 |
| Appendix D: Additional Information                                                          | 37 |
| Appendix E: Photographs and Figures                                                         | 38 |

**Section 1:**

**Introduction**

**1.1 General**

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on samples submitted to the Laboratory.

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Report author: K J Anderson

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## **1.2 Tests Requested By**

This testing in this report was requested by:

Ubisense  
St Andrews House  
St Andrews Road  
Chesterton  
Cambridge  
CB4 1DL  
United Kingdom

## **1.3 Manufacturer**

As Above

#### **1.4 Apparatus Assessed**

The following apparatus was assessed between: 7/2/13 and 8/2/13

UWB Watch Location Device (model number UBIWATCH21, FCC ID SEAWATCH21).

The apparatus is a UWB Watch Location Device containing an UWB transmitter operating at around 7200 MHz in the 3100MHz to 10600 MHz UWB band.

The apparatus is designed for indoor use only, the client declaration is contained within Appendix D of this report.

## 1.5 Test Result Summary

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

| Test Type                                          | Regulation                                              | Measurement standard                                                                  | Result |
|----------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------|--------|
| Transmitter bandwidth                              | Title 47 of the CFR:<br>Part 15 Subpart F; 15.517(b)    | -                                                                                     |        |
| Radiated emissions below 960 MHz                   | Title 47 of the CFR:<br>Part 15 Subpart F; 15.517(c)    | ANSI C63.4<br>Section 8 and<br>Title 47 of the<br>CFR:<br>Part 15 Subpart<br>F 15.521 | Pass   |
| Radiated Emissions above 960 MHz                   | Title 47 of the CFR:<br>Part 15 Subpart F; 15.517(c)(d) | ANSI C63.4<br>Section 8 and<br>Title 47 of the<br>CFR:<br>Part 15 Subpart<br>F 15.521 | Pass   |
| Radiated Peak Emissions                            | Title 47 of the CFR:<br>Part 15 Subpart F; 15.517(e)    | Title 47 of the<br>CFR: Part 15<br>Subpart F;<br>15.521g                              | Pass   |
| Radiated Spurious Emissions from digital circuitry | Title 47 of the CFR:<br>Part 15 Subpart B; 15.209       | ANSI C63.4                                                                            | Pass   |

## **1.6 Notes Relating To The Assessment**

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

Radiated emissions above 960MHz measured against average limits were made with the RMS detector function on the spectrum analyzer, with a sweep time set to 901ms or less - the spectrum analyzer scan had 901 points, and so a sweep time of 901ms or less ensured that the averaging time per point was 1ms or less. The VBW was always greater than or equal to the RBW unless noted.

The requirement listed in 47CFR Part 15.517(a) states that indoor UWB systems must be employed solely for indoor operation. The client has supplied a declaration of conformance to this section in a separate exhibit, included in Appendix D.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, "Pass" indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

Where relevant, the apparatus was only assessed using the monitoring methods and susceptibility criteria defined in this report.

All testing with the exception of testing at the Open Area Test Site was performed under the following environmental conditions:

|                     |                 |
|---------------------|-----------------|
| Temperature         | : 17 to 23 °C   |
| Humidity            | : 45 to 75 %    |
| Barometric Pressure | : 86 to 106 kPa |

All dates used in this report are in the format dd/mm/yy.

This assessment has been performed in accordance with the requirements of ISO/IEC 17025.

## **1.7 Deviations from Test Standards**

There were no deviations from the standards tested to.

**Section 2:****Measurement Uncertainty****2.1 Measurement Uncertainty Values**

For test data recorded, the following measurement uncertainty was calculated:

**Radiated Electric Field Emissions**

| Quantity Range              | Quantity                 | Expanded Uncertainty |
|-----------------------------|--------------------------|----------------------|
| 9kHz to 150 kHz             | Amplitude dB( $\mu$ V/m) | $\pm 1.6$ dB         |
| 150 kHz to 30 MHz           | Amplitude dB( $\mu$ V/m) | $\pm 2.1$ dB         |
| 30MHz to 300MHz Horizontal  | Amplitude dB( $\mu$ V/m) | $\pm 5.1$ dB         |
| 30MHz to 300MHz Vertical    | Amplitude dB( $\mu$ V/m) | $\pm 5.2$ dB         |
| 300MHz to 1GHz Horizontal   | Amplitude dB( $\mu$ V/m) | $\pm 5.4$ dB         |
| 300MHz to 1GHz Vertical     | Amplitude dB( $\mu$ V/m) | $\pm 5.2$ dB         |
| 1GHz to 18GHz Horizontal    | Amplitude dB( $\mu$ V/m) | $\pm 4.4$ dB         |
| 1GHz to 18GHz Vertical      | Amplitude dB( $\mu$ V/m) | $\pm 4.4$ dB         |
| 18GHz to 26.5GHz Horizontal | Amplitude dB( $\mu$ V/m) | $\pm 4.2$ dB         |
| 18GHz to 26.5GHz Vertical   | Amplitude dB( $\mu$ V/m) | $\pm 4.2$ dB         |
| 26.5GHz to 40GHz Horizontal | Amplitude dB( $\mu$ V/m) | $\pm 4.3$ dB         |
| 26.5GHz to 40GHz Vertical   | Amplitude dB( $\mu$ V/m) | $\pm 4.3$ dB         |

**Section 3:**

**Modifications**

**3.1 Modifications Performed During Assessment**

No modifications were performed during the assessment

**Appendix A:****Formal Emission Test Results**

Abbreviations used in the tables in this appendix:

|      |                                 |      |                                |
|------|---------------------------------|------|--------------------------------|
| Spec | : Specification                 | ALSR | : Absorber Lined Screened Room |
| Mod  | : Modification                  | OATS | : Open Area Test Site          |
|      |                                 | ATS  | : Alternative Test Site        |
| EUT  | : Equipment Under Test          |      |                                |
| SE   | : Support Equipment             | Ref  | : Reference                    |
|      |                                 | Freq | : Frequency                    |
| L    | : Live Power Line               |      |                                |
| N    | : Neutral Power Line            | MD   | : Measurement Distance         |
| E    | : Earth Power Line              | SD   | : Spec Distance                |
|      |                                 |      |                                |
| Pk   | : Peak Detector                 | Pol  | : Polarisation                 |
| QP   | : Quasi-Peak Detector           | H    | : Horizontal Polarisation      |
| Av   | : Average Detector              | V    | : Vertical Polarisation        |
|      |                                 |      |                                |
| CDN  | : Coupling & decoupling network |      |                                |

**A1 Transmitter Bandwidth**

A scan was performed of the transmitter bandwidth using an RMS detector with the RBW/VBW of the analyser set to 1 MHz. The bandwidth was measured at the -10dB points on the modulation envelope.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site :

☐

3m alternative test site :

☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| Test Details:          |                                                   |
|------------------------|---------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart F; 15.517(b) |
| Frequency range        | 6500MHz to 7500 MHz                               |
| EUT sample number      | S01                                               |
| Modification state     | 0                                                 |
| SE in test environment | None                                              |
| SE isolated from EUT   | None                                              |
| EUT set up             | Refer to Appendix C                               |

| Lower UWB Edge (MHz) | Upper UWB Edge (MHz) | Allowable Frequency Band (MHz) |       | Result |
|----------------------|----------------------|--------------------------------|-------|--------|
| 6626.0               | 7307.1               | 3100                           | 10600 | Pass   |

**A2 Transmit Radiated Emissions below 960MHz**

Preliminary scans were performed using a peak detector with RBW=100kHz. Final measurements were made using a quasi-peak detector with RBW=100kHz.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site :

☐

3m alternative test site :

☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| <b>Test Details:</b>   |                                                                        |
|------------------------|------------------------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart F; 15.517(c)                      |
| Measurement standard   | ANSI C63.4 Section 8 and Title 47 of the CFR: Part 15 Subpart F 15.521 |
| Frequency range        | 30MHz to 960 MHz                                                       |
| EUT sample number      | S01                                                                    |
| Modification state     | 0                                                                      |
| SE in test environment | None                                                                   |
| SE isolated from EUT   | None                                                                   |
| EUT set up             | Refer to Appendix C                                                    |

The worst case radiated emission measurements for spurious emissions:

| <b>Frequency (MHz)</b> | <b>Polarization</b> | <b>Level (dBuV/m)</b> | <b>Limit (dBuV/m)</b> | <b>Margin (dB)</b> | <b>Result</b> |
|------------------------|---------------------|-----------------------|-----------------------|--------------------|---------------|
| 31.100                 | Vertical            | 22.4                  | 40.0                  | -17.6              | Pass          |
| 942.200                | Vertical            | 33.1                  | 46.0                  | -12.9              | Pass          |

## Limits

| Frequency of emission (MHz) | Field strength $\mu\text{V/m}$ | Measurement Distance m | Field strength $\text{dB}\mu\text{V/m}$ |
|-----------------------------|--------------------------------|------------------------|-----------------------------------------|
| 0.009-0.490                 | 2400/F(kHz)                    | 300                    | 67.6/F (kHz)                            |
| 0.490-1.705                 | 24000/F(kHz)                   | 30                     | 87.6/F (kHz)                            |
| 1.705-30                    | 30                             | 30                     | 29.5                                    |
| 30-88                       | 100                            | 3                      | 40.0                                    |
| 88-216                      | 150                            | 3                      | 43.5                                    |
| 216-960                     | 200                            | 3                      | 46.0                                    |
| Above 960                   | 500                            | 3                      | 54.0                                    |

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = 20 \log_{10} \left( \frac{\text{measurement distance}}{\text{specification distance}} \right)$$

The results displayed take into account applicable antenna factors and cable losses.

- (b) The levels may have been rounded for display purposes.
- (c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

|                                                                                                                                                                                                                                                                                                                                | See (i) | See (ii) | See (iii) | See (iv) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|-----------|----------|
| Effect of EUT operating mode on emission levels                                                                                                                                                                                                                                                                                |         | ✓        |           |          |
| Effect of EUT internal configuration on emission levels                                                                                                                                                                                                                                                                        |         | ✓        |           |          |
| Effect of Position of EUT cables & samples on emission levels                                                                                                                                                                                                                                                                  |         | ✓        |           |          |
| (i) Parameter defined by standard and / or single possible, refer to Appendix D<br>(ii) Parameter defined by client and / or single possible, refer to Appendix D<br>(iii) Parameter had a negligible effect on emission levels, refer to Appendix D<br>(iv) Worst case determined by initial measurement, refer to Appendix D |         |          |           |          |

**A3 Transmit Radiated Emissions above 960MHz**

Scans and measurements were performed using an RMS average detector with the RBW of the analyser set to 1MHz, except for the bands 1164MHz to 1240MHz and 1559MHz to 1610MHz where the RBW of the analyser was set to 1kHz. The averaging time per point on the analyser scan was 1ms or less.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site : ☐

3m alternative test site : ☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| Test Details:          |                                                                        |
|------------------------|------------------------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart F; 15.517(c)(d)                   |
| Measurement standard   | ANSI C63.4 Section 8 and Title 47 of the CFR: Part 15 Subpart F 15.521 |
| Frequency range        | 960MHz to 40 GHz                                                       |
| EUT sample number      | S01                                                                    |
| Modification state     | 0                                                                      |
| SE in test environment | None                                                                   |
| SE isolated from EUT   | None                                                                   |
| EUT set up             | Refer to Appendix C                                                    |

The worst case radiated emission measurements :

| Frequency (MHz) | Polarization | Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result |
|-----------------|--------------|-----------------|-----------------|-------------|--------|
| 989.600         | Vertical     | -77.5           | -75.3           | -2.2        | Pass   |
| 1504.300        | Vertical     | -77.8           | -75.3           | -3.5        | Pass   |
| 1783.100        | Vertical     | -70.6           | -53.3           | -17.3       | Pass   |
| 2993.900        | Vertical     | -64.2           | -51.3           | -12.9       | Pass   |
| 6866.208        | Vertical     | -44.5           | -41.3           | -3.2        | Pass   |
| 9941.700        | Vertical     | -56.1           | -41.3           | -24.8       | Pass   |
| 17745.100       | Vertical     | -52.4           | -51.3           | -1.1        | Pass   |
| 25140.000       | Vertical     | -54.6           | -51.3           | -3.3        | Pass   |
| 39520.000       | Vertical     | -53.9           | -51.3           | -2.6        | Pass   |

Bands 1164 to 1240 MHz and 1559 to 1610 MHz

| Frequency (MHz) | Polarization | Level (dBm/kHz) | Limit (dBm/kHz) | Margin (dB) | Result |
|-----------------|--------------|-----------------|-----------------|-------------|--------|
| 1204.8          | Vertical     | -95.8           | -85.3           | -10.5       | Pass   |
| 1594.8          | Vertical     | -93.5           | -85.3           | -8.2        | Pass   |

**Limits 15.517(c)**

| <b>Frequency Range (MHz)</b> | <b>EIRP Limit (dBm/MHz)</b> |
|------------------------------|-----------------------------|
| 960–1610                     | -75.3                       |
| 1610–1990                    | -53.3                       |
| 1990–3100                    | -51.3                       |
| 3100–10600                   | -41.3                       |
| Above 10600                  | -51.3                       |

**Limits 15.517(d)**

| <b>Frequency Range (MHz)</b> | <b>EIRP Limit (dBm/kHz)</b> |
|------------------------------|-----------------------------|
| 1164–1240                    | -85.3                       |
| 1559–1610                    | -85.3                       |

**A4 Radiated Peak Emissions**

Measurements were performed using a peak detector with RBW=3MHz .

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site : ☐

3m alternative test site : ☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| Test Details:          |                                                   |
|------------------------|---------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart F; 15.517(e) |
| Measurement standard   | Title 47 of the CFR: Part 15 Subpart F; 15.521g   |
| Frequency range        | 6.5 to 7.5GHz                                     |
| EUT sample number      | S01                                               |
| Modification state     | 0                                                 |
| SE in test environment | None                                              |
| SE isolated from EUT   | None                                              |
| EUT set up             | Refer to Appendix C                               |

| Frequency (MHz) | Polarization | Level (dBm/3MHz) | Limit (dBm/3MHz) | Margin (dB) | Result |
|-----------------|--------------|------------------|------------------|-------------|--------|
| 6866.208        | Horizontal   | -34.6            | -24.4(Note)      | -10.2       | Pass   |

**Note:**

The test limit is derived from the 15.517(e) limit of 0dBm/50 MHz.

The measurement bandwidth used was 3 MHz, therefore the correction factor used was  $20 \log (3/50)$  dB.

**A5 Unintentional Radiated Electric Field Emissions - 15.109 (Receiver/Digital circuitry)**

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The maximum permitted field strength is listed in Section 15.109. The EUT was set to receive mode only on its lowest, centre and highest carrier frequency in turn.

The following test site was used for final measurements as specified by the standard tested to :

3m open area test site :

☐

3m alternative test site :

☒

| Test Details: Receive Mode |                                                        |
|----------------------------|--------------------------------------------------------|
| Regulation                 | Title 47 of the CFR: Part 15 Subpart (b) Clause 15.109 |
| Measurement standard       | ANSI C63.4                                             |
| Class                      | B – refer to specification limit table below.          |
| Frequency range            | 30 MHz to 1 GHz                                        |
| EUT sample number          | S01                                                    |
| Modification state         | 0                                                      |
| SE in test environment     | None                                                   |
| SE isolated from EUT       | None                                                   |
| EUT set up                 | Refer to Appendix C                                    |

No emissions were found within 20 dB of the emissions limit.

**Specification limits :**

The upper frequency of the measurement range was decided according to 47 CFR Part 15 Clause 15.33.

Radiated emission limits (47 CFR Part 15 Clause 15.109):

Except for a Class A digital device, the field strength of radiated emissions from unintentional radiators at a distance of 3m shall not exceed the following values:

| Frequency of emission (MHz) | Field strength $\mu\text{V/m}$ | Field strength $\text{dB}\mu\text{V/m}$ |
|-----------------------------|--------------------------------|-----------------------------------------|
| 30-88                       | 100                            | 40.0 (quasi-peak)                       |
| 88-216                      | 150                            | 43.5 (quasi-peak)                       |
| 216-960                     | 200                            | 46.0 (quasi-peak)                       |
| 960-1000                    | 500                            | 54.0 (quasi-peak)                       |
| Above 1000                  | 500                            | 54.0 (average)                          |
| Above 1000                  | -                              | 74.0 (peak)                             |

Notes:

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = 20 \log_{10} \left( \frac{\text{measurement distance}}{\text{specification distance}} \right)$$

The results displayed take into account applicable antenna factors and cable losses.

- (b) The levels may have been rounded for display purposes.
- (c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

|                                                                                                                                                                                                                                        | See 1) | See 2) | See 3) | See 4) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|
| Effect of EUT operating mode on emission levels                                                                                                                                                                                        |        | ✓      |        |        |
| Effect of EUT internal configuration on emission levels                                                                                                                                                                                |        | ✓      |        |        |
| Effect of Position of EUT cables & samples on emission levels                                                                                                                                                                          |        | ✓      |        |        |
| 1) Parameter defined by standard and / or single possible.<br>2) Parameter defined by client and / or single possible.<br>3) Parameter had a negligible effect on emission levels.<br>4) Worst case determined by initial measurement. |        |        |        |        |

**A6      ac Power Line Conducted Emissions 15.107 (Receiver/Digital circuitry)**

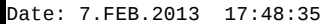
No ac Power Line emissions were performed as the EUT is exclusively battery powered

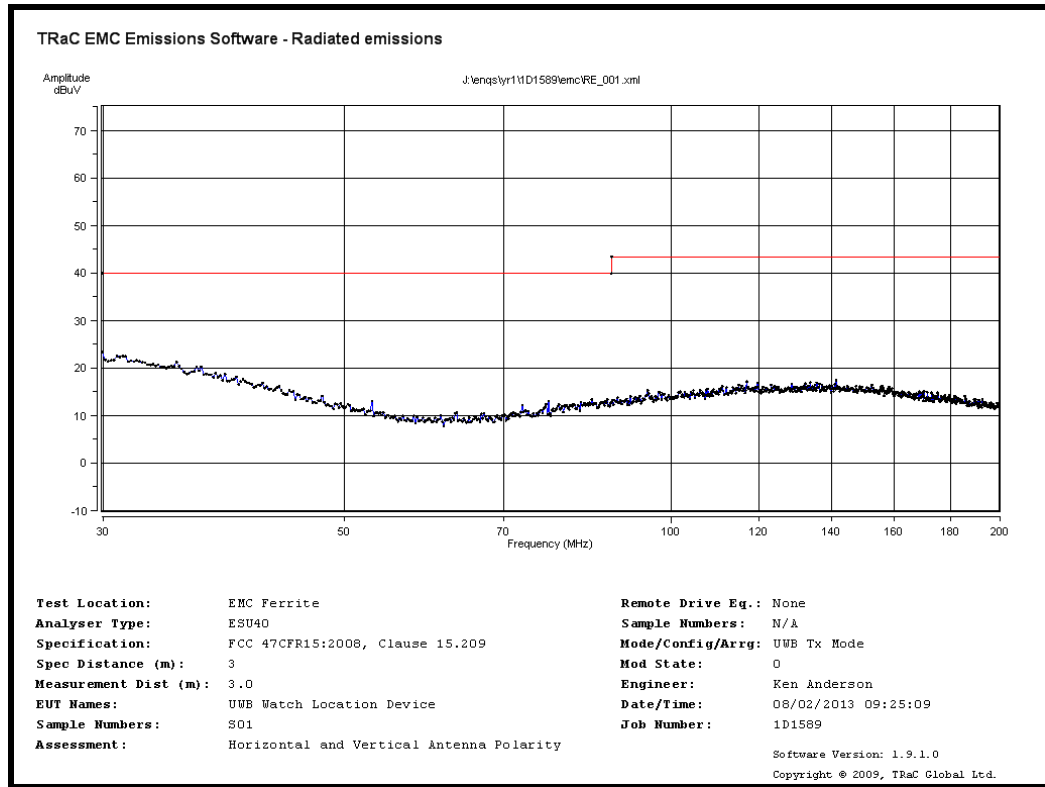
**Appendix B:****Supporting Graphical Data**

This appendix contains graphical data obtained during testing.

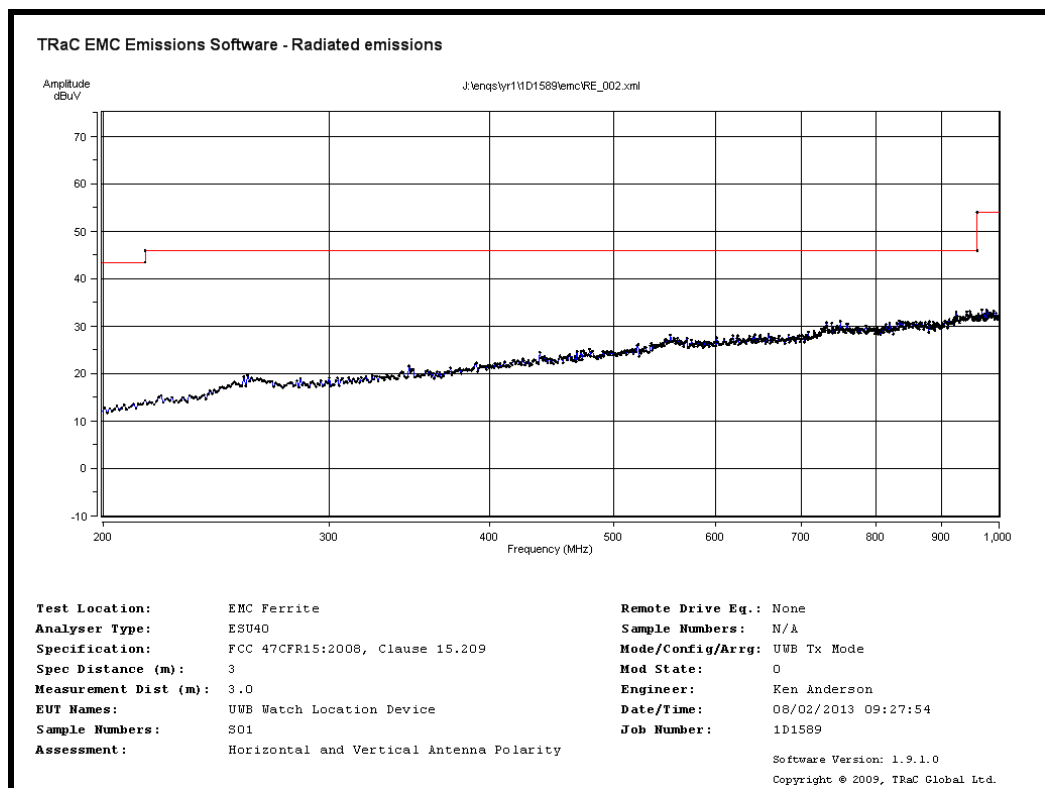
Notes:

- (a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A and Appendix B.
- (b) The time and date on the plots do not necessarily equate to the time of the test.
- (c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.
- (d) Appendix C details the numbering system used to identify the sample and its modification state.
- (e) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.

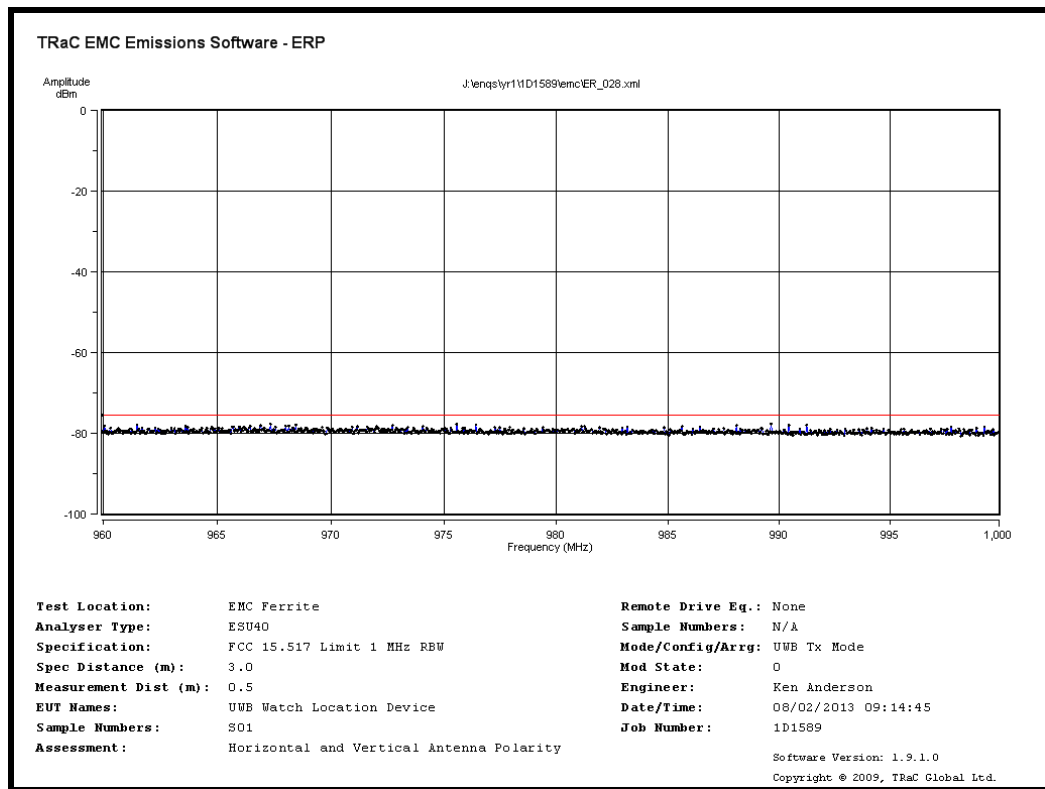




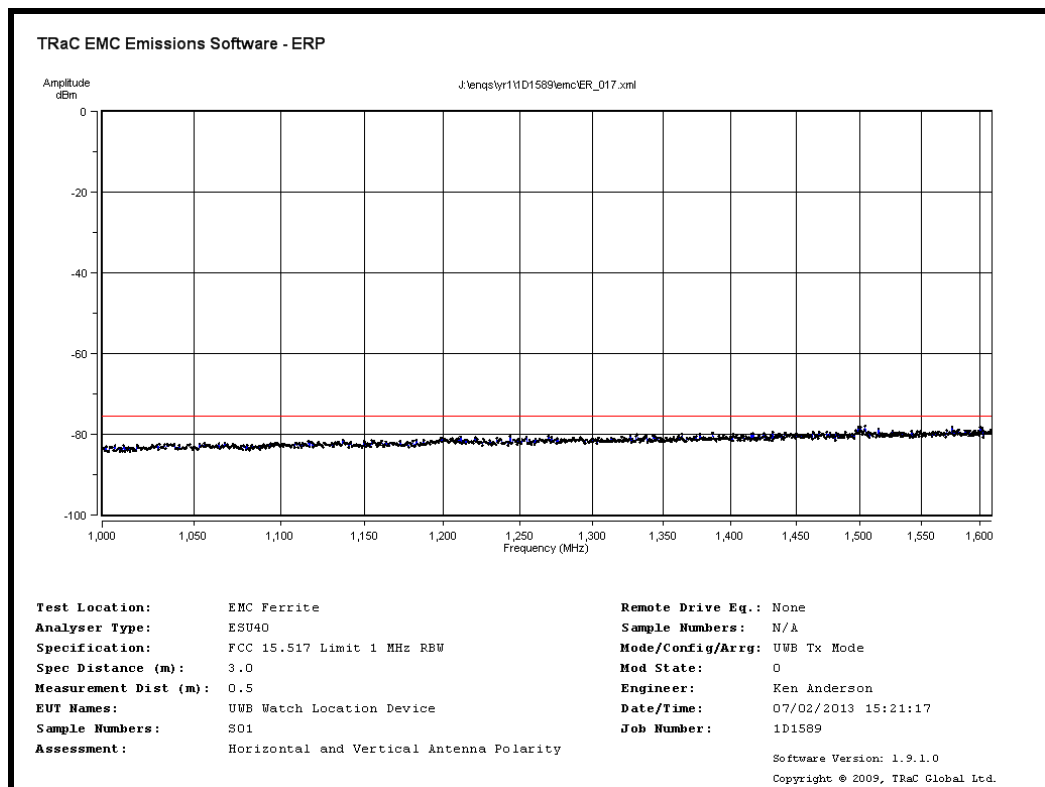
Radiated Emissions 30 MHz to 200 MHz



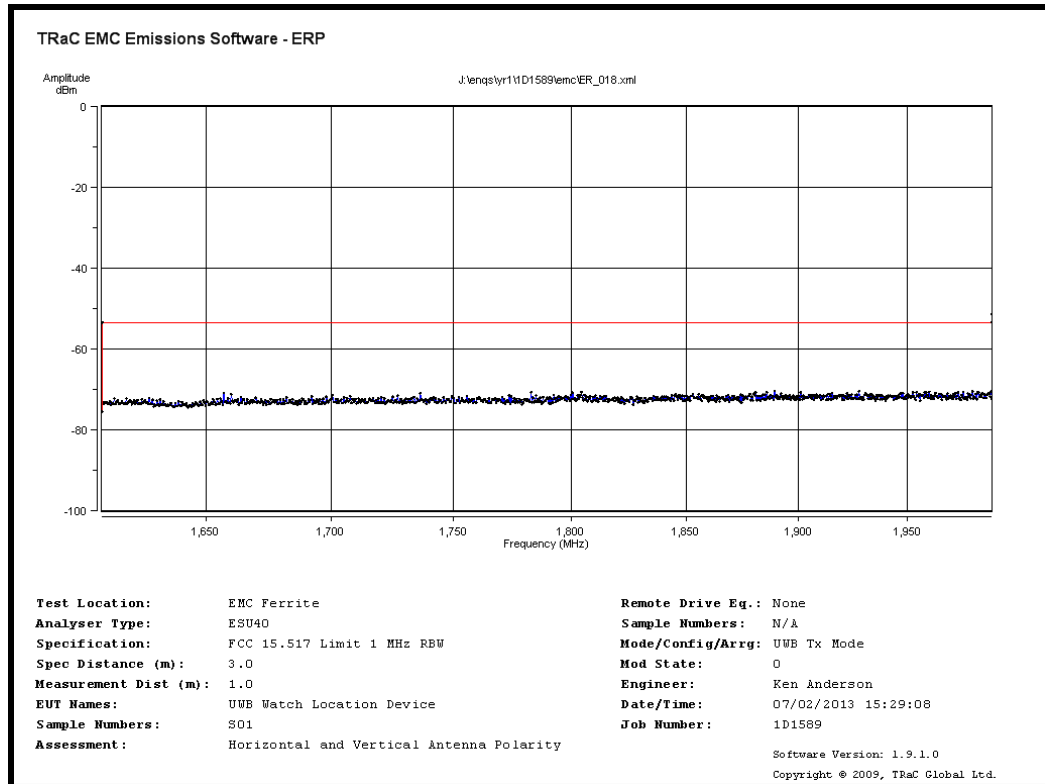
Radiated Emissions 200 MHz to 1000 MHz



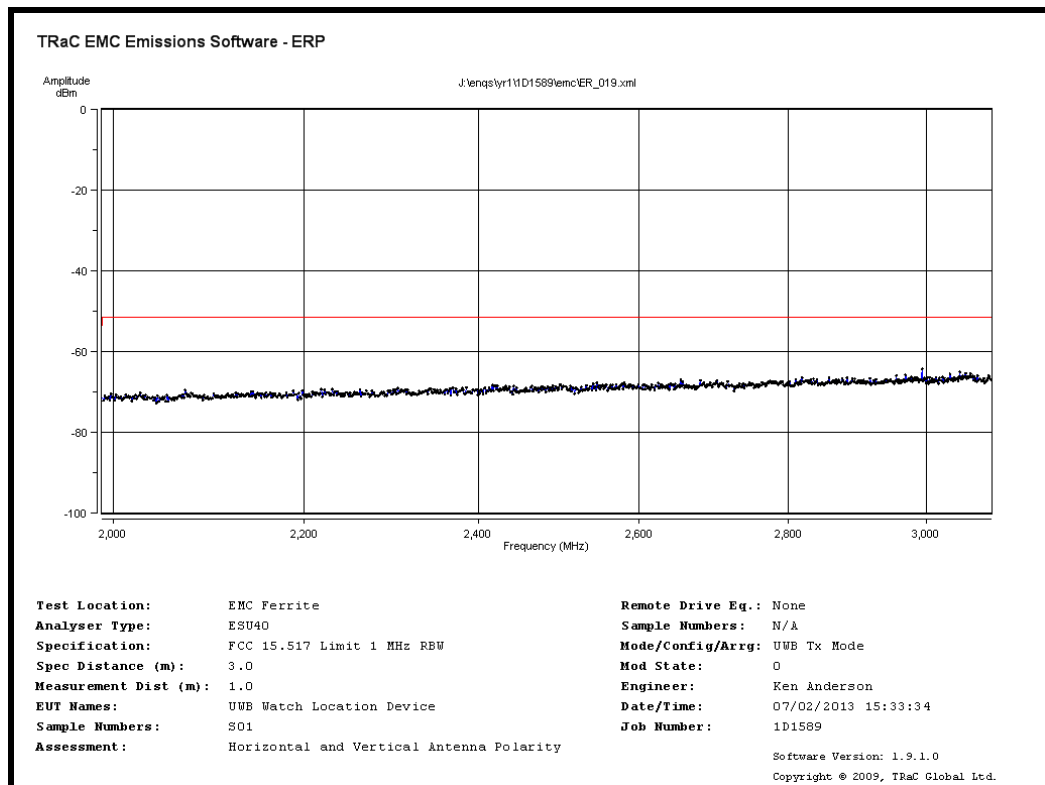
Radiated Emissions 960 MHz to 1000 MHz



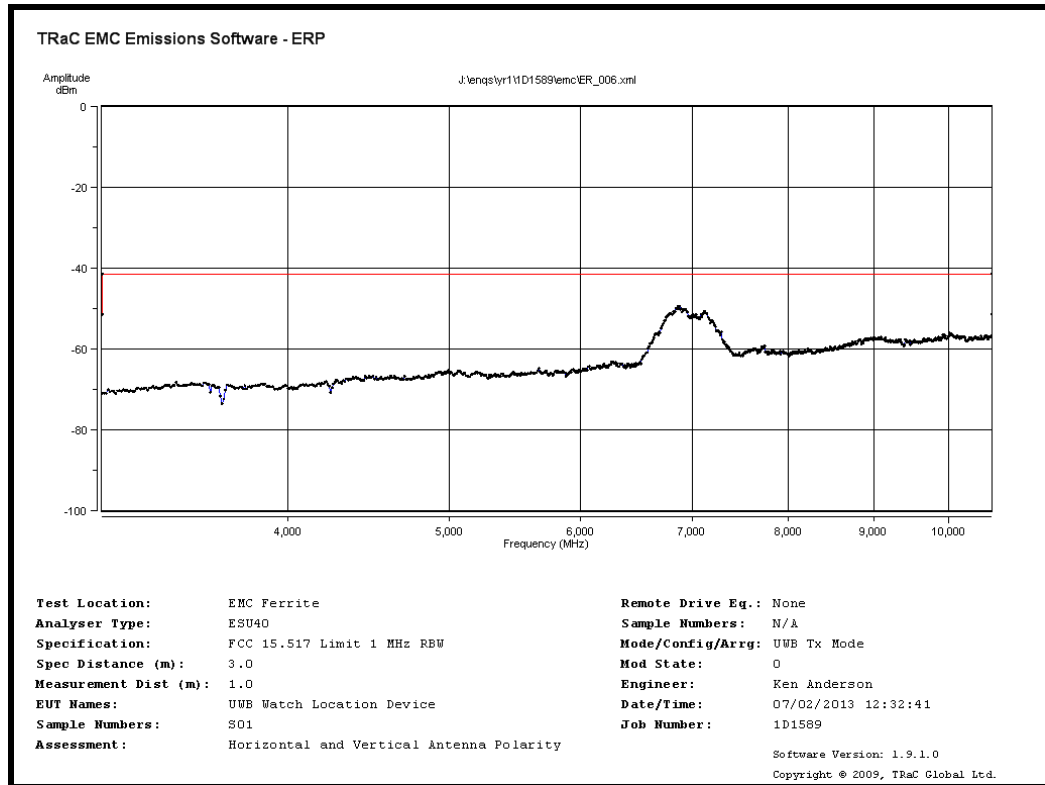
Radiated Emissions 1000 MHz to 1610 MHz



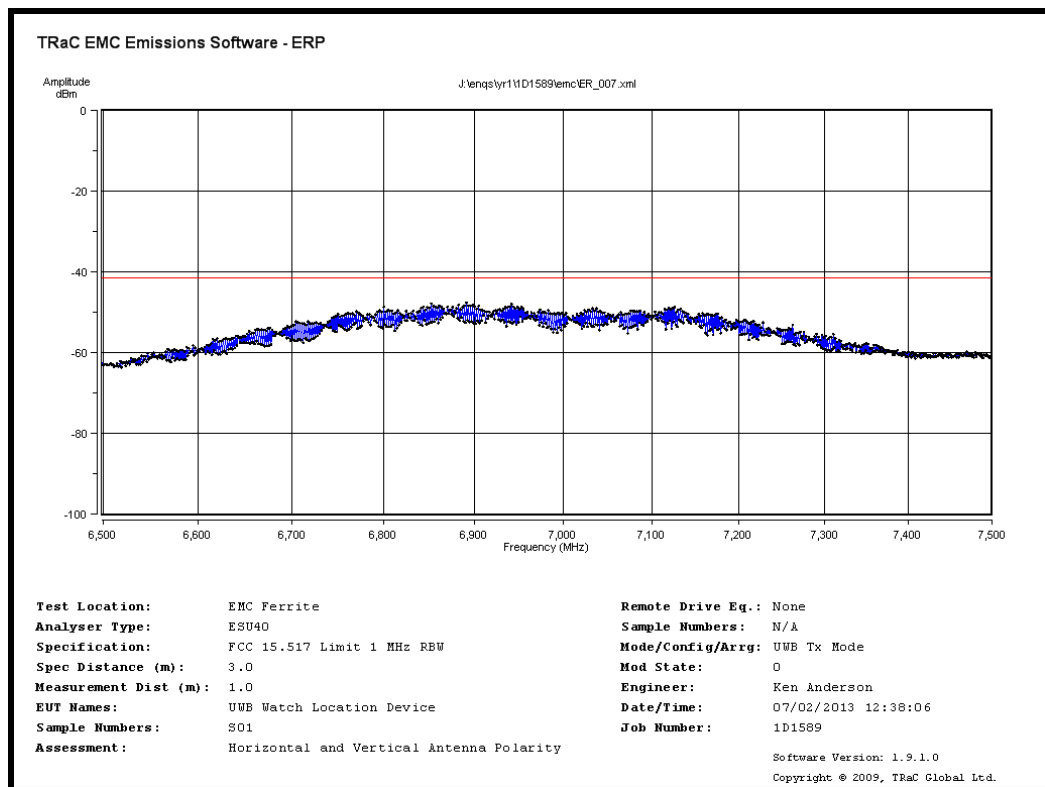
Radiated Emissions 1610 MHz to 1990 MHz



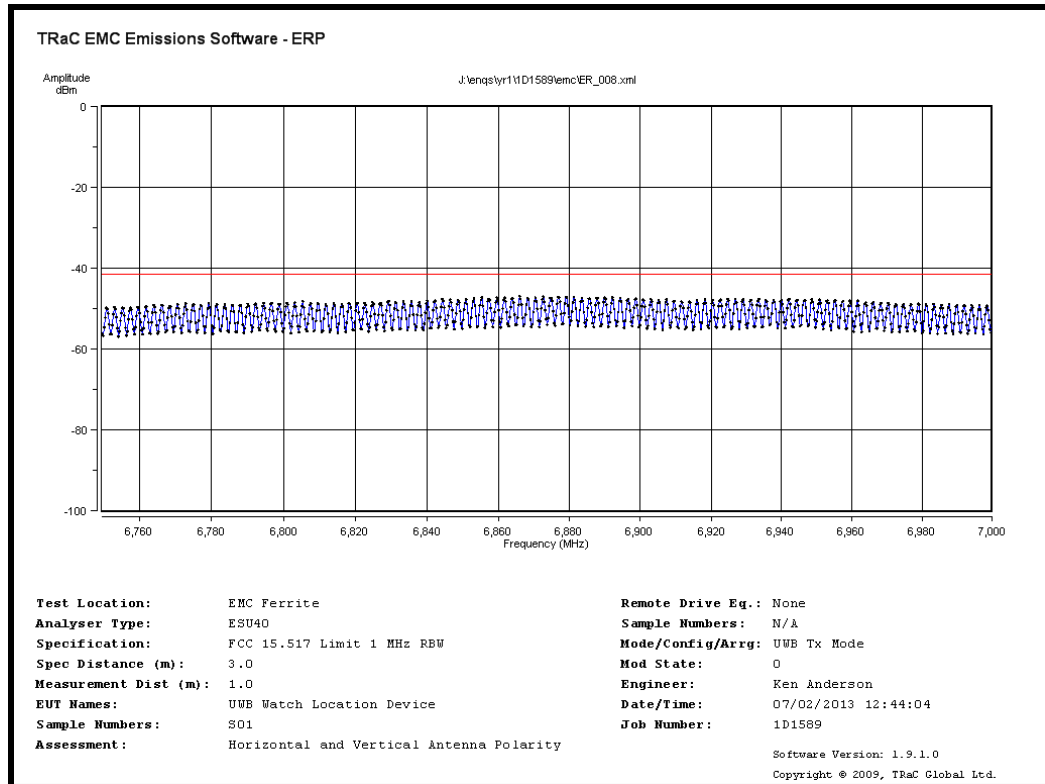
Radiated Emissions 1900 MHz to 3100 MHz



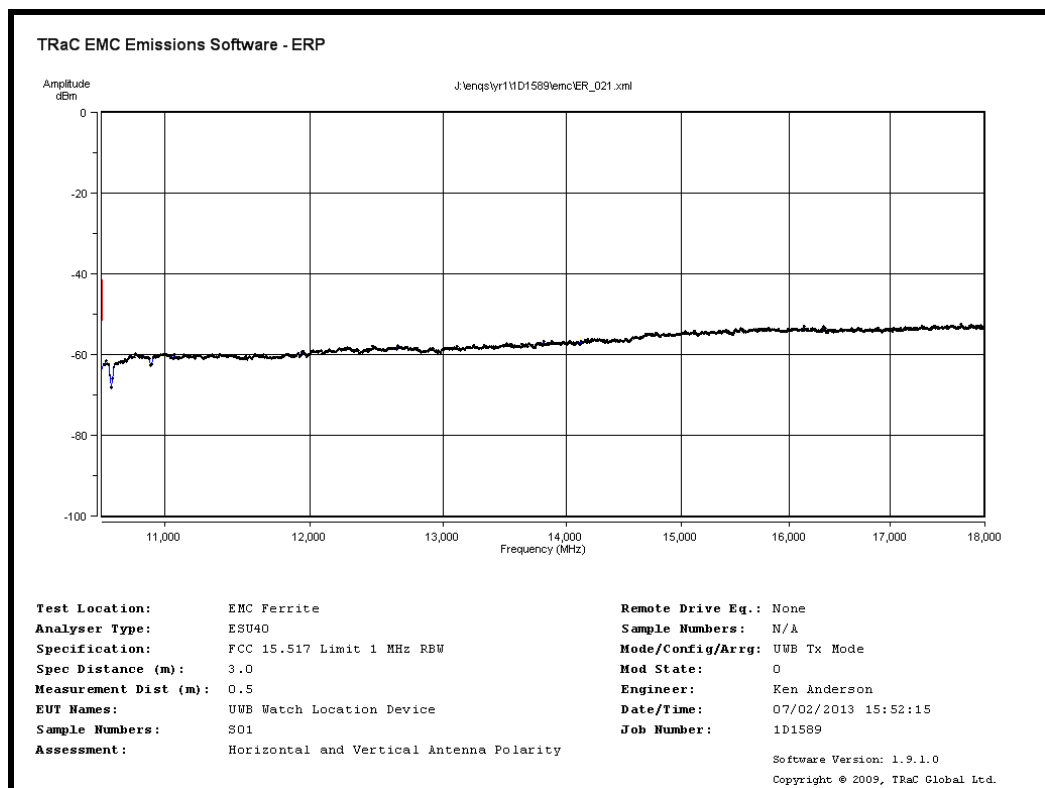
Radiated Emissions 3100 MHz to 10600 MHz



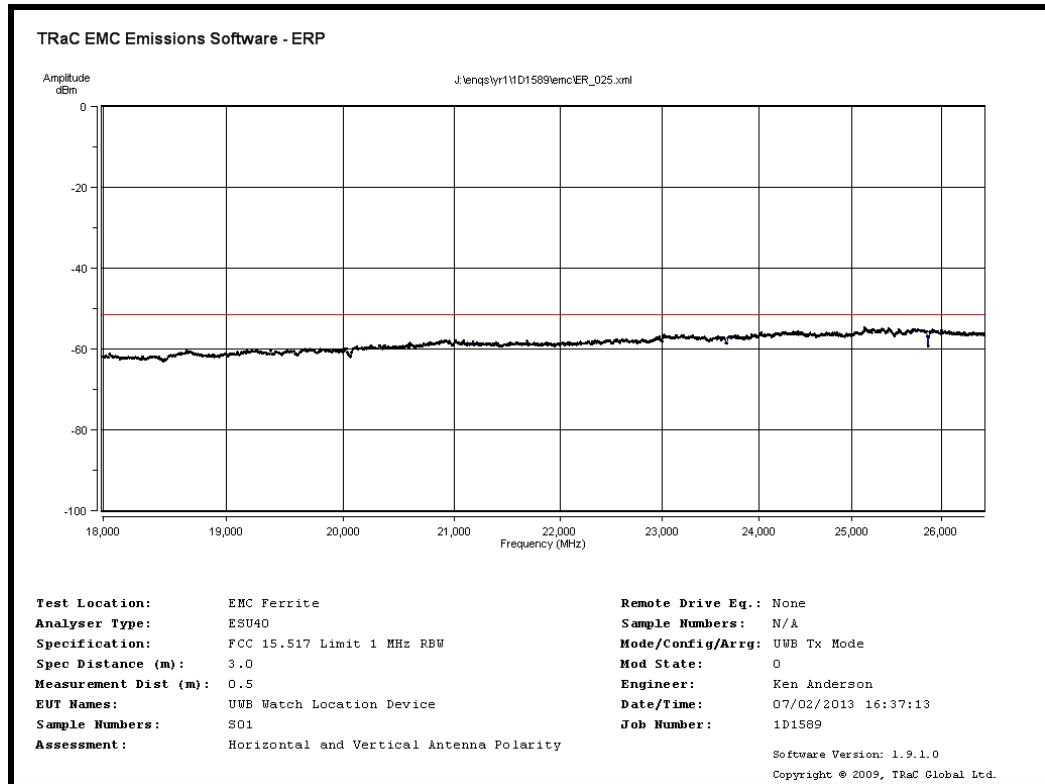
Carrier Emissions 6500 MHz to 7500 MHz



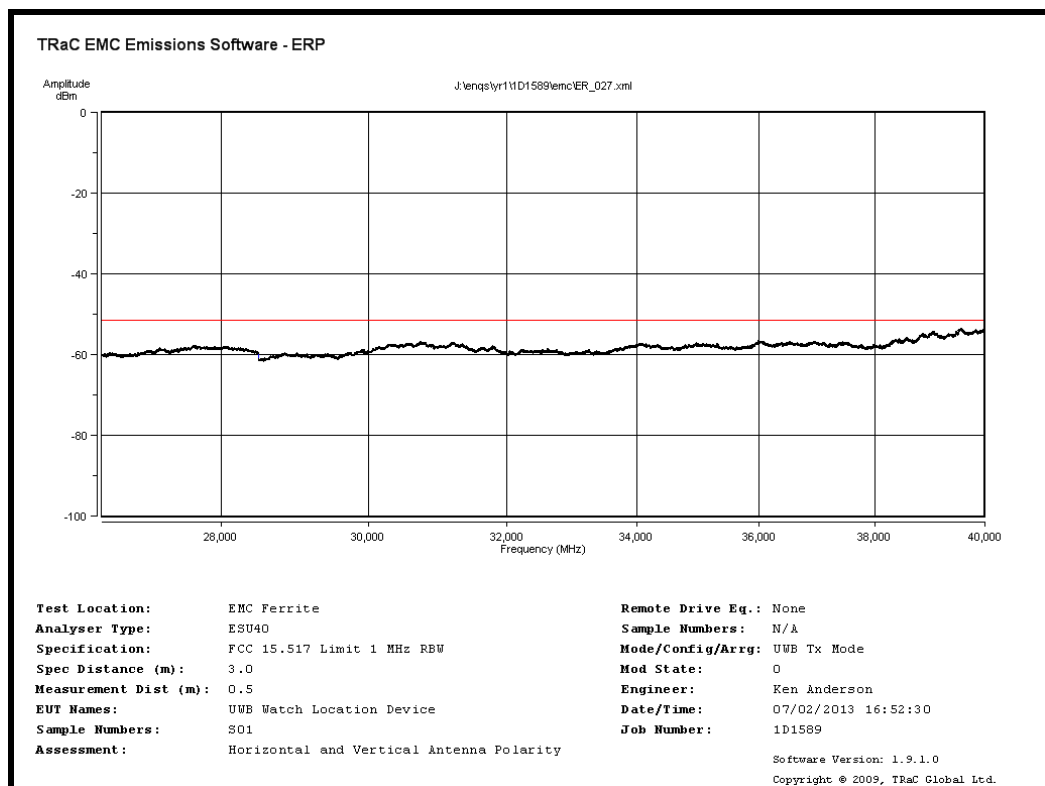
Carrier Emissions 6750 MHz to 7000 MHz



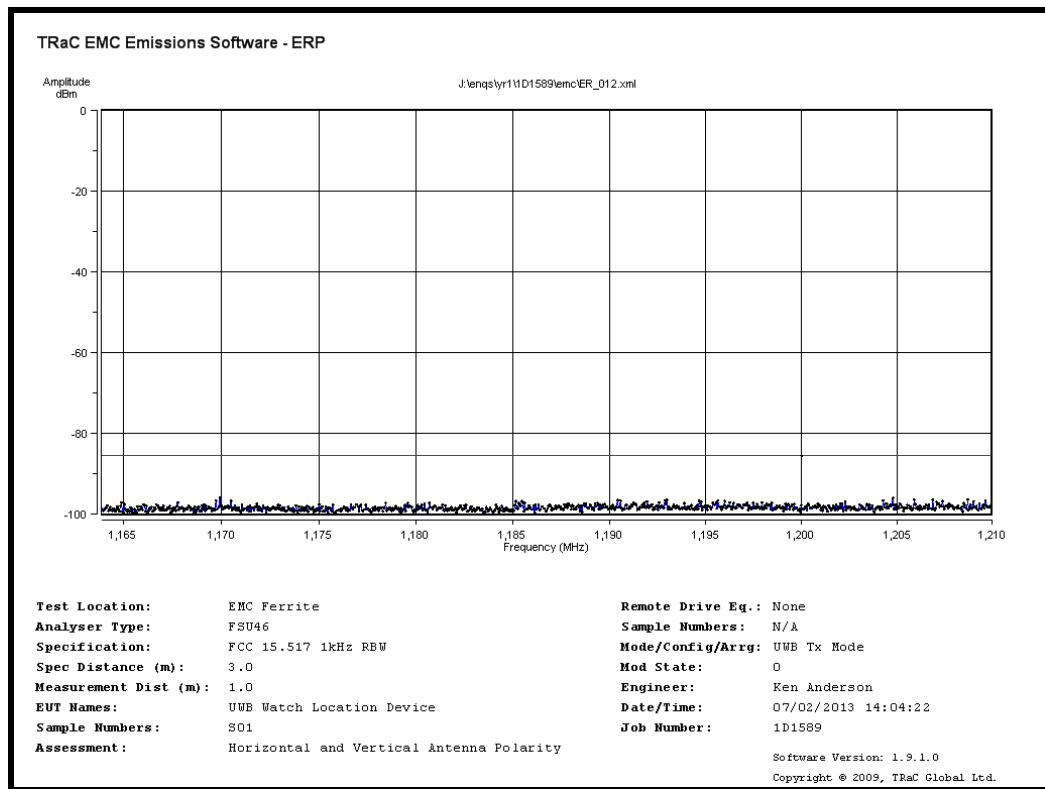
Radiated Emissions 10600 MHz to 18000 MHz



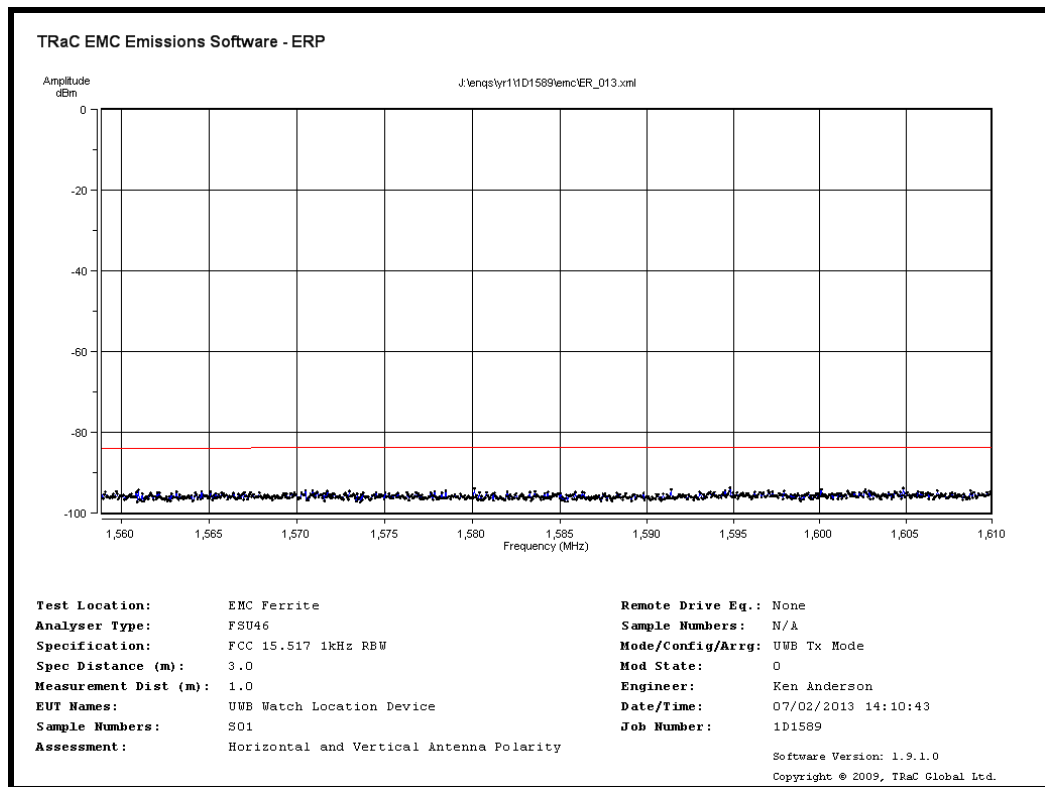
Radiated Emissions 18000 MHz to 26500 MHz



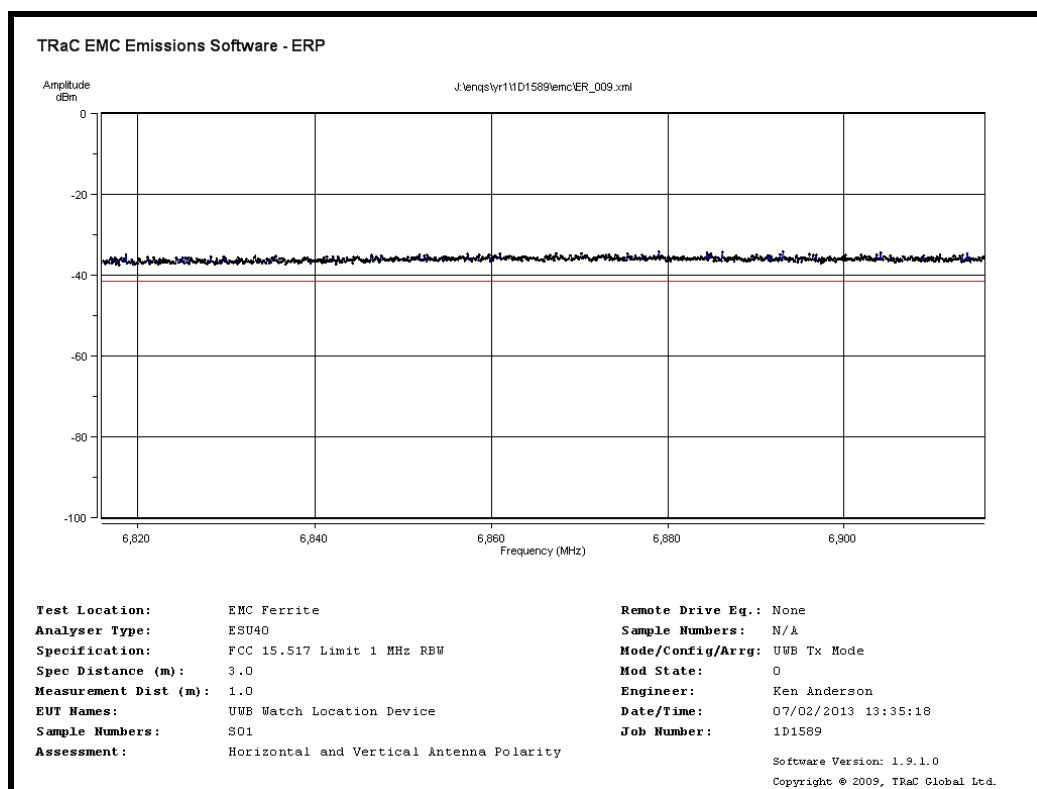
Radiated Emissions 26500 MHz to 40000 MHz



Radiated Emissions 1164 MHz to 1210 MHz



Radiated Emissions 1559 MHz to 1610 MHz



Radiated Peak Emissions 6816 MHz to 6916 MHz

**Appendix C:****Additional Test and Sample Details**

This appendix contains details of:

1. The samples submitted for testing.
2. Details of EUT operating mode(s)
3. Details of EUT configuration(s) (see below).
4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and it's modification state:

**Sample No:** Sxx Mod w

where:

|    |                       |           |
|----|-----------------------|-----------|
| xx | = sample number       | eg. S01   |
| w  | = modification number | eg. Mod 2 |

The following terminology is used throughout the test report:

**Support Equipment (SE)** is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

**EUT configuration** refers to the internal set-up of the EUT. It may include for example:

- Positioning of cards in a chassis.
- Setting of any internal switches.
- Circuit board jumper settings.
- Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as "single possible configuration".

**EUT arrangement** refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by TRaC Telecoms & Radio upon request.

**C1) Test samples**

The following samples of the apparatus were submitted by the client for testing :

| Sample No. | Description                                                            | Identification  |
|------------|------------------------------------------------------------------------|-----------------|
| S01        | UWB Watch Location Device (model number UBIWATCH21, FCC ID SEAWATCH21) | Serial No. 0001 |
|            |                                                                        |                 |
|            |                                                                        |                 |
|            |                                                                        |                 |

**C2) EUT Operating Mode During Testing.**

During testing, the EUT was exercised as described in the following tables:

| Test                              | Description of Operating Mode: TX                  |
|-----------------------------------|----------------------------------------------------|
| All tests detailed in this report | EUT continuously transmitting using UWB Modulation |

**C3) EUT Configuration Information.**

| Sample | Internal Configuration Details         |
|--------|----------------------------------------|
| S01    | Single possible internal configuration |
|        |                                        |
|        |                                        |
|        |                                        |

**C4) List of EUT Ports**

The EUT was a battery powered device containing no external ports.

**C5 Details of Equipment Used**

For Radiated Electric Field Emissions 30MHz to 1GHz:

| Lab 10     |         |                                  |                |                  |
|------------|---------|----------------------------------|----------------|------------------|
| RFG/REF No | Type    | Description                      | Manufacturer   | Date Calibrated. |
| 274        | ATS     | Ferrite Lined Chamber            | Panashield     | 10/07/11         |
| 679        | CBL6111 | Blue Bilog Antenna (0.03 – 1GHz) | Chase          | 05/05/11         |
| 008        | 8447D   | Pre-amp (0.1 – 1300MHz)          | H & P          | 16/02/11         |
| 126        | ESV20   | Test Receiver                    | R & S          | 18/05/11         |
| 404        | E4407B  | Spectrum Analyser                | Agilent        | 17/05/11         |
| 643        | N-type  | Sucotest Microwave Cable 1m      | Huber & Suhner | 17/09/10         |
| 651        | N-type  | Sucotest Microwave Cable 7m      | Huber & Suhner | 17/09/10         |
| 678        | N-type  | Sucotest Microwave Cable 2m      | Huber & Suhner | 28/03/11         |
| 636        | NSG1007 | 110Vac / 60Hz                    | Schaffner      | N/A              |
| REF887     | 34405A  | Multi-meter                      | Agilent        | 25/08/10         |

For Radiated Electric Field Emissions 1GHz to 18GHz:

| Lab 10     |         |                               |                |                 |
|------------|---------|-------------------------------|----------------|-----------------|
| RFG/REF No | Type    | Description                   | Manufacturer   | Date Calibrated |
| 274        | ATS     | Ferrite Lined Chamber         | Panashield     | 10/07/11        |
| 129        | 3115    | Horn Antennas                 | EMCO           | 11/08/09        |
| 307        | HP8449B | Microwave Pre-Amp (1-26.5GHz) | HP             | 01/03/10        |
| 643        | N-type  | Sucotest Microwave Cable 1m   | Huber & Suhner | 17/09/10        |
| 651        | N-type  | Sucotest Microwave Cable 7m   | Huber & Suhner | 17/09/10        |
| 678        | N-type  | Sucotest Microwave Cable 2m   | Huber & Suhner | 28/03/11        |
| 404        | E4407B  | Spectrum Analyser             | Agilent        | 17/05/11        |
| 636        | NSG1007 | 110Vac / 60Hz                 | Schaffner      | N/A             |
| REF887     | 34405A  | Multi-meter                   | Agilent        | 25/08/10        |

For Radiated Electric Field Emissions 1GHz to 18GHz:

| Lab 16     |         |                                   |                      |                 |
|------------|---------|-----------------------------------|----------------------|-----------------|
| RFG/REF No | Type    | Description                       | Manufacturer         | Date Calibrated |
| REF886     | Lab 16  | Large Anechoic Chamber            | Rainford EMC systems | 27/07/10        |
| REF880     | HL050   | Log Perodic Antenna (1-26.5GHz)   | R&S                  | 14/05/10        |
| 913        | HP8449B | Microwave Pre-Amp (1-26.5GHz)     | HP                   | 07/01/11        |
| 404        | E4407B  | Spectrum Analyser                 | Agilent              | 17/05/11        |
| 452        | SMA     | 1m 50Ohm coaxial UTIFLEX cable    | Teledyne Reynolds    | 25/05/11        |
| REF881     | N-type  | 50Ohm coaxial HF RF coaxial cable | Teledyne Reynolds    | 06/06/11        |
| REF882     | N-type  | 50Ohm coaxial HF RF coaxial cable | Teledyne Reynolds    | 06/06/11        |
| REF884     | N-type  | 50Ohm coaxial HF RF coaxial cable | Teledyne Reynolds    | 06/06/11        |
| REF885     | N-type  | 50Ohm coaxial HF RF coaxial cable | Teledyne Reynolds    | 06/06/11        |
| REF915     | PCR500L | ac/dc Power Supply                | Kikusui              | N/A             |
| REF887     | 34405A  | Multi-meter                       | Agilent              | 25/08/10        |

**Appendix D:**

**Additional Information**

Declaration from the client regarding indoor use..

**Appendix E:**

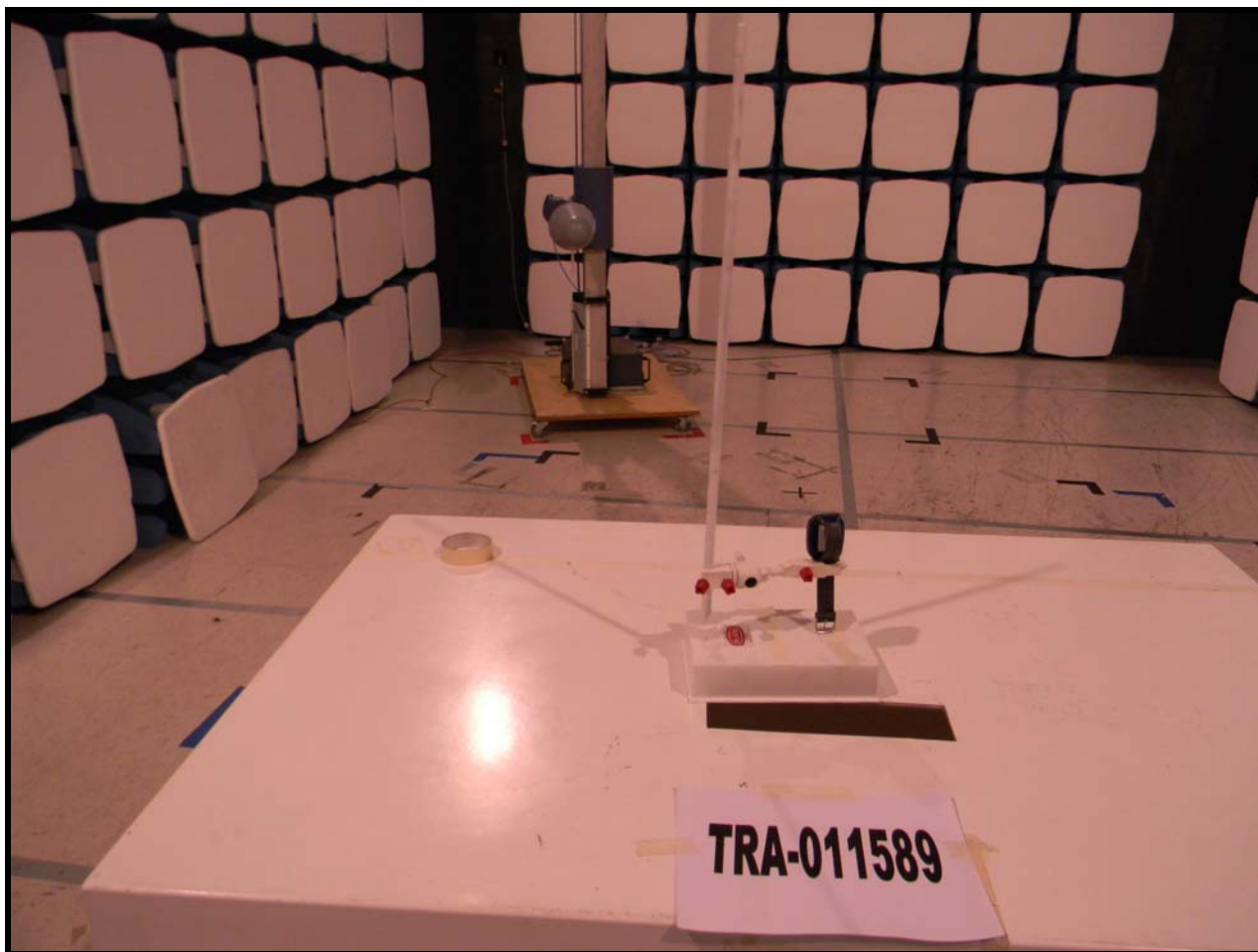
**Photographs and Figures**

Photograph 1 Radiated Spurious Emissions - Front View

Photograph 2 Radiated Spurious Emissions - Rear View



Photograph 1



Photograph 2

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