

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: XT3418

To: FCC Part 15.231: 2008

Test Report Serial No:
RFI/RPT1/RP75527JD08B

**This Test Report Is Issued Under The Authority
Of Brian Watson, Operations Director:**

pp 

Checked By:	Robert Graham
Signature:	
Date of Issue:	28 September 2009

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1. Customer Information

Company Name:	Pro Tech Monitoring Inc.
Address:	2549 Success Dr Odessa, FL 33556

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.231
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart C (Radio Frequency Devices) - Section 15.231
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	03 September 2009 to 11 September 2009

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Port Type	Result
Part 15.107	Receiver/Idle Mode AC Conducted Emissions	AC Mains	✓
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	Antenna	✓
Part 15.207	Transmitter AC Conducted Emissions	AC Mains	✓
Part 15.231(e)	Transmitter Fundamental Field Strength	Antenna	✓
Part 15.231(c)	Transmitter 20 dB Bandwidth	Antenna	✓
Part 15.231(a)	Transmitter Timeout	Antenna	✓
Part 15.35(c)	Transmitter Duty Cycle	Antenna	N/A
Part 15.231(e) & 15.209	Transmitter Radiated Emissions	Antenna	✓

Key to Results

✓ = Complied ✘ = Did not comply

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2003)
Title:	American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	X-Tech
Model Name or Number:	XT3418
Serial Number:	36984440
FCC ID Number:	NC3FTD3418

Description:	AC Charger
Brand Name:	Elmo Tech
Model Name or Number:	SE120100
Serial Number:	None stated

3.2. Description of EUT

The equipment under test was a GSM/GPRS/GPS tracker fitted with a 418 MHz transceiver.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Power Supply Requirement:	Nominal	3.7 V Li-ion battery
Type of Unit:	Transceiver	
Transmit Frequency Range:	418 MHz	
Receive Frequency Range:	418 MHz	

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop PC
Brand Name:	Dell
Model Name or Number:	Latitude D600
Serial Number:	Not stated

Description:	Infra Red Wireless Interface
Brand Name:	ACTiSYS
Model Name or Number:	ACT-IR220LN57
Serial Number:	LN001248

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating test modes, unless otherwise stated:

- Continuous transmit or transmitting 6 mS (approx) transmission bursts every 20 s repetitively (as required) at maximum output power
- Receive Mode.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration:

- For transmitter tests the EUT was tested with AC Charger connected. A bespoke application (MTD Term) on the laptop PC was used to place the EUT into test mode and continuously transmit or transmit in bursts at maximum power.
- For receiver tests, the EUT was tested with the EUT being charged from the AC charger. The EUT was placed into receive mode via MTD Term software on the laptop PC.
- AC mains conducted emissions were performed with the EUT being charged from the AC charger and the charger was connected to a 120 V 60 Hz supply via a LISN.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

5.2. Test Results

5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions

Test Summary:

FCC Part:	15.107
Test Method Used:	As detailed in ANSI C63.4 Section 7 and relevant annexes

Environmental Conditions:

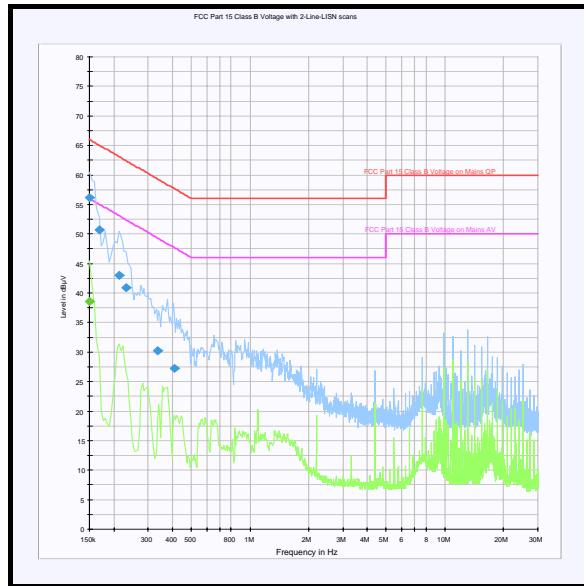
Temperature (°C):	26
Relative Humidity (%):	33

Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	56.1	66.0	9.9	Complied
0.168000	Live	50.7	65.1	14.4	Complied
0.213000	Live	42.9	63.1	20.2	Complied
0.231000	Live	41.0	62.4	21.4	Complied
0.334500	Live	30.2	59.3	29.1	Complied
0.411000	Live	27.3	57.6	30.3	Complied

Results: Average Detector Measurements

Frequency (MHz)	Line	Average Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	38.6	56.0	17.4	Complied

Receiver/Idle Mode AC Conducted Spurious Emissions (continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

5.2.2. Receiver/Idle Mode Radiated Spurious Emissions

Test Summary:

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

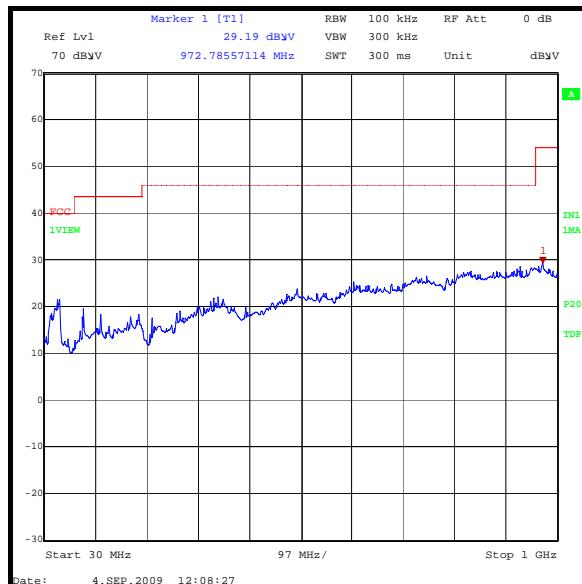
Temperature (°C):	25
Relative Humidity (%):	26

Results:

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
972.786	Vertical	29.2	54.0	24.8	Complied

Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Receiver/Idle Mode Radiated Spurious Emissions (continued)**Test Summary:**

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	1 GHz to 4 GHz

Environmental Conditions:

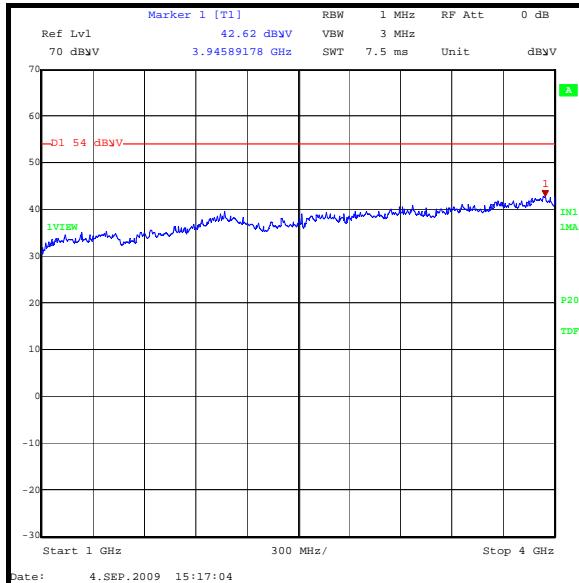
Temperature (°C):	24
Relative Humidity (%):	25

Results:

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
3.946	Horizontal	37.3	5.3	42.6	54.0	11.4	Complied

Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

5.2.3. Transmitter AC Conducted Spurious Emissions**Test Summary:**

FCC Part:	15.207
Test Method Used:	As detailed in ANSI C63.4 Section 7 and relevant annexes

Environmental Conditions:

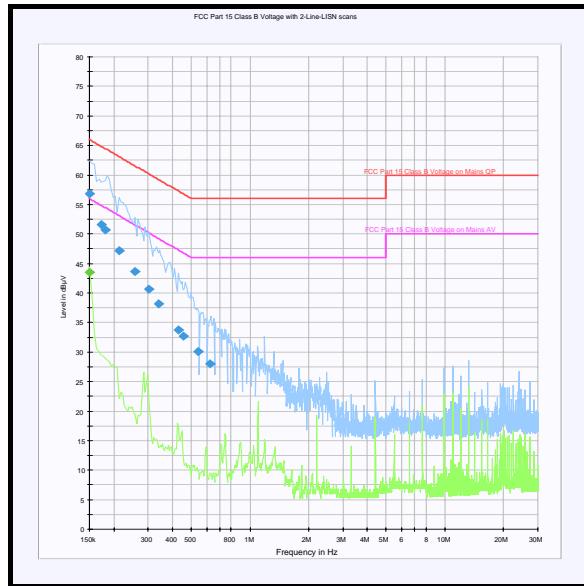
Temperature (°C):	26
Relative Humidity (%):	33

Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	56.8	66.0	9.2	Complied
0.172500	Live	51.6	64.8	13.2	Complied
0.181500	Live	50.6	64.4	13.8	Complied
0.213000	Live	47.2	63.1	15.9	Complied
0.258000	Live	43.6	61.5	17.9	Complied
0.303000	Live	40.7	60.2	19.5	Complied
0.339000	Live	38.1	59.2	21.1	Complied
0.429000	Live	33.8	57.3	23.5	Complied
0.456000	Live	32.7	56.8	24.1	Complied
0.541500	Live	30.1	56.0	25.9	Complied
0.622500	Live	28.0	56.0	28.0	Complied

Results: Average Detector Measurements

Frequency (MHz)	Line	Average Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	43.5	56.0	12.5	Complied

Transmitter AC Conducted Spurious Emissions (continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

5.2.4. Transmitter Fundamental Field Strength**Test Summary:**

FCC Part:	15.231(e)
Test Method Used:	As detailed in ANSI C63.4 Section 7 and relevant annexes

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	26

Results: Average Level

Frequency (MHz)	Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
418	38.2	72.3	34.1	Complied

Results: Peak Level

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
418	63.1	92.3	29.2	Complied

Note(s):

1. The average level was determined by subtracting the duty cycle correction factor (based on the measured transmission interval of 5.67 ms) from the measured peak level. The duty cycle correction factor of 24.9 dB was calculated using formula $20 \log (\text{On Time}/100\text{ms})$ as stated in FCC Part 15.35(c).
2. Measurements were made with the test antenna in the horizontal and vertical planes and the EUT in the X, Y and Z planes. The highest level was recorded in the above table.

5.2.5. Transmitter 20 dB Bandwidth

Test Summary:

FCC Part:	15.231(c)
Test Method Used:	As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes (see note below)

Environmental Conditions:

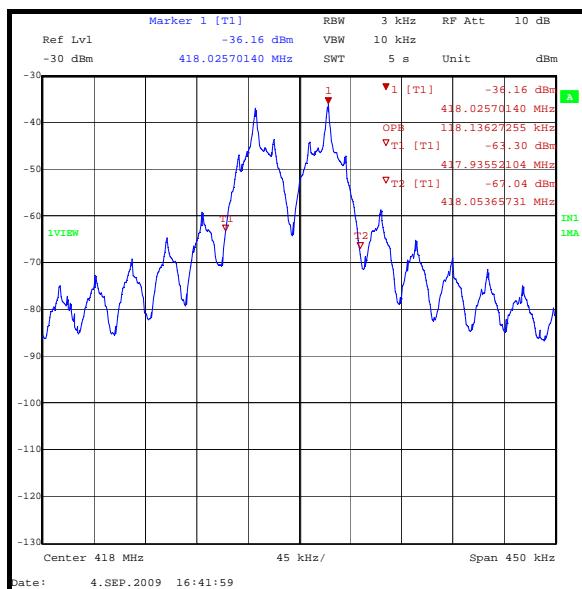
Temperature (°C):	25
Relative Humidity (%):	24

Results:

Transmitter 20 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
0.118	1.045	0.927	Complied

Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser



5.2.6. Transmitter Timeout

Test Summary:

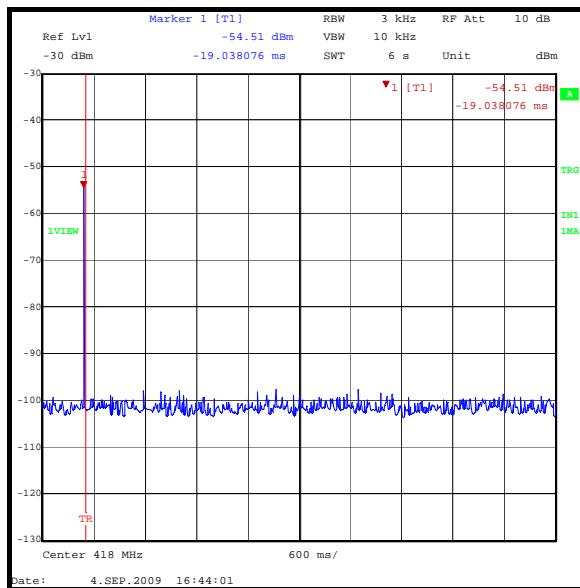
FCC Part:	15.231(a)
Test Method Used:	The EUT transmitter was activated and monitored via a spectrum analyser for a period not exceeding 6 seconds. It was observed that the EUT ceased transmission within the 5 second limit.

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	24

Results:

Deactivation Time (seconds)	Limit (seconds)
<0.1	5



5.2.7. Transmitter Duty Cycle

Test Summary:

FCC Part:	15.35(c)
Test Method Used:	The transmitter duty cycle was measured using a spectrum analyser and calculated by $20 \log(\text{On Time} / \text{Period})$

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	24

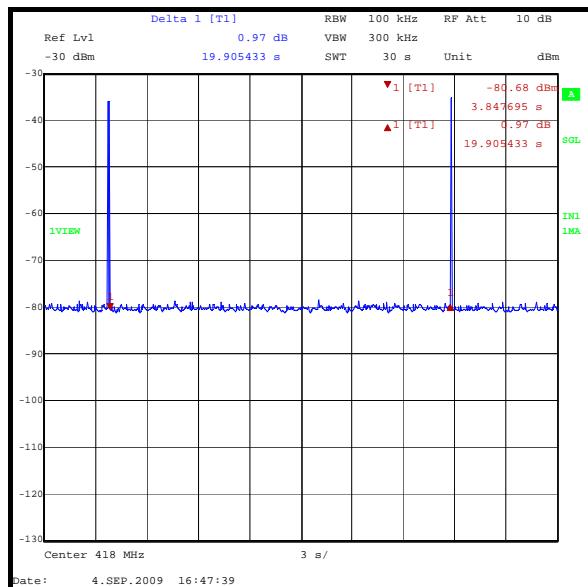
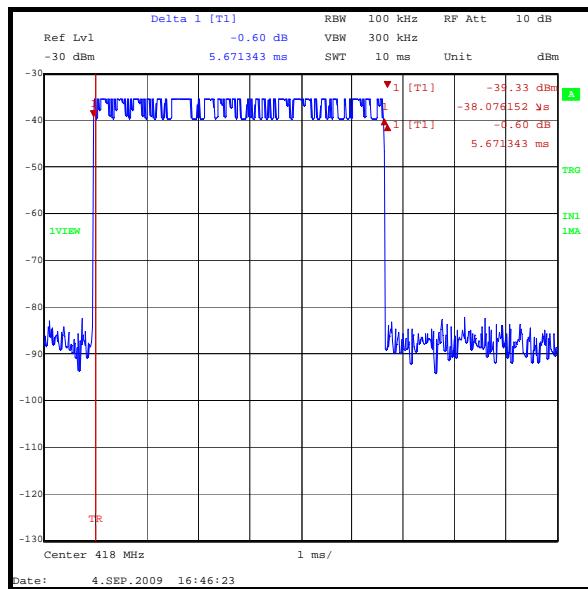
Results:

Pulse Duration (mS)	Duty Cycle (dB)
5.67	24.9

Silent Period (seconds)
19.905

Note(s):

1. In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter.



5.2.8. Transmitter Radiated Emissions

Test Summary:

FCC Part:	15.231(e) & 15.209
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range	30 MHz to 1 GHz

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	26

Results: Average Level

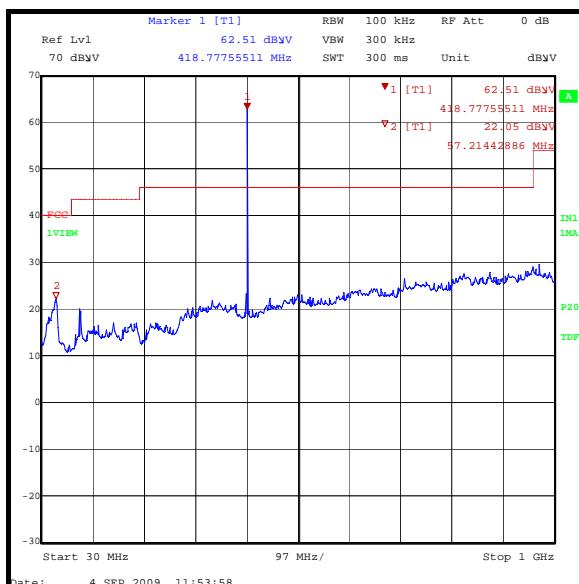
Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
57.214	Vertical	-2.1	52.3	54.4	Complied

Results: Peak Level

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
57.214	Vertical	22.8	72.3	49.5	Complied

Note(s):

1. The fundamental is shown on the plot.
2. FCC Part 15.209 general limits are shown on the pre-scan plot.
3. The average level was obtained by subtracting the duty cycle correction (24.9 dB) from the peak level measured with the EUT constantly transmitting.



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

5.2.9. Transmitter Radiated Emissions

Test Summary:

FCC Part:	15.231(e) & 15.209
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range	1 GHz to 4.5 GHz

Environmental Conditions:

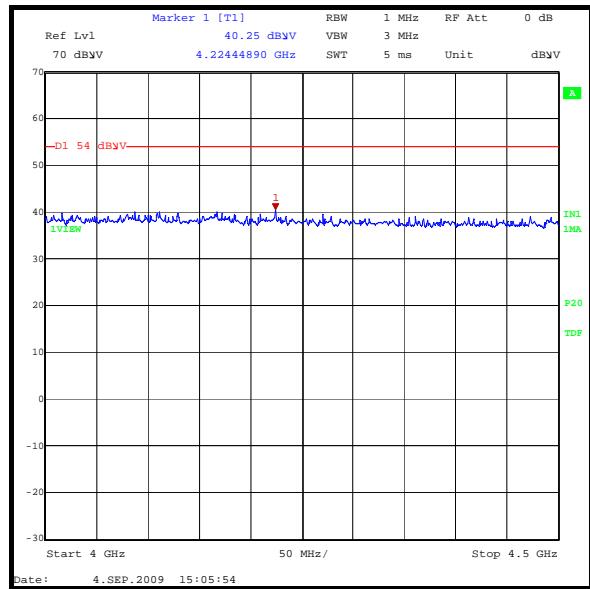
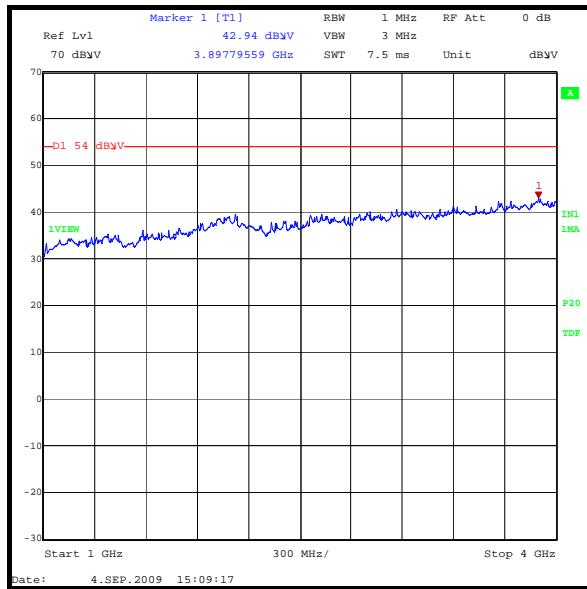
Temperature (°C):	24
Relative Humidity (%):	24

Results:

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
3.898	Horizontal	37.3	5.6	42.9	52.3	9.4	Complied

Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
2. FCC Part 15.209 general limits are shown on the pre-scan plots.



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	± 3.72 dB
Fundamental Field Strength	Not Applicable	95%	± 2.94 dB
20 dB Bandwidth	Not Applicable	95%	± 0.92 ppm
Transmitter Timeout / Duty Cycle	Not Applicable	95%	± 0.29 ms
Radiated Spurious Emissions	30 MHz to 40 GHz	95%	± 2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	25 Oct 2008	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	05 Jan 2009	12
A288	Antenna	Chase	CBL6111A	1589	13 Mar 2009	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Mar 2009	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2009	12
M1124	Test Receiver	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	22 Apr 2009	12

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.