**SGS United Kingdom Ltd.**

**International Electrical Approvals**

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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.*



| ***Test Engineer*** | ***Authorised Signatory*** |
|---|---|
| L.Steel | A. Reynard<br>Technical Manager |

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## 1. Client Information

| | |
|---|---|
| **Company Name:** | PAC International Ltd |
| **Address**: | 1 Park Gate Close,<br>Bredbury,<br>Stockport,<br>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,<br>Bowburn,<br>Co. Durham,<br>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:** | 20422 |
| **Unique Identifier:** | 1974357 |
| **Description of EUT:** | RF Card Entry Reader |
| **Internal Clock Frequencies: (Maximum)** | 614 kHz |
| **Supply Voltage:** | 12V DC from a Controller<br>(Controller supply = 120 V AC, 60 Hz) |
| **Classification:** | Intentional and Unintentional Radiator |
| **Accessories Supplied:** | 21446/2 Easikey 1000+ Controller<br>(Manufactured by PAC International)<br>20373 Easikey Controller<br>(Manufactured by PAC International) |

# 4. Test Specification, Methods and Procedures

## 4.1 Test Specification(s)

| Specification(s) | Title |
|---|---|
| FCC CFR 47 : October 1999<br>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<br>(9kHz – 30MHz) |
| 15.209 | Radiated Emissions<br>(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<br>(9 kHz - 30 MHz) | Radiated Emissions | Complied |
| 15.209<br>(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** (dBμV/m) | Limit (dBμV/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.

[1]Indicates 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=<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°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 (dBμV/m) | Quasi-Peak Limit @3m (dBμV/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 | - |