EMC Technologies (NZ) Ltd

Test Report No **70527.2**
Report date: 27 September 2007

TEST REPORT

Kahne KB1000 Series Bolus Transmitter

tested to

47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart C – Intentional Radiators

for

Kahne Ltd

This Test Report is issued with the authority of:

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 **Kahne KB1000 Series Bolus Transmitter** complies with FCC Part 15 Subpart C as an Intentional Radiator when the methods as described in ANSI 63.4 - 2003 are applied.

2. RESULTS SUMMARY

Clause	Parameter	Result
15.201	Equipment authorisation requirement.	Certification required.
15.203	Antenna requirement	Complies. Antenna integral.
15.204	External PA and antenna modifications	Not applicable. No external devices.
15.205	Restricted bands of operation	Complies. Device transmits periodically on 433.9500 MHz.
15.207	Conducted limits	Not applicable. Device is powered using an internal battery.
15.209	Radiated emission limits.	Not applicable. All emissions from the device are related to the transmitter fundamental and the resulting harmonic emissions.
15.231(a)	General requirements	Not applicable. Device operates periodically therefore 15.231(e) will apply.
15.231(b)	Field strength of emissions	See 15.231(e). Device sends short duration data messages. Pulse modulation not used. 15.35(c) not applied. Peak and average detectors used
15.231(c)	Bandwidth	Complies.
15.231(d)	Temperature tests	Not applicable. Device operates at 433.950 MHz
15.231(e)	Field strength of emissions	Complies with a 0 dB margin at 433.950 MHz (Vertical) when measured using a peak detector
15.231(e)	Silent period	Complies

3. INTRODUCTION

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

The test sample was selected by the client.

This report relates only to the sample tested.

This report contains no corrections or erasures.

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 DETAILS

Company Name	Kahne Ltd
Address	109 Valley Road Mount Eden
City	Auckland
Country	New Zealand
Contact	Mr Michael Eivers

5. DESCRIPTION OF TEST SAMPLE

Brand Name Kahne

Model Number KB1000 Series

Product Bolus Transmitter

Manufacturer Kahne Ltd

Country of Origin New Zealand

Serial Number Not serialised

FCC ID WO7KB100008

This transmitter transmits data periodically on 433.9500 MHz.

The transmitter has been tested in free space however it would normally be swallowed by a cow and is used to send temperature, pressure and pH data relating to the animal at periodic intervals.

It is internally powered using a 3.6 Vdc battery.

Testing was carried out with the transmitter sending 51.5 mS long messages every 10 seconds.

In practice the Bolus is operated with a transmission time fixed at 52 mS with the bolus transmitting 1 to 30 times an hour.

Due to the internal attenuation of the animal the data from the Bolus is transmitted to a device called a Bospac which is mounted on the back of the cow.

The Bospac receives the messages from the Bolus and then re-transmits them to a distance receiver.

Frequency Shift Keying (FSK) modulation is used.

6. METHODS AND PROCEDURES

Standard

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

Methods and Procedures

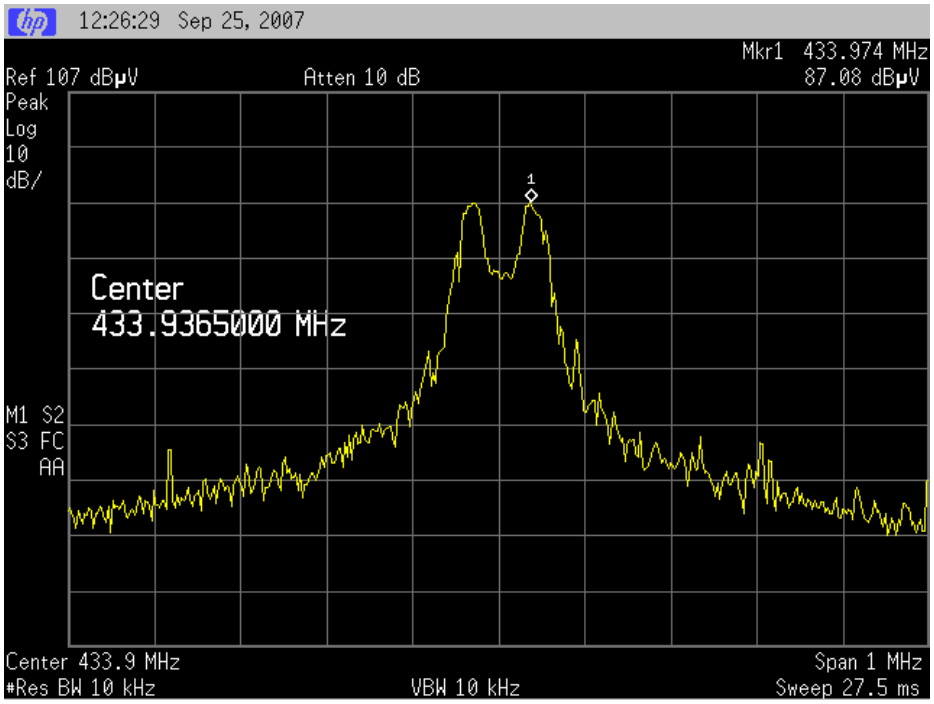
The measurement methods and procedures as described in ANSI C63.4 - 2003 were used.

7. RESULTS

Section 15.205: Restricted bands of operation.

The transmitter has a centre frequency of approximately 433.9500 MHz.

This falls between the restricted bands of 399.9 - 410 MHz and 608 – 614 MHz.



Result: Complies.

Section 15.231(a) General requirements

This transmitter operates periodically and therefore paragraph (e) of this section has been applied

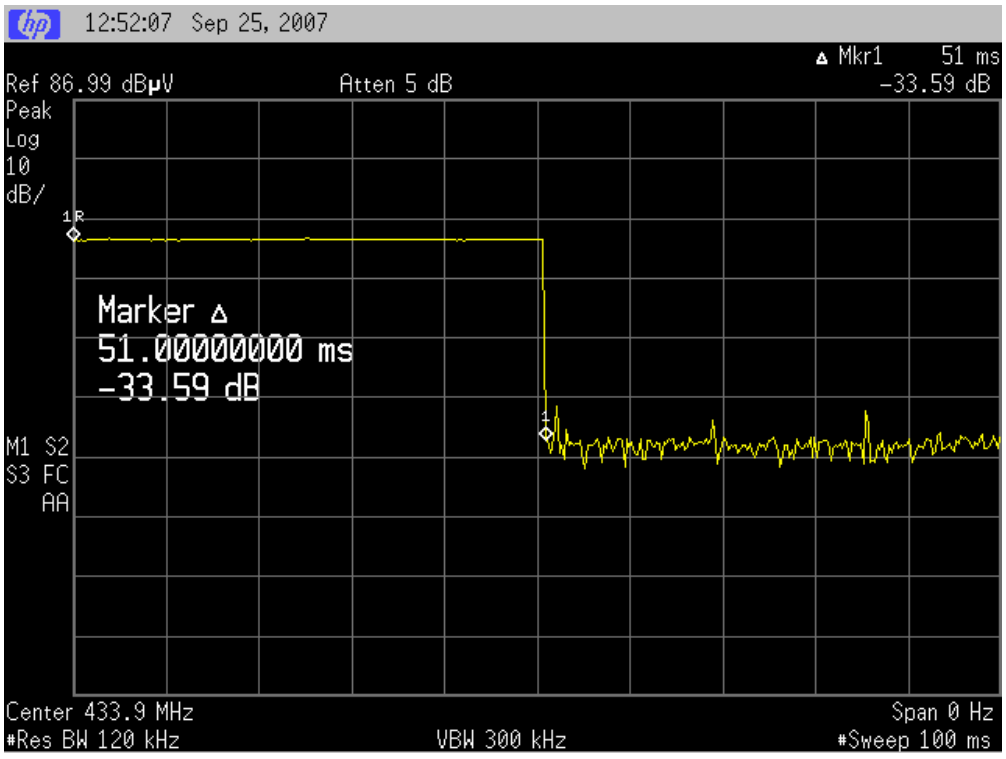
Section 15.231(b) Field strength of emissions

This transmitter operates periodically and therefore paragraph (e) of this section has been applied

However the following point should be noted

(1) Field strength of emissions have been made at a distance of 3 metres

(2) Average and peak measurements have been made. Pulse limiting as per Section 15.35(c) has not been applied as pulse modulation is not used. See plot below which shows a constant amplitude output during the on time of approximately 51 mS.



(3) Spurious emission have measured using an average and peak detector with the limits as per section 15.231(e) being applied

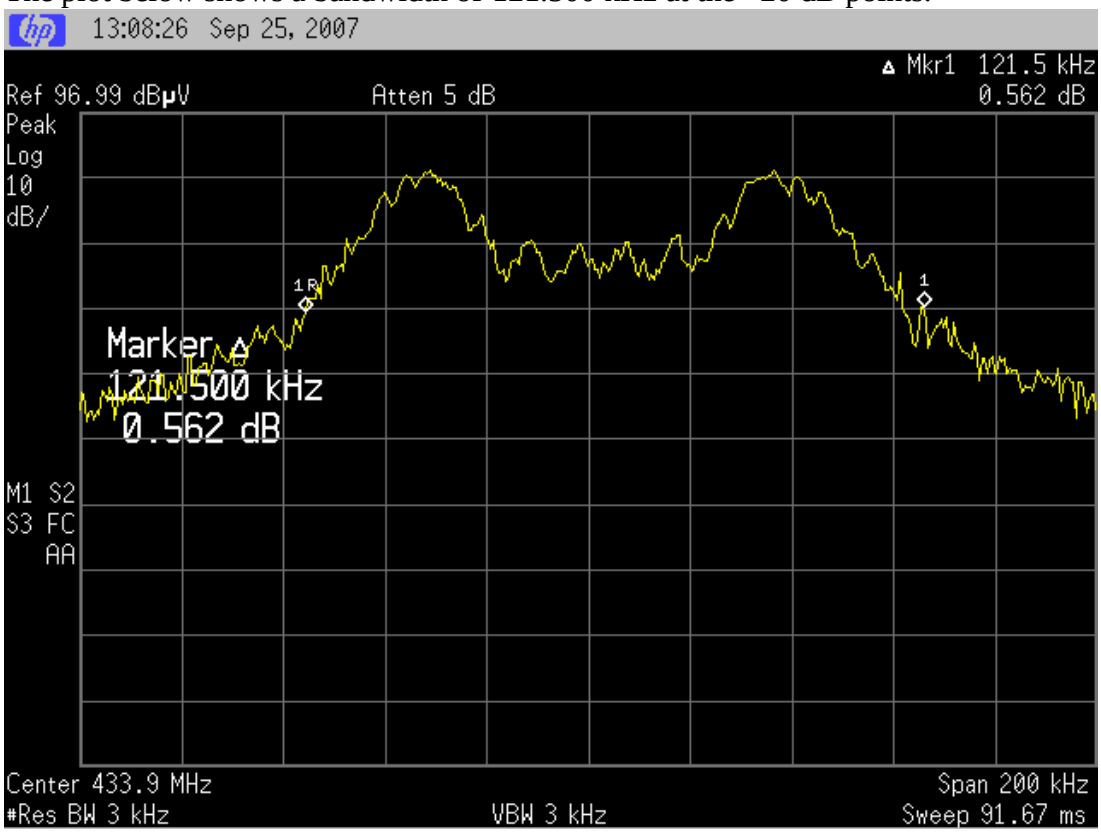
Section 15.231(c) Bandwidth.

The bandwidth of the emission should not be greater than 0.25% of the centre frequency at the –20 dB points.

Centre frequency = 433.950 MHz.

0.25% of 433.950 MHz is 1.085 MHz.

The plot below shows a bandwidth of 121.500 kHz at the –20 dB points.



Result: Complies.

Section 15.231(e) Field strength of emissions

Radiated emissions testing was carried out over the frequency range of 30 MHz to 4340 MHz as the transmitter operates on 433.950 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, Part 1, Clause 16, and ANSI C63.4 - 2003.

The device was placed on the test tabletop, which is a total of 0.8 m above the test site ground plane with testing was carried out over a distance of 3 metres.

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. The emission is measured in both vertical and horizontal antenna polarisations, where appropriate.

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

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

The average limit as described in Section 15.231(e) has been applied as follows:

Fundamental 260 – 470 MHz = 16.6667 x 433.950 MHz – 2833.3333 = 4399.1812 uV/m.

This is then convert to dBuV/m using 20*log (4399.1812) = 72.8 dBuV/m

The peak level is +20 dB higher being 92.8 dBuV/m

The average spurious emission limit is 20 dB below the fundamental emission level at 52.8 dBuV/m with the peak spurious emission limit being 72.8 dBuV/m.

General emission measurements were also made over the range of 30 – 4350 MHz with the limits as described in Part 15, section 15.209 being applied however the only emissions observed were the transmitter fundamental emission and the harmonic emissions which are recorded below.

Fundamental emission

Frequency MHz	Level dBuV/m	Limit dBuV/m	Margin dB	Antenna	Detector
433.9500	92.8	92.8	0.0	Vertical	Peak
433.9500	78.5	92.8	14.3	Horizontal	Peak
433.9500	65.2	72.8	7.6	Vertical	Average
433.9500	47.9	72.8	24.9	Horizontal	Average

Result: Complies with a 0 dB margin when measured in peak (Vertical). Measurement falls within the window of uncertainty for this test method.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 4500 MHz) ± 4.1 dB

Spurious emissions

Frequency MHz	Level dBuV/m	Limit dBuV/m	Margin dB	Antenna	Detector
867.8600	61.1	72.8	11.7	Vertical	Peak
867.8600	51.0	72.8	21.8	Horizontal	Peak
867.8600	29.3	52.8	23.5	Vertical	Average
867.8600	25.0	52.8	27.8	Horizontal	Average
1301.7900	62.1	72.8	10.7	Vertical	Peak
1301.7900	55.2	72.8	17.6	Horizontal	Peak
1301.7900	28.3	52.8	24.5	Vertical	Average
1301.7900	33.3	52.8	19.5	Horizontal	Average
1735.7200	57.5	72.8	15.3	Vertical	Peak
1735.7200	47.3	72.8	25.5	Horizontal	Peak
1735.7200	27.1	52.8	25.7	Vertical	Average
1735.7200	33.6	52.8	19.2	Horizontal	Average
2169.6500	66.7	72.8	6.1	Vertical	Peak
2169.6500	60.6	72.8	12.2	Horizontal	Peak
2169.6500	45.2	52.8	7.6	Vertical	Average
2169.6500	40.3	52.8	12.5	Horizontal	Average
2603.4300	55.2	72.8	17.6	Vertical	Peak
2603.4300	56.0	72.8	16.8	Horizontal	Peak
2603.4300	41.7	52.8	11.1	Vertical	Average
2603.4300	41.9	52.8	10.9	Horizontal	Average
3037.650	-	72.8 / 52.8	-	Vert/Hort	Peak/Average
3471.600	-	72.8 / 52.8	-	Vert/Hort	Peak/Average
3905.550	-	72.8 / 52.8	-	Vert/Hort	Peak/Average
4339.500	-	72.8 / 52.8	-	Vert/Hort	Peak/Average

Result: Complies with a 6.2 dB margin at 2169.650 MHz when measured in peak (vertical).

Measurement uncertainty with a confidence interval of 95% is:

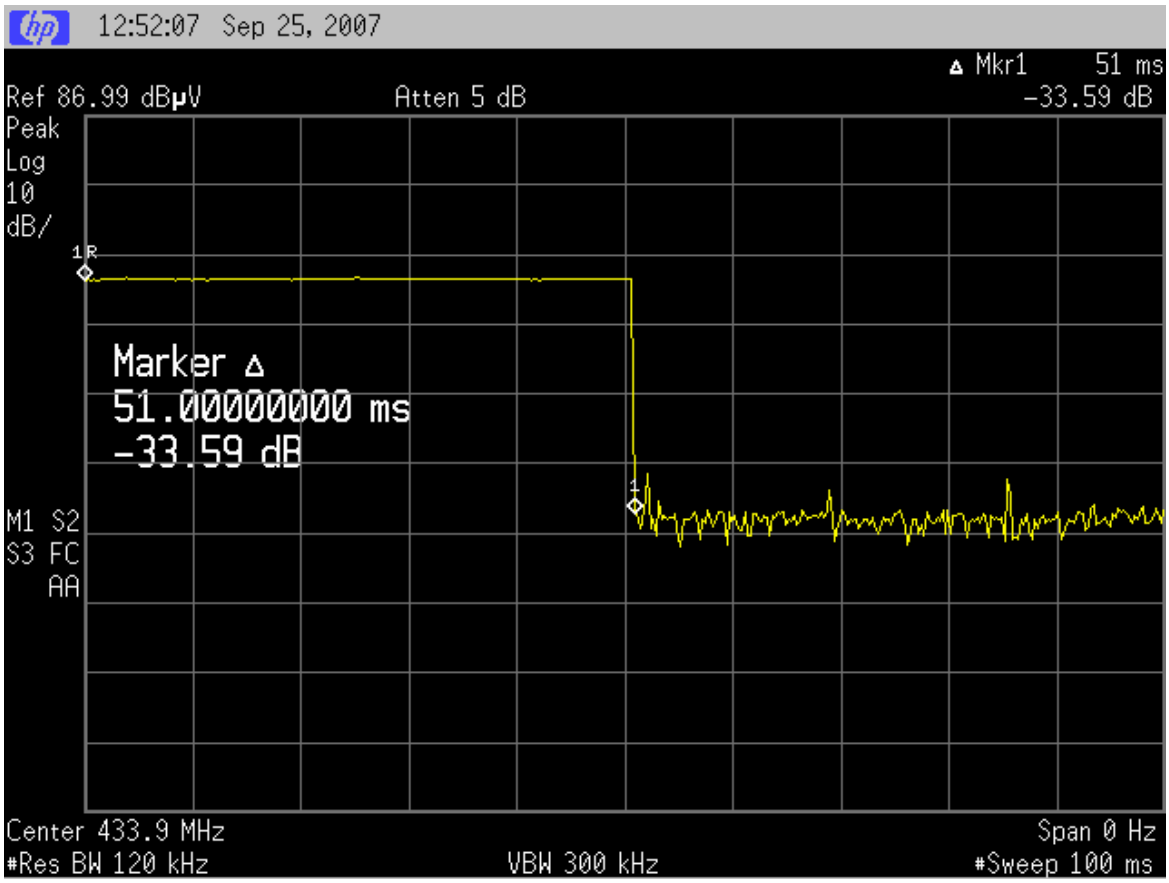
- Free radiation tests (30 - 4500 MHz) ± 4.1 dB

Section 15.231(e) Timing of transmissions

While in test mode transmissions were observed every 10 seconds approximately with the transmission lasting approximately 52 mS.

In real life the transmissions would normally occur every 5 to 30 minutes in order to preserve the battery life of the device.

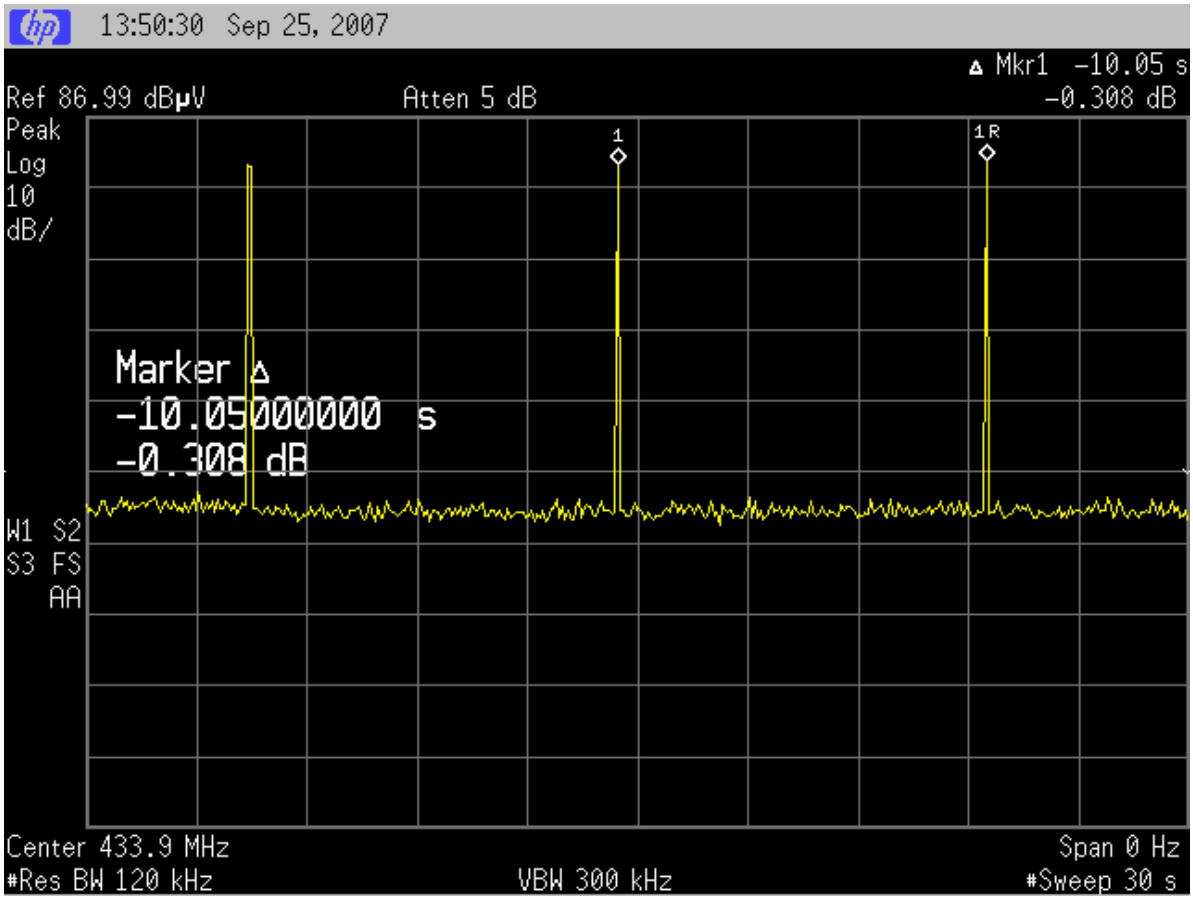
The FCC rules state that each transmission shall not be longer than 1 second. The transmission has been measured to be approximately 52 mS.



The FCC rules also state that the silent period shall be at least 30 times the transmission duration but not less than 10 seconds.

51 mS x 30 = 1.5 seconds.

Therefore 10 second rule has been applied.



Result: Complies

8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	N/A
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	N/A
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	N/A
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3603	4 Feb 2008
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612	4 Feb 2008
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	4 Feb 2008
Horn Antenna	Electrometrics	RGA-60	6234	E1494	3 May 2008
Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595	30 Jan 2008
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3776	6 Mar 2008
Pre Amplifier	Hewlett Packard	8349B	2644A01659	-	4 Feb 2008

9. 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 in January 2007.

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.

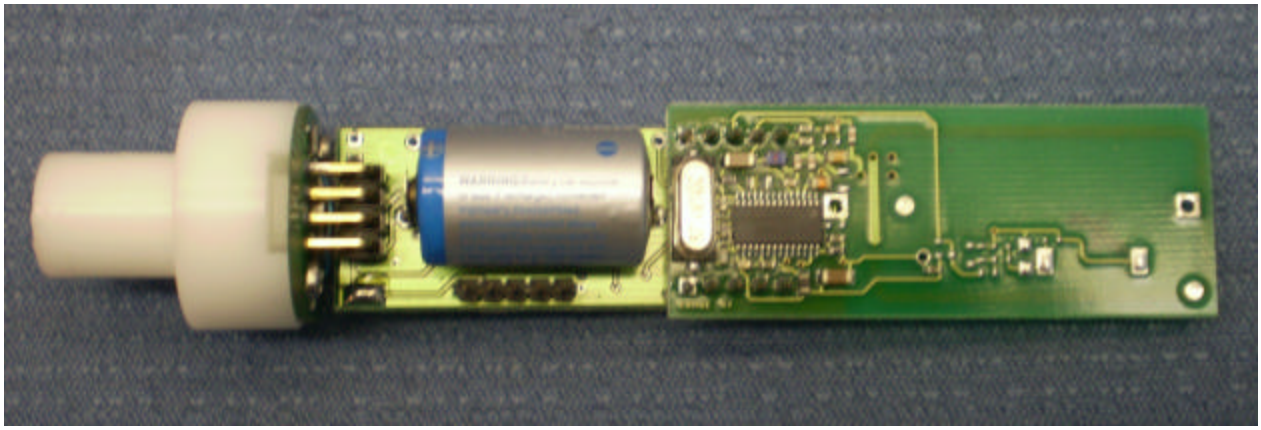
All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, 2005.

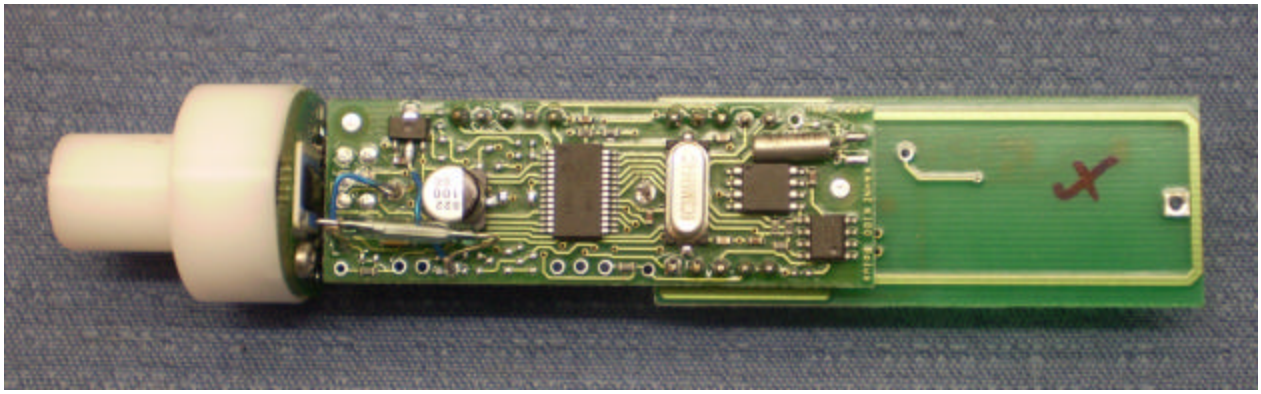
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with a number of accreditation bodies in various economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied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

10. PHOTOGRAPHS

External View

Internal View





Radiated emissions test set up