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## **TEST REPORT**

**Gallagher Handheld EID Tag Readers  
HR4 (G03302) & HR5 (G03303).**

*tested to*

**47 Code of Federal Regulations**

**Part 15 - Radio Frequency Devices**

**Subpart C – Intentional Radiators**

*for*

**Gallagher Group Ltd**

This Test Report is issued with the authority of:

A handwritten signature in black ink, appearing to read "Andrew Cutler".

**Andrew Cutler- General Manager**



All tests reported  
herein have been  
performed in accordance  
with the laboratory's  
scope of accreditation

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## 1. STATEMENT OF COMPLIANCE

The **Gallagher Handheld EID Tag Readers HR4 (G03302) & HR5 (G03303)** comply with FCC Part 15 Subpart C as an Intentional Radiator when the methods as described in ANSI C63.4 - 2003 are applied.

## 2. RESULTS SUMMARY

The results from testing carried out between the 6<sup>th</sup> November 2012 and the 22<sup>nd</sup> March 2013 are summarised in the following table:

| Clause | Parameter                                     | Result   |
|--------|---|--|
| 15.201 | Equipment authorisation requirement           | Certification required.                                    |
| 15.203 | Antenna requirement                           | Complies. Antenna internal to the device.                  |
| 15.204 | External PA and antenna modifications         | Not applicable. No external devices.                       |
| 15.205 | Restricted bands of operation                 | Complies. Device transmits on 134.2 kHz                    |
| 15.207 | Conducted limits                              | Complies with a 2.5 dB at 402.000 kHz (Quasi Peak).        |
| 15.209 | Radiated emission limits - Emissions < 30 MHz | Complies with a 7.9 dB margin at 134.2 kHz (Average).      |
| 15.209 | Radiated emission limits – Emissions > 30 MHz | Complies with a 1.2 dB margin at 304.716 MHz (Horizontal). |

## 3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

**The client selected the test sample.**

**This report relates only to the sample tested.**

**This report contains corrections to the Model Numbers in Report 130214.1 dated 26<sup>th</sup> March 2013.**

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

#### **4. CLIENT INFORMATION**

|                     |                     |
|---------------------|---------------------|
| <b>Company Name</b> | Gallagher Group Ltd |
| <b>Address</b>      | Kahikatea Drive     |
| <b>City</b>         | Hamilton            |
| <b>Country</b>      | New Zealand         |
| <b>Contact</b>      | Mr Samuel Parkinson |

#### **5. DESCRIPTION OF TEST SAMPLE**

|                          |  |
|--------------------------|--|
| <b>Brand Name</b>        | Gallagher                                |
| <b>Model Numbers</b>     | SmartReader HR4 (G03302) & HR5 (G303303) |
| <b>Product</b>           | Handheld EID Tag Reader                  |
| <b>Manufacturer</b>      | Gallagher Group Ltd                      |
| <b>Country of Origin</b> | New Zealand                              |
| <b>Serial Number</b>     | 1308475000, 1308475001                   |

Device contains a Bluetooth module with FCC ID: QQQWT11IA and IC: 5123A-BGTWT11IA.

This report also covers model number HR5 (G303303) which is identical to model number HR4 (G03302) except for the keypad on the HR5 having more keys than the keypad on the HR4 .

## **6. SETUPS AND PROCEDURES**

### **Standard**

The sample was tested in accordance with 47 CFR Part 15 Subpart C.

### **Methods and Procedures**

The measurement methods and procedures as described in ANSI C63.4 - 2003 were used.

### **Section 15.201: Equipment authorisation requirement**

Certification as detailed in Subpart J of Part 2 is required for this device.

### **Section 15.203: Antenna requirement**

This device has an internal antenna for the 134.2 kHz transmitter.

**Result:** Complies.

### **Section 15.204: External radio frequency power amplifiers and antenna modifications**

It is not possible to attach an external power amplifier to this transmitter.

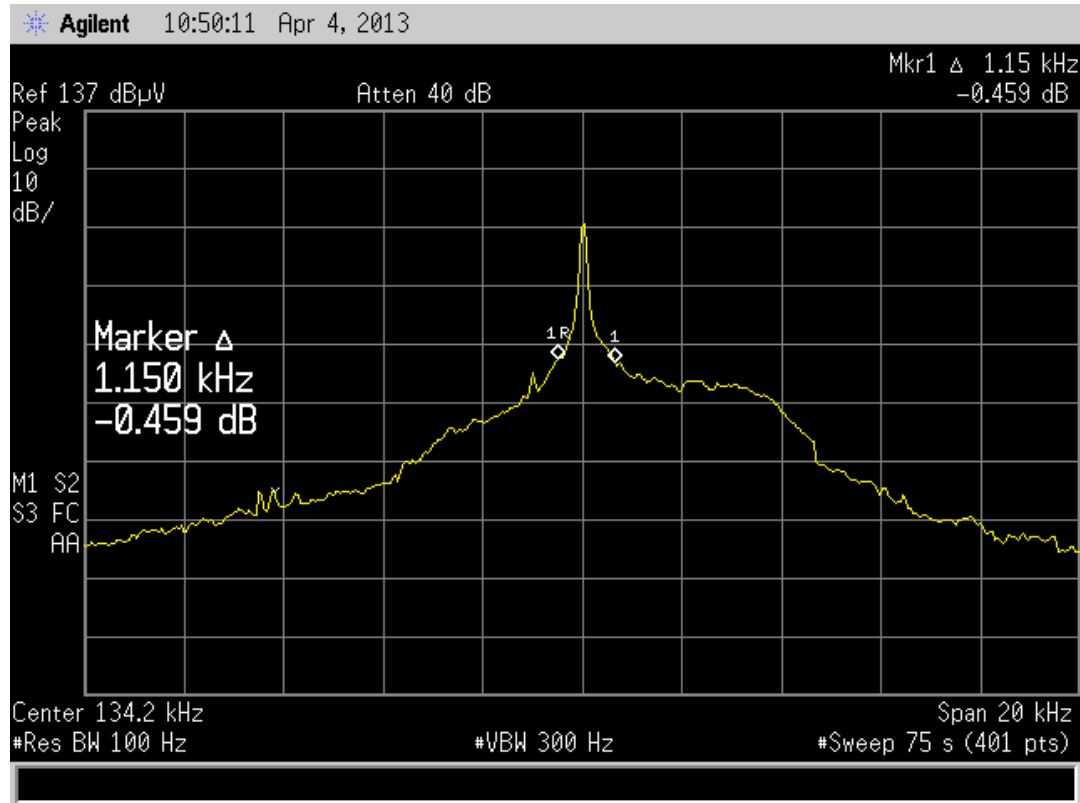
**Result:** Complies.

## Section 15.205: Restricted bands of operation

The transmitter transmits on 134.200 kHz.

This device would therefore fall between the restricted bands of 90 – 110 kHz and 495 – 505 kHz

The 134.2 kHz modulation bandwidth has been measured to be 1.150 kHz



Measurements were made at the -23 dB points using a resolution bandwidth of 100 Hz and a video bandwidth of 300 Hz.

**Result:** Complies.

## **Section 15.207: Conducted emissions testing**

Conducted Emissions testing was carried out over the frequency range of 150 kHz to 30 MHz which was carried out at the laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 m screened room

Testing was carried out using a representative AC power supply system that was powered at 120 Vac 60 Hz which was used to charge the batteries that operate this device and was connected to the USB port on the device.

It is possible to operate the tag reader while the AC charger is attached and charging the internal batteries.

Testing was carried out with the device transmitting continuously on 134.2 kHz and with the Bluetooth module operating continuously.

The device was placed on top of the emissions table, which is 1 m x 1.5 m, 80 cm above the screened room floor which acts as the horizontal ground plane.

In addition the device was positioned 40 cm away from the screened room wall which acts as the vertical ground plane.

The artificial mains network was bonded to the screened room floor.

At all times the device was kept more than 80 cm from the artificial mains network.

The Class B limits have been applied.

The supplied plot is combined plot showing the worst case quasi peak and average results of both the phase and neutral lines to the representative AC power supply.

Quasi peak and average detectors have been used with resolution bandwidths of 9 kHz.

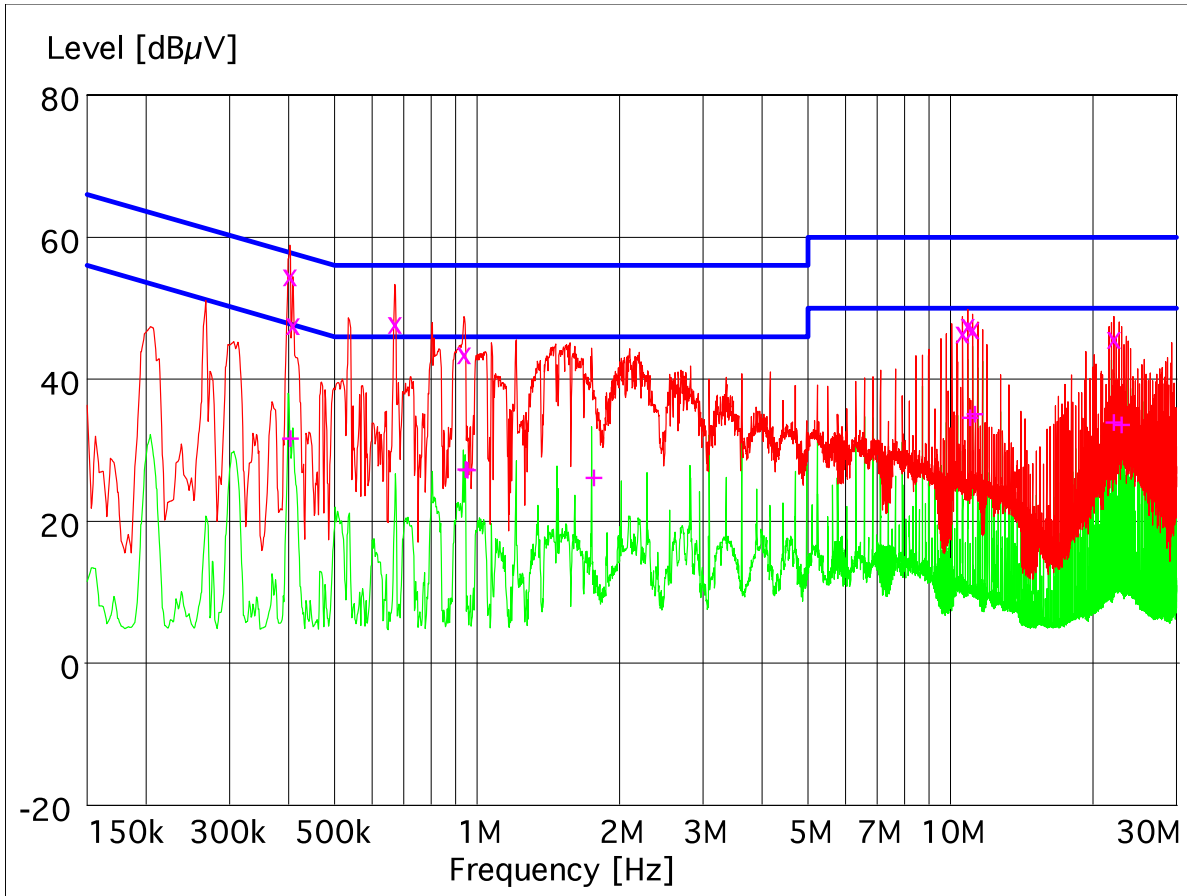
Measurement uncertainty with a confidence interval of 95% is:

- AC Mains port                      (0.15-30 MHz)  $\pm$  2.8 dB

## Conducted Emissions – AC Input Power Port

**Setup:** Device tested when operating continuously on 134.2 kHz while being powered using a 120 Vac 60 Hz power supply. In addition the Bluetooth transmitter was activated.

Peak ---   
 Average --   
 Quasi Peak X   
 Average +



Final Quasi-Peak Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Phase | Rechecks dBµV |
|---------------|------------|------------|-----------|-------|---------------|
| 0.402000      | 55.30      | 57.8       | 2.5       | N     | 55.1          |
| 0.408000      | 48.40      | 57.7       | 9.3       | L1    |               |
| 0.669000      | 48.60      | 56.0       | 7.4       | N     |               |
| 0.939000      | 44.30      | 56.0       | 11.7      | L1    |               |
| 10.604000     | 47.20      | 60.0       | 12.8      | N     |               |
| 10.869500     | 48.30      | 60.0       | 11.7      | N     |               |
| 11.139500     | 47.80      | 60.0       | 12.2      | N     |               |
| 22.142000     | 46.50      | 60.0       | 13.5      | N     |               |

Final Average Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Phase | Rechecks dBµV |
|---------------|------------|------------|-----------|-------|---------------|
| 0.399000      | 35.60      | 47.9       | 12.3      | L1    |               |
| 0.936000      | 28.30      | 46.0       | 17.7      | L1    |               |
| 0.942000      | 28.20      | 46.0       | 17.8      | N     |               |
| 1.746000      | 27.10      | 46.0       | 19.0      | N     |               |
| 10.874000     | 35.60      | 50.0       | 14.4      | N     |               |
| 11.139500     | 36.10      | 50.0       | 13.9      | N     |               |
| 21.872000     | 34.90      | 50.0       | 15.1      | N     |               |
| 22.677500     | 34.60      | 50.0       | 15.5      | N     |               |



## **Section 15.209: Radiated emission limits, general requirements**

Radiated emissions testing was carried out over the frequency range of 100 kHz to 1000 MHz as the highest frequency in use has stated to be 72 MHz which is less than 108 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand. This site conforms to the requirements of CISPR 16 and ANSI C63.4 - 2003.

Testing was carried out using a representative AC power supply system that was powered at 120 Vac 60 Hz which was used to charge the batteries that operate this device and was connected to the USB port on the device.

It is possible to operate the tag reader while the AC charger is attached and charging the internal batteries.

Testing was carried out with the device transmitting continuously on 134.2 kHz and with the Bluetooth module operating continuously.

The device being placed in the centre of the test table laying flat as if it were being held in the hand in a normal operating position using a test jig that was supplied by the client.

Pretesting of the device showed that this was the worst case mode of operation which has been reported in this test report.

Correct operation was confirmed periodically by placing a suitable card in front of the device which would give an audible beep.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height, where appropriate, with an automated antenna tower.

Below 30 MHz a magnetic loop is used with the centre of the loop being 1 metre above the ground with measurements being made using peak and average detectors below 490 kHz.

Above 490 kHz and below 30 MHz a quasi peak detector was used.

Above 30 MHz the emission is measured in both vertical and horizontal antenna polarisations, where appropriate, using a quasi peak detector.

The emission level was determined in field strength by taking the following into consideration:

Level (dB $\mu$ V/m) = Receiver Reading (dB $\mu$ V) + Antenna Factor (dB) + Coax Loss (dB)

**Result:** Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 1000 MHz)  $\pm$  4.1 dB
- Free radiation tests (100 kHz – 30 MHz)  $\pm$  4.8 dB

### Section 15.209: 125 kHz Fundamental emission:

Measurements were made using a magnetic loop antenna and a receiver with an average detector and a peak detector both using a 9 kHz bandwidth

| Frequency<br>kHz | Level<br>dBuV/m | Limit<br>(dBuV/m) | Margin<br>(dB) | Detector | Distance<br>Metres |
|------------------|-----------------|-------------------|----------------|----------|--------------------|
| 134.200          | 76.2            | 84.1              | 7.9            | Average  | 10                 |
| 134.200          | 83.1            | 104.1             | 21.0           | Peak     | 10                 |

Measurements were made at a distance of 10 metres with the limit being determined by using the extrapolation factor of 40 dB per decade limit as detailed in section 15.31 f (2).

The average limit at 300 m at 134.2 kHz is 17.8 uV/m or 25 dBuV/m and 45 dBuV/m in peak.

This gives a limit at 10 m at 134.2 kHz of 84.1 dBuV/m and 104.1 dBuV/m in peak

Testing was also carried out to determine whether a variation in the supply voltage would cause a significant change in field strength with the 120 Vac supply being varied by +/- 15% between 102 Vac and 138 Vac.

| Voltage<br>(Vdc) | Field Strength<br>(dBuV/m) |
|------------------|----------------------------|
| 102.0            | 76.2                       |
| 120.0            | 76.2                       |
| 138.0            | 76.2                       |

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm$  4.8 dB

## Section 15.209: 125 kHz Spurious Emissions (below 30 MHz)

A receiver with an average detector and a peak detector using a 9 kHz bandwidth was used between 110 – 490 kHz and a quasi peak detector with a 9 kHz bandwidth was used between 490 kHz – 30.0 MHz.

| Frequency<br>kHz | Level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Detector   | Comment     |
|------------------|-----------------|-----------------|--------------|------------|-------------|
| 268.400          | 44.0            | 78.1            | -            | Average    | Noise Floor |
| 268.400          | 54.0            | 98.1            | -            | Peak       | Noise Floor |
| 402.600          | 46.0            | 74.6            | -            | Average    | Noise Floor |
| 402.600          | 56.0            | 94.6            | -            | Peak       | Noise Floor |
| 536.800          | 43.0            | 52.1            | -            | Quasi Peak | Ambient     |
| 671.000          | 40.0            | 50.2            | -            | Quasi Peak | Noise Floor |
| 805.200          | 34.0            | 48.6            | -            | Quasi Peak | Ambient     |
| 939.400          | 33.0            | 47.2            | -            | Quasi Peak | Ambient     |
| 1073.600         | 30.0            | 46.1            | -            | Quasi Peak | Ambient     |
| 1207.800         | 32.0            | 45.1            | -            | Quasi Peak | Noise Floor |
| 1342.000         | 35.0            | 44.1            | -            | Quasi Peak | Ambient     |
| 1476.200         | 26.0            | 43.3            | -            | Quasi Peak | Ambient     |
| 22950.000        | 32.1            | 49.5            | 17.4         | Quasi Peak | Emission    |

No spurious emissions were detected from the 134.2 kHz transmitter

Magnetic loop measurements were made a distance of 10 metres.

At each frequency the measurement antenna was further adjusted to give the highest field strength.

The 300 metre limit between 125 – 490 kHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The 30 metre limit between 490 – 1705 kHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The limit between 110 – 490 kHz was increased by 20 dB when the peak detector was used.

The spurious emissions observed do not exceed the level of the fundamental emission.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm$  4.8 dB

## Section 15.209: Spurious Emissions (above 30 MHz)

Measurements between 30 –1000 MHz have been made at a distance of 3 metres.

A receiver with a quasi peak detector with a 120 kHz bandwidth was used between 30 – 1000 MHz

The limits as described in Section 15.209 have been applied.

| Frequency MHz | Vertical dB $\mu$ V/m | Horizontal dB $\mu$ V/m | Limit dB $\mu$ V/m | Margin dB | Detector   | BW      |
|---------------|-----------------------|-------------------------|--------------------|-----------|------------|---------|
| 30.000        | 34.8                  |                         | 40.0               | 5.2       | Quasi Peak | 120 kHz |
| 32.000        | 30.6                  |                         | 40.0               | 9.4       | Quasi Peak | 120 kHz |
| 57.430        | 31.5                  |                         | 40.0               | 8.5       | Quasi Peak | 120 kHz |
| 58.640        | 31.6                  |                         | 40.0               | 8.4       | Quasi Peak | 120 kHz |
| 83.460        | 20.1                  |                         | 40.0               | 19.9      | Quasi Peak | 120 kHz |
| 108.000       | 37.9                  |                         | 43.5               | 5.6       | Quasi Peak | 120 kHz |
| 109.260       | 36.2                  |                         | 43.5               | 7.3       | Quasi Peak | 120 kHz |
| 141.430       | 38.7                  |                         | 43.5               | 4.8       | Quasi Peak | 120 kHz |
| 144.000       | 40.1                  | 35.2                    | 43.5               | 3.4       | Quasi Peak | 120 kHz |
| 136.288       |                       | 37.5                    | 43.5               | 6.0       | Quasi Peak | 120 kHz |
| 137.571       |                       | 39.3                    | 43.5               | 4.2       | Quasi Peak | 120 kHz |
| 138.853       |                       | 37.6                    | 43.5               | 5.9       | Quasi Peak | 120 kHz |
| 142.701       |                       | 38.1                    | 43.5               | 5.4       | Quasi Peak | 120 kHz |
| 147.825       | 39.3                  |                         | 43.5               | 4.2       | Quasi Peak | 120 kHz |
| 182.580       | 36.1                  |                         | 43.5               | 7.4       | Quasi Peak | 120 kHz |
| 183.844       | 35.3                  |                         | 43.5               | 8.2       | Quasi Peak | 120 kHz |
| 185.250       | 36.2                  |                         | 43.5               | 7.3       | Quasi Peak | 120 kHz |
| 191.579       | 34.1                  |                         | 43.5               | 9.4       | Quasi Peak | 120 kHz |
| 216.000       | 30.5                  | 34.5                    | 46.0               | 11.5      | Quasi Peak | 120 kHz |
| 252.000       |                       | 43.9                    | 46.0               | 2.1       | Quasi Peak | 120 kHz |
| 255.851       |                       | 44.6                    | 46.0               | 1.4       | Quasi Peak | 120 kHz |
| 257.134       | 34.7                  | 44.0                    | 46.0               | 2.0       | Quasi Peak | 120 kHz |
| 258.416       | 36.1                  | 44.7                    | 46.0               | 1.3       | Quasi Peak | 120 kHz |
| 260.922       | 36.3                  |                         | 46.0               | 9.7       | Quasi Peak | 120 kHz |
| 261.022       |                       | 44.1                    | 46.0               | 1.9       | Quasi Peak | 120 kHz |
| 299.560       | 40.1                  | 44.3                    | 46.0               | 1.7       | Quasi Peak | 120 kHz |
| 304.716       | 44.8                  | 42.2                    | 46.0               | 1.2       | Quasi Peak | 120 kHz |
| 306.009       | 43.4                  | 40.3                    | 46.0               | 2.6       | Quasi Peak | 120 kHz |
| 333.020       | 30.3                  | 34.5                    | 46.0               | 11.5      | Quasi Peak | 120 kHz |
| 343.285       |                       | 34.7                    | 46.0               | 11.3      | Quasi Peak | 120 kHz |
| 583.366       |                       | 27.1                    | 46.0               | 18.9      | Quasi Peak | 120 kHz |
| 666.132       |                       | 30.8                    | 46.0               | 15.2      | Quasi Peak | 120 kHz |

All other emissions observed had a margin to the limit that exceeded 15 dB.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 MHz – 1000 MHz)  $\pm$  4.1 dB

## 7. TEST EQUIPMENT USED

| Instrument        | Manufacturer | Model      | Serial No  | Asset Ref | Cal Due        |
|-------------------|--------------|------------|------------|-----------|----------------|
| Aerial Controller | EMCO         | 1090       | 9112-1062  | RFS 3710  | Not applicable |
| Aerial Mast       | EMCO         | 1070-1     | 9203-1661  | RFS 3708  | Not applicable |
| Turntable         | EMCO         | 1080-1-2.1 | 9109-1578  | RFS 3709  | Not applicable |
| AC Supply         | APT          | 7008       | 4170003    | -         | Not applicable |
| Receiver          | R & S        | ESHS 10    | 828404/005 | 3728      | 21 Nov 2013    |
| Mains Network     | R & S        | ESH2-Z5    | 881362/032 | 3628      | 21 Aug 2013    |
| Receiver          | R & S        | ESIB-40    | 100171     | R-27-1    | 21 Oct 2013    |
| Loop Antenna      | EMCO         | 6502       | 9003-2485  | 3798      | 7 Feb 2014     |
| VHF Balun         | Schwarzbeck  | VHA 9103   | -          | RFS 3603  | 7 Feb 2014     |
| Biconical Ant     | Schwarzbeck  | BBA 9106   | -          | RFS 3612  | 7 Feb 2014     |
| Log Periodic Ant  | Schwarzbeck  | VUSLP 9111 | 9111-228   | 3785      | 7 Feb 2014     |

## 8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies Ltd registration with the Federal Communications Commission as a listed facility, registration number: 90838, which was updated on February 15<sup>th</sup>, 2011.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, 2005.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, 2005

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

## 9. PHOTOGRAPHS

Radiated emission test set up photos





Conducted emissions test setup photos





