SGS United Kingdom Ltd.

EMC Services

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Electromagnetic Compatibility
Test Report

Test of:	RF ID Card Entry Reader
Model Number:	20450
Applicant:	PAC International LTD
Test Type:	Compliance
Test Specification:	FCC CFR47, parts 15.207 and 15.209 for Intentional Radiators.
SGS Serial Number:	DUR 21562
Date of Receipt:	9th September 1999
Date of Test(s):	10th to 24th September 1999
Date of Issue:	27th September 1999
Issue Number:	1

Test Engineer	***Authorised Signatory***
L. Steel	A. Reynard

CONTENTS

Page Number

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
Facsimile:	+44 161 430 8658

2. Details Of Test Laboratory

Company Name:	SGS EMC Services LTD.
Address:	Unit 10, Bowburn South Industrial Estate, Bowburn, County Durham, DH6 5AD, United Kingdom.
Contact Persons:	Mr Alan Reynard
Telephone:	+44 191 377 2000
Facsimile:	+44 191 377 2020

3. Equipment Under Test (EUT)

3.1 Identification Of EUT

Model Number:	20450
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
Internal Clock Frequencies:	8 MHz
Supply Voltage:	18V DC
Classification:	Intentional radiator, incorporating digital device.
Environment Class:	Class B 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 15.207 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
15.207	AC Power line Conducted Emissions
15.209	Radiated Emissions

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.

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
15.207	AC Power line Conducted Emissions	Complied
15.209	Radiated Emissions	Complied

Result

In the configuration tested, the EUT complies with the requirements of Clauses 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 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 reader (door closed condition).

Test Results

Live Terminal Worst Case Emissions

Frequency (MHz)	Quasi Peak Measurement (dBµV)	Quasi Peak Limit (dBµV)
14.751	39.8	47.96
15.255	36.7	47.96
15.507	31.4	47.96
16.002	42.2	47.96
17.005	34.8	47.96
17.757	30.4	47.96

Neutral Terminal Worst Case Emissions

Frequency (MHz)	Quasi Peak Measurement (dBµV)	Quasi Peak Limit (dBµV)
16.006	30.2	47.96
16.506	31.9	47.96
17.005	33.1	47.96
17.500	38.9	47.96
17.757	29.4	47.96
19.255	34.2	47.96

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

Test Method

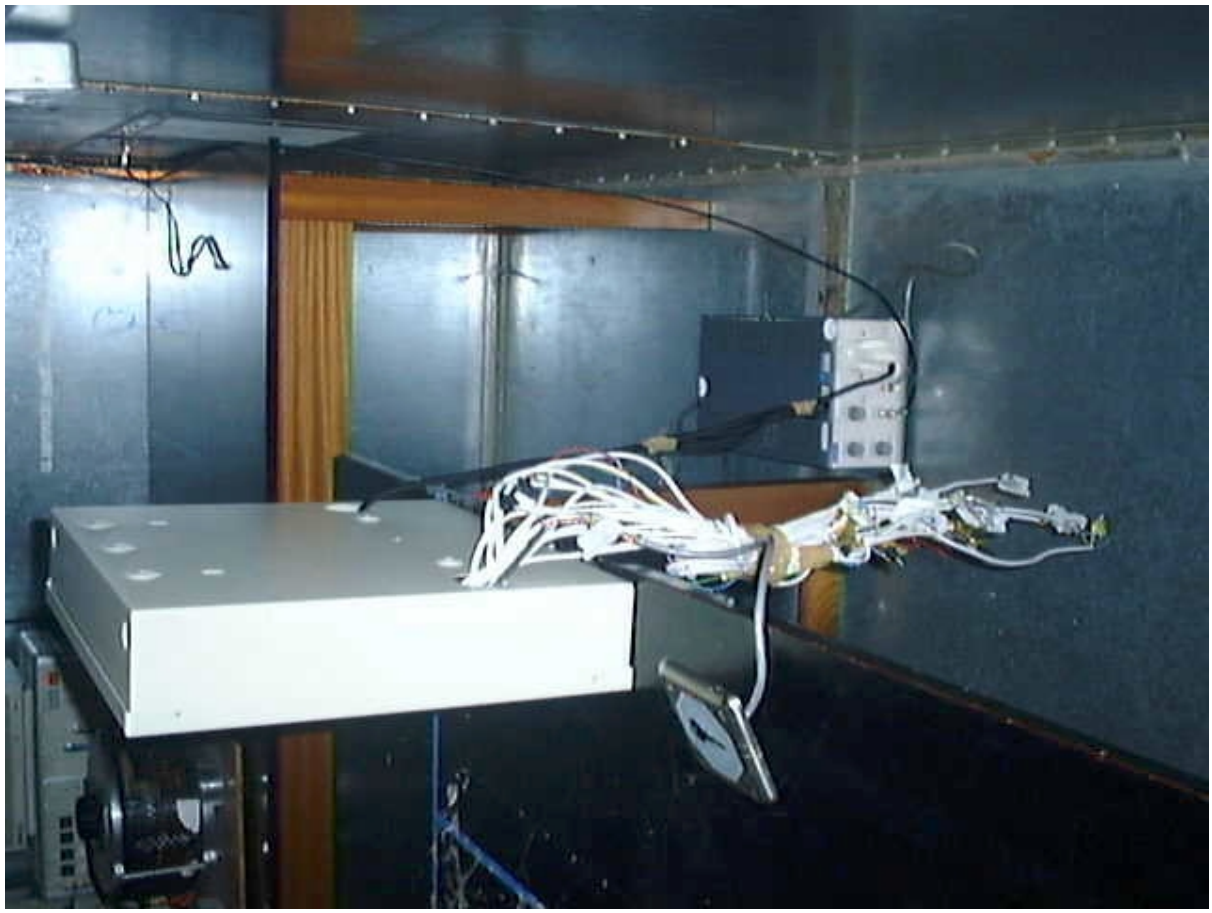
As per ANSI C63.4 : 1992.

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 Configurations

Equipment Set-up



Conducted Emissions Environmental Conditions

Power Supply	120V, 60Hz
Temperature	18°C
Relative Humidity	41 %
Barometric Pressure	1016 mb

Conducted Emissions Measurement Uncertainties

Frequency	± 200kHz
Amplitude	± 3.0dB

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 (50Ω)	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

8.5 Radiated Emissions Test Results

CFR Clause	15.209
Frequency Range	0.009 – 1000 MHz

Operating Mode

The compliance test was performed with an authorised RF ID tag on the reader (door open condition).

Test Results

Worst Case Emissions

Frequency (kHz)	Corrected Peak Measurement (dBµV/m)	Limit (dBµV/m)
125.03*	-14.3	25.66
250.00**	< -35.9	25.66
375.057	- 41.4	25.66
500.00**	< - 50.17	25.66
625.093	-42.83	25.66
875.037	- 53.0	25.66

* The supply was varied between 85% and 115% to maximise the emission.

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

Frequency (MHz)	Corrected (3m) Quasi Peak Measurement (dBµV)	Quasi Peak Limit (dBµV)	Antenna Polarity (H/V)
79.855	35.0	40	V
190.479	36.9	43.5	V
208.901	39.6	43.5	V
233.497	36.7	46	V
264.209	43.8	46	V
325.673	37.1	46	V

Test Method

As per ANSI C63.4 : 1992

Frequency Range tested = 0.009 to 1000MHz (as per sec 15.33 (a)(1)).

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

The loop antenna was rotated in the vertical and horizontal plane to maximise the emissions.

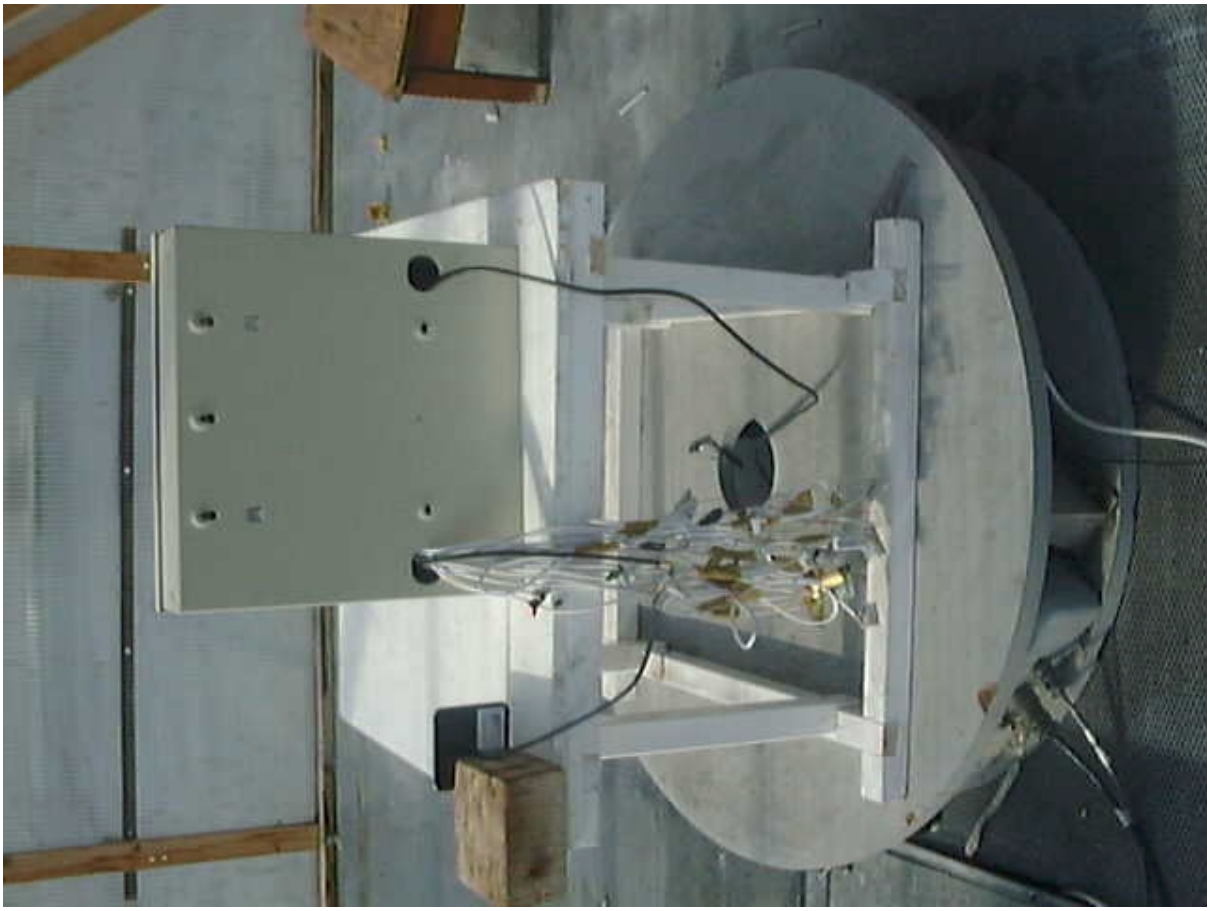
Measurements below 30 MHz were performed at 3m and extrapolated to correct distance (300 =m below 490 kHz, 30m above 490 kHz) using the factor of 40 dB/dec.

Measurements above 30 MHz were performed at a test distance of 10m and extrapolated to the corrected distance of 3m using the factor 20 dB / dec.

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

Equipment Set-up



Radiated Emissions Environmental Conditions

Power Supply (to controller)	120V, 60Hz
Temperature	21 °C
Relative Humidity	40 %
Barometric Pressure	1002 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 3110	11/11/98	2 Years
Log Periodic Antenna	EMCO 3146	2/6/98	2 Years
Spectrum Analyser	HP 8563E	12/2/99	1 Year
Active Loop Antenna	EMCO 6502	7/8/98	2 Years
Rohde and Schwarz Receiver	ESVS10	18/8/98	1 Year