SGS United Kingdom Ltd.

International Electrical Approvals

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Electromagnetic Compatibility

Test of:	Central Network Controller (CNC), including power supply
Model Number:	25511 (Central Network Controller), Model no. not supplied for Power Supply
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 24097.1/EMC/LS/02
Date of Receipt:	20th May 2002
Date of Test(s):	27th May 2002 – 29th May 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 Number:	25511 (Central Network Controller / CNC), Model no. not supplied for Power Supply
Unique Identifier:	1984493 (CNC), 1984493 (Power Supply)
Description of EUT:	Central Network Controller, including Power Supply
Internal Clock Frequencies: **(Maximum)**	32 MHz – CNC <108 MHz (Power Supply)
Supply Voltage:	120v ac, 60 Hz
Classification:	Intentional and Unintentional Radiator (CNC), Unintentional Radiator (Power Supply)
Accessories Supplied:	None

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

To perform the relevant tests and assess the product for compliance with the above specification.

4.3 Methods and Procedures

The standards listed on the previous page refer to the following tests: -

CFR 47 Clause	Test
15.107/15.207	Conducted Emissions (Intentional and Unintentional Radiator)
15.109 (30-1000 MHz)	Radiated Emissions (Intentional and Unintentional Radiator)
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 central network controller (cnc) connects to the power supply via a low voltage dc cable. During tests, this cable was bundled to 1m in length.

The controller has the following additional ports, terminated as indicated:

i) 5 signal ports, terminated with various resistors at the end of 1m lengths of cable
ii) 1 reader port, with 1m cable attached to it (lead unterminated)

The power supply has a battery backup port – this was terminated with a typical battery via a 1m lead.

Note: terminations as provided by 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
15.107/15.207	Conducted Emissions	Complied
15.109	Radiated Emissions 30-1000 MHz (Intentional and Unintentional Radiator)	Complied
15.209	Radiated Emissions 9 kHz to 30 MHz (Intentional Radiator)	Complied

Result

In the configuration tested, the EUT complies with the test standard detailed above.

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

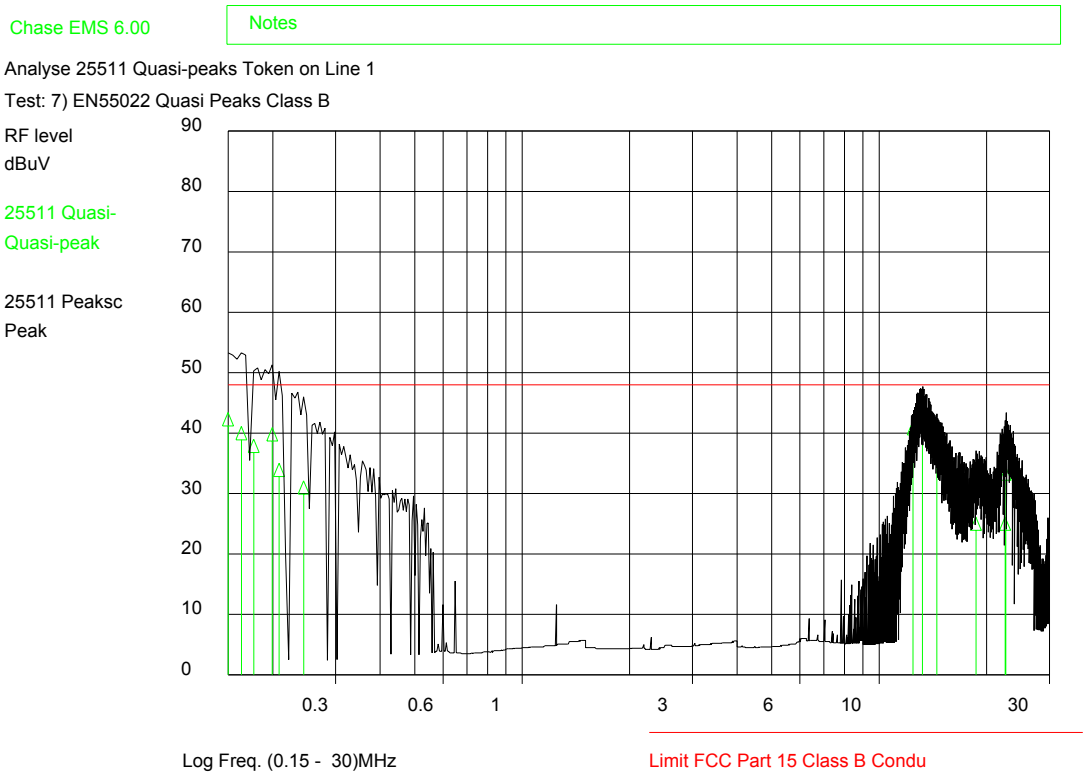
CFR 47 Clause:	15.107/15.207
Limits:	CISPR 22, Class B (As specified in FCC document FCC 02-157 (ET Docket No. 98-80), adopted May 23rd 2002).
Frequency Range	0.15 – 30 MHz

Operating Mode

The compliance test was performed whilst the central network controller had an authorised card presented to its reader.

Test Results

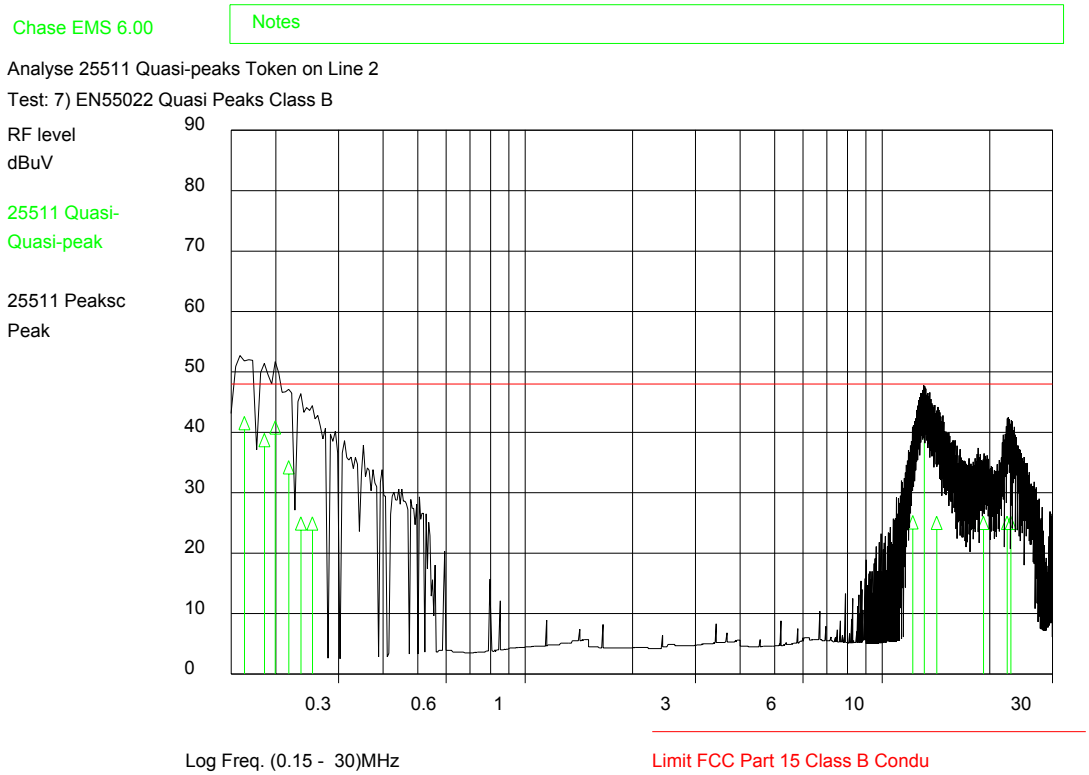
Live Terminal Worst Case Emissions



Frequency (MHz)	Quasi Peak Measurement (dBμV)	Quasi Peak Limit (dBμV)	Average Limit (dBμV)
0.1635	41.1	65.3	55.3
0.1770	39.0	64.6	54.6
0.1995	40.9	63.6	53.6
0.2085	35.0	63.3	53.3
0.2445	32.1	61.9	51.9
12.4305	41.9	60	50
13.2225	45.1	60	50
14.5095	38.4	60	50
18.6720	26.1	60	50
22.5375	26.1	60	50
22.6320	34.4	60	50

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

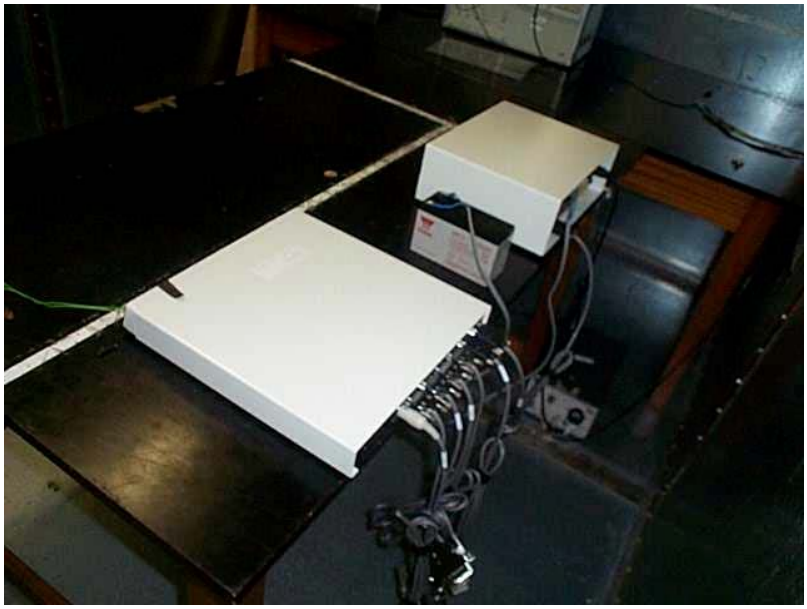
Neutral Terminal Worst Case Emissions



Frequency (MHz)	Quasi Peak Measurement (dBμV)	Quasi Peak Limit (dBμV)	Average Limit (dBμV)
0.1635	42.6	65.3	55.3
0.1860	39.8	64.2	54.2
0.1995	41.9	63.6	53.6
0.2175	35.3	62.9	52.9
0.2355	26.0	62.3	52.3
0.2535	26.0	61.6	51.6
12.1875	26.2	60	50
13.1235	44.3	60	50
14.2170	26.1	60	50
19.2165	26.1	60	50
22.3845	26.1	60	50
22.9245	26.1	60	50

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

Conducted Emissions Test Configuration



Conducted Emissions Environmental Conditions

Power Supply (to controller)	120V, 60Hz
Temperature	19.5°C
Relative Humidity	52%
Barometric Pressure	1001mb

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 A
Frequency Range	30-1000 MHz

Operating Mode

The compliance test was performed whilst the central network controller had an authorised card presented to its reader.

Test Results

Frequency (MHz)	Quasi-Peak Measurement @10m (dBμV/m)	Quasi-Peak Limit @10m (dBμV/m)	Antenna Polarity
55.340	25.94	39.0	Vertical
79.972	26.24	39.0	Vertical
110.689	35.94	43.5	Vertical
122.997	31.24	43.5	Vertical
141.439	28.64	43.5	Vertical
165.313	28.54	43.5	Vertical
196.605	30.64	43.5	Vertical
212.599	33.24	43.5	Vertical
239.977	26.14	46.4	Vertical
383.976	42.64	46.4	Vertical
399.979	39.94	46.4	Vertical
431.974	29.44	46.4	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.

NOTE 3: Measurements were performed at a test distance of 3m and extrapolated to an equivalent 10 m value by deducting an extrapolation factor of 20 dB decade, hence a correction factor of -10.46dB was used.

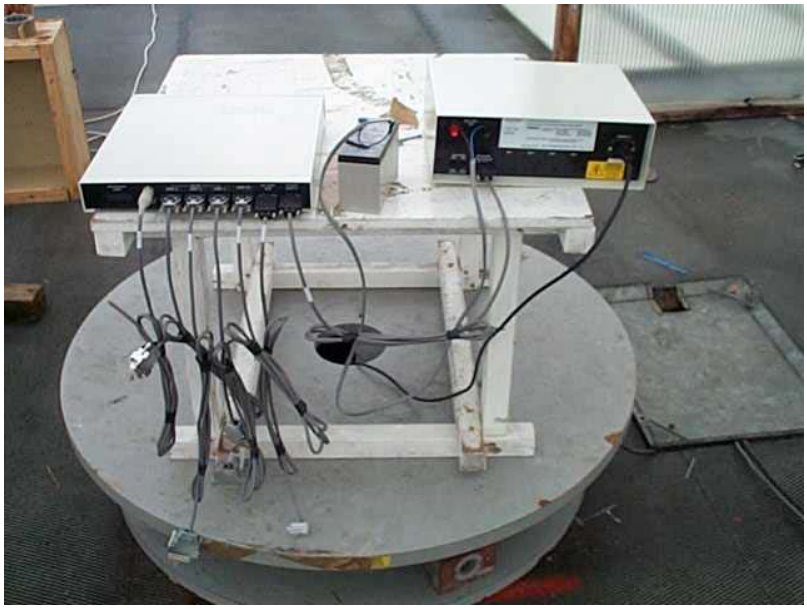
Test Method

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, 60Hz
Temperature	9°C
Relative Humidity	67%
Barometric Pressure	986mb

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

Operating Mode

The compliance test was performed whilst the central network controller had an authorised card presented to its reader.

Test Results

Peak Measurements

Frequency MHz	Corrected Peak Measurement** (dBμV/m)	Limit (dBμV/m)	Measurement Distance (metres)
*0.154	-18.05	23.87	300
0.050	-14.48	n/a*	300
0.996	11.72	27.63	30
0.149	-43.71	24.14	300
0.299	-44.15	18.09	300
0.348	-42.15	16.77	300
0.375	-35.65	16.12	300
0.461	-38.98	14.33	300
0.769	-5.75	29.88	30

*n/a: Emission found to be generated by the power supply unit (an unintentional device) which is not subject to the Intentional radiator limits.

*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, 60Hz
Temperature	9.5°C
Relative Humidity	63%
Barometric Pressure	982mb

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