# EMC Technologies (NZ) Ltd

Test Report No **50535.1**
Report date: 3rd June 2005

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# TEST REPORT

## SPEDA Awning Remote Control System

*tested to*

## 47 Code of Federal Regulations

## Part 15 - Radio Frequency Devices

## Subpart B – Unintentional Radiators

## Subpart C – Intentional Radiators

*for*

## South Pacific Electronic Design Associates (SPEDA) 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 **SPEDA Awning Remote Control System** complies with FCC Part 15 Subpart B as an Unintentional Radiator and Subpart C as an Intentional Radiator when the methods, as described in ANSI C63.4 - 1992, are applied.

## 2. RESULTS SUMMARY

The results from testing are summarised in the following table:

Receiver

| Clause | Parameter | Result |
|---|---|---|
| 15.101 | Equipment authorisation requirement. | Certification or Declaration of Conformity required for receivers. |
| 15.103 | Exempted devices. | Not applicable as the device is a receiver and is not a digital device. |
| 15.107 | Conducted limits | Complies. |
| 15.109 | Radiated emission limits | Complies. |
| 15.111 | Antenna power conduction limit for receivers. | Not applicable. Receiver does not have terminals for the connection of an external antenna. |

Transmitter

| 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 316.050 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 | Transmitter is operated manually with a switch that deactivates the transmitter within 5 seconds of being released. |
| 15.231(b) | Field strength of emissions | Complies with a 0.2 dB margin at 316.1300 MHz (Horizontal), with measurements falling within the window of uncertainty. |
| 15.231(c) | Bandwidth | 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 INFORMATION

| | |
|---|---|
| **Company Name** | South Pacific Electronic Design Associates (SPEDA)Ltd |
| **Address** | PO Box 20253 |
| **City** | Christchurch |
| **Country** | New Zealand |
| **Contact** | Mr Russell Hocken |

# 5. DESCRIPTION OF TEST SAMPLE

| | |
|---|---|
| **Brand Name** | SPEDA |
| **Model Number** | See below |
| **Product** | Awning Remote Control System |
| **Manufacturer** | South Pacific Electronic Design Associates Ltd |
| **Country of Origin** | New Zealand |
| **Serial Number** | Not serialised |
| **FCC ID** | TX8 |

This system consists of the following items which will be covered by the same FCC ID:

- ACS 316.0505 MHz remote control transmitter
- ACMC1 115 Vac remote control receiver and motor controller
- ACSRF 115 Vac remote control receiver and existing ACS controller

# 6. METHODS AND PROCEDURES

Standard

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

Methods and Procedures

he measurement methods and procedures as described in ANSI C63.4 - 1992 were used.

# 7. RESULTS

**Section 15.107 Conducted emission limits.**

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.

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

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

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

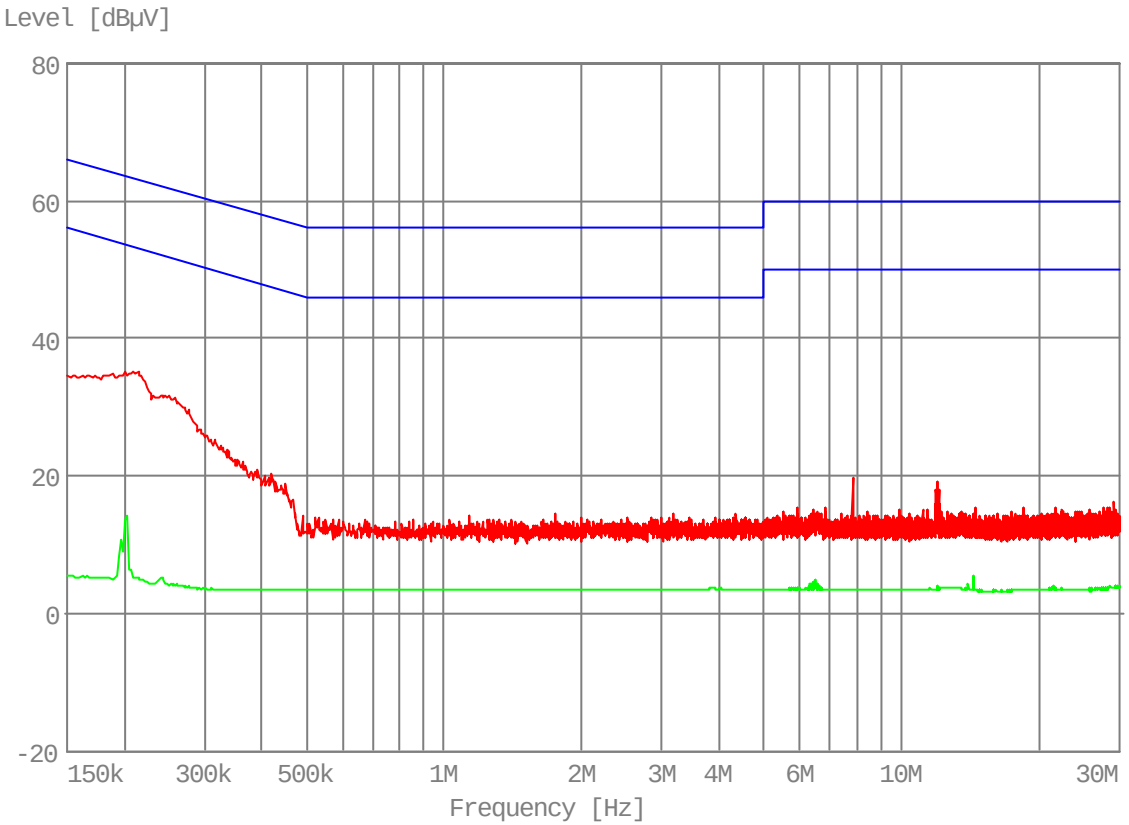
At all times the device was kept more than 80cm from the artificial mains network.

Measurement uncertainty with a confidence interval of 95% is:

- Conducted emissions (0.15-30 MHz) ± 2.8 dB

## Conducted emissions

| **Comments:** | ACMC1 receiver tested receiving continuously when powered at 115 Vac. |
|---|---|




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

Quasi-Peak Measurements

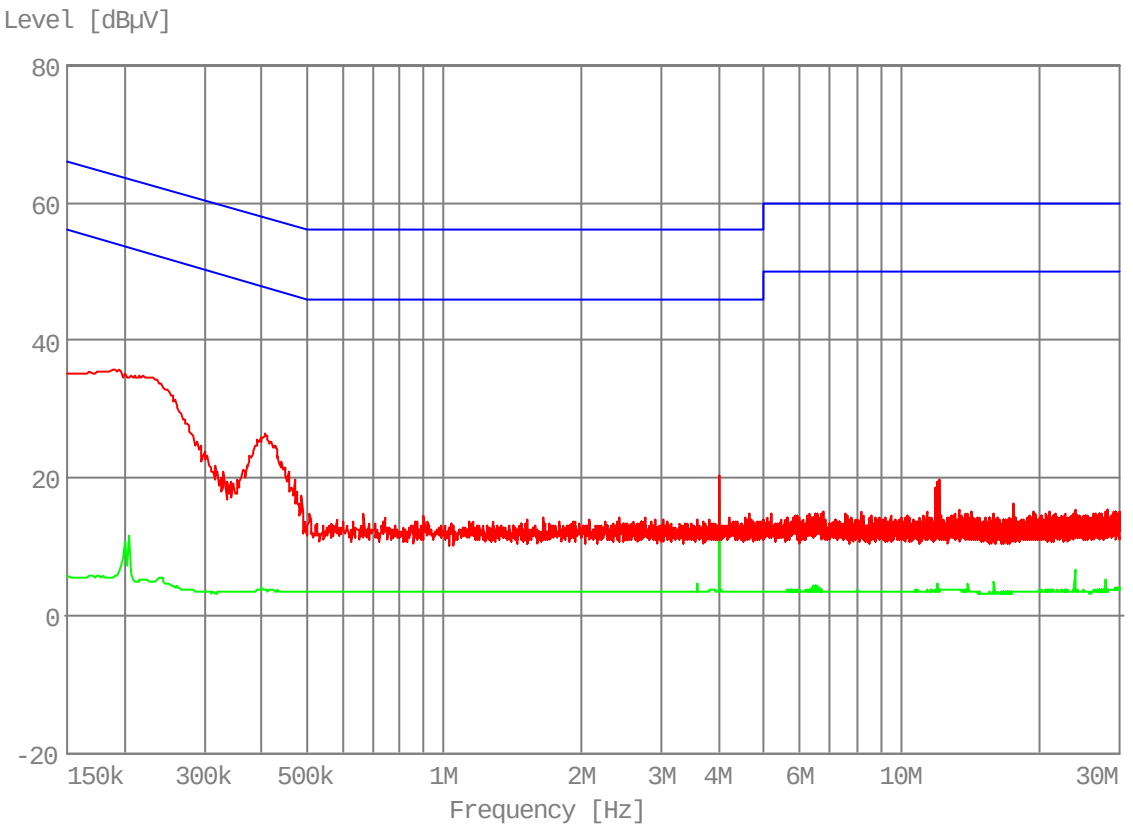
| Frequency MHz | Level dBmV | Limit dBmV | Margin dB | Exceed | Phase | Rechecks dBmV |
|---|---|---|---|---|---|---|
| No results recorded | | | | | | |

Average Measurements

| Frequency MHz | Level dBmV | Limit dBmV | Margin dB | Exceed | Phase | Rechecks dBmV |
|---|---|---|---|---|---|---|
| No results recorded | | | | | | |

## Conducted emissions

| **Comments:** | ACSRF receiver tested when receiving continuously when powered at 115 Vac. |
|---|---|




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

Quasi-Peak Measurements

| Frequency MHz | Level dBmV | Limit dBmV | Margin dB | Exceed | Phase | Rechecks dBmV |
|---|---|---|---|---|---|---|
| No results recorded | | | | | | |

Average Measurements

| Frequency MHz | Level dBmV | Limit dBmV | Margin dB | Exceed | Phase | Rechecks dBmV |
|---|---|---|---|---|---|---|
| No results recorded | | | | | | |

**Section 15.109 Radiated emission limits.**

Radiated emissions testing was carried out over the frequency range of 30 MHz to 2750 MHz as the ACMC1 and ASCRF receivers operate on 316 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 - 1992.

The receivers were placed on the test tabletop, which is a total of 0.8 m above the test site ground plane.

The receivers were both tested while receiving continuously when powered at 115 Vac.

Testing was carried out over a distance of 3 metres.

Below 1000 MHz a Quasi Peak detector with a bandwidth of 120 kHz was utilised.

Above 1000 MHz a Peak detector with a bandwidth of 1 MHz was utilised.

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 limits as described in Section 15.109 have been applied as follows:

| | | |
|---|---|---|
| 30 – 88 MHz | 100 uV/m | 40.0 dBuV/m |
| 88 – 216 MHz | 150 uV/m | 43.5 dBuV/m |
| 216 – 960 MHz | 200 uV/m | 46.0 dBuV/m |
| above 960 MHz | 500 uV/m | 54.0 dBuV/m |

No emissions could be detected from either receiver over the range of 30 MHz to 2750 MHz when either a Quasi Peak, Average or Peak detector was utilised.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 2750 MHz) ± 4.1 dB

**Section 15.205: Restricted bands of operation.**

The transmitter transmits on 316.050 MHz.

This falls between the restricted bands of 240 – 285 MHz and 322 – 335.4 MHz.

**Result:** Complies.

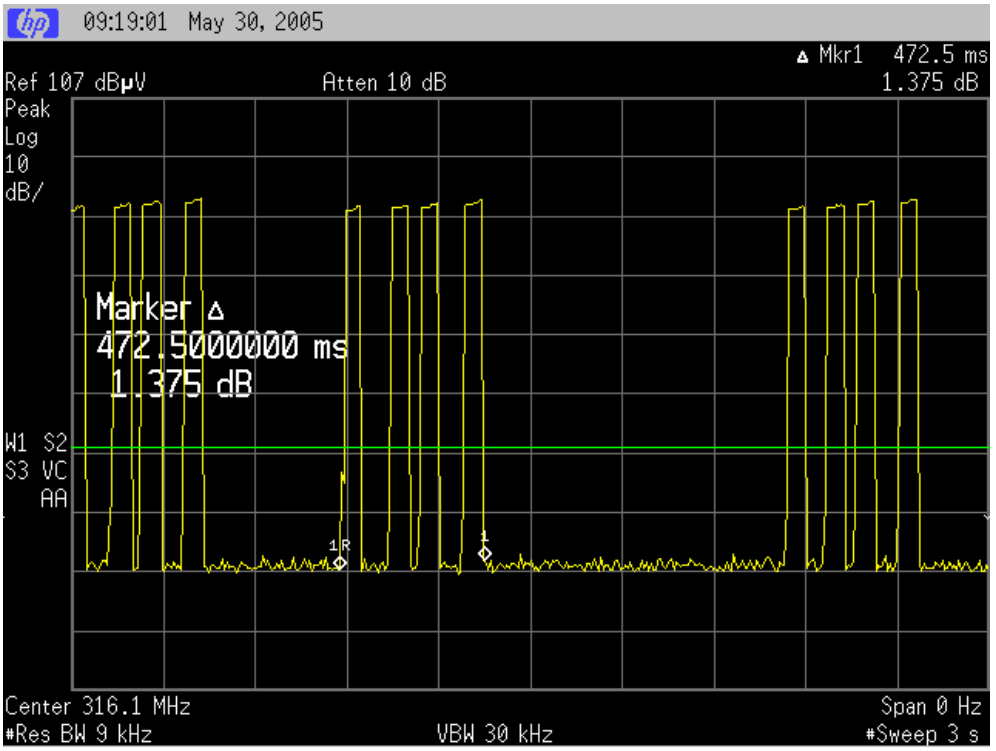
**Section 15.231(a) General requirements and field strength of emissions.**

The transmitter tested is a hand held remote control that is used for raising and lowering external awnings that are fitted mainly to mobile homes.

The remote control is powered using an internal battery.

The transmitter is activated manually and it deactivates automatically once the control switch is no longer being pressed.

This activation takes less than 1 second as can be seen from the attached plots.



**Section 15.231(b) Field strength of emissions.**

Radiated emissions testing was carried out over the frequency range of 30 MHz to 3160 MHz as the transmitter operates on 316 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 - 1992.

The device was placed on the test tabletop, which is a total of 0.8 m above the test site ground plane and was remotely activated.

Testing was carried out over a distance of 3 metres.

Below 1000 MHz a Quasi Peak detector with a bandwidth of 120 kHz was utilised.

Above 1000 MHz a Peak detector and an Average detector with a bandwidth of 1 MHz was utilised.

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 limits as described in Section 15.231 have been applied as follows:

Fundamental 260 – 470 MHz = 41.6667 x 316 MHz – 7083.3333 = 6083.3439 uV/m.

This is then convert to dBuV/m using 20*log (6041.6772) = 75.7 dBuV/m

The spurious emission limit is 20 dB below the fundamental emission level.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (30 - 4000 MHz) ± 4.1 dB

**Fundamental emission.**

| Frequency MHz | Level dBuV/m | Limit dBuV/m | Margin dB | Antenna | Detector |
|---|---|---|---|---|---|
| 316.130 | 74.3 | 75.7 | 1.4 | Vertical | Quasi Peak |
| 316.130 | 75.5 | 75.7 | 0.2 | Horizontal | Quasi Peak |

**Spurious emissions**

| Frequency MHz | Level dBuV/m | Limit dBuV/m | Margin dB | Antenna | Detector |
|---|---|---|---|---|---|
| 632.248 | 51.6 | 55.7 | 4.1 | Vertical | Quasi Peak |
| 632.248 | 50.2 | 55.7 | 5.5 | Horizontal | Quasi Peak |
| 948.365 | 39.0 | 55.7 | 16.7 | Vertical | Quasi Peak |
| 948.365 | 46.6 | 55.7 | 9.1 | Horizontal | Quasi Peak |
| 1264.483 | 44.0 | 55.7 | 11.7 | Vertical | Average |
| 1264.483 | 43.7 | 55.7 | 12.0 | Horizontal | Average |
| 1264.483 | 49.1 | 55.7 | 6.6 | Vertical | Peak |
| 1264.483 | 47.9 | 55.7 | 7.8 | Horizontal | Peak |
| 1580.650 | - | 55.7 | - | Vert/Hort | Peak |
| 1896.780 | - | 55.7 | - | Vert/Hort | Peak |
| 2212.910 | - | 55.7 | - | Vert/Hort | Peak |
| 2529.040 | - | 55.7 | - | Vert/Hort | Peak |
| 2845.170 | - | 55.7 | - | Vert/Hort | Peak |
| 3161.300 | - | 55.7 | - | Vert/Hort | Peak |

**Section 15.231(c) Bandwidth.**

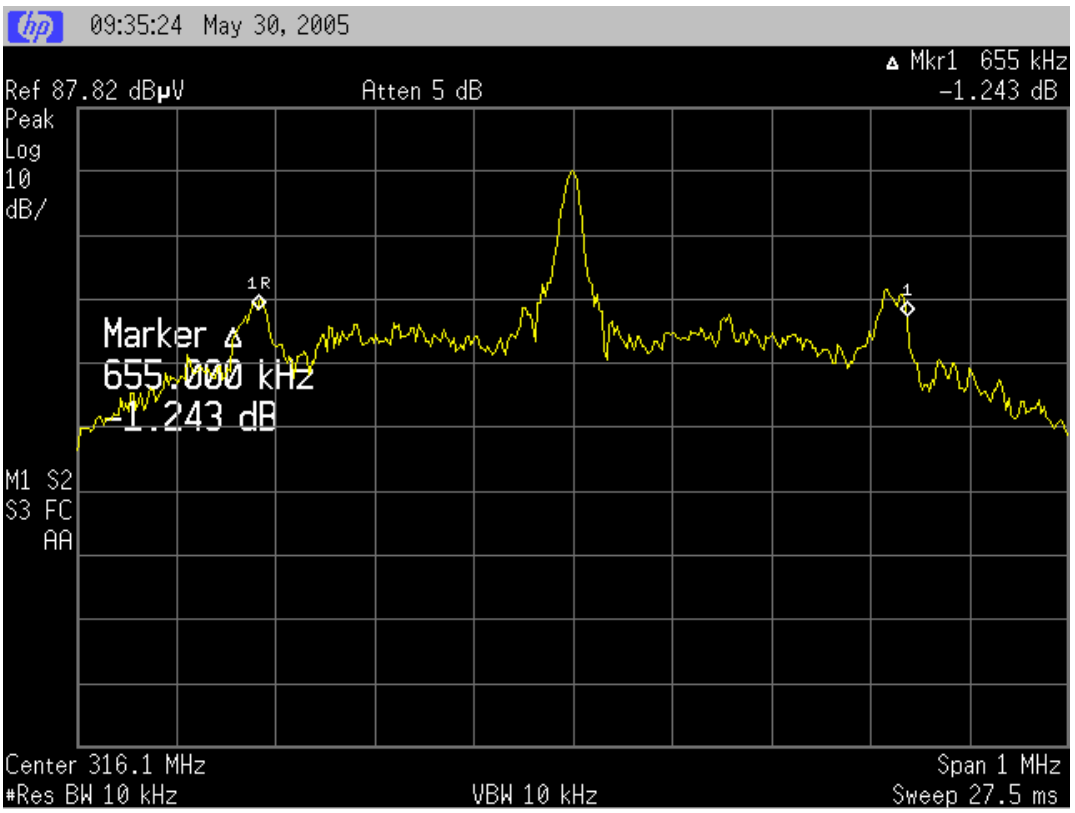
The bandwidth of the emission should not be greater than 0.25% of the centre frequency at the –20 dB points.

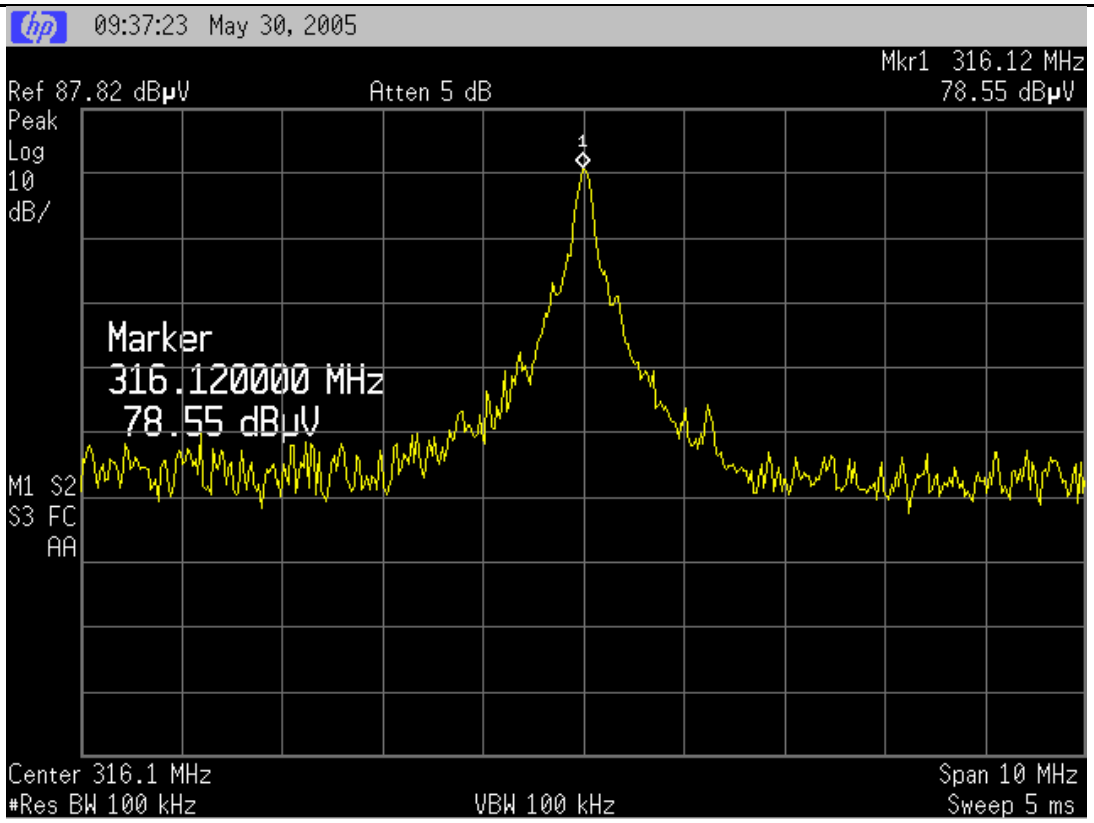
Centre frequency = 316 MHz.

0.25% of 316 MHz is 790 kHz.

The plot below shows a bandwidth of 655.0 kHz at the –20 dB points.

**Result:** Complies.




09:37:23 May 30, 2005
Mkr1 316.12 MHz
Ref 87.82 dBµV
Atten 5 dB
78.55 dBµV
Peak
Log
10
dB/
1
Marker
316.120000 MHz
78.55 dBµV
M1 S2
S3 FC
AA
Center 316.1 MHz
Span 10 MHz
#Res BW 100 kHz
VBW 100 kHz
Sweep 5 ms

# 8. TEST EQUIPMENT USED

| Instrument | Manufacturer | Model | Serial No | Asset Ref |
|---|---|---|---|---|
| Aerial Controller | EMCO | 1090 | 9112-1062 | RFS 3710 |
| Aerial Mast | EMCO | 1070-1 | 9203-1661 | RFS 3708 |
| Biconical Antenna | Schwarzbeck | BBA 9106 | - | RFS 3612 |
| Log Periodic Antenna | Schwarzbeck | VUSLP 9111 | 9111-228 | 3785 |
| Measurement Receiver | Rohde & Schwarz | ESCS 30 | 847124/020 | E1595 |
| Spectrum Analyser | Hewlett Packard | E7405A | US39150142 | 3776 |
| Horn Antenna | Electrometrics | RGA-60 | 6234 | E1494 |
| Coax Cable | Sucoflex | 104PA | 2545/4PA | - |
| Turntable | EMCO | 1080-1-2.1 | 9109-1578 | RFS 3709 |
| VHF Balun Antenna | Schwarzbeck | VHA 9103 | | RFS 3603 |

# 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 on February 23rd, 2004.

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 17025.1999.

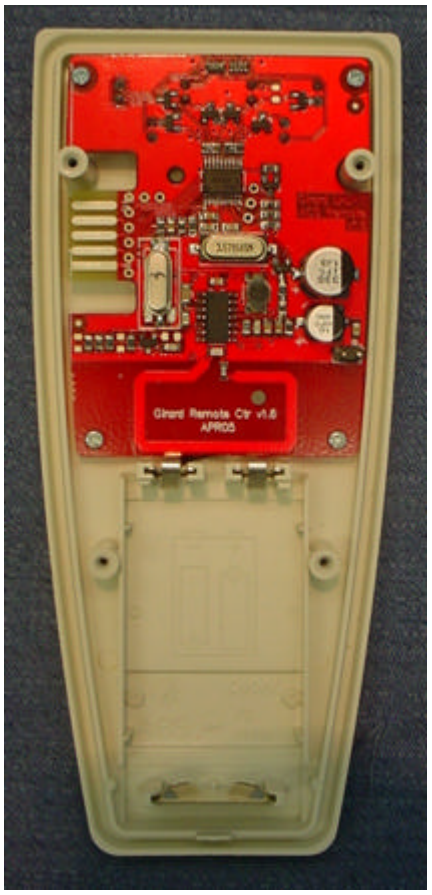
All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.1999.

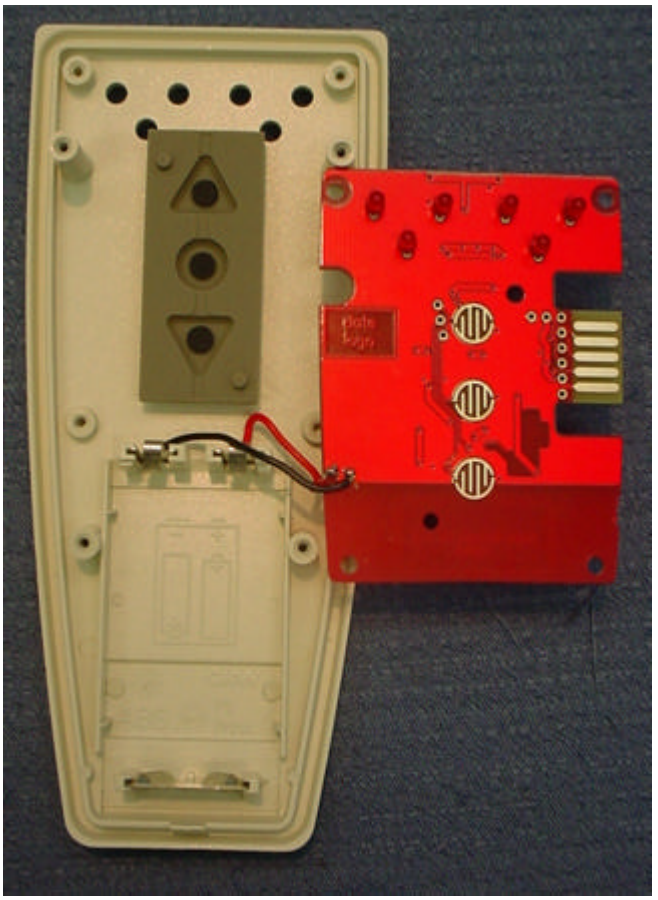
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

# 10. PHOTOGRAPHS

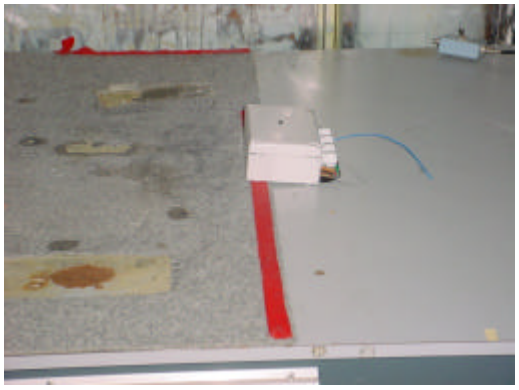
Transmitter external view

Transmitter internal views

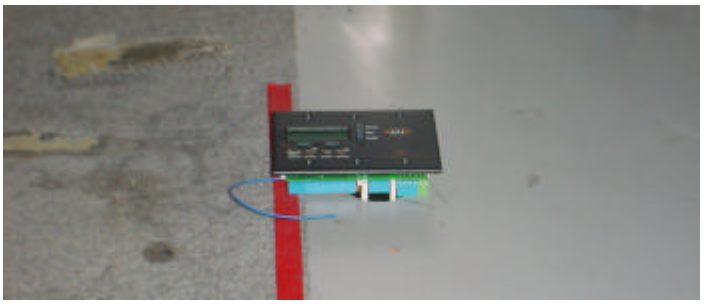


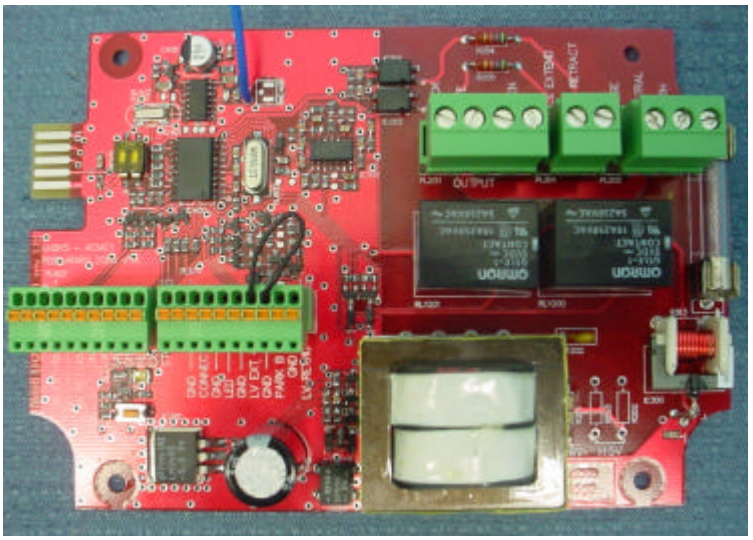
Conducted emissions test set up – ACMC1 Receiver

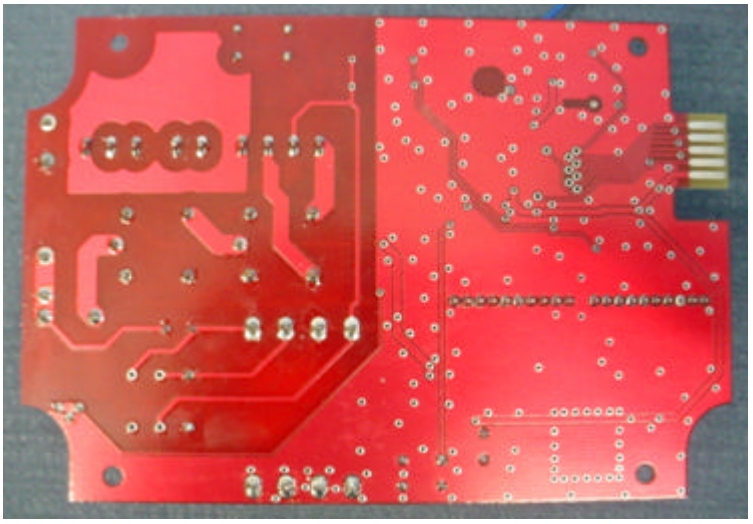


Conducted emissions test set up – ACS Receiver

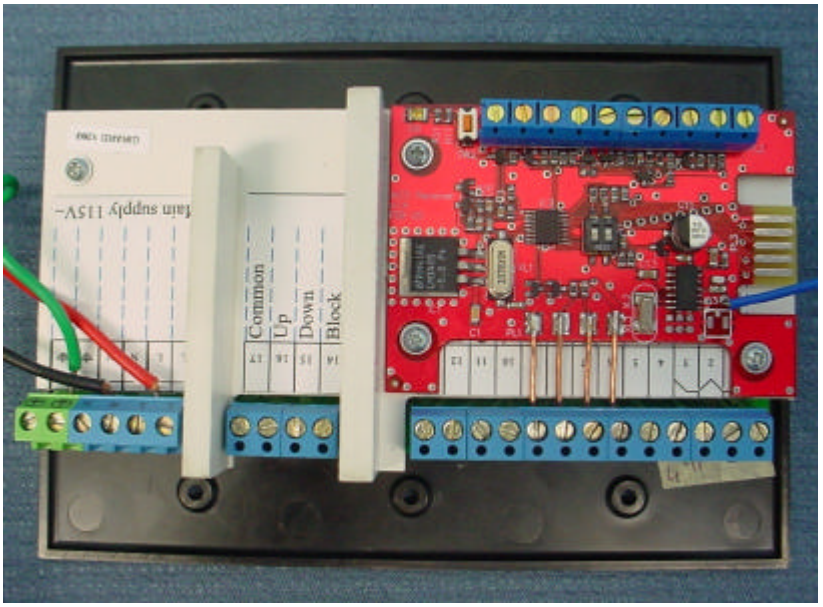


ACMC1 Receiver Internal View

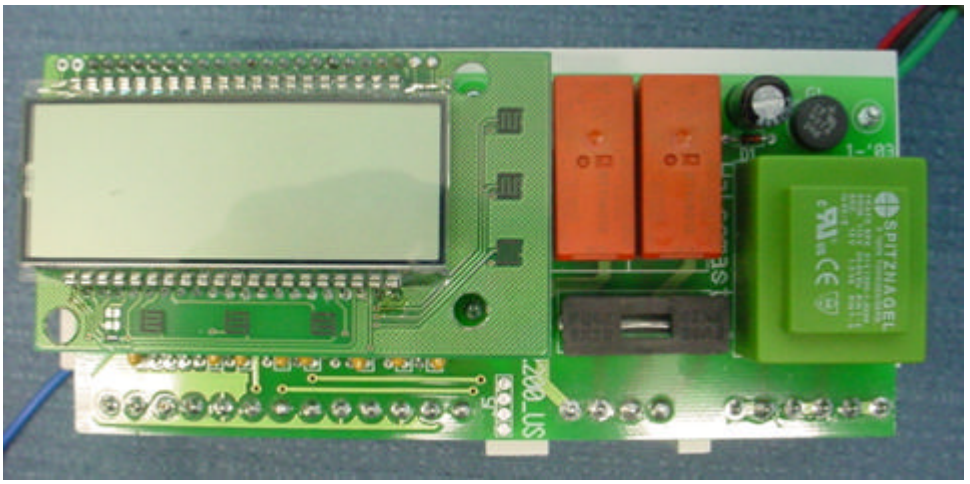


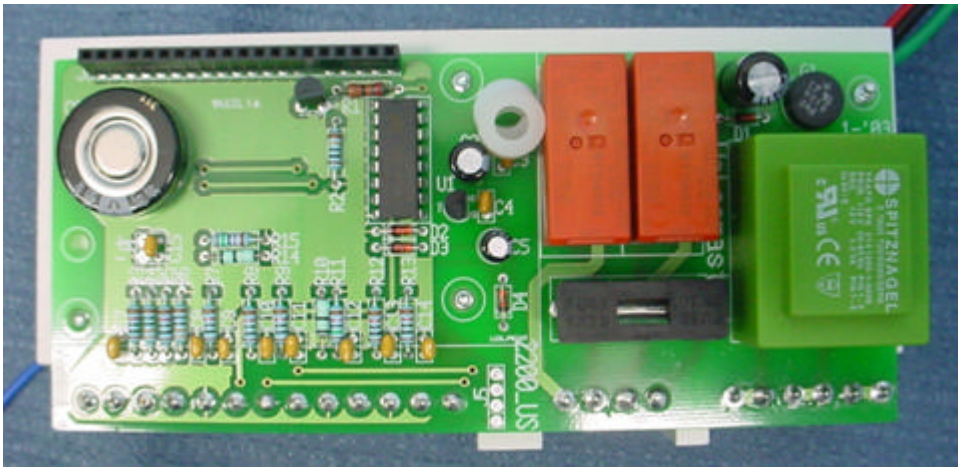


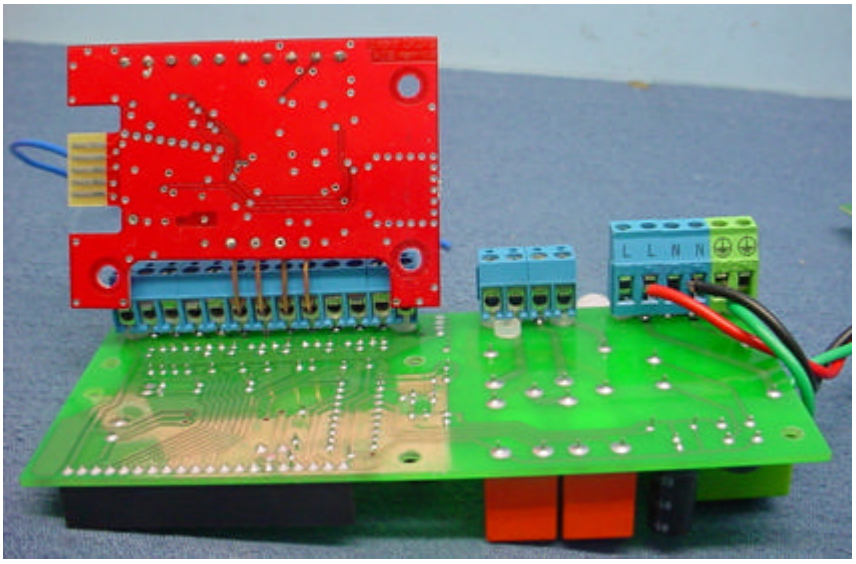
ASCRF Receiver External View



ASCRF Receiver internal views



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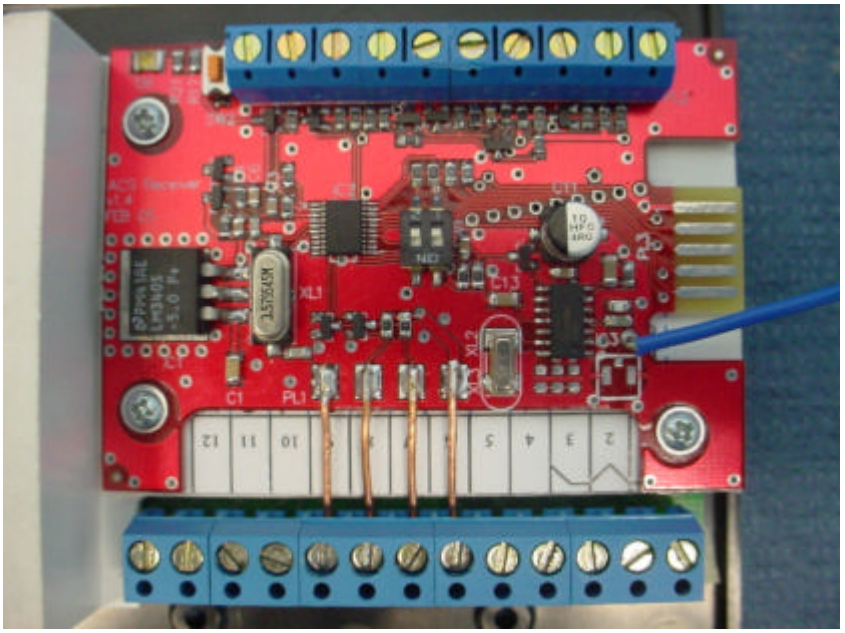

Transmitter under test

ACMC1 Receiver Under Test

ASCRF receiver under test