

EMC Technologies (NZ) Ltd

Test Report No 71043.1

Report date: 2 November 2007

TEST REPORT

Elite STK Lite RFID System

tested to

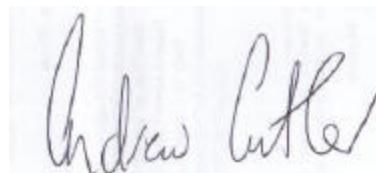
47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart C – Intentional Radiators

for

IPICO Australasia



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 **Elite STK Lite RFID System** complies with FCC Part 15 Subpart C as an Intentional Radiator when the methods as described in ANSI C63.4 - 2003 are applied with measurements falling within the window of uncertainty for this test method.

2. RESULTS SUMMARY

| Clause | Parameter | Result |
|--------|---|---|
| 15.201 | Equipment authorisation requirement | Certification required. |
| 15.203 | Antenna requirement | Complies. Antenna connector unique. |
| 15.204 | External PA and antenna modifications | Not applicable. No external devices. |
| 15.205 | Restricted bands of operation | Complies. Device transmits on 125.0 kHz. |
| 15.207 | Conducted limits | Not applicable. Internal DC powered device. |
| 15.209 | Radiated emission limits - Fundamental | Complies with a 0.4 dB (average) at 125 kHz when measured at a distance of 10 metres. |
| 15.209 | Radiated emission limits - Spurious emissions <30 MHz | Complies with a 13.4 dB margin at 500 kHz (Average). |
| 15.209 | Radiated emission limits – Spurious emissions >30 MHz | Complies with a 0.0 dB margin at 520.000 MHz (Vertical). |

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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 IPICO Australasia

Address PO Box 19
Redcliffe

State Queensland 4020

Country Australia

Contact Mr Roger Dunn / Mr Mark Fletcher

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5. DESCRIPTION OF TEST SAMPLE

| | |
|----------------------------|-------------------|
| Brand Name | Elite |
| Model Number | STK Lite |
| Product | RFID System |
| Manufacturer | IPICO Australasia |
| Country of Origin | Australia |
| Serial Number | 5011014 |
| FCC ID | VHY-IP3458A |
| Ancillary Equipment | Nil |

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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 transmitter antennas attach to the device using unique connectors.

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.

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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.

Above 30 MHz the transmitter was tested above a metallic ground plane being placed on the test table at a height of 0.8 m.

The antennas were placed on the concrete test pad, not the metallic ground plane, at the rear of the ground plane.

Below 30 MHz testing was carried out on the grass test site with the antenna and the transmitter being placed on the ground.

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.

Above 30 MHz 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:

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

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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

Measurements were made at a distance of 10 metres.

The limit at 300 metre has been extrapolated to measurement distance of 10 metres using a factor of 40 dB per decade as detailed in section 15.31(f)(2).

The highest emission level was determined during the pre screening of the device when the antenna sheets were manually positioned around the antenna centre point.

At this point the measurement antenna was then further adjusted to give the highest field strength.

The maximum field strength was found to be where the transmitting antenna was facing the measurement antenna (see photographs of test set up).

Measurements were made while the device was being powered at 12 Vdc using the internal batteries.

Testing was carried out when the antennas were in opposing mode.

| Frequency (kHz) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Distance (metres) |
|--------------------|---------------------|-------------------|----------------|----------------------|
| 125.000 | 85.3 | 85.7 | 0.4 | 10 |

| Frequency (kHz) | Peak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Distance (metres) |
|--------------------|------------------|-------------------|----------------|----------------------|
| 125.000 | 85.7 | 105.7 | 20.0 | 10 |

The peak limit is the average limit plus 20 dB

Result: Complies with a 0.4 dB margin when measured using an average detector.

Measurement uncertainty with a confidence interval of 95% is:

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

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Section 15.209: Spurious Emissions (below 30 MHz)

| Frequency kHz | Level dBuV/m | Limit dBuV/m | Margin dB | Detector |
|------------------|-----------------|-----------------|--------------|------------|
| 250.000 | 38.3 | 79.6 | 41.3 | Average |
| 250.000 | 45.1 | 99.6 | 54.5 | Peak |
| 375.000 | 39.5 | 76.1 | 36.6 | Average |
| 375.000 | 41.5 | 96.1 | 54.6 | Peak |
| 500.000 | 40.2 | 53.6 | 13.4 | Quasi Peak |
| 625.000 | - | 51.7 | - | Quasi Peak |
| 750.000 | - | 50.1 | - | Quasi Peak |
| 875.000 | - | 48.8 | - | Quasi Peak |
| 1000.000 | - | 47.6 | - | Quasi Peak |
| 1125.000 | - | 46.6 | - | Quasi Peak |
| 1250.000 | - | 45.7 | | Quasi Peak |

No other emissions detected from the transmitter that were within 20 dB of the applicable limit.

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

Pre screening of the device of the device was carried on the test site using a turntable which showed that the maximum field strength of the spurious emissions was in the same radial as for the fundamental emission.

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

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.

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).

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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.

No receiver emissions were observed from the receiver which operates at approximately 6.8 MHz.

The receiver is a TRF receiver.

Result: Complies with a 13.4 dB margin at 500 kHz.

Measurement uncertainty with a confidence interval of 95% is:

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

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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.

Measurements were carried out as the device contains several digital devices.

The device was tested transmitting continuously on 125 kHz and receiving on approximately 6.8 MHz.

Device was tested with the USB, Ethernet and USB flash drive ports not terminated as these ports would typically not be loaded when being used typically.

The limits as described in Section 15.209 have been applied as follows:

| | | |
|-------------------|----------|-------------|
| 30.0 – 88.0 MHz | 100 uV/m | 40 dBuV/m |
| 88.0 – 216.0 MHz | 150 uV/m | 43.5 dBuV/m |
| 216.9 – 960.0 MHz | 200 uV/m | 46.0 dBuV/m |

Result: Complies with a 0.0 dB margin at 520.000 MHz (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 – 1000 MHz) \pm 4.1 dB

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Spurious Emissions

| Frequency MHz | Vertical dBuV/m | Hort dBuV/m | Recheck dBuV/m | Limit dBuV/m | Margin dB | Result | Antenna |
|------------------|--------------------|----------------|-------------------|-----------------|--------------|--------|------------|
| 34.745 | 31.2 | | | 40.0 | 8.8 | Pass | Vertical |
| 35.745 | 32.0 | | | 40.0 | 8.0 | Pass | Vertical |
| 40.000 | 26.5 | | | 40.0 | 13.5 | Pass | Vertical |
| 50.000 | 25.6 | | | 40.0 | 14.4 | Pass | Vertical |
| 72.743 | 26.0 | | | 40.0 | 14.0 | Pass | Vertical |
| 80.000 | 32.1 | | | 40.0 | 7.9 | Pass | Vertical |
| 110.000 | 27.1 | | | 43.5 | 16.4 | Pass | Vertical |
| 120.000 | 29.9 | | | 43.5 | 13.6 | Pass | Vertical |
| 124.700 | 28.5 | | | 43.5 | 15.0 | Pass | Vertical |
| 130.000 | 27.7 | | | 43.5 | 15.8 | Pass | Vertical |
| 133.000 | 29.0 | | | 43.5 | 14.5 | Pass | Vertical |
| 144.000 | 31.0 | | | 43.5 | 12.5 | Pass | Vertical |
| 150.000 | 29.0 | | | 43.5 | 14.5 | Pass | Vertical |
| 160.000 | 33.1 | | | 43.5 | 10.4 | Pass | Vertical |
| 250.000 | 24.3 | | | 46.0 | 21.7 | Pass | Vertical |
| 295.000 | 26.5 | | | 46.0 | 19.5 | Pass | Vertical |
| 300.000 | | 35.5 | | 46.0 | 10.5 | Pass | Horizontal |
| 320.000 | 34.0 | | | 46.0 | 12.0 | Pass | Vertical |
| 345.000 | 35.9 | | | 46.0 | 10.1 | Pass | Vertical |
| 350.000 | 40.2 | | | 46.0 | 5.8 | Pass | Vertical |
| 360.000 | 40.8 | | | 46.0 | 5.2 | Pass | Vertical |
| 365.000 | 37.0 | | | 46.0 | 9.0 | Pass | Vertical |
| 370.000 | 35.1 | | | 46.0 | 10.9 | Pass | Vertical |
| 400.000 | 42.3 | | | 46.0 | 3.7 | Uncert | Vertical |
| 460.000 | 34.6 | | | 46.0 | 11.4 | Pass | Vertical |
| 480.000 | 36.3 | | | 46.0 | 9.7 | Pass | Vertical |
| 520.000 | 46.0 | 35.4 | 45.8 | 46.0 | 0.0 | Uncert | Vertical |
| 600.000 | 42.5 | | | 46.0 | 3.5 | Uncert | Vertical |
| 760.000 | | 39.9 | | 46.0 | 6.1 | Pass | Horizontal |
| 800.000 | | 43.6 | | 46.0 | 2.4 | Uncert | Horizontal |

A large number of emissions were observed however only the significant emissions have been recorded.

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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 |
| Biconical Antenna | Schwarzbeck | BBA 9106 | - | RFS 3612 | 7 Feb 2009 |
| Receiver | R & S | ESCS 30 | 847124/020 | E1595 | 21 Dec 2007 |
| Receiver | R & S | ESHS 10 | 828404/005 | RFS 3728 | 11 July 2008 |
| Log Periodic | Schwarzbeck | VUSLP 9111 | 9111-228 | 3785 | 7 Feb 2009 |
| Loop Antenna | EMCO | 6502 | 9003-2485 | HTS0201 | 11 July 2008 |
| Mains Network | EMCO | 3825/2 | 9206-1967 | 3774 | 8 June 2008 |
| Variac | General Radio | 1592 | - | RFS 3690 | Not applicable |
| Turntable | EMCO | 1080-1-2.1 | 9109-1578 | RFS 3709 | Not applicable |
| VHF Balun | Schwarzbeck | VHA 9103 | - | RFS 3603 | 7 Feb 2009 |

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 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, 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 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.

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9. PHOTOGRAPH (S)



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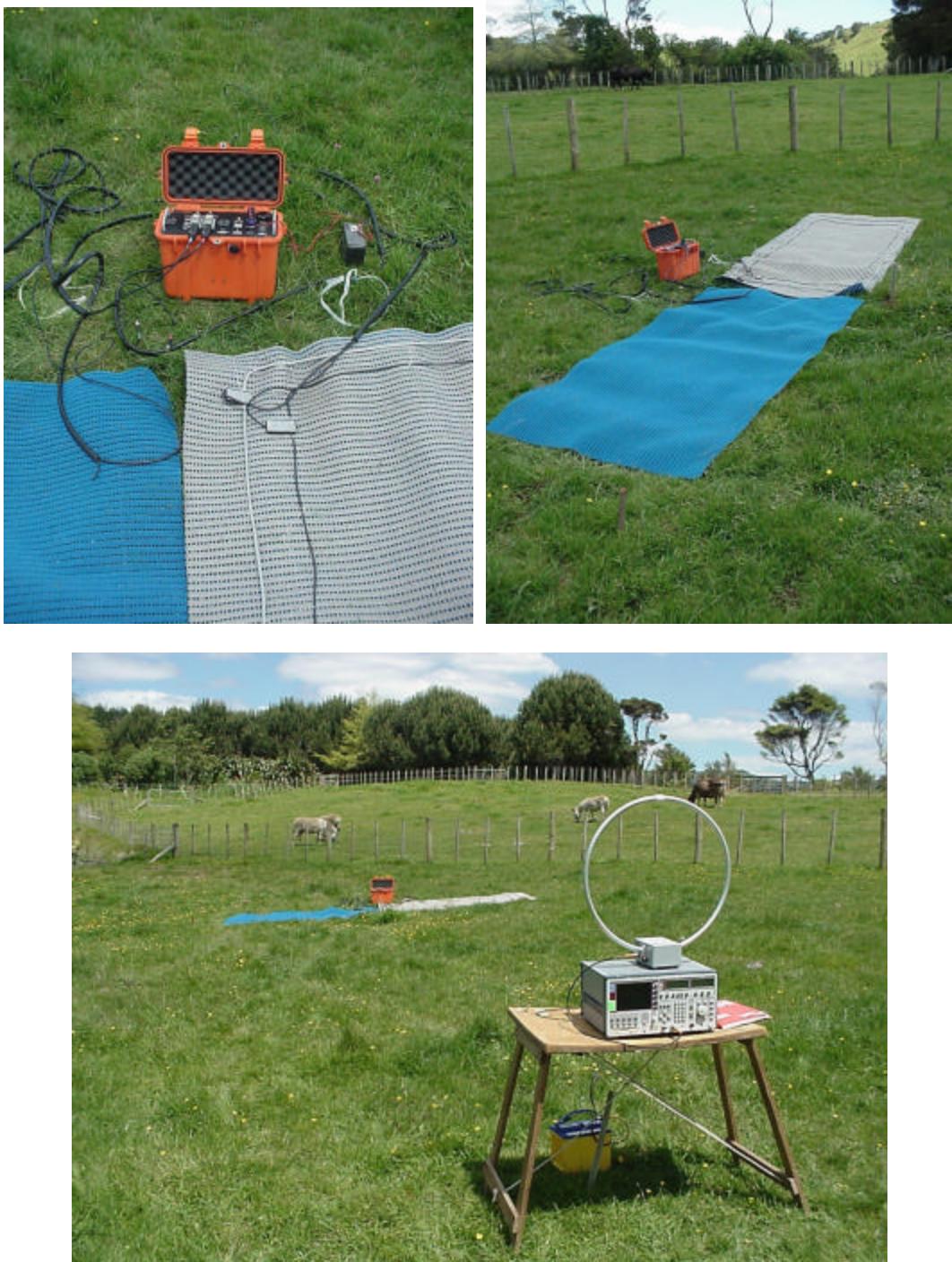
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Low Frequency Test Set Up



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High Frequency Emissions Test Set Up



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