# EMC Technologies (NZ) Ltd

Test Report No **70310.1**
Report date: 22 March 2007

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# TEST REPORT

## PRX-MULTI 4115 125 kHz Proximity Card and Pin Reader

*tested to*

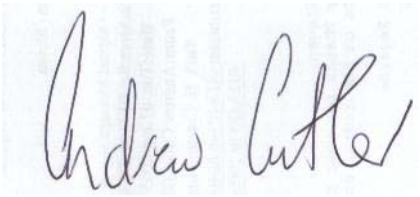
## 47 Code of Federal Regulations

## Part 15 - Radio Frequency Devices

## Subpart C – Intentional Radiators

*for*

## Integrated Control Technology



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 **PRX-MULTI 4115 125 kHz Proximity Card and Pin Reader** complies 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

| Clause | Parameter | Result |
|---|---|---|
| 15.201 | Equipment authorisation requirement | Certification required. |
| 15.203 | Antenna requirement | Complies. Antenna integral to device. |
| 15.204 | External PA and antenna modifications | Not applicable. No external devices. |
| 15.205 | Restricted bands of operation | Complies. Device transmits on 125 kHz. |
| 15.207 | Conducted limits | Complies with a 13.6 dB margin at 1.375 MHz (average). |
| 15.209 | Radiated emission limits - Fundamental | Complies with a 22.8 dB margin. |
| 15.209 | Radiated emission limits - Spurious emissions <30 MHz | Complies. No emissions detected. |
| 15.209 | Radiated emission limits – Spurious emissions >30 MHz | Complies with a 12.3 dB margin at 116.440 MHz (Vertical). |

# 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 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** | Integrated Control Technology |
| **Address** | 6C Ascension Place<br>Mairangi Bay |
| **City** | Auckland |
| **Country** | New Zealand |
| **Contact** | Mr Chris Cook |

# 5. DESCRIPTION OF TEST SAMPLE

| | |
|---|---|
| **Brand Name** | PRX-MULTI |
| **Model Number** | 4115 |
| **Product** | 125 kHz Proximity Card and Pin Reader |
| **Manufacturer** | Integrated Control Technology |
| **Country of Origin** | New Zealand |
| **Serial Number** | Not serialised |
| **FCC ID** | Yet to be determined |

# 6. RESULTS

**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**

As can be seen from the attached photographs the device has an integral antenna which would be classed as being unique.

**Result:** Complies.

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

From the attached photographs it can be seen that 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 125.0 kHz.

This falls between the restricted bands of 90 –110 kHz and 495 – 505 kHz.

**Result:** Complies.

**Section 15.207: Conducted emissions**

At the time of testing it was not clear how this device would be powered however it is powered at 12 Vdc and therefore either an AC adaptor or a battery could be used to power the device.

AC mains testing at 110 Vac has therefore been carried out using a representative power supply.

Testing for conducted emissions 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 over the frequency range of 150 kHz to 30 MHz.

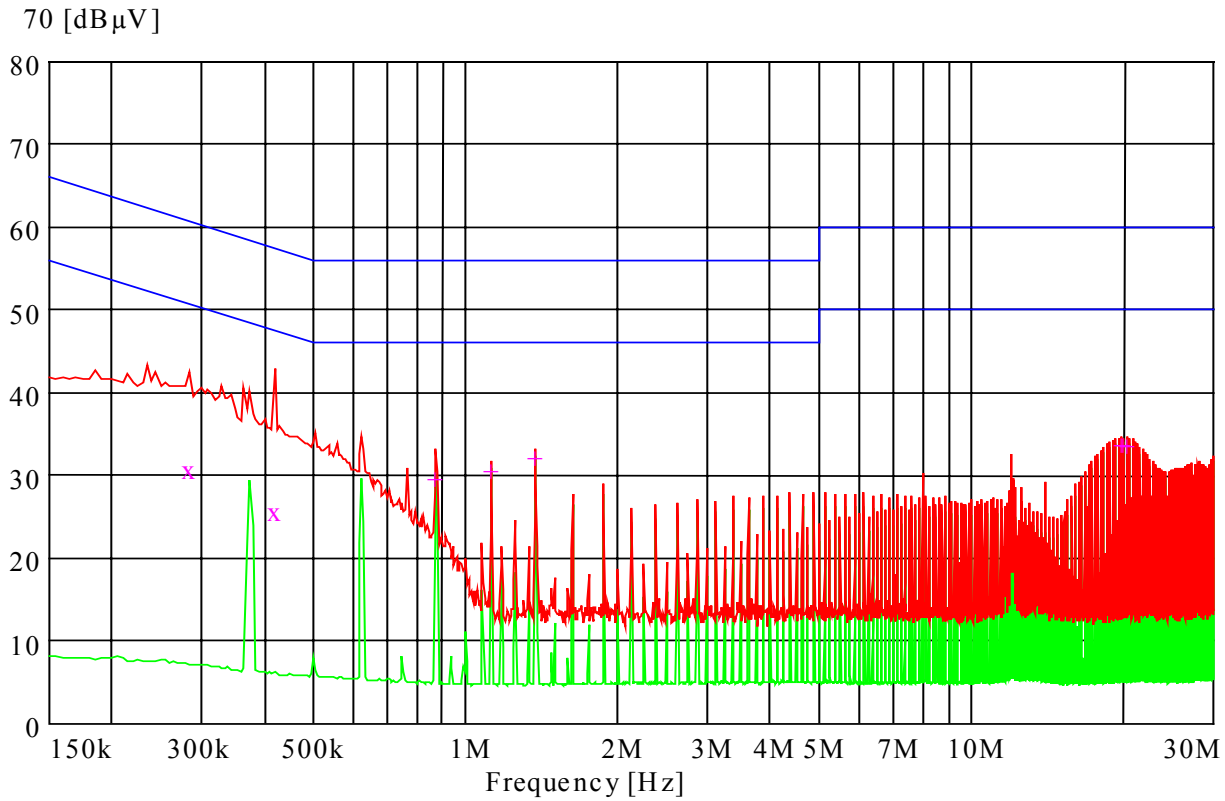
The device was placed 0.8 m away from the artificial mains terminal network on the emissions test table which is 1 m x 1.5 m, and is 0.8 m above the screened room floor which acts as the horizontal ground plane and is 0.4 m away from the screened room wall which acts as the vertical ground plane.

Measurement uncertainty with a confidence interval of 95% is:
- Mains terminal tests (0.15 - 30 MHz) ± 2.2 dB

**Result:** Complies

## Conducted emissions

| | |
|---|---|
| **Comments:** | Device was tested transmitting continuously on 125 kHz when powered at 115 Vac using a representative AC power supply to supply 12 Vdc to the device. |




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

Quasi-Peak Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Phase | Rechecks dBµV |
|---|---|---|---|---|---|
| 0.285000 | 31.10 | 60.6 | 29.5 | L1 | |
| 0.420000 | 26.20 | 57.4 | 31.2 | N | |

Average Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Phase | Rechecks dBµV |
|---|---|---|---|---|---|
| 0.875000 | 30.00 | 46.0 | 16.0 | N | |
| 1.125000 | 30.90 | 46.0 | 15.1 | N | |
| 1.375000 | 32.40 | 46.0 | 13.6 | N | |
| 19.760000 | 34.20 | 50.0 | 15.8 | N | |
| 20.010000 | 34.10 | 50.0 | 15.9 | N | |
| 20.260000 | 34.00 | 50.0 | 16.0 | 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.

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 in the centre of the test tabletop, which is a total of 0.8 m above the test site ground plane.

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)

**Fundamental emission:**

Measurements on this device were carried while it was transmitting continuously.

Measurements were made using a magnetic loop antenna and a receiver with an average detector and a 9 kHz bandwidth at a distance of 10 metres.

As allowed by section 15.31(f)(2) measurements were made at 10 metres with the 300 metre limit being extrapolated by a factor of 40 dB per decade.

The 300 metre limit of 19.2 uV/m has been converted to 25.7 dBuV/m and this limit has been extrapolated by 80 dB's as 300 metres to 10 metres is 1.5 decades.

The dc supply to the device was varied between 85% and 115%.

| Frequency kHz | Voltage Vdc | Level dBuV/m | Limit dBuV/m | Margin dB |
|---|---|---|---|---|
| 125.000 | 10.2 | 62.9 | 85.0 | -22.8 |
| 125.000 | 12.0 | 62.9 | 85.0 | -22.8 |
| 125.000 | 13.8 | 62.9 | 85.0 | -22.8 |

**Result:** Complies with a 22.8 dB margin.

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (100 kHz – 30 MHz) ± 4.8 dB

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

| Frequency kHz | Level dBuV/m | Limit dBuV/m | Margin dB |
|---|---|---|---|
| 268.4 | > 42.8 | 79.0 | < 36.2 |
| 402.6 | > 39.8 | 75.5 | < 35.7 |
| 536.8 | > 40.9 | 53.0 | < 12.1 |
| 671.0 | > 40.6 | 51.1 | < 10.5 |
| 805.2 | > 38.2 | 49.5 | < 11.3 |
| 939.4 | > 39.1 | 48.1 | < 9.0 |
| 1073.6 | > 37.4 | 47.0 | < 9.6 |
| 1207.8 | > 34.5 | 46.0 | < 11.5 |
| 1342.0 | > 33.9 | 45.0 | < 11.1 |
| 1476.2 | > 34.1 | 44.2 | < 10.1 |
| 1610.4 | > 32.9 | 43.5 | < 10.6 |
| 1744.6 | > 31.4 | 49.5 | < 18.1 |

Magnetic loop measurements were attempted at a distance of 10 metres.

No spurious emissions were detected from the device.

Measurements were made while the device was being powered using external 12 Vdc lead acid battery attached.

A receiver with an average detector and a 9 kHz bandwidth was used between 125 – 490 kHz and a quasi peak detector with a 9 kHz bandwidth was used between 490 kHz – 30.0 MHz.

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) and 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).

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (100 kHz – 30 MHz) ± 4.8 dB

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

| Freq MHz | Vert dBuV/m | Hort dBuV/m | Limit dBuV/m | Margin dB | Result | Antenna |
|---|---|---|---|---|---|---|
| 78.920 | 11.2 | | | 40.0 | 28.8 | Pass |
| 82.920 | 12.1 | | | 40.0 | 27.9 | Pass |
| 86.300 | 14.8 | | | 40.0 | 25.2 | Pass |
| 87.300 | 15.5 | | | 40.0 | 24.5 | Pass |
| 88.050 | 16.3 | | | 43.5 | 27.2 | Pass |
| 89.550 | 21.0 | | | 43.5 | 22.5 | Pass |
| 90.805 | 21.1 | | | 43.5 | 22.4 | Pass |
| 93.055 | 19.3 | | | 43.5 | 24.2 | Pass |
| 95.305 | 19.1 | | | 43.5 | 24.4 | Pass |
| 100.305 | 19.2 | | | 43.5 | 24.3 | Pass |
| 102.935 | 20.8 | 15.8 | | 43.5 | 22.7 | Pass |
| 104.182 | 21.3 | 16.6 | | 43.5 | 22.2 | Pass |
| 105.182 | 22.3 | 17.5 | | 43.5 | 21.2 | Pass |
| 106.435 | 22.9 | 18.1 | | 43.5 | 20.6 | Pass |
| 107.437 | 24.0 | 19.0 | | 43.5 | 19.5 | Pass |
| 108.185 | 23.9 | 19.2 | | 43.5 | 19.6 | Pass |
| 108.937 | 24.4 | 19.7 | | 43.5 | 19.1 | Pass |
| 109.937 | 25.7 | 20.8 | | 43.5 | 17.8 | Pass |
| 110.937 | 26.2 | 21.2 | | 43.5 | 17.3 | Pass |
| 111.937 | 27.7 | 22.3 | | 43.5 | 15.8 | Pass |
| 112.937 | 28.6 | 22.6 | | 43.5 | 14.9 | Pass |
| 113.937 | 29.8 | 23.4 | | 43.5 | 13.7 | Pass |
| 114.937 | 30.6 | 24.1 | | 43.5 | 12.9 | Pass |
| 115.937 | 30.9 | 24.7 | | 43.5 | 12.6 | Pass |
| 116.440 | 31.2 | 25.3 | | 43.5 | 12.3 | Pass |
| 117.440 | 30.8 | 25.4 | | 43.5 | 12.7 | Pass |
| 119.440 | 28.6 | 24.3 | | 43.5 | 14.9 | Pass |
| 120.440 | 27.0 | 22.5 | | 43.5 | 16.5 | Pass |
| 122.570 | 28.7 | 24.1 | | 43.5 | 14.8 | Pass |
| 123.570 | 27.6 | 23.9 | | 43.5 | 15.9 | Pass |
| 124.570 | 26.7 | 22.4 | | 43.5 | 16.8 | Pass |
| 126.370 | 22.5 | 19.0 | | 43.5 | 21.0 | Pass |
| 128.570 | 23.1 | 20.2 | | 43.5 | 20.4 | Pass |
| 130.570 | 21.1 | 18.7 | | 43.5 | 22.4 | Pass |
| 132.570 | 19.0 | 17.4 | | 43.5 | 24.5 | Pass |

Device tested when powered using an external battery while transmitting continuously.

Radiated emissions testing was carried out over the frequency range of 30.0 to 1000 MHz.

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

Testing was carried out by manually scanning between 30 MHz and 1000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

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.

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

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

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

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 1000 MHz)± 4.1 dB

# 7. 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 |
| Artificial Mains Network | Rohde & Schwarz | ESH 2-Z5 | 881362/034 | RFS 3628 |
| Biconical Antenna | Schwarzbeck | BBA 9106 | - | RFS 3612 |
| Log Periodic Antenna | Schwarzbeck | VUSLP 9111 | 9111-228 | 3785 |
| Loop Antenna | EMCO | 6502 | 9311-2801 | A-231 |
| Measurement Receiver | Rohde & Schwarz | ESHS 10 | 828404/005 | RFS 3728 |
| Measurement Receiver | Rohde & Schwarz | ESCS 30 | 847124/020 | E1595 |
| Software | Rohde & Schwarz | ESKI 140 | - | - |
| Turntable | EMCO | 1080-1-2.1 | 9109-1578 | RFS 3709 |
| VHF Balun Antenna | Schwarzbeck | VHA 9103 | - | RFS 3603 |

# 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 last updated on January 23rd, 2007.

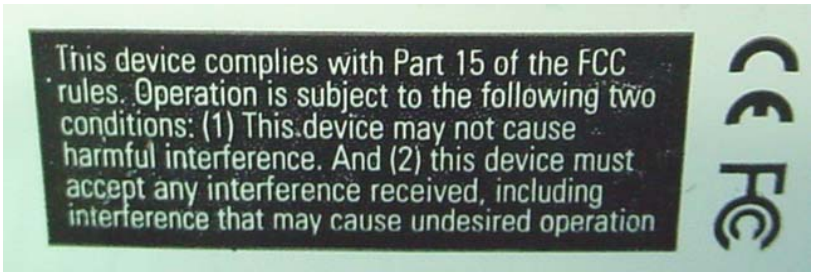
All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

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.

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.

## 9. PHOTOGRAPH (S)

Labels




Internal and External Views


Radiated Emissions Test Set-up