

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: MTD

To: FCC Part 15.231: 2008

**Test Report Serial No:**  
RFI/RPT1/RP74737JD15A

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



<b>Checked By:</b>	Nigel Davison
<b>Signature:</b>	
<b>Date of Issue:</b>	06 April 2009

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## **1. Customer Information**

<b>Company Name:</b>	Pro Tech Monitoring inc
<b>Address:</b>	2549 Success Dr Odessa, FL 33556

## 2. Summary of Testing

### 2.1. General Information

<b>Specification Reference:</b>	47CFR15.231
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart C (Radio Frequency Devices) - Section 15.231
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	12 March 2009 to 23 March 2009

### 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Port Type	Result
FCC Part 15.107	Receiver AC Conducted Emissions	AC Mains	✓
FCC Part 15.109	Receiver Radiated Spurious Emissions	Antenna	✓
FCC Part 15.207	Transmitter AC Conducted Emissions	AC Mains	✓
FCC Part 15.231(b)	Transmitter Fundamental Fieldstrength	Antenna	✓
FCC Part 15. 231(c)	Transmitter 20 dB Bandwidth	Antenna	✓
FCC Part 15.231(a)	Transmitter Timeout	Antenna	✓
FCC Part 15.35(c)	Transmitter Duty Cycle	Antenna	Not Applicable
FCC Part 15.231(b) & 15.209	Transmitter Radiated Emissions	Antenna	✓

#### **Key to Results**

✓ = Complied      ✘ = Did not comply

### 2.3. Methods and Procedures

<b>Reference:</b>	ANSI C63.4 (2003)
<b>Title:</b>	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)**

<b>Description:</b>	Tracking Device
<b>Brand Name:</b>	MTD
<b>Model Name or Number:</b>	Not stated
<b>Serial Number:</b>	33592707
<b>FCC ID Number:</b>	NC3MTD3433

<b>Description:</b>	Cradle with two RJ11 interface
<b>Brand Name:</b>	Pro Tech
<b>Model Name or Number:</b>	MCS 1000
<b>Serial Number:</b>	50337535
<b>Cable Length and Type:</b>	1.8m / Multicore
<b>Connected to Port:</b>	Interface port

<b>Description:</b>	AC Power Adaptor for battery charging through cradle
<b>Brand Name:</b>	CUI INC
<b>Model Name or Number:</b>	DSA-0151A-05
<b>Serial Number:</b>	None Stated
<b>Cable Length and Type:</b>	1.8m / Multicore
<b>Connected to Port:</b>	Power

#### **3.2. Description of EUT**

The equipment under test was a belt worn GSM/GPRS and ISM band version tracking device.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

### **3.4. Additional Information Related to Testing**

<b>Tested Technology:</b>	Short Range Device (SRD)	
<b>Power Supply Requirement:</b>	Nominal	3.7 V via Li-ion battery
<b>Type of Unit:</b>	Transceiver	
<b>Transmit Frequency:</b>	433.92 MHz	
<b>Receive Frequency:</b>	433.92 MHz	

### **3.5. Support Equipment**

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

<b>Description:</b>	Infra Red Wireless Interface
<b>Brand Name:</b>	ACTiSYS
<b>Model Name or Number:</b>	ACT-IR220LN57
<b>Serial Number:</b>	LN001248
<b>Cable Length and Type:</b>	1.2m / Multicore
<b>Connected to Port:</b>	Wireless (Infra Red)

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

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

- Continuous transmit or transmitting at  $6 \pm 2$  ms transmission burst 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 standalone. A test mode was enabled on the EUT to allow continuous transmission via MTD Term software
- For receiver tests, the EUT was tested with the EUT being charged whilst sat in the cradle. A test mode was enabled on the EUT via MTD Term software to allow the EUT in continuous receive mode
- AC mains conducted emissions were performed with the EUT being charged whilst sat in the cradle

## **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

### 5.3. Receiver 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:

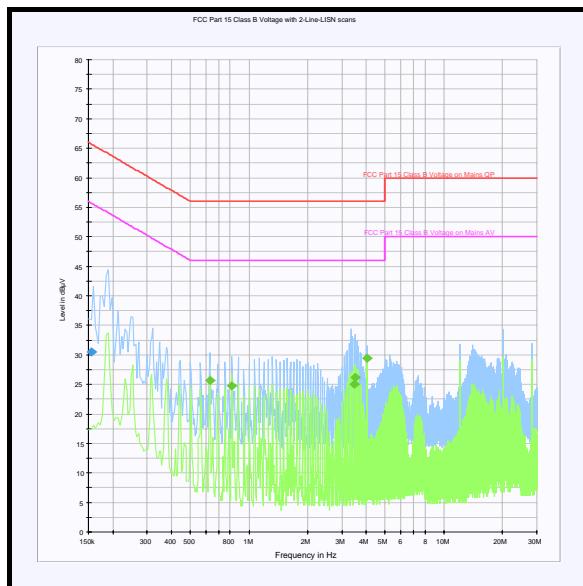
Temperature(°C):	17
Relative Humidity(%):	47

#### Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.154500	Neutral	30.4	65.8	35.4	Complied

#### Results: Average Detector Measurements

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.627000	Neutral	25.6	46.0	20.4	Complied
0.816000	Neutral	24.7	46.0	21.3	Complied
3.448500	Neutral	25.0	46.0	21.0	Complied
3.511500	Live 1	26.2	46.0	19.8	Complied
4.033500	Neutral	29.4	46.0	16.6	Complied



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

## 5.4. Receiver Radiated Spurious Emissions

### Test Summary:

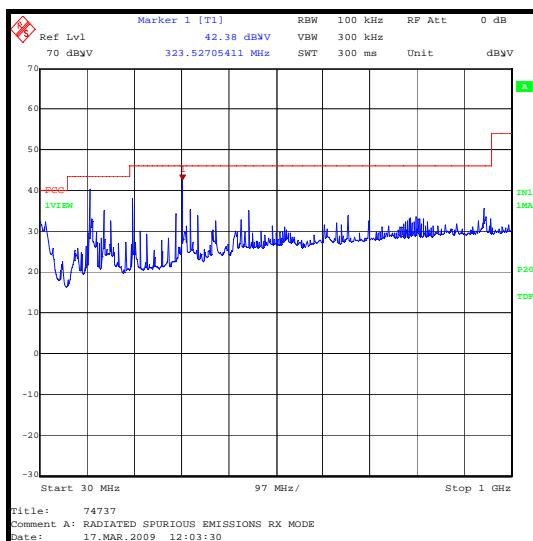
FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 to 1000 MHz

### Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	26

### Results:

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
133.056	Vertical	39.4	43.5	4.1	Complied
162.194	Vertical	35.4	43.5	8.1	Complied
221.165	Vertical	38.4	46.0	7.6	Complied
309.643	Vertical	33.3	46.0	12.7	Complied
324.392	Vertical	42.7	46.0	3.3	Complied
353.899	Vertical	34.7	46.0	11.3	Complied
451.575	Vertical	33.1	46.0	12.9	Complied
802.350	Vertical	36.6	46.0	9.4	Complied



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

**Receiver Radiated Spurious Emissions (continued)****Test Summary:**

<b>FCC Part:</b>	15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range:</b>	1 to 2 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	26

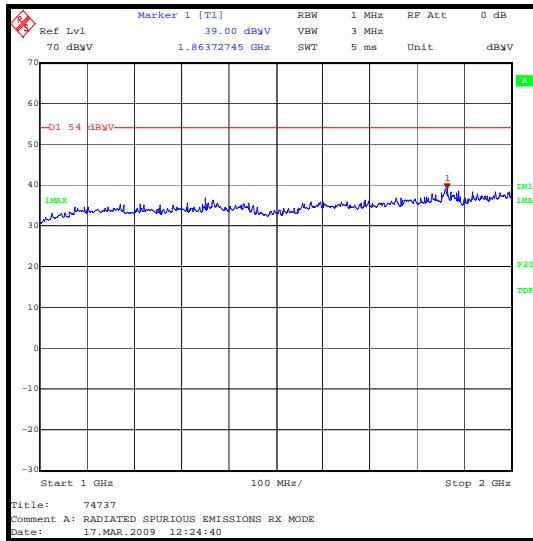
**Results: Highest Peak Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.864	Vertical	40.4	-1.4	39.0	54.0	15.0	Complied

**Note(s):**

1. \*Note: 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: 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-scans and for indication purposes only. For final measurements, see accompanying table.

## 5.5. 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:

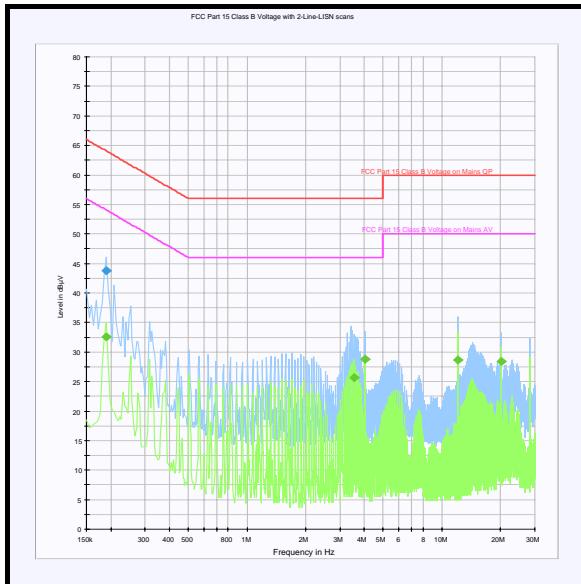
Temperature Range (°C):	17
Relative Humidity Range (%):	47

### Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.190500	Neutral	43.8	64.0	20.2	Complied

### Results: Average Detector Measurements

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.190500	Neutral	32.6	54.0	21.4	Complied
3.525000	Live 1	25.7	46.0	20.3	Complied
4.033500	Neutral	28.8	46.0	17.2	Complied
12.097500	Live 1	28.6	50.0	21.4	Complied
20.161500	Live 1	28.4	50.0	21.6	Complied



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

## 5.6. Transmitter Fundamental Fieldstrength

### Test Summary:

FCC Part:	15.231(b)
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes

### Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	27

### Results:

Channel	Peak Fieldstrength (dB $\mu$ V/m)	Average Fieldstrength (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
Single Channel	98.2	76.3	80.8	4.5	Complied

### Note(s):

1. The peak level was measured with the EUT in continuous transmit mode as it was impractical to measure the emission with EUT transmit a 6±2 ms burst every 20 seconds.  
The average level was determined by subtracting the duty cycle correction factor from the measured peak level. The duty cycle correction factor was calculated using formula 20 log (On Time/100ms) as per FCC Part 15.35(c), with the EUT transmits a 6±2 ms burst every 20 seconds.

## 5.7. Transmitter 20 dB Bandwidth

### Test Summary:

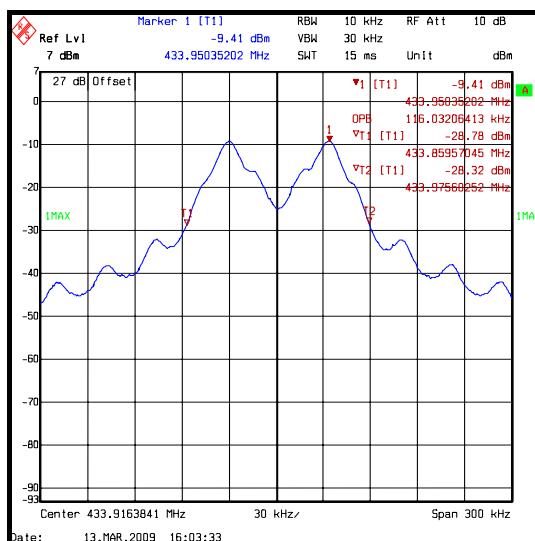
FCC Part:	15.231(c)
Test Method Used:	The 20dBc (99%) occupied bandwidth was measured using the Occupied Bandwidth Function of the spectrum analyser.

### Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	24

### Results:

Transmitter 20 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
0.1160	1.0848*	0.9688	Complied



## 5.8. Transmitter Timeout

### Test Summary:

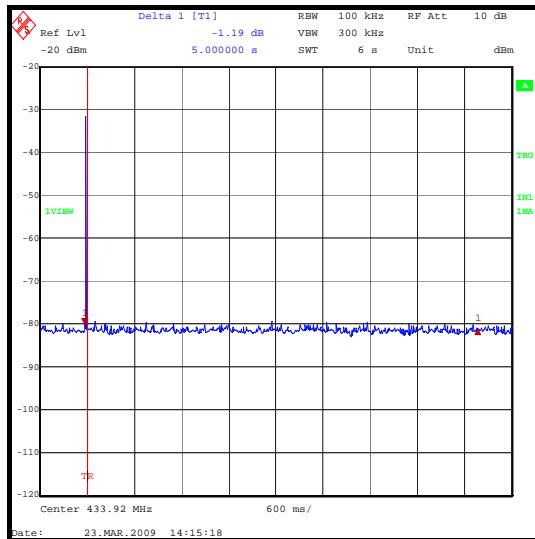
FCC Part:	15.231(a)
Test Method Used:	The EUT transmitter was activated and monitored via a spectrum analyser for a period not exceeding 6 seconds. It was observed that the EUT ceased transmission within the 5 second limit.

### Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	24

### Results:

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



## 5.9. 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 20Log(On Time / Period)

### Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	24

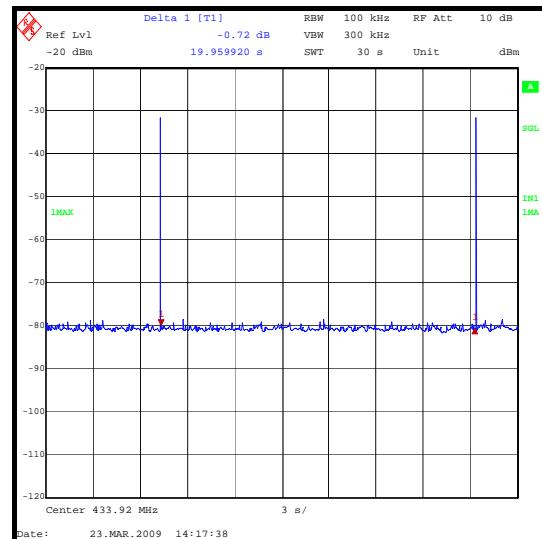
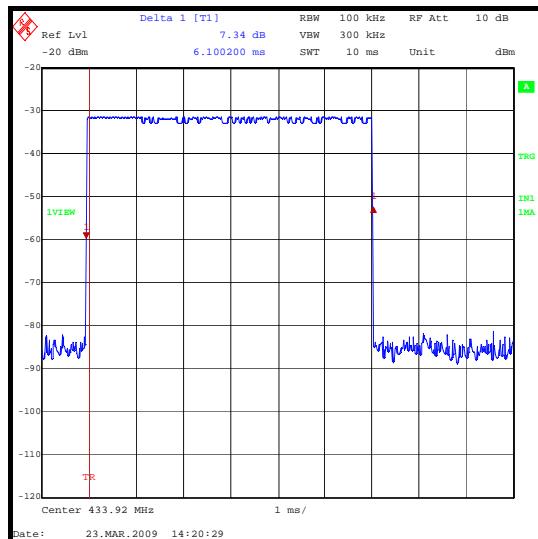
### Results:

Pulse Duration (mS)		Duty Cycle (dB)
Lowest	(6 – 2)	27.9
Actual Measured	(6.1)	24.3
Highest	(6 + 2)	21.9

Silent Period (seconds)
19.960

### 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. However, the manufacturer declared a transmitter duration time of (6±2ms) therefore the worse case duty cycle of 6mS +2 was used throughout this report as it represented the worst case duration time.



## 5.10. Transmitter Radiated Emissions

### Test Summary:

FCC Part:	15.231(b) & 15.209
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range	30 to 1000

### Environmental Conditions:

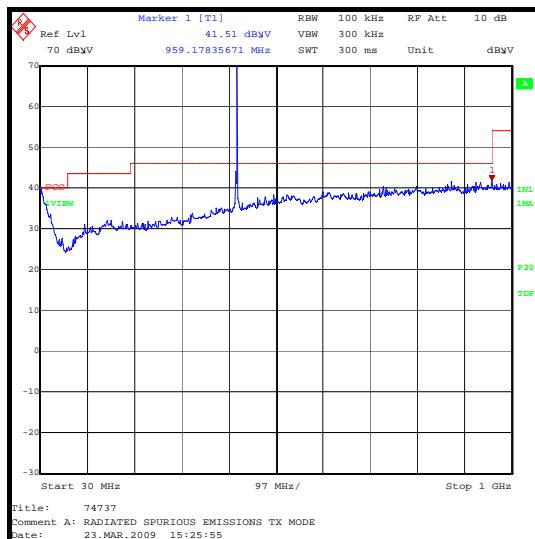
Temperature (°C):	23
Relative Humidity (%):	26

### Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
959.178	Horizontal	41.5	19.6	60.8	41.2	Complied

### Note(s):

1. The peak level was measured with the EUT in continuous transmit mode as it was impractical to measure the emission with EUT transmit a  $6\pm2$  ms burst every 20 seconds. The average level was determined by subtracting the duty cycle correction factor from the measured peak level. The duty cycle correction factor was calculated using formula  $20 \log (\text{On Time}/100\text{ms})$  as per FCC Part 15.35(c), with the EUT transmits a  $6\pm2$  ms burst every 20 s.
2. \*Note: 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: 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 tables.

## 5.11. Transmitter Radiated Emissions

### Test Summary:

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

### Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	27

### Results: Highest Peak Level:

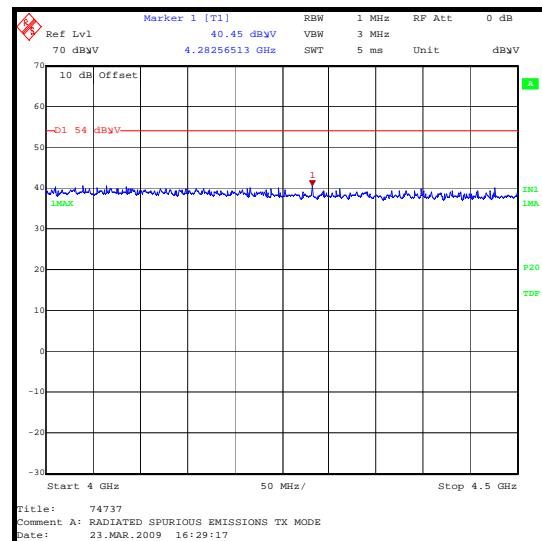
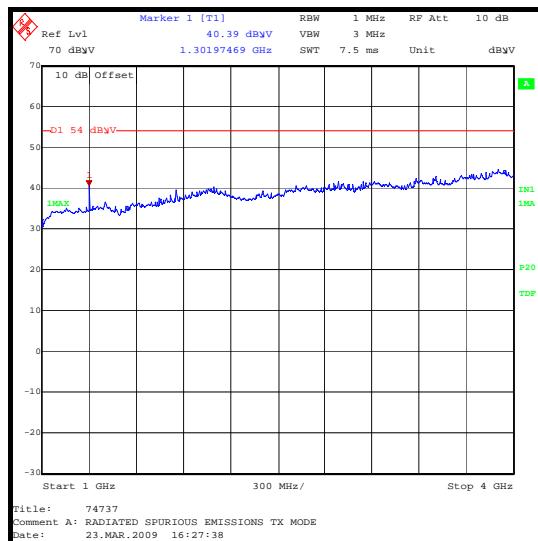
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.302	Horizontal	52.1	-4.5	47.6	74.0	26.4	Complied

### Results: Highest Average Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.302	Horizontal	30.2	-4.5	25.7	54.0	28.3	Complied

### Note(s):

1. The peak level was measured with the EUT in continuous transmit mode as it was impractical to measure the emission with EUT transmit a  $6\pm2$  ms burst every 20 seconds. The average level was determined by subtracting the duty cycle correction factor from the measured peak level. The duty cycle correction factor was calculated using formula  $20 \log (On\ Time/100ms)$  as per FCC Part 15.35(c), with the EUT transmits a  $6\pm2$  ms burst every 20 seconds.



Note: These plots are pre-scans 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%	±3.25 dB
Occupied Bandwidth	N/A	95%	±0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±1.78 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)
A004	Line Impedance Stabilization Network	Rohde & Schwarz	ESH3-Z5	890604/027	19 May 2008	12
A1299	Antenna	Schaffner	CBL6143	5094	28 Jul 2008	12
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
E013	Environmental Chamber	Sanyo	ATMOS chamber	None	Calibrated before use	-
K0002	Site Reference 4421	Rainford EMC	N/A	N/A	Calibration not required	-
K0004	Site Reference 4428	RFI Global Services Ltd	N/A	N/A	Calibration not required	-
K0008	Site Reference 4422	RFI Global Services Ltd	N/A	N/A	Calibration not required	-
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	21 Aug 2008	12
M1379	Test Receiver	Rohde and Schwarz	ESIB7	100330	14 Aug 2008	12

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