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Electromagnetic Compatibility

Test of: RF Card Entry Reader

Model Number: 20422

Applicant: PAC International Ltd

Test Type: Compliance

Test Specification: FCC CFR47, part 15.209

Test Result: Complied

SGS Serial Number: DUR 24095.2/EMC/LS/02

Date of Receipt: 20th June 2002

Date of Test(s): 20th June 2002 – 9th January 2003

Date of Issue: 10th January 2003

Issue Number: 3

This report refers only to the sample submitted for test.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

Test Engineer

L.Steel

Authorised Signatory

A. Reynard
Technical Manager

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1. Client Information

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2. Details Of Test Laboratory

Company Name: SGS International Electrical Approvals

UKAS Accreditation Number: 1116

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Contact Persons: Mr Alan Reynard

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3. Equipment Under Test (EUT)

3.1 Identification Of EUT

Model Number:	20422
Unique Identifier:	1974357
Description of EUT:	RF Card Entry Reader
Internal Clock Frequencies: (Maximum)	614 kHz
Supply Voltage:	12V DC from a Controller (Controller supply = 120 V AC, 60 Hz)
Classification:	Intentional and Unintentional Radiator
Accessories Supplied:	21446/2 Easikey 1000+ Controller (Manufactured by PAC International) 20373 Easikey Controller (Manufactured by PAC International)

4. Test Specification, Methods and Procedures

4.1 Test Specification(s)

Specification(s)	Title
FCC CFR 47 : October 1999 Part 15.209 only	Code Of Federal Regulations

4.2 Purpose Of Test

To perform the radiated emissions test to the above specification in the frequency range 9 kHz to 1000 MHz.

4.3 Methods and Procedures

The standard listed above refers to the following tests: -

CFR 47 Clause	Test
15.209	Radiated Emissions (9kHz – 30MHz)
15.209	Radiated Emissions (30MHz – 1000MHz)

5. Deviations or Exclusions from the Test Specifications

There were no deviations from the test specifications.

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

6.1 Operation of EUT during testing.

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

6.2 Configuration and Peripherals

Radiated Emissions 9kHz – 30MHz:

The EUT was connected to a controller, (Manufacturer: PAC International, Model No: 21446/2, Serial No: Not supplied) in order to provide power to the EUT. The controller was not placed on the test support during tests, since the controller front panel is an intentional transmitter also, which operates at the same frequency as the EUT.

The controller had its ports terminated as follows:

- i) relay ports – 1m leads attached with 150 ohm terminating resistors
- ii) Tamper/Override, six wire bus port, printer RS232 port – 1m leads attached with 150 ohm resistors in series with a 100 nF capacitors as terminations

Radiated Emissions 30MHz – 1000MHz:

The EUT was connected to a controller, (Manufacturer: PAC International, Model No: 20373, Serial No: Not supplied) in order to provide power to the EUT. The controller was not placed on the test support during tests.

The controller had its ports terminated as follows:

- i) Lock Ports – 150 Ohm resistor in series with 100nF capacitor.
-

7. Test Results

7.1 General Comments

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

7.2 Modifications Made to the EUT

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

7.3 Summary of Test Results

CFR 47 Clause	Test	Result
15.209 (9 kHz - 30 MHz)	Radiated Emissions	Complied
15.209 (30 – 1000MHz)	Radiated Emissions	Complied

Result

In the configuration tested, the EUT complies with the requirements of Clause 15.209 of CFR 47: October 1999, up-to a frequency of 1000 MHz.

7.4 Radiated Emissions Test Results – 15.209 (9kHz – 30MHz)

CFR Clause	15.209
Frequency Range	9 kHz to 30 MHz

Operating Mode

The compliance test was performed with an authorised card presented to the reader.

Test Results**Peak Measurements**

Frequency MHz	Corrected Peak Measurement** (dB μ V/m)	Limit (dB μ V/m)	Measurement Distance (metres)
*0.153	-8.71	23.90	300
0.123	-49.43	25.80	300
0.308	-25.5	17.83	300
0.466	-36.67	14.23	300
2.000	-20.72	29.54	30
¹ 0.550	-14.08	32.79	30
¹ 0.700	-14.08	30.70	30
¹ 0.850	-14.08	29.01	30
¹ 0.900	-14.08	28.51	30

*Indicates EUT carrier frequency. The supply voltage to the controller was varied between 85% and 115% to maximise the carrier level.

¹Indicates typical noise floor figures of test equipment.

Test Method

As per ANSI 63.4 : 1992

Measurements were performed at a test distance of 1m and extrapolated to correct distance of 300m and 30m respectively, using a factor of 40 dB/decade, hence a correction factor of -99.08 for 300m and -59.08 for 30m was used. The corrected levels are shown above.

Measurement detector details: Peak Detector, 300 Hz bandwidth where $F \leq 150\text{kHz}$, 10 kHz bandwidth where $F > 150\text{ kHz}$

Radiated Emissions Test Configuration



Radiated Emissions Environmental Conditions

Power Supply (to controller)	120V AC, 60 Hz
Temperature	13°C
Relative Humidity	59%
Barometric Pressure	976mb

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
Loop Antenna	EMCO 6502	Dec 00
Spectrum Analyser	HP8563E	Nov 00

7.5 Radiated Emissions Test Results – 15.209 (30 – 1000MHz)

CFR Clause	15.209
Frequency Range	30-1000 MHz

Operating Mode

The compliance test was performed with an authorised card presented to the reader.

Test Results***Worst Case Emissions***

Frequency MHz	Quasi-Peak Measurement @3m (dB μ V/m)	Quasi-Peak Limit @3m (dB μ V/m)	Antenna Polarity
42.313	21.2	40	Vertical
492.86	21.6	46	Vertical
799.845	38.8	46	Vertical
45.772	17.6	40	Horizontal
69.996	12.4	40	Horizontal
484.945	20.0	46	Horizontal
850.124	31.9	46	Horizontal

NOTE 1: The test results shown have automatically been corrected to account for Antenna factors, pre-amplifier gain and cable losses, via measurement software.

Test Method

As per ANSI 63.4 : 1992

Measurements performed at a test distance of 3m.

Measurement detector details: Quasi-Peak, 120 kHz bandwidth

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

Power Supply (to controller)	120V AC, 60 Hz
Temperature	4.5°C
Relative Humidity	29%
Barometric Pressure	991mb

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
Receiver System	HP 8573B	Nov 01
Biconical Antenna	EMCO 3110	Nov 00
Log Periodic Antenna	EMCO 3146	Aug 01
Pre-amplifier	ZHL 1042J	Jan 02
Check Equip.	York CNE III	-
Software	Open Site HP85879	-