



TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Smart One 0.6418

FCC ID: NC3XT06418

To: FCC Part 15.231: 2010 Subpart C

Test Report Serial No:
RFI-RPT-RP80091JD05A

**This Test Report Is Issued Under The Authority
Of Chris Guy, Head of Global Approvals::**

A handwritten signature of Chris Guy.

Checked By:	A. Henriques
Signature:	A handwritten signature of A. Henriques.
Date of Issue:	17 December 2010

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1.Customer Information

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

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.231
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 15 Subpart C (Radio Frequency Devices) - Section 15.231
Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	07 December 2010 to 09 December 2010

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.107(a)	Receiver/Idle Mode AC Conducted Emissions	✓
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	✓
Part 15.207	Transmitter AC Conducted Emissions	✓
Part 15.231(e)	Transmitter Fundamental Field Strength	✓
Part 15.231(c)	Transmitter 20 dB Bandwidth	✓
Part 15.231(a)	Transmitter Timeout	✓
Part 15.35(c)	Transmitter Duty Cycle	Note 1
Part 15.231(e) & 15.209	Transmitter Radiated Emissions	✓

Key to Results

✓ = Complied ✘ = Did not comply

Note 1: The measurement was performed to assist in the calculation of the level of average and emissions as the EUT employs pulsed operation.

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Reference:	ANSI C63.10 (2009)
Title:	American National Standard for Testing Unlicensed Wireless Devices

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:	Smart One
Model Name or Number:	0.6418
Serial Number:	35002718
Hardware Version Number:	0.6
Software Version Number:	5.0.2.4
FCC ID::	NC3XT06418

Description:	AC Charger
Brand Name:	MFL
Model Name or Number:	MLF-012W1201000
Serial Number:	Z104-10220007

3.2. Description of EUT

The equipment under test was a GPS tracking equipment for Department of Corrections.

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	3.6 V Li-ion battery
Type of Unit:	Transceiver	
Transmit Frequency Range:	418 MHz	
Receive Frequency Range:	418 MHz	

3.5. Support Equipment

No support equipment was used to exercise the EUT during testing:

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 6.2 mS (approx) transmission bursts every 15 seconds 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 the AC charger connected. The EUT was controlled by pressing a sequence of buttons on the front panel display which placed the EUT into test mode allowing continuous transmit or transmission in bursts at maximum power.
- For receiver tests, the EUT was tested with the EUT being charged from the AC charger.
- AC mains conducted emissions were performed with the EUT being charged from the AC charger connected to a 120 V 60 Hz supply via a LISN.
- Duty Cycle and Timeout tests were performed with EUT in transmit burst mode.

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:

Test Engineer:	Andrew Edwards	Test Date:	09 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.107
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

Environmental Conditions:

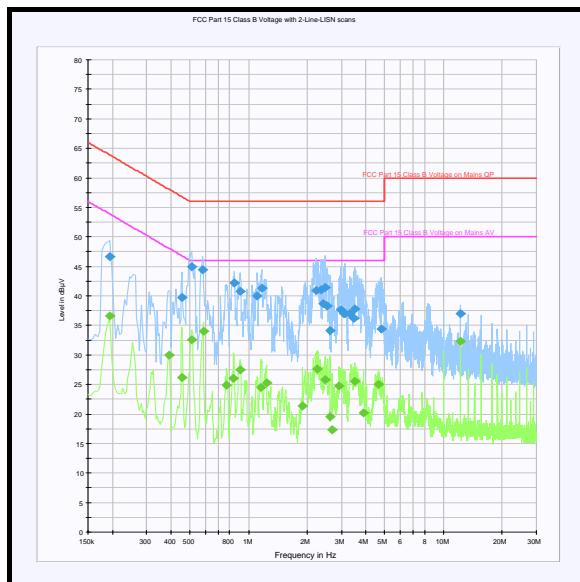
Temperature (°C):	22
Relative Humidity (%):	20

Results: Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.195000	Live	46.7	63.8	17.1	Complied
0.456000	Live	39.8	56.8	17.0	Complied
0.510000	Neutral	45.0	56.0	11.0	Complied
0.582000	Neutral	44.4	56.0	11.6	Complied
0.847500	Neutral	42.2	56.0	13.8	Complied
0.901500	Neutral	40.8	56.0	15.2	Complied
1.108500	Neutral	39.9	56.0	16.1	Complied
1.171500	Neutral	41.3	56.0	14.7	Complied
2.211000	Neutral	40.9	56.0	15.1	Complied
2.350500	Neutral	41.1	56.0	14.9	Complied
2.409000	Neutral	38.7	56.0	17.3	Complied
2.476500	Neutral	41.5	56.0	14.5	Complied
2.535000	Neutral	38.3	56.0	17.7	Complied
2.607000	Neutral	34.1	56.0	21.9	Complied
2.967000	Neutral	37.6	56.0	18.4	Complied
3.066000	Neutral	37.0	56.0	19.0	Complied
3.124500	Neutral	37.0	56.0	19.0	Complied
3.309000	Neutral	37.1	56.0	18.9	Complied
3.448500	Neutral	36.2	56.0	19.8	Complied
3.516000	Neutral	37.8	56.0	18.2	Complied
4.816500	Neutral	34.4	56.0	21.6	Complied
12.241500	Neutral	37.0	60.0	23.0	Complied

Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**Results: Average**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.195000	Neutral	36.6	53.8	17.2	Complied
0.388500	Neutral	30.0	48.1	18.1	Complied
0.456000	Live	26.2	46.8	20.6	Complied
0.510000	Neutral	32.6	46.0	13.4	Complied
0.586500	Neutral	34.0	46.0	12.0	Complied
0.771000	Neutral	24.9	46.0	21.1	Complied
0.838500	Neutral	26.1	46.0	19.9	Complied
0.901500	Neutral	27.4	46.0	18.6	Complied
1.153500	Neutral	24.5	46.0	21.5	Complied
1.234500	Neutral	25.2	46.0	20.8	Complied
1.887000	Neutral	21.3	46.0	24.7	Complied
2.260500	Neutral	27.6	46.0	18.4	Complied
2.467500	Neutral	25.8	46.0	20.2	Complied
2.607000	Live	19.5	46.0	26.5	Complied
2.674500	Live	17.3	46.0	28.7	Complied
2.917500	Neutral	24.7	46.0	21.3	Complied
3.516000	Neutral	25.6	46.0	20.4	Complied
3.907500	Live	20.2	46.0	25.8	Complied
4.609500	Neutral	25.0	46.0	21.0	Complied
12.241500	Neutral	32.3	50.0	17.7	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 tables.

5.2.2. Receiver/Idle Mode Radiated Spurious Emissions**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	07 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

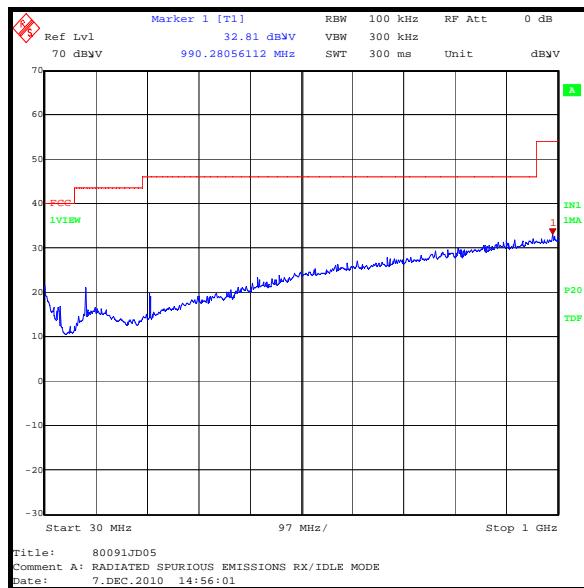
Temperature (°C):	24
Relative Humidity (%):	20

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
990.281	Vertical	32.8	54.0	21.2	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. 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.
3. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.

Receiver/Idle Mode Radiated Spurious Emissions (continued)

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

Test Engineer:	Andrew Edwards	Test Date:	07 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
Frequency Range:	1 GHz to 2.1 GHz

Environmental Conditions:

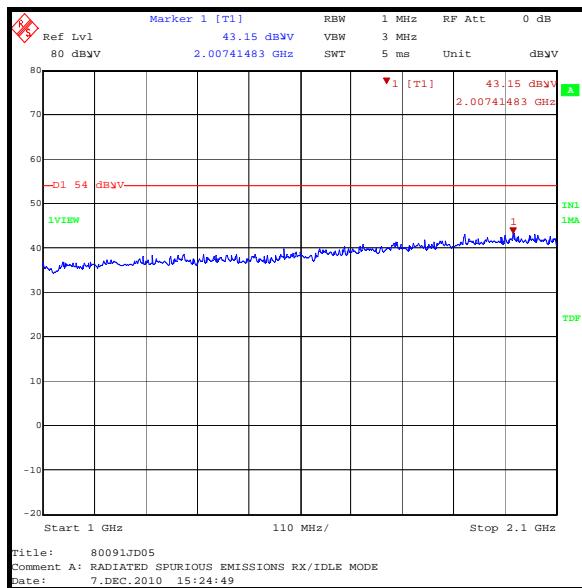
Temperature (°C):	25
Relative Humidity (%):	20

Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
2007.414	Vertical	43.2	54.0	10.8	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. 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.

Receiver/Idle Mode Radiated Spurious Emissions (continued)

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

Test Engineer:	Andrew Edwards	Test Date:	09 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.207
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

Environmental Conditions:

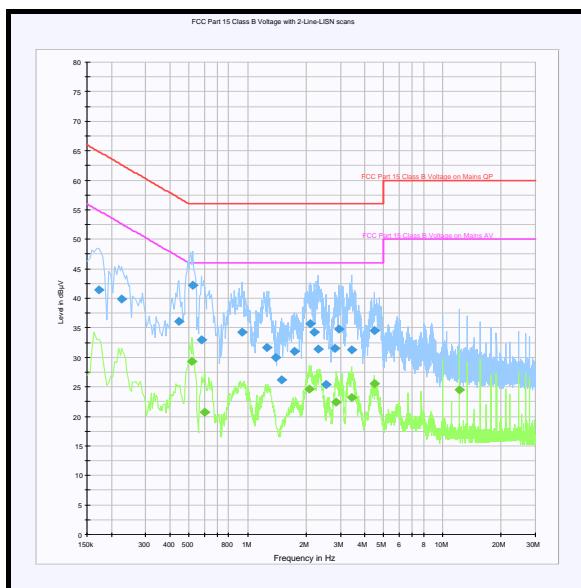
Temperature (°C):	22
Relative Humidity (%):	20

Results: Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.172500	Live	41.5	64.8	23.3	Complied
0.226500	Live	39.9	62.6	22.7	Complied
0.442500	Neutral	36.1	57.0	20.9	Complied
0.523500	Neutral	42.2	56.0	13.8	Complied
0.577500	Neutral	33.0	56.0	23.0	Complied
0.933000	Neutral	34.3	56.0	21.7	Complied
1.248000	Neutral	31.7	56.0	24.3	Complied
1.387500	Neutral	30.0	56.0	26.0	Complied
1.491000	Neutral	26.2	56.0	29.8	Complied
1.734000	Neutral	31.0	56.0	25.0	Complied
2.085000	Neutral	35.7	56.0	20.3	Complied
2.197500	Neutral	34.2	56.0	21.8	Complied
2.292000	Neutral	31.4	56.0	24.6	Complied
2.512500	Neutral	25.5	56.0	30.5	Complied
2.805000	Neutral	31.6	56.0	24.4	Complied
2.940000	Neutral	34.8	56.0	21.2	Complied
3.435000	Neutral	31.3	56.0	24.7	Complied
4.452000	Neutral	34.5	56.0	21.5	Complied

Transmitter AC Conducted Spurious Emissions (continued)**Results: Average**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.519000	Live	29.3	46.0	16.7	Complied
0.604500	Neutral	20.8	46.0	25.2	Complied
2.071500	Neutral	24.6	46.0	21.4	Complied
2.854500	Neutral	22.5	46.0	23.5	Complied
3.403500	Neutral	23.2	46.0	22.8	Complied
4.452000	Neutral	25.5	46.0	20.5	Complied
12.241500	Neutral	24.5	50.0	25.5	Complied



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

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

Test Engineer:	Nick Steele	Test Date:	07 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.231(e)
Test Method Used:	As detailed in ANSI C63.10 Section 6.5

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	21

Results: Peak Level

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
418	69.9	92.3	22.4	Complied

Results: Average Level

Frequency (MHz)	Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
418	45.8	72.3	26.5	Complied

Note(s):

1. The average level was determined as per the method detailed in ANSI C63.10 Section 7.6 by subtracting the duty cycle correction factor (based on the measured transmission interval of 6.232 ms) from the measured peak level. The duty cycle correction factor of 24.1 dB was calculated using formula $20 \log \left(\frac{\text{On Time}}{100\text{ms}} \right)$ as stated in FCC Part 15.35(c).

5.2.5. Transmitter 20 dB Bandwidth**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	08 December 2010
Test Sample Serial No:	35002718		

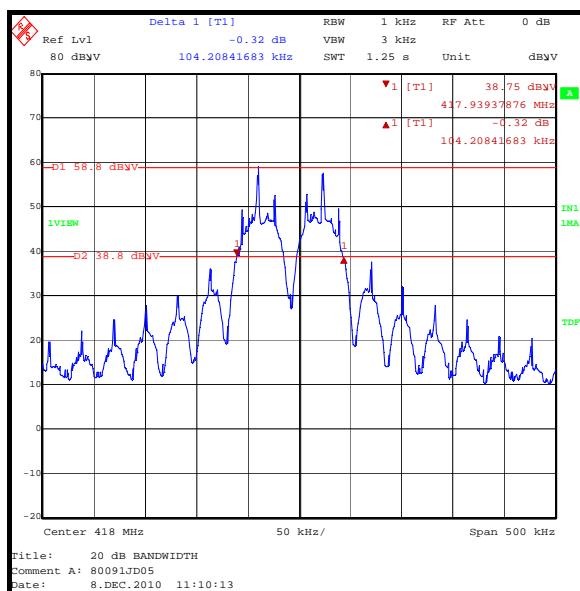
FCC Part:	15.231(c)
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	21

Results:

Frequency (MHz)	20 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
418	0.104	1.045	0.941	Complied



5.2.6. Transmitter Timeout**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	08 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.231(a)
Test Method Used:	As detailed in ANSI C63.10 Section 7.4

Environmental Conditions:

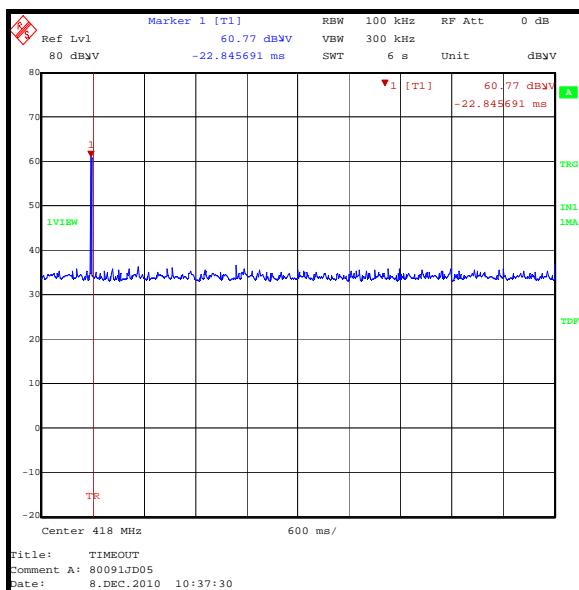
Temperature (°C):	23
Relative Humidity (%):	21

Results:

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

Note(s):

1. 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.



5.2.7. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Andrew Edwards	Test Date:	07 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.35(c)
Test Method Used:	As detailed in ANSI C63.10 Section 7.5

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	20

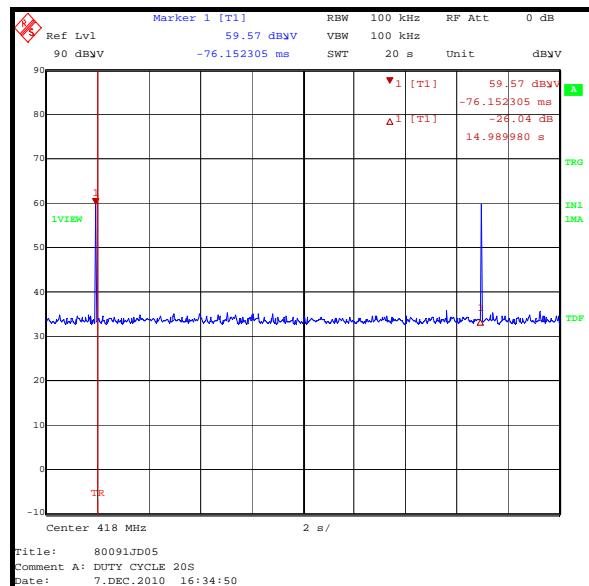
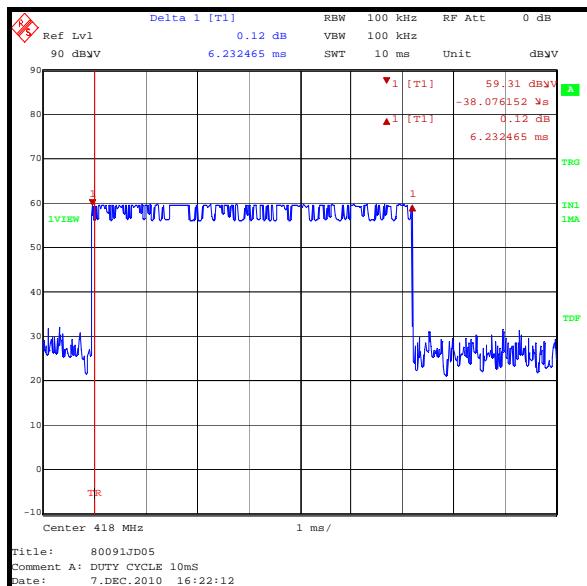
Results:

Pulse Duration (mS)	Duty Cycle (dB)
6.232	24.1

Silent Period (seconds)
14.990

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. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by $20 \log(\text{On Time} / [\text{Period or 100mS whichever is the lesser}])$
2. Duty cycle = $20 \log (6.232 \text{ ms}/100\text{ms}) = -24.1$



5.2.8.Transmitter Radiated Emissions**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	07 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.231(e) & 15.209
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range	30 MHz to 1 GHz

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	20

Results: Peak

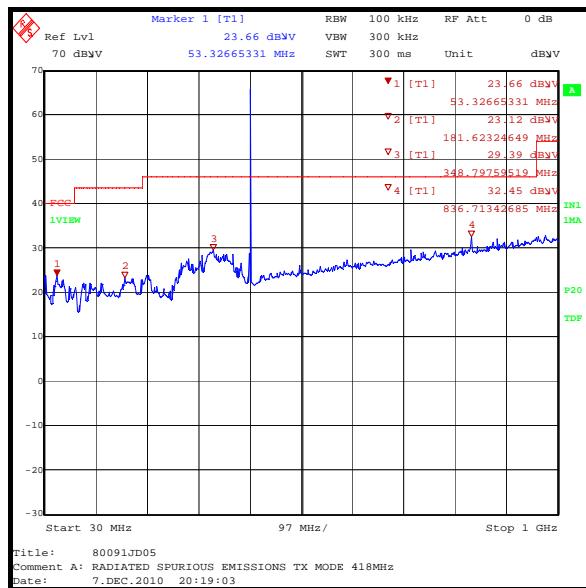
Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
Note 3					

Results: Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
Note 3					

Note(s):

1. The emission at 418 MHz shown on the plot is the EUT fundamental.
2. Part 15.209 general limits are shown on the pre-scan plot.
3. All emissions were found to be greater than 20 dB below the calculated peak and average limits i.e. 72.3 dB μ V/m and 52.3 dB μ V/m respectively.

Transmitter Radiated Emissions (continued)

5.2.9. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Nick Steele	Test Date:	07 December 2010
Test Sample Serial No:	35002718		

FCC Part:	15.231(e) & 15.209
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range	1 GHz to 4.2 GHz

Environmental Conditions:

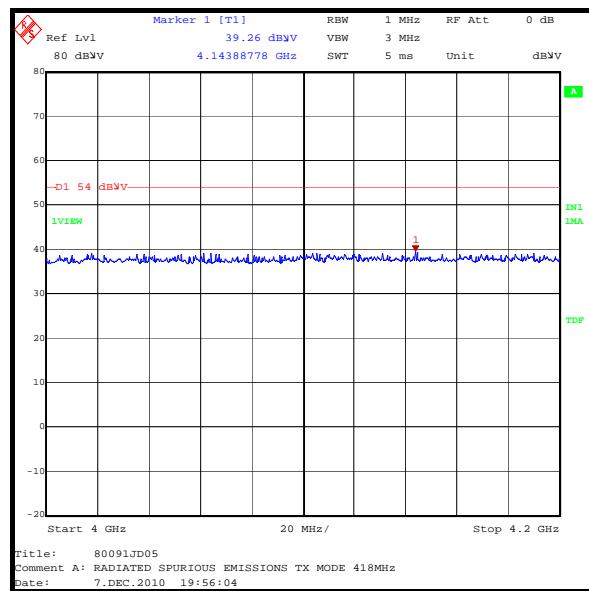
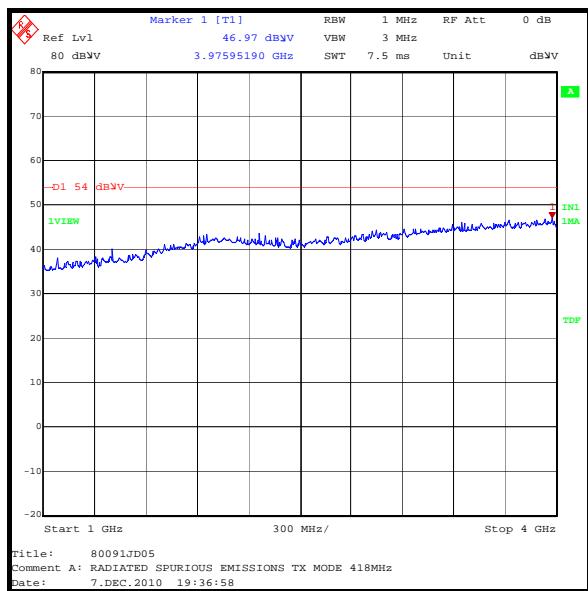
Temperature (°C):	24
Relative Humidity (%):	20

Results: Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
Note 2					

Note(s):

1. Part 15.209 general limits are shown on the pre-scan plots.
2. No spurious emissions were detected above the noise floor of the measuring receiver.



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
Fundamental Field Strength	30 MHz to 1 GHz	95%	±2.94 dB
20 dB Bandwidth	30 MHz to 1 GHz	95%	±0.92 ppm
Transmitter Timeout / Duty Cycle	30 MHz to 1 GHz	95%	± 0.29 ms
Radiated Spurious Emissions	30 MHz to 4.2 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 Calibration Due	Cal. Interval (Months)
A1069	LISN	Rohde & Schwarz	ESH3-Z5	837469/012	13 Apr 2011	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	06 Jun 2011	12
A1818	Antenna	EMCO	3115	00075692	05 Sep 2011	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	01 Mar 2011	12
A253	Antenna	Flann Microwave	12240-20	128	05 Sep 2011	12
A288	Antenna	Chase	CBL6111A	1589	05 Sep 2011	12
M1124	Test Receiver	Rohde & Schwarz	ESI26	100046K	22 Apr 2011	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	26 Aug 2011	12

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