SGS United Kingdom Ltd.

International Electrical Approvals

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Electromagnetic Compatibility
Test Report

Test of:	Datasonde 8 kHz/33.6 kHz High power
Model Number:	10/ND2415-OR
Applicant:	Radiodetection Ltd
Test Type:	Compliance
Test Specification:	FCC CFR47, part 15.209 for Intentional Radiators.
SGS Serial Number:	DUR22909/EMC/ST/01/A
Date of Receipt:	5th March 2001
Date of Test(s):	19th March 2001 – 22nd March 2001
Date of Issue:	20th April 2001
Issue Number:	2

S. C. Thompson

A. H. Reynard

Test Engineer

S. Thompson

Authorised Signatory

F. Huggins / A. Reynard / M. Harvey

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1. Client Information

Company Name:	Radiodetection Ltd
Address:	Western Drive Bristol BS14 0AZ
Contact Person:	Norman Prior
Telephone:	0117 976 7776
Facsimile:	0117 976 7775

2. Details Of Test Laboratory

Company Name:	SGS UK LTD.
Address:	South Industrial Estate Bowburn Co. Durham DH6 5AD
Contact Persons:	Mr Alan Reynard
Telephone:	+44 191 377 2000
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3. Equipment Under Test (EUT)

3.1 Identification Of EUT

Model Number:	10/ND2415-OR
Unique Identifier:	IP00001
FCC ID:	K68ND2415D
Description of EUT:	The EUT is a Datasonde
Fundamental (Carrier) Frequency	8kHz or 33.6 kHz
Internal Clock Frequencies:	Highest frequency used is 4.608 MHz
Supply Voltage:	3V DC using 2x 'C' size batteries
Classification:	Intentional radiator incorporating digital device
Environment Class:	Class B
Ports present:	None – Battery Powered
Accessories Supplied:	G2 DrillTrack System *

* This was used solely to ensure the datasonde was operating correctly and to change the operating frequency of the datasonde. This was not in the test area whilst the tests were conducted.

4. Test Specification, Methods and Procedures

4.1 Test Specification(s)

Specification(s)	Title
FCC CFR 47 part 15.209	Code Of Federal Regulations
ANSI C63.4 : 1992	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.

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
15.209	Radiated Emissions (Intentional Radiator)

5. Deviations or Exclusions from the Test Specifications

There were no deviations from the test specifications.

The scope of the inspection is limited to what is specified in the clients instructions and does not include any other checks or tests such as the electrical (electronic) control systems ability to cope with the implications of the dates falling on, before or after “January 2000”.

6. Operation of the EUT During Testing / Configuration and Peripherals

6.1 Operation of EUT during testing.

The EUT was tested whilst transmitting at 33.6 kHz and repeated whilst transmitting at 8 kHz.

6.2 Configuration and Peripherals

No support equipment or peripherals were used during the testing.

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 (Intentional)	Complied

Result

In the configuration tested, the EUT complies with the requirements of Clause 15.209 of CFR 47.

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

7.4 Transmitter Radiated Emissions <30 MHz - Intentional Radiator

CFR Clause	15.209
Frequency Range	9 kHz – 30 MHz

Operating Mode

The EUT was operating whilst the transmitter frequency was set at 33 kHz and repeated when set to 8 kHz.

Test Results

Worst Case Emissions

Transmitter at 33 kHz

Frequency (kHz)	Corrected Peak Measurement (dBμV/m)	Limit (dBμV/m)
33.63	15.43	37.07
133.26	-24.63	15.43
232.26	-15.93	15.43
302.11	-27.96	15.43
369.5	-28.76	15.43
402.68	-32.6	15.43
436.34	-29.59	15.43

Transmitter at 8 kHz

Frequency (kHz)	Corrected Peak Measurement (dBμV/m)	Limit (dBμV/m)
8.4	27.68	No limit
25.2	-5.65	27.68
42.02	-20.43	27.68
109.217	-25.1	27.68
125.992	-26.5	27.68
142.85	-30.83	27.68

Test Method

As per ANSI C63.4 : 1992

Measurements were performed at 3m and extrapolated to correct distance of 300m using a factor of 40dB/dec. Hence the correction factor of –80 dB was used. The corrected values are given above.

Frequency Range tested = 9 kHz to 30 MHz (as per sec 15.33 (a)(1)(4)).

Measurement Detector Details: Peak, 300Hz bandwidth at frequencies below 150 kHz, 10 kHz at frequencies above 150 kHz.

Radiated Emissions Test Configuration

Radiated Emissions Environmental Conditions

Power Supply	3V DC using x2 'C' size batteries
Temperature	8°C
Relative Humidity	49%
Barometric Pressure	1011mb

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	Calibration Interval
Active loop antenna	EMCO 6152	7/8/98	3 Years
Spectrum Analyser	HP 8563E	10/5/00	1 Year

7.5 Transmitter Radiated Emissions 30 MHz – 1 GHz - Intentional Radiator

CFR Clause	15.209
Frequency Range	30 MHz – 1 GHz

Operating Mode

The EUT was operating whilst the transmitter frequency was set at 33 kHz and repeated when set to 8 kHz.

Test Results

Transmitter at 33 kHz

Frequency (MHz)	3m Peak Measurement (dBμV/m)	Limit at 3m (dBμV/m)
110	16.63	43.52
258.08	17.21	46.00
262.73	17.67	46.00
267.3	17.5	46.00
271.92	17.72	46.00
850*	29.42	46.00

Transmitter at 8 kHz

Frequency (MHz)	3m Measurement (dBμV/m)	Limit (dBμV/m)
110.32	18.1	43.52
258.10	15.01	46.00
262.7	16.3	46.00
400*	16.94	46.00
600*	26.14	46.00
850*	29.42	46.00

* Noise floor figures of test equipment.

Test Method

As per ANSI C63.4 : 1992

Frequency Range tested = 30 MHz to 1 GHz (as per sec 15.33 (a)(4)).

Measurement Detector Details: Peak, 300Hz bandwidth at frequencies below 150 kHz, 10 kHz at frequencies above 150 kHz.

Measurements were performed at 3m.

Radiated Emissions Test Configuration

Radiated Emissions Environmental Conditions

Power Supply	3V DC using 2x 'C' size batteries
Temperature	14°C
Relative Humidity	32%
Barometric Pressure	989mb

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	Calibration Interval
Biconilog antenna	EMCO 3142	22/6/99	2 Years
Spectrum Analyser	HP 8563E	10/5/00	1 Year