

# EMC Technologies (NZ) Ltd

Test Report No 70327.2

Report date: 17 July 2007

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## TEST REPORT

### **IPICO IP3911 Dual Frequency Elite STK RFID System**

*tested to*

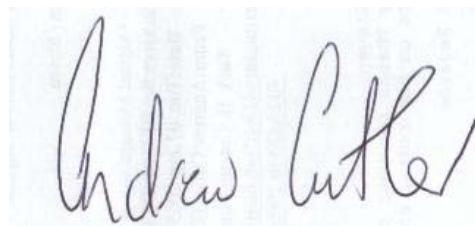
### **47 Code of Federal Regulations**

#### **Part 15 - Radio Frequency Devices**

#### **Subpart C – Intentional Radiators**

*for*

### **IPICO Australasia**



This Test Report is issued with the authority of:

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**Andrew Cutler - General Manager**



All tests reported  
herein have been  
performed in accordance  
with the laboratory's  
scope of accreditation

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**EMC Technologies (NZ) Ltd**

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## 1. STATEMENT OF COMPLIANCE

The **IPICO IP3911 Dual Frequency Elite STK 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.

## 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. Not intended to AC mains powered.
15.209	Radiated emission limits - Fundamental	Complies with a 24.0 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 an 8.0 dB margin at 348.365, 360.000 and 527.155 MHz.

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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

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## **5. DESCRIPTION OF TEST SAMPLE**

<b>Brand Name</b>	IPICO
<b>Model Number</b>	IP3911
<b>Product</b>	Dual Frequency Elite STK RFID System
<b>Manufacturer</b>	IPICO Australasia
<b>Country of Origin</b>	Australia
<b>Serial Number</b>	#1
<b>FCC ID</b>	Not yet determined
<b>Ancillary Equipment</b>	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 device has unique antenna 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 15.207: Conducted limits

As can be seen from the intended us photographs this device is not intended to be used from an AC mains supply and provisions have only be made for operating this device using external batteries

Therefore testing AC mains conducted emission testing has not been carried out.

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

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:

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

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## Fundamental emission:

Measurements were made using a magnetic loop antenna and a receiver with an average detector and a 9 kHz bandwidth.

Measurements were initially made at a distance of 10 metres then also at 30 metres.

Using these measurements a 300 metre extrapolated level has been determined as detailed in section 15.31(f)(2) as measurements were made at two distances on the radial that was determined to give the highest field strength.

The highest radial was determined during the pre screening of the device when it was rotated on the test site using a turntable.

Measurements were made while the device was being powered at 12 Vdc using an external battery that was fully charged.

Previous testing had shown that this power configuration gave the highest field strength.

Frequency (kHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Distance
125.000	89.8	-	-	10 metres
125.000	60.2	-	-	30 metres
125.000	-1.9	25.0	-26.9	300 metres

## Calculations:

10 metre to 30 metre roll off = 29.6 dB

10 metres to 30 metres is 0.477 of a decade

30 metres to 300 metres is 1 decade.

Therefore 10 metres to 300 metres is 1.477 of a decade

10 metres to 300 metres roll off is  $29.6 \text{ dB} \times (1.477 / 0.477) = 91.7 \text{ dB}$

10 metre measurement 89.8 dBuV/m – 91.7 dB = -1.9 dBuV/m at 300 metres

## Result: Complies with a 26.9 dB margin

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests  $(100 \text{ kHz} - 30 \text{ MHz}) \pm 4.8 \text{ dB}$

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

Frequency kHz	Level dBuV/m	Limit dBuV/m	Margin dB	Result
250.000	-	79.6	-	Pass
375.000	-	76.1	-	Pass
500.000	-	53.6	-	Pass
625.000	-	51.7	-	Pass
750.000	-	50.1	-	Pass
875.000	-	48.8	-	Pass
1000.000	-	49.5	-	Pass
1125.000	-	49.5	-	Pass
1250.000	-	49.5	-	Pass

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.

Measurements were made while the device was being powered using an external 12 Vdc battery that was fully charged.

A receiver with an average detector and 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) 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).

The spurious emissions observed do not exceed the level of the fundamant emission.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests                     $(100 \text{ kHz} - 30 \text{ MHz}) \pm 4.8 \text{ dB}$

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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.

Measurements were made while the device was being powered using an external 12 Vdc battery that was fully charged.

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 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 an 8.0 dB margin at 348.365, 360.000 and 527.155 MHz.

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

Device tested when being powered using an external 12 Vdc battery.

Frequency	Level		Limit	Margin	Result	Worst Case
MHz	Vertical	Hort	dBuV/m	dB		Antenna
30.000	30.5		40.0	9.5	Pass	Vertical
31.997	29.0		40.0	11.0	Pass	Vertical
32.000	29.0		40.0	11.0	Pass	Vertical
33.775	26.2		40.0	13.8	Pass	Vertical
120.000	23.4	11.7	43.5	20.1	Pass	Vertical
125.000	21.9		43.5	21.6	Pass	Vertical
153.400	21.4	16.7	43.5	22.1	Pass	Vertical
160.000	23.4	17.8	43.5	20.1	Pass	Vertical
187.750	21.1	15.0	43.5	22.4	Pass	Vertical
200.000	21.2	30.3	43.5	13.2	Pass	Horizontal
220.000	20.1	23.9	46.0	22.1	Pass	Horizontal
230.000	22.6	25.8	46.0	20.2	Pass	Horizontal
240.000	25.9	34.3	46.0	11.7	Pass	Horizontal
250.000	19.3	28.1	46.0	17.9	Pass	Horizontal
280.000	23.6	32.0	46.0	14.0	Pass	Horizontal
320.000	27.2	19.2	46.0	18.8	Pass	Vertical
348.365	38.0	33.7	46.0	8.0	Pass	Vertical
360.000	29.0	38.0	46.0	8.0	Pass	Horizontal
375.000	28.0	31.3	46.0	14.7	Pass	Horizontal
440.000	28.3	29.3	46.0	16.7	Pass	Horizontal
460.000	18.7	23.2	46.0	22.8	Pass	Horizontal
475.000	30.8	24.3	46.0	15.2	Pass	Vertical
527.155	38.0	36.5	46.0	8.0	Pass	Vertical
560.000	21.3	28.8	46.0	17.2	Pass	Horizontal
600.000	26.6	31.5	46.0	14.5	Pass	Horizontal
640.000	30.3	32.1	46.0	13.9	Pass	Horizontal
859.705	31.5	26.1	46.0	14.5	Pass	Vertical
930.000	31.2	30.9	46.0	14.8	Pass	Vertical

No further emissions detected within 20 dB of the applicable limit.

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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	9311-2801	A-231	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 23<sup>rd</sup>, 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)

External view of the transmitter



External view of the transmitting mat antennas



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## Typical use of the system



## Radiated emissions test set up over 30 MHz



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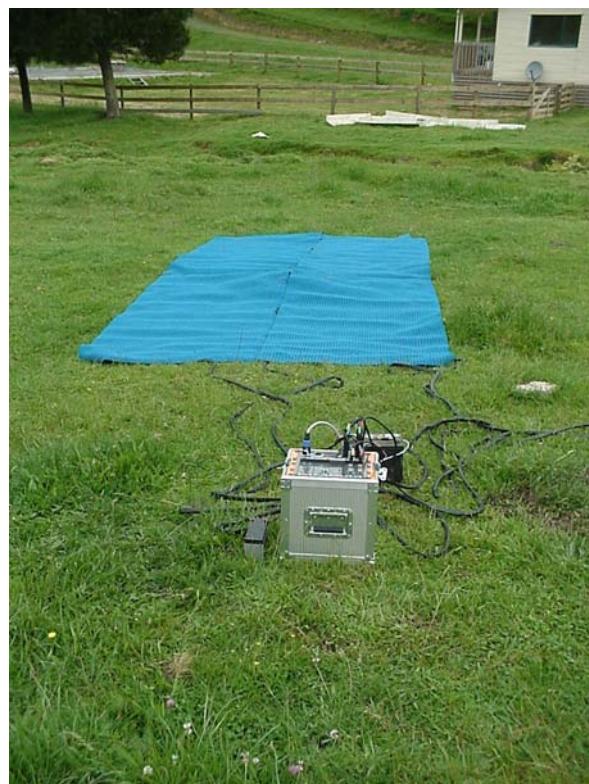
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## Radiated Emissions Testing Below 30 MHz



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