



South Industrial Estate
Bowburn
Co. Durham
DH6 5AD
United Kingdom
Tel: +44 (0) 191 377 2000
Fax: +44 (0) 191 377 2020
email: sgsiea@sgs.com

SGS United Kingdom Ltd.
International Electrical Approvals

Electromagnetic Compatibility

Test of: RF Card Entry Reader

Model Number: 25686

Applicant: PAC International Ltd

Test Type: Compliance

Test Specification: FCC CFR47, part 15.209

Test Result: Complied

SGS Serial Number: DUR 24094/EMC/LS/02

Date of Receipt: 14th June 2002

Date of Test(s): 14th - 18th June 2002

Date of Issue: 10th January 2002

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

CONTENTS	Page Number
1. Client Information	3
2. Details Of Test Laboratory.....	3
3. Equipment Under Test (EUT)	4
3.1 Identification Of EUT.....	4
4. Test Specification, Methods and Procedures	5
4.1 Test Specification(s)	5
4.2 Purpose Of Test.....	5
4.3 Methods and Procedures.....	5
5. Deviations or Exclusions from the Test Specifications	6
6. Operation of the EUT During Testing / Configuration and Peripherals	6
6.1 Operation of EUT during testing.	6
6.2 Configuration and Peripherals	6
7. Test Results	8
7.1 General Comments.....	8
7.2 Modifications Made to the EUT.....	8
7.3 Summary of Test Results	8
7.4 Radiated Emissions Test Results – 15.209 (9KHz – 30MHz).....	9
7.5 Radiated Emissions Test Results – 15.209 (30MHz – 1000MHz)	11

1. Client Information

Company Name: PAC International Ltd

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

Contact Person: Shaun Byrne

Telephone: 0161 406 3400

Facsimile: 0161 430 8658

2. Details Of Test Laboratory

Company Name: SGS International Electrical Approvals

UKAS Accreditation Number: 1116

Address: South Industrial Estate,
Bowburn,
Co. Durham,
DH6 5AD.

Contact Persons: Mr Alan Reynard

Telephone: 0191 377 2000

Facsimile: 0191 377 2020

3. Equipment Under Test (EUT)

3.1 Identification Of EUT

Model Number:	25686
Unique Identifier:	1951642
Description of EUT:	RF Card Entry Reader
Internal Clock Frequencies: (Maximum)	614 kHz
Supply Voltage:	18V DC from a Controller (Controller supply = 120 V AC, 60 Hz)
Classification:	Intentional and Unintentional Radiator
Accessories Supplied:	2100 Controller (9kHz – 30MHz) See section 6.2 (30MHz – 1000MHz)

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 9kHz – 1000MHz as requested by the client.

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: 25566, Serial No: Not supplied) in order to provide power to the EUT. The controller front panel was disconnected during the tests since this is an intentional transmitter also, which operates at the same frequency as the EUT.

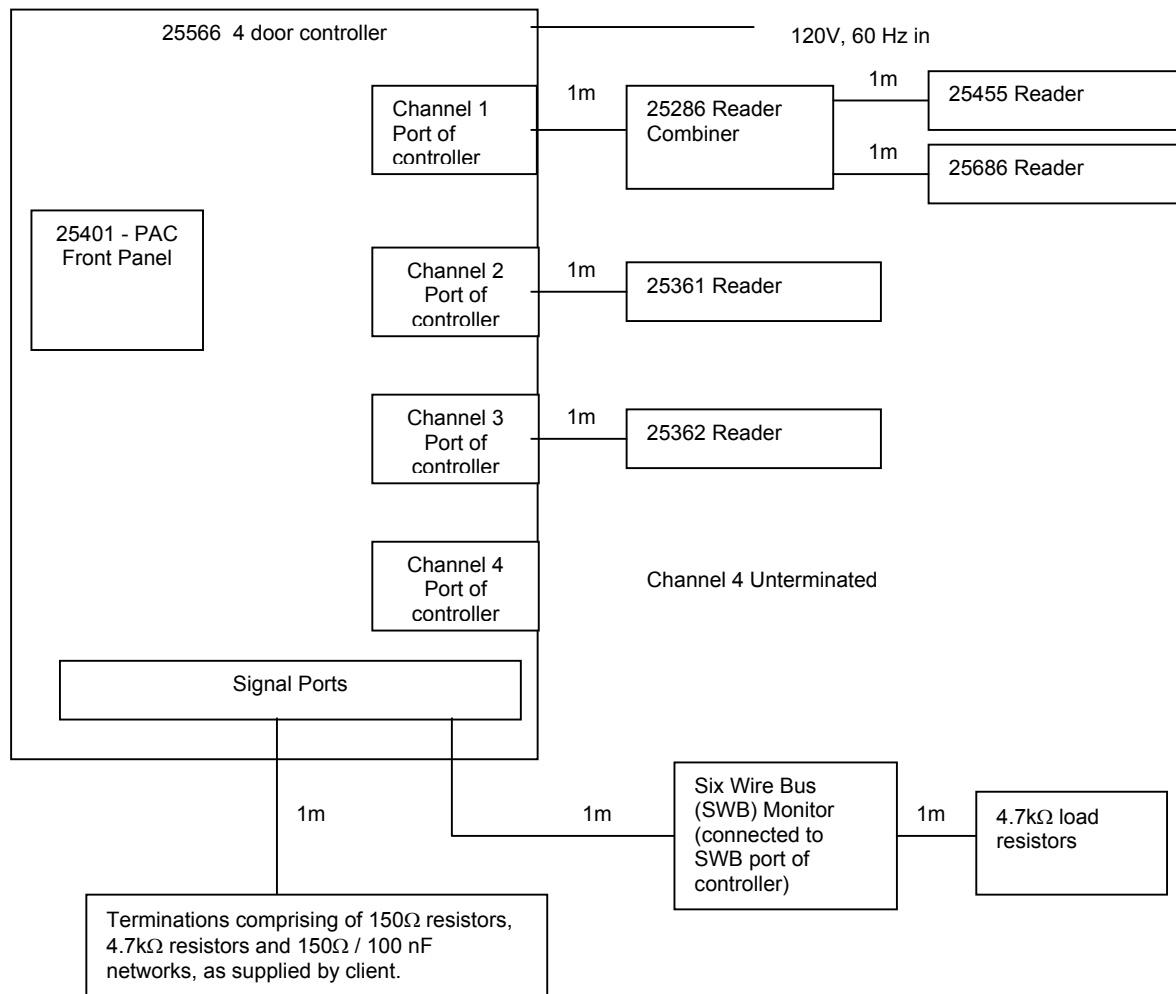
The controller had its ports terminated as follows:

- 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 tested as part of a larger system (shown below).

System Setup



NOTE: The controller is support equipment (it is not being tested). It is submitted only to allow us to perform the Conducted and Radiated emissions tests on the other units.

Component Model No.	Serial No.	Description	Intentional/ Unintentional Radiator?	Highest Frequency Generated/Used
25566	None	4 door controller	Unintentional	<108 MHz
25401	None	Card Reader	Intentional and Unintentional	614 kHz
25286	1851728	Reader Combiner	Unintentional	<108 MHz
25010	1888815	SWB Monitor	Unintentional	<108 MHz
25455	1951674	Card Reader	Intentional and Unintentional	614 kHz
25686	1951642	Card Reader	Intentional and Unintentional	614 kHz
25361	S0078637	Card Reader	Intentional and Unintentional	11.0592 MHz
25362	S0078642	Card Reader	Intentional and Unintentional	11.0592 MHz

Note: Highest frequencies declared by the client.

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 (9kHz- 30 MHz)	Radiated Emissions	Complied
15.209 (30MHz – 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 1000MHz

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

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)
*0.154	-19.08	23.84	300
0.310	-38.60	17.77	300
0.466	-45.74	14.23	300
¹ 0.250	-53.98	19.64	300
¹ 0.400	-53.98	15.56	300
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.

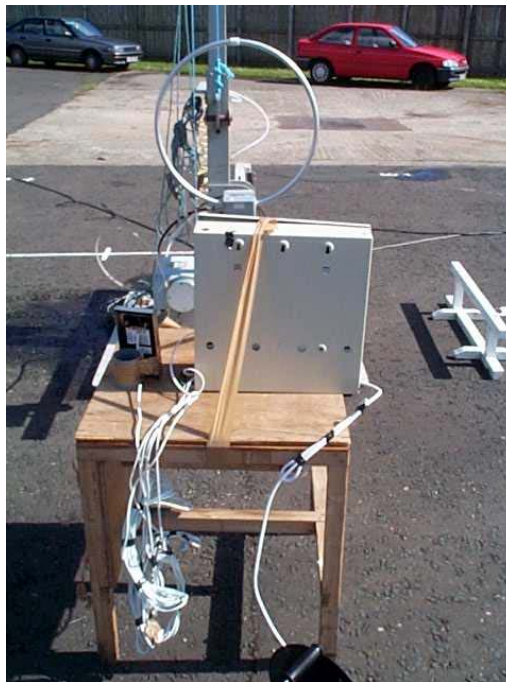
Test Method

As per ANSI 63.4 : 1992

Measurements 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 $F < 150\text{kHz}$, 10 kHz bandwidth where $F \geq 150\text{ kHz}$

Radiated Emissions Test Configuration



NOTE: The photograph shown is for the 25361 reader. The photograph of for the actual EUT (25686) was not taken. The setups for both tests were identical.

Radiated Emissions Environmental Conditions

Power Supply (to controller)	120V AC, 60 Hz
Temperature	13°C
Relative Humidity	59%
Barometric Pressure	987mb

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 (30MHz – 1000MHz)

CFR Clause	15.209
Frequency Range	30-1000 MHz

Operating Mode

The compliance test was performed with authorised cards presented to all RF card readers with the controller door open.

NOTE: The controller was placed close to the ground plane during the test, since the controller is usually remotely located and is not being tested.

Test Results

Frequency MHz	Quasi-Peak Measurement @3m (dB μ V/m)	Quasi-Peak Limit @3m (dB μ V/m)	Antenna Polarity
46.067	35.9	40	Vertical
79.864	37.0	40	Vertical
110.589	34.4	43.5	Vertical
129.018	41.1	43.5	Vertical
130.869	36.3	43.5	Vertical
147.467	37.8	43.5	Vertical
184.338	42.8	43.5	Vertical
235.581	32.6	46	Vertical

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

NOTE 2: Vertical antenna polarity was worst case for all emissions, hence results for horizontal antenna polarity were not recorded.

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	13.5°C
Relative Humidity	51%
Barometric Pressure	963mb

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	-