SGS United Kingdom Ltd.

International Electrical Approvals

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Electromagnetic Compatibility

Test of:	RF Card Entry System
Model Numbers:	Refer to page 5
Applicant:	PAC International Ltd
Test Type:	Compliance
Test Specification:	FCC CFR47, parts 15.107/15.207, 15.109 and 15.209.
Test Result:	Complied
SGS Serial Number:	DUR 24094.1/EMC/LS/02
Date of Receipt:	30th May 2002
Date of Test(s):	30th May 2002 – 24th June 2002
Date of Issue:	10th January 2003
Issue Number:	3

This report refers only to the sample submitted for test.

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

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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

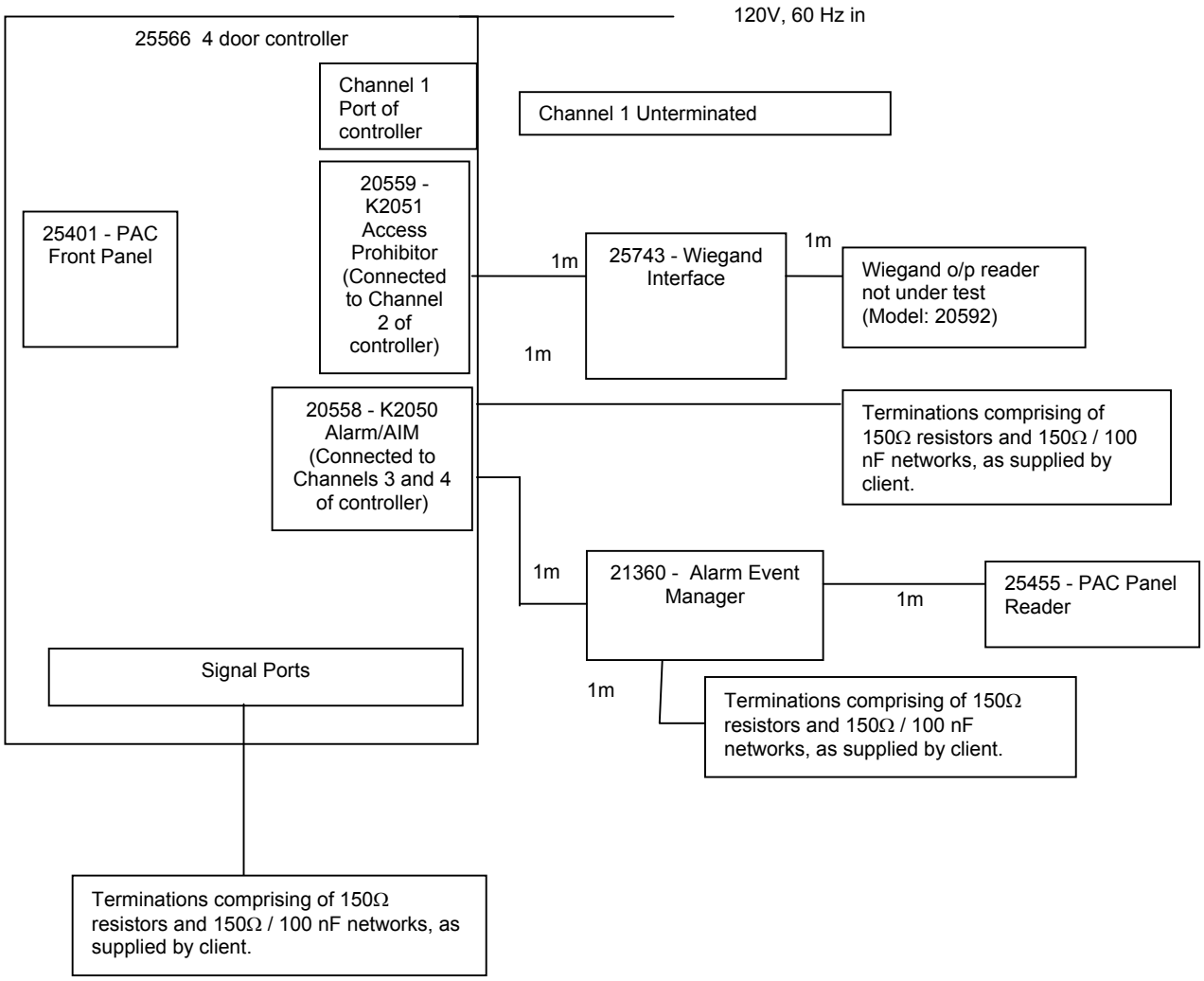
Company Name:	SGS International Electrical Approvals.
UKAS Accreditation Number:	1116
Address:	South Industrial Estate, Bowburn, Co. Durham, DH6 5AD.
Contact Persons:	Mr Alan Reynard
Telephone:	0191 377 2000
Facsimile:	0191 377 2020

3. Equipment Under Test (EUT)

3.1 Identification Of EUT

Model Numbers:	Refer to page 5 for details of individual components of the system.
Unique Identifier:	Refer to page 5.
Description of EUT:	RF Card Entry System
Internal Clock Frequencies:	Refer to Page 5.
Supply Voltage:	120V ac to controller (Note: all other PAC parts obtain their power via the controller).
Classification:	Refer to page 5.

EUT System Diagram



NOTE: When testing PAC part 25401 to sec. 15.209, only the signal ports on the diagram above were terminated. Ports 1,2,3 and 4 were unterminated (i.e. no other PAC items were connected to the controller)

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
25743	1922376	Wiegand Interface	Unintentional	<108 MHz
20559	1700593	Access Prohibitor	Unintentional	<108 MHz
20558	1876054	Alarm Interface	Unintentional	<108 MHz
21360	1801225	Alarm Event Manager	Unintentional	<108 MHz
25455	1951674	Card Reader	Intentional and Unintentional	614 kHz
20592	1806250	Card Reader	Intentional and Unintentional	-

Note 1: PAC part 20592 is not under test.

Note 2: Highest frequencies declared by the client.

4. Test Specification, Methods and Procedures

4.1 Test Specification(s)

Specification(s)	Title
FCC CFR 47 : October 1999 Parts 15.107/15.207, 15.109 and 15.209	Code Of Federal Regulations

4.2 Purpose Of Test

1) To fully test the whole system to clauses 15.107/15.207 and 15.109
2) To test PAC part 25401 only, to the requirements of 15.209 (Upto 30 MHz only)

As requested by the client.

4.3 Methods and Procedures

The standard listed above refers to the following tests: -

CFR 47 Clause	Test
15.107/15.207	Conducted Emissions (Intentional and Unintentional Radiators)
15.109 (30-1000 MHz)	Radiated Emissions (Intentional and Unintentional Radiators)
15.209 (9 kHz to 30 MHz)	Radiated Emissions (Intentional Radiator)

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

The EUT configuration is shown on page 5 of this report.

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
15.107/15.207	Conducted Emissions (Whole EUT system tested)	Complied
15.109	Radiated Emissions (Whole EUT system tested)	Complied
15.209	Radiated Emissions (PAC part 25401 only)	Complied

Result

i) In the configuration tested, the whole system (including PAC part 25401) complies with the requirements of Clauses 15.107/15.207 and 15.109 of CFR 47 : October 1999.
ii) In the configuration tested, PAC part 25401 complies with the requirements of Clause 15.209 of CFR 47 : October 1999, across the frequency range 9 kHz to 30 MHz.

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

7.4 Conducted Emissions Test Results – 15.107/15.207

CFR 47 Clause:	15.107/15.207
Limit:	CISPR 22, Class B (As specified in FCC document FCC 02-157 (ET Docket No. 98-80), adopted May 23rd 2002).
Frequency Range	0.15 – 30 MHz

Operating Mode

The compliance test was performed with authorised cards presented to all RF card readers.

NOTE: Measurements were made on the AC mains of the controller.

Test Method

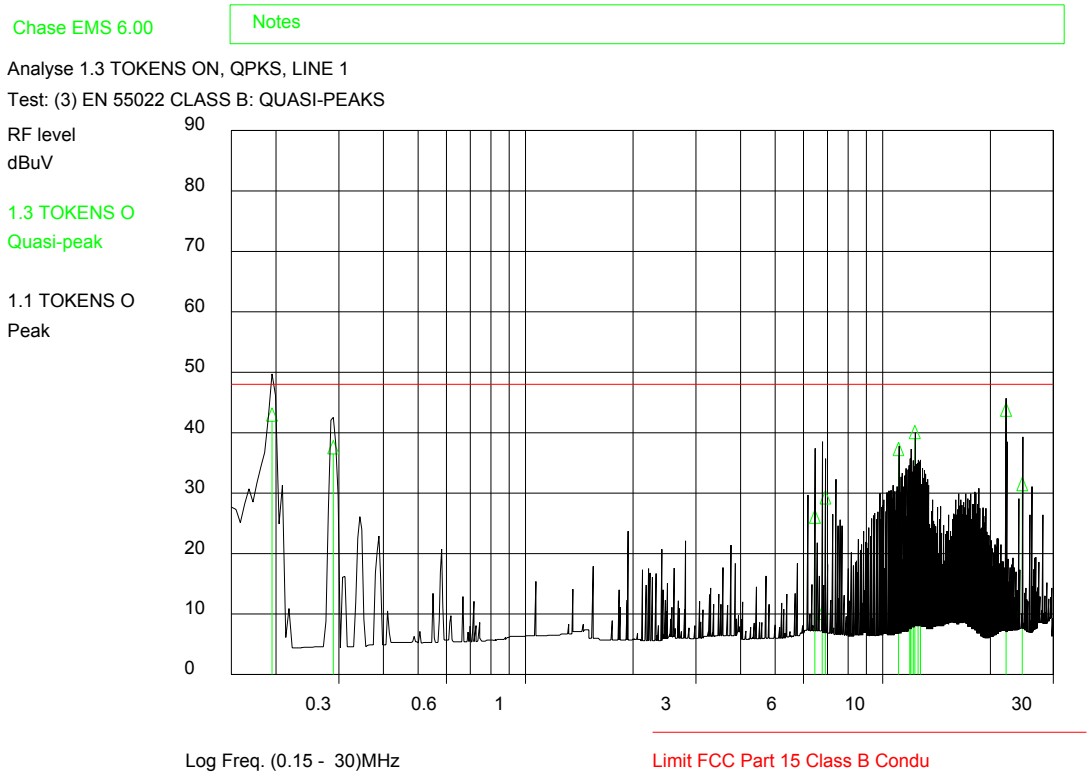
As per ANSI 63.4 : 1992

Measurement detector details: Quasi-Peak, 9 kHz bandwidth

Test Results

NOTE: The test results shown have automatically been corrected to account for LISN attenuation and cable loss, via measurement software.

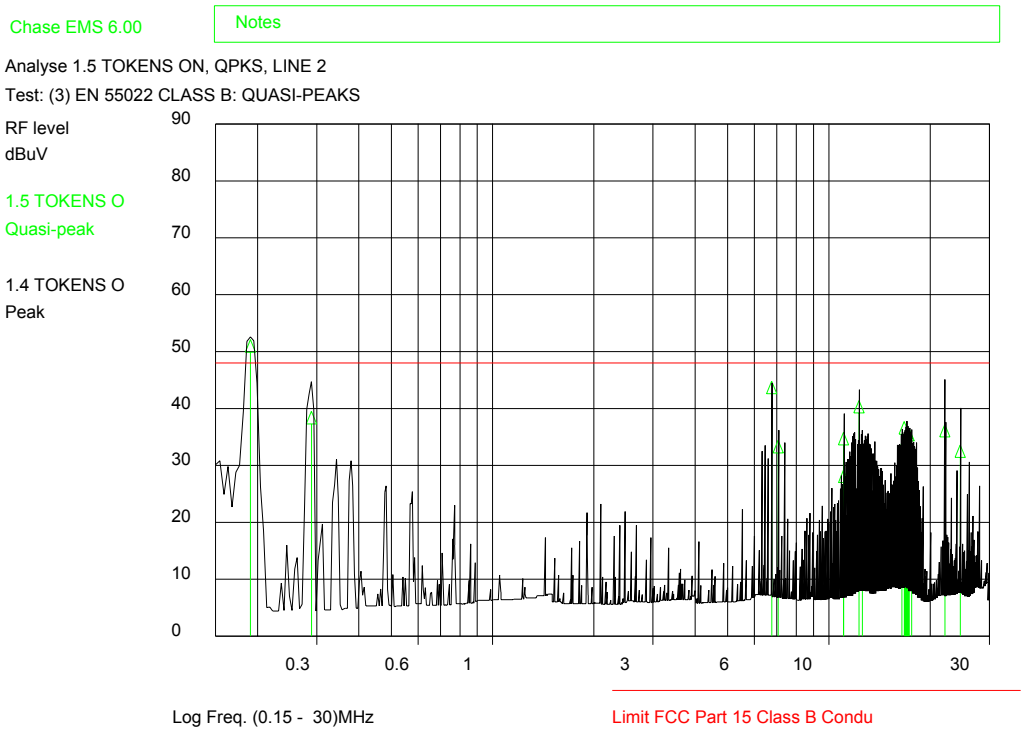
Live Terminal Worst Case Emissions



Frequency (MHz)	Quasi Peak Measurement (dBμV)	Quasi Peak Limit (dBμV)	Average Limit (dBμV)
0.195	44.1	63.8	53.8
0.289	38.7	60.6	50.6
6.459	27.2	60	50
6.769	11.3	60	50
6.909	30.4	60	50
11.062	38.4	60	50
11.890	20.2	60	50
11.985	30.3	60	50
12.169	11.3	60	50
12.291	41.2	60	50
12.556	11.3	60	50
12.745	11.3	60	50
22.123	44.9	60	50
24.585	32.6	60	50

NOTE: Average measurements not performed since Quasi-Peak measurements are below the Average limit.

Neutral Terminal Worst Case Emissions



Frequency (MHz)	Quasi Peak Measurement (dBμV)	Quasi Peak Limit (dBμV)	Average Limit (dBμV)
0.190	52.1	64	54
0.289	39.5	60.6	50.6
6.760	44.8	60	50
7.071	34.4	60	50
11.058	35.8	60	50
11.067	29.2	60	50
12.291	41.4	60	50
12.574	31.00	60	50
16.759	37.7	60	50
16.953	35.7	60	50
17.052	27.9	60	50
17.142	36.9	60	50
17.241	31.00	60	50
17.331	36.5	60	50
17.623	26.8	60	50
22.128	37.2	60	50
24.585	33.6	60	50

NOTE: Average measurements not performed since Quasi-Peak measurements are below the Average limit.

Conducted Emissions Test Configuration

Note: The test was performed with a 40cm separation distance between the EUT and the vertical ground plane. The table was moved away from the vertical ground plane to allow a clearer photograph of EUT and cable setup to be taken.

Conducted Emissions Environmental Conditions

Power Supply (to controller)	120V AC, 60Hz
Temperature	20.5°C
Relative Humidity	50%
Barometric Pressure	1011mb

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
LISN (50Ω)	Thurlby Thandar TTi 1600	Jan 02
Chase Receiver	LHR7000	Sep 01
Software	Version 6.00b	-
SGS Screened Room	-	-
Spectrum Analyser	HP8563E	Nov 00
Check Equip.	PLC 1C	-

7.5 Radiated Emissions Test Results – (15.109)

CFR Clause	15.109
Limits	Class B
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.

Test Results

Frequency MHz	Quasi-Peak Measurement @3m (dBμV/m)	Quasi-Peak Limit @3m (dBμV/m)	Antenna Polarity
58.007	30.2	40	Vertical
67.586	36.3	40	Vertical
110.591	33.7	43.5	Vertical
130.891	28.7	43.5	Vertical
161.830	40.1	43.5	Vertical
184.330	42.3	43.5	Vertical
196.639	37.8	43.5	Vertical
233.492	38.3	46	Vertical
380.981	34.4	46	Vertical
442.441	35.8	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.

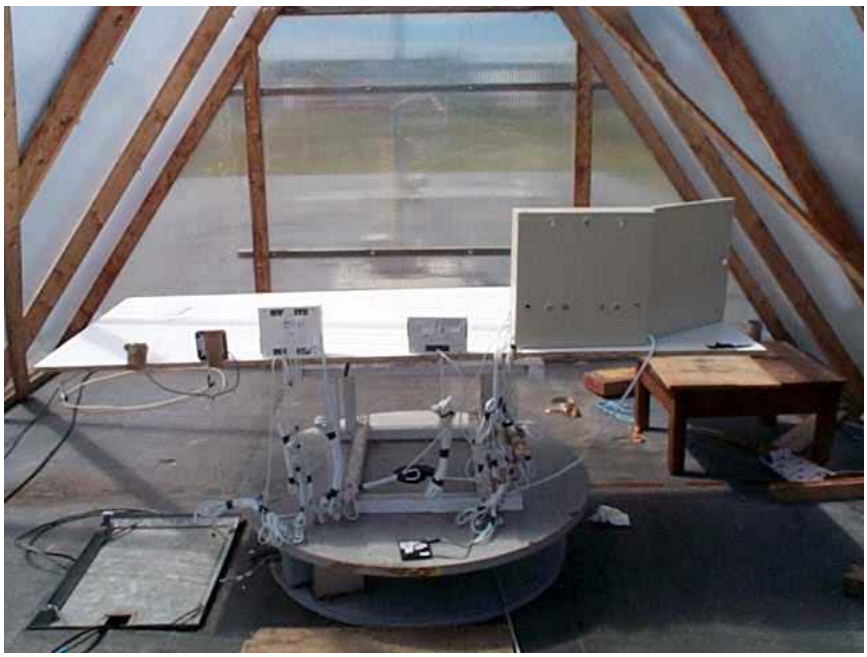
Test Method

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	14.5°C
Relative Humidity	43%
Barometric Pressure	1001mb

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	-

7.6 Radiated Emissions Test Results – (15.209)

CFR Clause	15.209
Frequency Range	9 kHz to 30 MHz

NOTE: PAC Part 25401 is the item under test for this part (part 15.209)

Operating Mode

The compliance test was performed with an authorised card presented to the 25401 reader, with the controller door open.

Test Results

Peak Measurements

Frequency MHz	Corrected Peak Measurement** (dBμV/m)	Limit (dBμV/m)	Measurement Distance (metres)
*0.153	-17.88	23.87	300
0.097	-32.45	27.86	300
0.307	-39.81	17.86	300
[1]0.400	-53.98	15.56	300
0.460	-46.81	14.34	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	28.52	30

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

Radiated Emissions Test Configuration

Radiated Emissions Environmental Conditions

Power Supply (to controller)	120V AC, 60 Hz
Temperature	13.5°C
Relative Humidity	62%
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