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SGS United Kingdom Ltd.

EMC Services

Electromagnetic Compatibility Test Report

Test of:	Front Panel RF ID Card Entry Reader
Model Number:	21397
Applicant:	PAC International LTD
Test Type:	Compliance
Test Specification:	FCC CFR47, parts 15.109 for unintentional radiators, parts 15.207 and 15.209 for Intentional Radiators.
SGS Serial Number:	DUR 21563
Date of Receipt:	9 th November 1999
Date of Test(s):	9 th to 11 th November 1999
Date of Issue:	24 th November 1999
Issue Number:	1

Test Engineer

L. Steel

Authorised Signatory

A. H. Reynard

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1. Client Information

Company Name: PAC International LTD.

Address: 1 Park Gate Close,
Bredbury,
Stockport,
SK6 2SZ,
United Kingdom.

Contact Person: Mr Shaun Byrne

Telephone: +44 161 406 3400

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2. Details Of Test Laboratory

Company Name: SGS EMC Services LTD.

UKAS Accreditation Number: 1116

Address: Unit 10,
Bowburn South Industrial Estate,
Bowburn,
County Durham,
DH6 5AD,
United Kingdom.

Contact Persons: Mr Alan Reynard

Telephone: +44 191 377 2000

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3. Equipment Under Test (EUT)

3.1 Identification Of EUT

Model Number:	21397
Unique Identifier:	Unique Identifier Not Supplied
Description of EUT:	The EUT is an R.F. card entry reader, designed to prevent access to restricted areas by unauthorised persons.
Fundamental (Carrier) Frequency	125 kHz Single Channel
Internal Clock Frequencies:	1 and 8 MHz
Supply Voltage:	18V DC (Via central controller)
Classification:	Intentional radiator, incorporating digital device.
Environment Class:	Class A digital device
Ports present:	One port.
Accessories Supplied:	Central Controller

4. Test Specification, Methods and Procedures

4.1 Test Specification(s)

Specification(s)	Title
FCC CFR 47 : October 1998 Parts 15.109, 15.207 and 15.209	Code Of Federal Regulations
ANSI C63.4 : 1992	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.

4.2 Purpose Of Test

To perform the relevant tests and assess the product for compliance with the above specification.

4.3 Methods and Procedures

The standards listed on the previous page refer to the following tests:

CFR 47 Clause	Test
15.109	Radiated Emissions (Unintentional Radiator)
15.207	AC Power line Conducted Emissions
15.209	Radiated Emissions (Intentional Radiator)

5. Deviations or Exclusions from the Test Specifications

There were no deviations from the test specifications.

The scope of the inspection is limited to what is specified in the clients instructions and does not include any other checks or tests such as the electrical (electronic) control systems ability to cope with the implications of the dates falling on, before or after "January 2000".

6. Support Equipment

The EUT was tested whilst interfaced with a central controller.

Controller Manufacturer:	PAC International Ltd
Model No.:	2200
Serial No.:	Unique identifier not supplied.

The controller has a four and two door configuration. The two door version is the same as the 4 door version with components removed.

7. Operation of the EUT During Testing / Configuration and Peripherals

7.1 Operation of EUT during testing.

Refer to individual test results sections for details of EUT operation during testing.

7.2 Configuration and Peripherals

The EUT was tested whilst interfaced with a central controller.

8. Test Results

8.1 General Comments

The test methods used are referred to in the individual test results sections of this test report.

8.2 Modifications Made to the EUT

No modifications were made to the EUT during the testing process.

8.3 Summary of Test Results

CFR 47 Clause	Test	Result
15.109	Radiated Emissions (Unintentional)	Complied
15.207	AC Power line Conducted Emissions	Complied
15.209	Radiated Emissions (Intentional)	Complied

Result

In the configuration tested, the EUT complies with the requirements of Clauses 15.109, 15.207 and 15.209 of CFR 47 : October 1998.

Full details of all tests can be found in the test results section of this report.

8.4 Radiated Emissions Test Results- Unintentional Radiator

CFR Clause	15.109
Limits	Class A digital device
Frequency Range	30 – 1000 MHz

Operating Mode

The compliance test was performed with an authorised RF ID tag on the front panel reader.

Test Results

Worst Case Emissions

2 Door Version

Frequency (MHz)	Quasi Peak Measurement (dB μ V)	Quasi Peak Limit (dB μ V)	Antenna Polarity (H/V)
44.917	27.8	39.0	V
52.059	31.3	39.0	V
56.370	32.4	39.0	V
76.820	32.3	39.0	V
211.968	33.9	43.5	V
239.607	36.4	46.4	V

4 Door Version

Frequency (MHz)	Quasi Peak Measurement (dB μ V)	Quasi Peak Limit (dB μ V)	Antenna Polarity (H/V)
55.255	32.7	39.0	V
75.873	28.4	39.0	V
211.951	34.4	43.5	V
239.614	33.6	46.4	V
258.043	32.2	46.4	V
331.774	33.0	46.4	V

Test Method

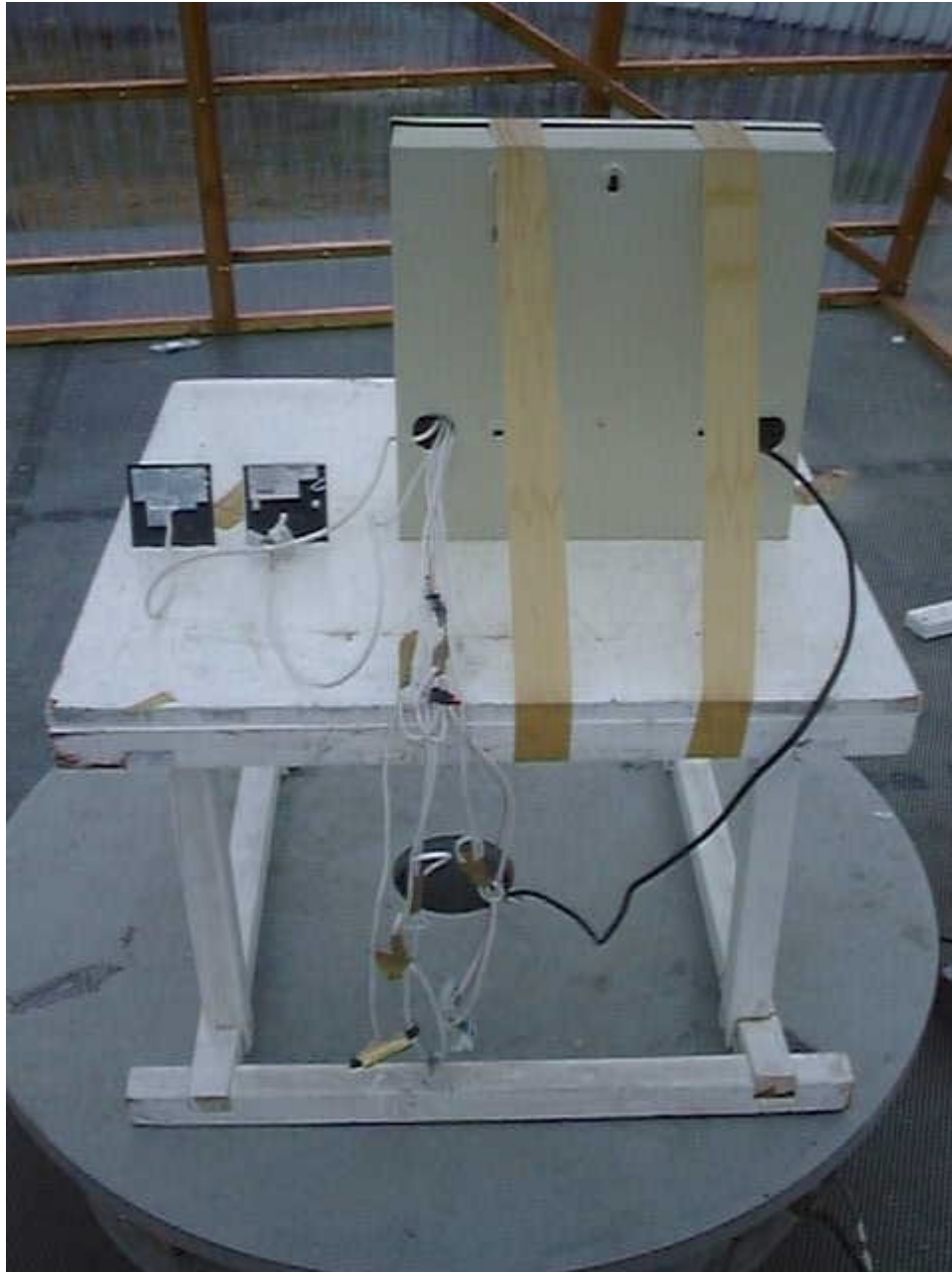
As per ANSI C63.4 : 1992

Measurements performed at a test distance of 10m.

Frequency Range tested = 30 to 1000MHz (as per sec 15.33).

Measurement Detector Details: Quasi-Peak, 120 kHz bandwidth.

Note: Initial pre-testing was performed to obtain worst case operating mode for the compliance test (Authorised RF ID card on and off the reader).

Radiated Emissions Test Configuration**EUT Configuration****Radiated Emissions Environmental Conditions**

Power Supply (to controller)	120V, 60Hz
Temperature	15 °C
Relative Humidity	89 %
Barometric Pressure	992 mb

Radiated Emissions Measurement Uncertainties

Frequency	± 200kHz
Amplitude	± 4.6dB

The uncertainties stated are calculated in accordance with the requirements of UKAS with a confidence level of 95%.

Test Equipment Used

Equipment Type	Model Number	Last Calibration Date	Calibration Interval
Biconical Antenna	EMCO 3109	2/6/98	2 Years
Log Periodic Antenna	EMCO 3146	2/6/98	2 Years
Hewlett Packard Receiver System	HP8573B	12/5/99	1 Year

8.5 AC Power Line Conducted Emissions Test Results

CFR 47 Clause:	15.207
Frequency Range	0.45 – 30 MHz.

Operating Mode

The compliance test was performed without an authorised RF ID card on the front panel reader .

Test Results

2 Door Version

Live Terminal Worst Case Emissions

Frequency (MHz)	Quasi Peak Measurement (dB μ V)	Quasi Peak Limit (dB μ V)
13.441	31.8	47.96
14.976	42.7	47.96
15.174	35.6	47.96
15.871	29.5	47.96
18.432	45.8	47.96
20.569	30.0	47.96

Neutral Terminal Worst Case Emissions

Frequency (MHz)	Quasi Peak Measurement (dB μ V)	Quasi Peak Limit (dB μ V)
14.175	27.9	47.96
14.634	32.0	47.96
14.980	37.9	47.96
15.246	32.6	47.96
15.862	30.2	47.96
27.652	28.9	47.96

Note: The figures shown have been corrected automatically by measurement software, to account for cable loss and LISN attenuation.

4 Door Version***Live Terminal Worst Case Emissions***

Frequency (MHz)	Quasi Peak Measurement (dB μ V)	Quasi Peak Limit (dB μ V)
5.179	21.1	47.96
11.938	21.9	47.96
12.298	22.0	47.96
13.747	25.9	47.96
15.750	24.2	47.96
18.436	38	47.96

Neutral Terminal Worst Case Emissions

Frequency (MHz)	Quasi Peak Measurement (dB μ V)	Quasi Peak Limit (dB μ V)
11.992	22.8	47.96
14.598	26.7	47.96
15.165	28.8	47.96
15.867	22.3	47.96
18.432	43.1	47.96
19.665	23.4	47.96

Note: The figures shown have been corrected automatically by measurement software, to account for cable loss and LISN attenuation.

Test Method

As per ANSI C63.4 : 1992.

Measurement Detector Details: Quasi-Peak, 9 kHz bandwidth.

Note: Initial pre-testing was performed to obtain worst case operating mode for the compliance test (Authorised RF ID card on and off the reader) .

Conducted Emissions Test Configuration**EUT Configuration**

Conducted Emissions Environmental Conditions

Power Supply (to controller)	120V, 60Hz
Temperature	19.5°C
Relative Humidity	55 %
Barometric Pressure	1000 mb

Conducted Emissions Measurement Uncertainties

Frequency	$\pm 200\text{kHz}$
Amplitude	$\pm 3.0\text{dB}$

The uncertainties stated are calculated in accordance with the requirements of UKAS with a confidence level of 95%.

Test Equipment Used

Equipment Type	Model Number	Last Calibration Date	Calibration Interval
LISN (50 Ω)	Thurlby Thandar TTi 1600	21/9/98	1 Year
Chase Receiver	LHR7000	11/2/99	1 Year
Software	Version 6.00b	N/A	N/A
SGS Screened Room	-	N/A	N/A

8.6 Radiated Emissions Test Results- Intentional Radiator

CFR Clause	15.209
Frequency Range	0.125MHz – tenth harmonic frequency

Operating Mode

Fundamental (carrier) emission measurements performed without card on front panel reader.

Test Results

Worst Case Emissions

2 Door Version

Frequency (kHz)	Corrected Peak Measurement (dB μ V/m)	Limit (dB μ V/m)
*125.033	- 33.6	25.66
¹ 250	<-35.0	25.66
¹ 375	<-47.0	25.66
¹ 500	<-51.0	25.66
¹ 625	<-53.0	25.66
¹ 750	<-49.0	25.66

*The Supply was varied between 85% and 115% to maximise the emissions.

¹Noise floor figures of test equipment shown at approximate fundamental harmonic frequencies.

4 Door Version

Frequency (kHz)	Corrected Peak Measurement (dB μ V/m)	Limit (dB μ V/m)
*125.032	- 33.8	25.66
¹ 250	<-35.0	25.66
¹ 375	<-47.0	25.66
¹ 500	<-51.0	25.66
¹ 625	<-53.0	25.66
¹ 750	<-49.0	25.66

*The Supply was varied between 85% and 115% to maximise the emissions.

¹Noise floor figures of test equipment shown at approximate fundamental harmonic frequencies.

Test Method

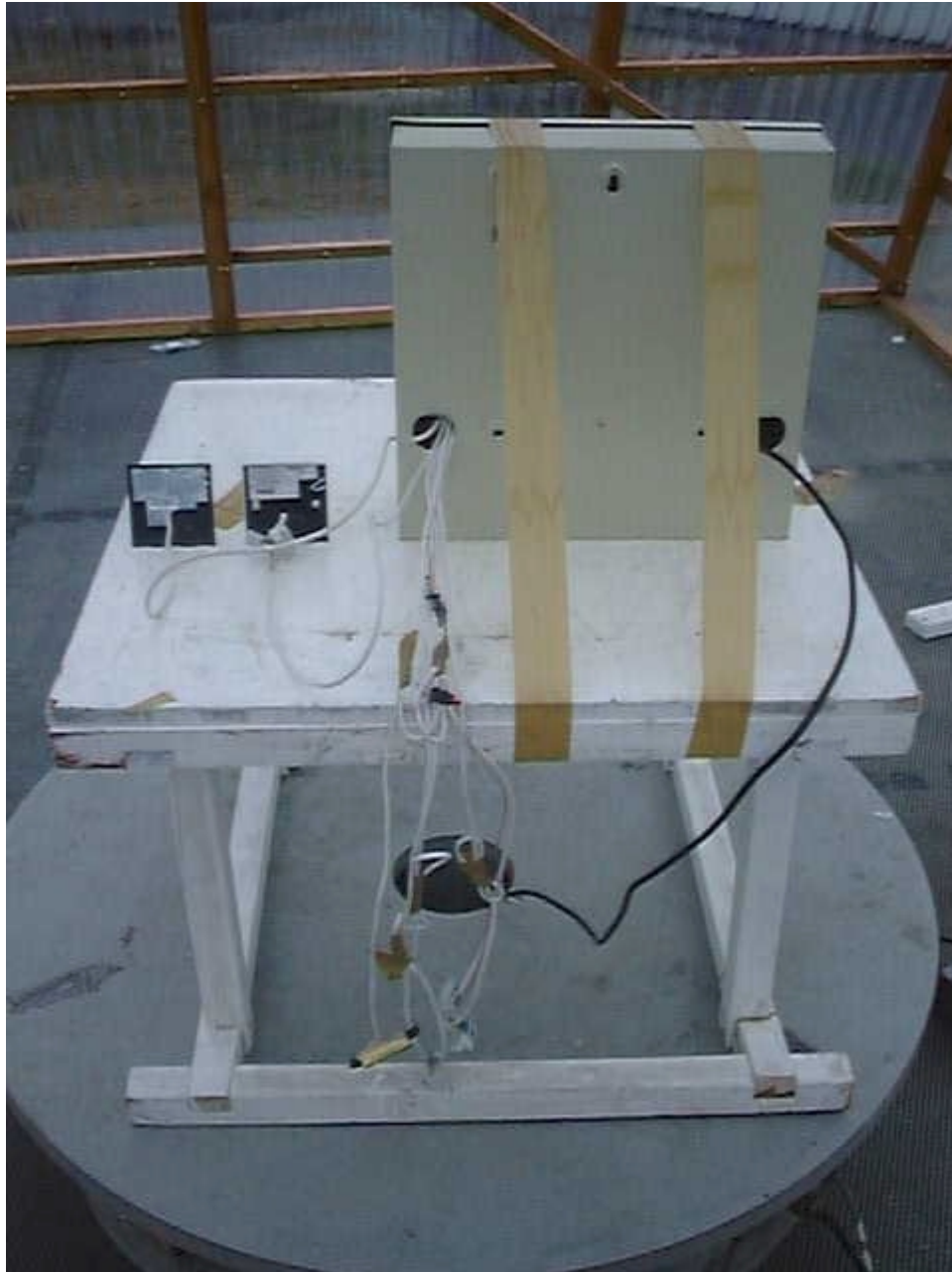
As per ANSI C63.4 : 1992

Measurements performed at 3m and extrapolated to correct distance (300m below 490kHz, 30m above 490kHz) using factor of 40dB/dec. Hence the correction factor of -80 dB was used. The corrected values are given above.

Frequency Range tested = 0.15MHz to tenth harmonic frequency (as per sec 15.33 (a)(1)).

Measurement Detector Details: Peak, 9 kHz bandwidth.

Note: Initial pre-testing was performed to obtain worst case operating mode for the compliance test (Authorised RF ID card on and off the peripheral readers).

Radiated Emissions Test Configuration**EUT Configuration**

Radiated Emissions Environmental Conditions

Power Supply (to controller)	120V, 60Hz
Temperature	17 °C
Relative Humidity	53 %
Barometric Pressure	994 mb

Radiated Emissions Measurement Uncertainties

Frequency	± 200kHz
Amplitude	± 4.6dB

The uncertainties stated are calculated in accordance with the requirements of UKAS with a confidence level of 95%.

Test Equipment Used

Equipment Type	Model Number	Last Calibration Date	Calibration Interval
Active loop antenna	EMCO 6502	7/8/98	2 Years
Spectrum Analyser	HP 8563E	12/2/99	1 Year

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