

email: sgsiea@sgs.com

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

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:	14 th June 2002	
Date of Test(s):	14 th - 18 th June 2002	
Date of Issue:	10 th 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

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

TEST REPORT Page 2 of 12





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:	614 kHz	
(Maximum)		
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)	

TEST REPORT Page 4 of 12





Page 5 of 12

TEST

4. Test Specification, Methods and Procedures

4.1 Test Specification(s)

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

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).





REPORT Page 7 of 12

TEST

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

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** (dBµV/m)	Limit (dBµV/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=<150kHz, 10 kHz bandwidth where F=>150 kHz



TEST REPORT Page 10 of 12

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)

TEST

REPORT

Page 11 of 12

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 (dBµV/m)	Quasi-Peak Limit @3m (dBµV/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	-