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TEST REPORT

SmartTouch Non-Rechargeable NF0054

tested to the

Code of Federal Regulations (CFR) 47

**Part 15 – Radio Frequency Devices,
Subpart C – Intentional Radiators**

**Section 15.249 – Operation in the band
2400.0 – 2483.5 MHz**

for

Adherium (NZ) Limited

This Test Report is issued with the authority of:

A handwritten signature in black ink, appearing to read "Andrew Cutler", is written over a light blue rectangular background.

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 **SmartTouch Non-Rechargeable NF0054** complies with 47 CFR Part 15 and in particular Sections, 15.205, 15.207, 15.209, 15.215 and 15.249 as detailed below when tested in accordance with ANSI C63.4 – 2003.

2. RESULTS SUMMARY

The results of testing carried out in November 2015 are detailed below.

Clause	Description	Result
15.201	Equipment authorisation requirement	Applied
15.203	Antenna requirement	Complies
15.204	External power amplifiers	Not applicable
15.205	Operation in restricted bands	Complies
15.207	Conducted emissions	Not applicable
15.209	Radiated emissions	See below
15.215	Additional provisions	Complies
15.249 (a)	Field strength of fundamental	Complies
15.249 (a)	Field strength of harmonics	Complies
15.249 (b)	Fixed, point to point operations	Not applicable
15.249 (c)	3 metre measurement distance	Noted
15.249 (d)	Spurious emission levels except harmonics	Complies
15.249 (e)	Detectors above 1000 MHz	Noted
15.249 (f)	Reference to section 15.37(d)	Noted

3. CLIENT INFORMATION

Company Name Adherium (NZ) Limited

Address Level 2
204 Quay Street

City Auckland 1010

Country New Zealand

Contact Ms Tina Mason

4. DESCRIPTION OF TEST SAMPLE

Brand Name	SmartTouch Non-Rechargeable
Model Number	NF0054
Product	Battery powered electronic data logger for inhaled medication
Manufacturer	Adherium (NZ) Ltd
Country of Origin	New Zealand
Serial Number	600501, 600502
FCC ID	PN2-STC1

Product Description

The device tested is a battery powered electronic data logger that monitors inhaled medication actuations and records the date and time of use.

The data can then be uploaded using the Bluetooth Low Energy (Bluetooth Smart) Transceiver.

The USB port is provided for service, installation and upgrade purposes and would not be accessed by the user for these purposes.

Certification is being sought for the Bluetooth Low Energy (Bluetooth Smart) Transceiver contained within the device.

5. EQUIPMENT PARAMETERS

The Bluetooth Low Energy (Bluetooth Smart) Transceiver in this device has the following RF specifications:

FCC Band:	2400.0 MHz – 2483.5 MHz
Test Frequencies:	2402 MHz, 2440 MHz, 2480 MHz
Channel Spacing:	2 MHz
Modulation Description:	GFSK, AFH (Bluetooth Low Energy)
Rated Power:	2.5 mW (+4.0 dBm)
Antenna Type:	Internal
Power Supply:	Internal 3 Vdc battery that cannot be re-charged
Clock frequencies	32.768 kHz crystal 32 MHz crystal
Ports	USB port for set up and installation purposes only

6. ATTESTATION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

The client selected the test sample.

The report relates only to the sample tested.

This report contains no corrections.

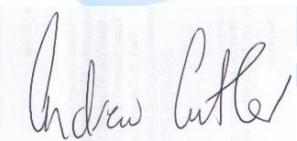
Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.



Andrew Cutler
General Manager
EMC Technologies NZ Ltd

7. TEST RESULTS

Section 15.201: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device as it contains a 2.4 GHz transmitter.

Section 15.203 – Antenna requirement

This device uses an internal 2.4 GHz antenna that has no external connector.

Result: Complies

Section 15.204: External radio frequency power amplifiers and antenna modifications

An external power amplifier is not supplied with this device and it is not possible to attach an external power amplifier.

Result: Complies.

Section 15.205 – Restricted bands of operation

Refer to measurements made with reference to Section 15.249 (a).

This device operates in the 2400.0 – 2483.5 MHz which is not a restricted band.

Result: Complies

Section 15.207: Conducted limits

Device is powered using internal batteries.

Device cannot be directly or indirectly attached to the public AC mains supply

This section is therefore not applicable.

Section 15.209 – Radiated emissions below 30 MHz

In accordance with section 15.249 (d) the general emission limits specified in Section 15.209 (a) have been applied to all emissions except the transmitter harmonics.

See Section 15.249 (a) for further details.

As this device contains a digital device that operates using frequencies below 30 MHz, 32 kHz clock, low frequency measurements were attempted between 10 kHz – 30 MHz at the open area test site over a distance of 10 metres using a loop antenna, the centre of which was, 1 metre above the ground.

Testing was carried out when the device was transmitting continuously in Bluetooth Low Energy mode when powered using the supplied internal batteries.

Testing was carried out in the X, Y and Z planes.

The general limits described in 15.209 have been applied with the 300 metre and 30 metre limits being extrapolated by a factor of 40 dB per decade as allowed for in section 15.31(d)(2).

Between 9 – 90 kHz and between 110 – 490 kHz an Average detector and a Peak detector were used.

Where a peak detector was used the limit was increased by +20 dB

Between 90 kHz and 110 kHz band between 490 kHz and 30 MHz a Quasi Peak detector was used.

No emissions were detected on these frequencies of interest and no other emissions were detected from this device over the range of 9 kHz – 30 MHz

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (9 kHz – 30 MHz) ± 4.8 dB

Section 15.209 – Radiated emissions above 30 MHz

In accordance with section 15.249 (d) the general emission limits specified in Section 15.209 (a) have been applied to all emissions except the transmitter harmonics.

See Section 15.249 (a) for further details.

Testing for general radiated emissions was carried out over the frequency range of 30 MHz to 1000 MHz as the highest frequency in use by the digital device is less than 108 MHz (32 MHz).

Testing was carried out at the laboratory's open area test site - located at 670 Kawakawa Orere Rd, RD5 Papakura, New Zealand. This site conforms to the requirements of CISPR 16 and ANSI C63.4 - 2003.

Testing was carried out when the device was transmitting continuously in Bluetooth Low Energy mode when powered using the supplied internal batteries.

Testing was carried out in the X, Y and Z planes.

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.

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 μ V/m) = Receiver Reading (dB μ V) + Antenna Factor (dB/m) + Coax Loss (dB)

No emissions were detected from the device

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

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

Section 15.215 (c) – Additional provisions to the general radiated emission limitations

The device operates in the 2400 – 2483.5 MHz band.

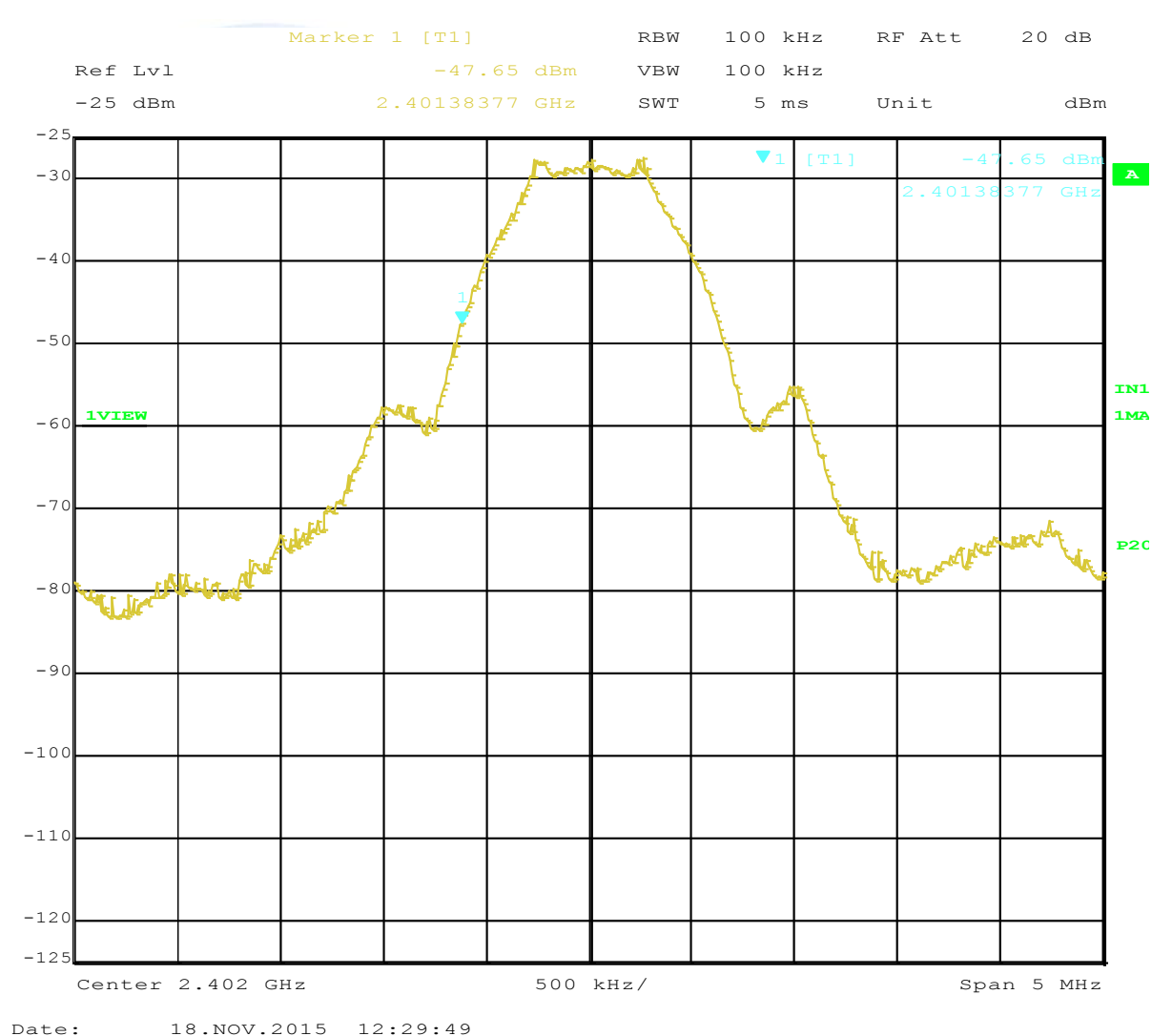
Relative spectrum mask measurements have been made when the device was operating on 2402.0 MHz and 2480.0 MHz

Measurements were made at the -20 dB points.

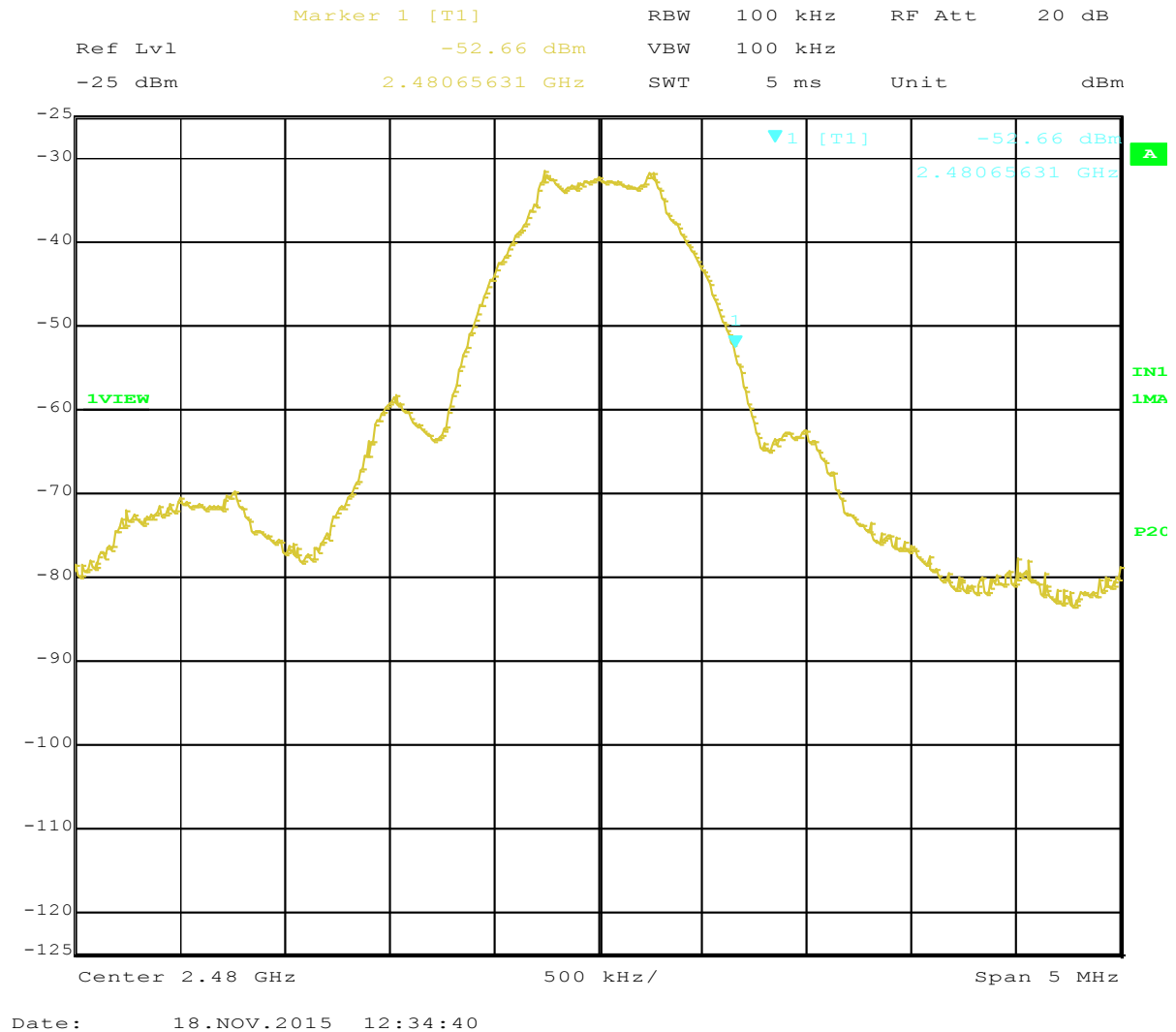
Frequency (MHz)	F low (MHz)	F high (MHz)
2402.0	2401.383	-
2480.0	-	2480.656

The device can be seen to stay within the band of 2400 – 2483.5 MHz at the -20 dB points

2402 MHz



2480 MHz



Results: Complies

Global Product Certification

Section 15.249 (a) – Field strength of the Fundamental and Harmonics

Radiated emission measurements were carried out with the limits as per section 15.249 (a) being applied to the Fundamental and Harmonics of each transmitter.

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at 670 Kawakawa Orere Rd, RD5 Papakura, New Zealand.

The transmitter was placed on the test table top which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were made 3 metres from the transmitting antenna.

Measurements below 1000 MHz were made using a Quasi Peak Detector with a bandwidth of 120 kHz.

Measurements above 1000 MHz were made using an average detector with a bandwidth of 1.0 MHz and also a peak detector with a bandwidth of 1.0 MHz.

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 with an automated antenna tower.

All emissions were measured in both vertical and horizontal antenna polarisations.

Testing was carried out when the device was made to hop continuously on 2402 MHz, 2440 MHz and 2480 MHz when powered using the supplied internal batteries up to the 10th harmonic starting at 30 MHz.

Testing was carried out in the X, Y and Z planes.

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

Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB/m) + Coax Loss (dB) – Amplifier Gain (dB)

Fundamental emission

Testing was carried out as detailed below

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Detector
2402.000	90.5	88.7	114.0	23.5	Vertical	Peak
	88.5	86.4	94.0	5.5	Vertical	Average
2440.000	90.4	88.8	114.0	23.6	Vertical	Peak
	88.2	86.7	94.0	5.8	Vertical	Average
2480.000	90.3	88.9	114.0	23.7	Vertical	Peak
	88.1	85.6	94.0	5.9	Vertical	Average

Section 15.249 specifies a limit of 50 mV/m (94 dBuV/m) when an average is used for devices operating in the band of 2400.0 – 2483.5 MHz.

The peak limit is the average limit + 20 dB.

This limit has been converted to dBuV/m using the formula $20 * (\log 0.050 / 0.000001)$

Measurements were made in the Y, X and Z axis.

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 25,000 MHz) ± 4.1 dB

Spurious emissions

Transmitting continuously on 2402.0 MHz

Freq. (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Detector
4804.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
4804.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
7206.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
7206.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
9608.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
9608.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
12010.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
12010.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
14412.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
14412.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
16814.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
16814.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
19216.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
19216.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
21618.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
21618.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
24020.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
24020.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average

No spurious emissions were observed.

All measurements are noise floor measurements

Transmitting continuously on 2440.0 MHz

Freq. (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Detector
4880.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
4880.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
7320.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
7320.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
9760.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
9760.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
12200.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
12200.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
14640.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
14640.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
17080.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
17080.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
19520.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
19520.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
21960.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
21960.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
24400.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
24400.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average

No spurious emissions were observed.

All measurements are noise floor measurements

Transmitting continuously on 2480.0 MHz

Freq (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin dB	Antenna	Detector
4960.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
4960.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
7440.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
7440.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
9920.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
9920.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
12400.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
12400.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
14880.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
14880.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
17360.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
17360.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
19840.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
19840.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
22320.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
22320.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average
24800.0	< 59.0	< 59.0	74.0	> 15.0	Vert/Hort	Peak
24800.0	< 46.0	< 46.0	54.0	> 8.0	Vert/Hort	Average

No spurious emissions were observed.

All measurements are noise floor measurements.

Measurements were attempted at a distance of 3 metres using vertical and horizontal polarisations when the device was placed in the X, Y and Z axes.

Measurements were made using a peak and an average detector with a 1 MHz bandwidth.

As per section 15.249 a limit of 500 uV/m applies to the harmonic emissions when an average detector is used.

This limit has been converted to dBuV/m using the formula $20 * (\log 500)$ with a factor of + 20 dB being added to determine the peak limit.

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 25,000 MHz) ± 4.1 dB

8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial #	Asset	Cal Due	Interval
Aerial Controller	EMCO	1090	9112-1062	3710	N/a	N/a
Aerial Mast	EMCO	1070-1	9203-1661	3708	N/a	N/a
Biconical	Schwarzbeck	BBA 9106	9594	3696	03/02/2018	3 years
Horn Antenna	EMCO	3115	9511-4629	E1526	04/06/2017	3 years
Horn Antenna	EMCO	3116	92035	-	10 /05/2016	3 years
Log Periodic	Schwarzbeck	VUSLP 91111	9111-228	3785	01/12/2017	3 years
Loop Antenna	EMCO	6502	9003-2485	3798	04/07/2017	3 years
Receiver	Rohde & Schwarz	ESIB-40	100171	4003	16/04/2016	1 year
Turntable	EMCO	1080-1-2.1	9109-1578	3709	N/a	N/a
VHF Balun	Schwarzbeck	VHA9103	9594	3696	03/02/2018	3 years

At the time of testing all test equipment was within calibration

9. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd registration with the Federal Communications Commission as a listed facility, Registration Number: 90838, which was last updated in June 2014.

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

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

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

10. PHOTOGRAPHS

External photos and Label





Radiated Emissions (Y Plane)



Y Plane



X Plane



Z Plane

