
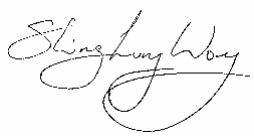



## TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Satellite Tracking Of People LLC  
BluBox

To: FCC Part 15.249

**Test Report Serial No:**  
RFI/MPTE1/RP48270JD05A

<b>This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager:</b> 	
<b>Tested By: Steven Wong</b> 	<b>Checked By: Tony Henriques</b> 
<b>Report Copy No: PDF</b>	
<b>Issue Date: 10 August 2006</b>	<b>Test Dates: 04 May 2006 to 20 June 2006</b>

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This report may be copied in full. The results in this report apply only to the sample(s) tested.

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Registered in England and Wales. Company number: 2117901

**Test of:      Satellite Tracking Of People LLC**  
**BluBox**  
**To:            FCC Part 15.249**

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Test of:       Satellite Tracking Of People LLC  
                  BluBox  
To:             FCC Part 15.249

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**Table of Contents**

1. Client Information .....4

2. Equipment Under Test (EUT) .....5

3. Test Specification, Methods and Procedures .....7

4. Deviations from the Test Specification .....8

5. Operation of the EUT During Testing.....9

6. Summary of Test Results .....10

7. Measurements, Examinations and Derived Results .....11

8. Measurement Uncertainty .....19

9. Measurement Methods .....20

Appendix 1. Test Equipment Used .....23

Appendix 2. Test Configuration Drawings.....24

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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## **1. Client Information**

<b>Company Name:</b>	Satellite Tracking Of People LLC
<b>Address:</b>	4801 Woodway Drive Suite 110W Houston Texas 77056-1828 USA
<b>Contact Name:</b>	Mr S Freathy

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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## **2. Equipment Under Test (EUT)**

The following information (with the exception of the Date of Receipt) has been supplied by the client:

### **2.1. Identification of Equipment Under Test (EUT)**

Brand Name:	STOP
Model Name or Number:	BluBox
Serial Number:	001
FCC ID:	S5EAA0548
Country of Manufacture:	UK
Date of Receipt:	12 May 2006

Description:	AC Adaptor
Brand Name:	mpw
Model Name or Number:	SA071113
Serial Number:	None stated
Country of Manufacture:	China
Date of Receipt:	12 May 2006

### **2.2. Description of EUT**

The equipment under test is a monitoring transceiver designed to operate in a system with a BluTag4 personal tracking device.

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

During the course of testing the EUT was not modified.

**Test of:** Satellite Tracking Of People LLC  
BluBox  
**To:** FCC Part 15.249

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

<b>Power Supply Requirement:</b>	Nominal 110 V 60 Hz AC Mains supply (& internal back-up battery supply)		
<b>Equipment Category:</b>	Base Station (Fixed Use)		
<b>Type of Unit:</b>	Transceiver		
<b>Transmit Frequency Range:</b>	915 MHz, single frequency operation		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Single	Not Applicable	915
<b>Receive Frequency Range:</b>	915 MHz, single frequency operation		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Single	Not Applicable	915
<b>Highest Unintentionally Generated Frequency:</b>	915 MHz		
<b>Highest Fundamental Frequency:</b>	915 MHz		
<b>Occupied Bandwidth:</b>	321.6 KHz		

#### **2.5. Port Identification**

<b>Port</b>	<b>Description</b>	<b>Type/Length</b>	<b>Applicable</b>
1	AC Adaptor Input Port	-	Y

#### **2.6. Support Equipment**

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

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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### **3. Test Specification, Methods and Procedures**

#### **3.1. Test Specifications**

<b>Reference:</b>	FCC Part 15 Subpart C: 2005 (Sections 15.249).
<b>Title:</b>	Code of Federal Regulations, Part 15 (47CFR215) Radio Frequency Devices.
<b>Comments:</b>	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.

#### **3.2. Methods and Procedures**

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003

Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1996)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

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.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)

Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

#### **3.3. Definition of Measurement Equipment**

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

Test of:      **Satellite Tracking Of People LLC**  
              **BluBox**  
To:           **FCC Part 15.249**

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#### **4. Deviations from the Test Specification**

There were no deviations from the test specification.



Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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## **5. Operation of the EUT During Testing**

### **5.1. Operating Modes**

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

The EUT was set to transmit continuously on 915 MHz with modulation.

### **5.2. Configuration and Peripherals**

The EUT was tested in the following configuration:

Standalone powered by an external 110 V AC mains supply via the AC adaptor.

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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## **6. Summary of Test Results**

Range of Measurements	Specification Reference	Port Type	Compliance Status
Transmitter Fundamental Fieldstrength	C.F.R. 47 FCC Part 15: 2005 Section 15.249(a)	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 2: 2005 Section 2.1049	Antenna	Complied
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2005 Section 15.249(a)(d)(e) & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2005 Section 15.249(d) & 15.209	Antenna	Complied

### **6.1. Location of Tests**

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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## **7. Measurements, Examinations and Derived Results**

### **7.1. General Comments**

7.1.1. This section contains test results only.

7.1.2. 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 8 for details of measurement uncertainties.

7.1.3. No testing of Receiver AC conducted emissions or radiated spurious emissions was performed as the EUT continuously transmits and is never in a 'Receive' only condition.

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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**7.2. Transmitter Fundamental Fieldstrength Section 15.249(a)**

7.2.1. The EUT was configured for radiated emissions testing as described in Section 8 of this report.

7.2.2. Tests were performed to identify the maximum fieldstrength of the fundamental frequency.

**Results:****Powered by Primary External AC Supply (via AC adaptor)**

Frequency (MHz)	Antenna Polarity	Input Voltage (AC)	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
914.985	Vertical	110.0	90.3	94.0	3.7	Complied
914.985	Vertical	93.5	90.3	94.0	3.7	Complied
914.985	Vertical	126.5	90.3	94.0	3.7	Complied

**Powered by Internal Back-up Battery Supply**

Frequency (MHz)	Antenna Polarity	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
914.985	Vertical	89.6	94.0	4.4	Complied

Test of:       Satellite Tracking Of People LLC  
              BluBox  
To:            FCC Part 15.249

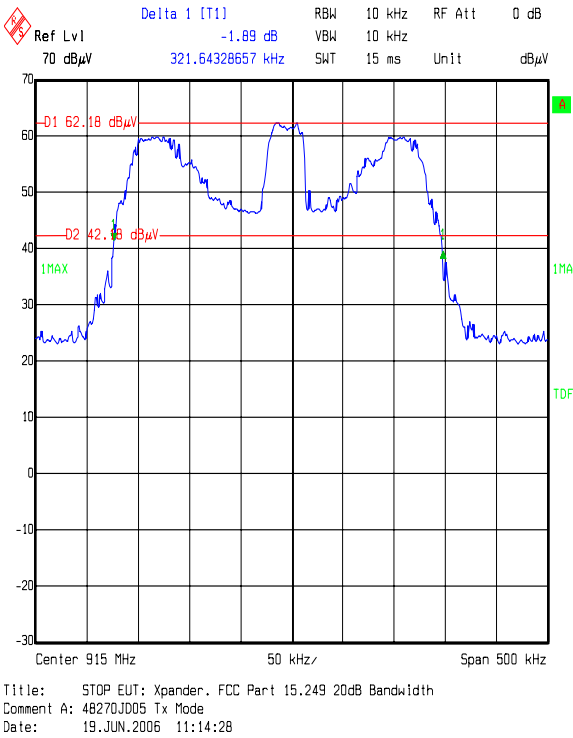
**7.3. Transmitter 20 dB Bandwidth: Section 2.1049**

7.3.1. The EUT was configured for 20 dB bandwidth measurements as described in Section 8 of this report.

7.3.2. Tests were performed to identify the 20 dB bandwidth.

**Results:**

Transmitter 20 dB Bandwidth (kHz)
321.643



Test of: Satellite Tracking Of People LLC  
 BluBox  
 To: FCC Part 15.249

#### 7.4. Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209

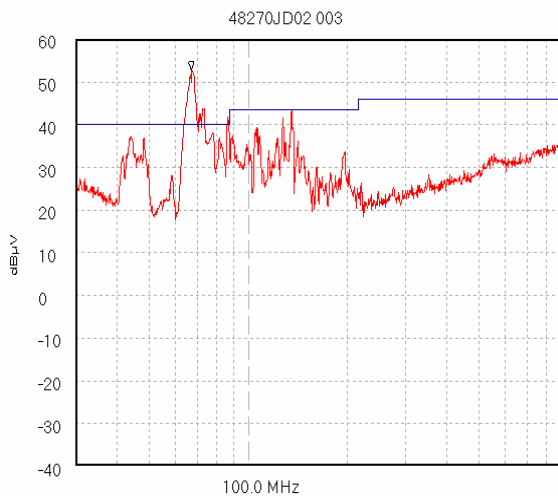
##### 7.4.1. Electric Field Strength Measurements: 30 to 1000 MHz

7.4.1.1. The EUT was configured for radiated emissions testing as described in Section 8 of this report.

7.4.1.2. Tests were performed to identify the maximum radiated spurious emission levels.

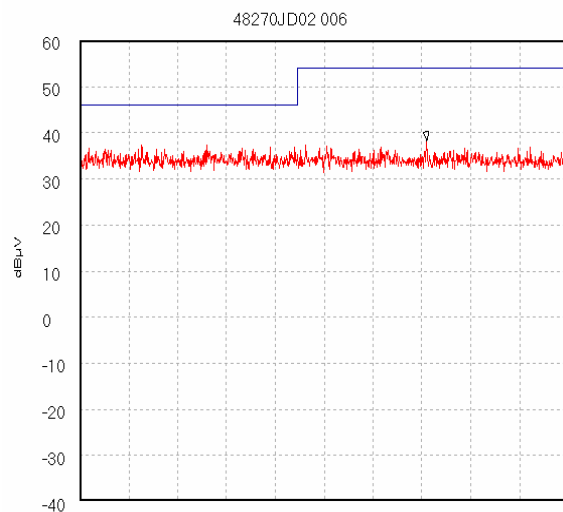
##### Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
44.126	Vertical	33.2	40.0	6.8	Complied
66.988	Vertical	39.0	40.0	1.0	Complied
86.350	Vertical	23.0	40.0	17.0	Complied
134.611	Vertical	25.7	40.0	14.3	Complied
145.411	Vertical	19.6	40.0	20.4	Complied



Trace 1  
 rad\_30\_to\_1000

Start 30.0 MHz; Stop 902.0 MHz - Log Scale  
 Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
 RBW 120.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 340.0 mS  
 Peak 67.387 MHz, 52.77 dB $\mu$ V  
 Limit/Mask: rad\_30\_to\_1000; ; Limit Test Failed  
 Transducer Factors: A490  
 13/06/2006 14:27:11



Trace 1  
 rad\_30\_to\_1000

Start 928.0 MHz; Stop 1.0 GHz  
 Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
 RBW 120.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 40.0 mS  
 Peak 979.12 MHz, 38.22 dB $\mu$ V  
 Limit/Mask: rad\_30\_to\_1000; ; Limit Test Passed  
 Transducer Factors: A490  
 13/06/2006 14:42:07

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test of: Satellite Tracking Of People LLC  
 BluBox  
 To: FCC Part 15.249

**Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)**

**7.4.2. Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz)**

**Results:**

**Highest Peak Level:**

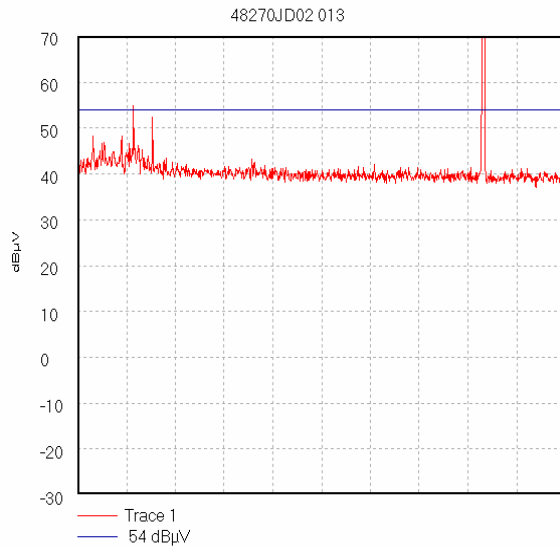
Frequency (MHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1114.169	Vertical	81.0	-12.8	68.2	74.0	5.8	Complied
1150.012	Vertical	74.1	-12.8	61.3	74.0	12.7	Complied
1830.070	Vertical	63.0	-11.8	51.2	74.0	22.8	Complied
2744.755	Horizontal	54.8	-11.1	43.7	74.0	30.3	Complied
4574.900	Horizontal	46.1	-6.4	39.7	74.0	34.3	Complied
9819.640	Vertical	37.4	-1.0	36.4	74.0	37.6	Complied

**Highest Average Level:**

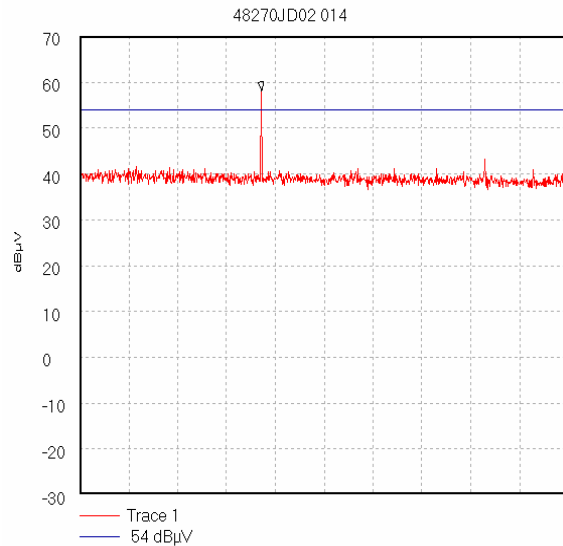
Frequency (MHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1114.169	Vertical	52.9	-12.8	40.1	54.0	13.9	Complied
1150.012	Vertical	46.7	-12.8	33.9	54.0	20.1	Complied
1830.070	Vertical	61.0	-11.8	49.2	54.0	4.8	Complied
2744.755	Horizontal	46.0	-11.1	34.9	54.0	19.1	Complied
4574.900	Horizontal	41.4	-6.4	35.0	54.0	19.0	Complied
9819.640	Vertical	20.5	-1.0	19.5	54.0	34.5	Complied

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

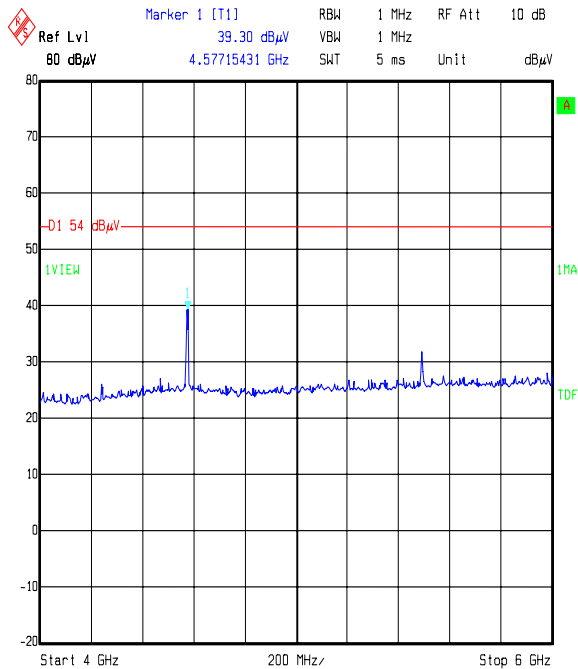
### Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)



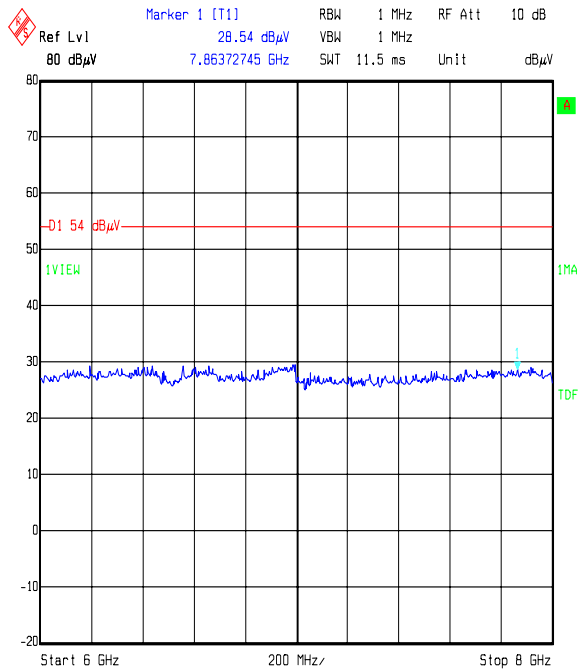
Start 1.0 GHz; Stop 2.0 GHz  
Ref 70 dBμV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 3.0 MHz; Att 10 dB; Swp 20.0 mS  
Peak 1.83 GHz, 73.98 dBμV  
Display Line: 54 dBμV; Limit Test Failed  
Transducer Factors: A490  
13/06/2006 15:27:14



Start 2.0 GHz; Stop 4.0 GHz  
Ref 70 dBμV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 3.0 MHz; Att 10 dB; Swp 20.0 mS  
Peak 2.744 GHz, 58.12 dBμV  
Display Line: 54 dBμV; Limit Test Failed  
Transducer Factors: A490  
13/06/2006 15:31:58



Title: Satellite Tracking People FCC 15.249  
Comment A: Peak 4GHz to 6GHz  
Date: 10.MAY 2006 15:02:16



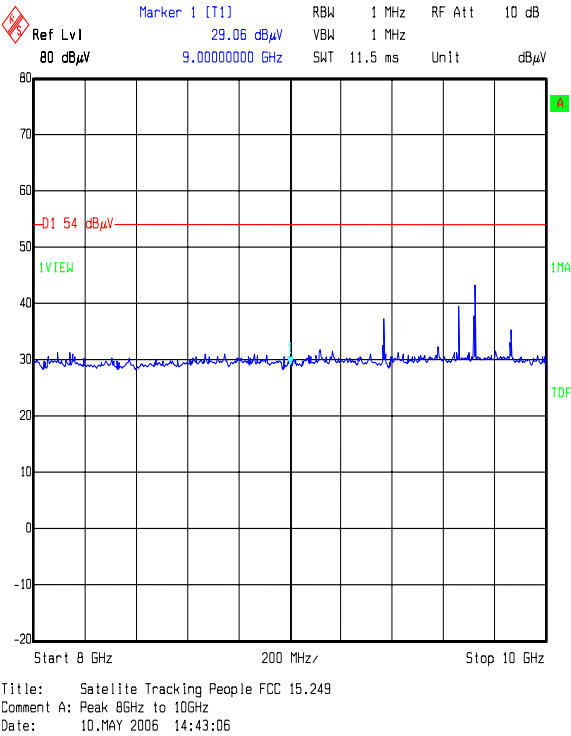
Title: Satellite Tracking People FCC 15.249  
Comment A: Peak 6GHz to 8GHz  
Date: 10.MAY 2006 14:52:04

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.



Test of:        **Satellite Tracking Of People LLC**  
                  **BluBox**  
To:             **FCC Part 15.249**

**Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)**



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

Test of: Satellite Tracking Of People LLC  
 BluBox  
 To: FCC Part 15.249

## 7.5. Transmitter Radiated Emissions at Band Edges: Section 15.249(d) & 15.209

7.5.1. The EUT was configured for transmitter radiated emissions testing described in Section 8 of this report.

7.5.2. Tests were performed to identify the maximum emissions level at the band edges of the frequency band that the EUT will operate over.

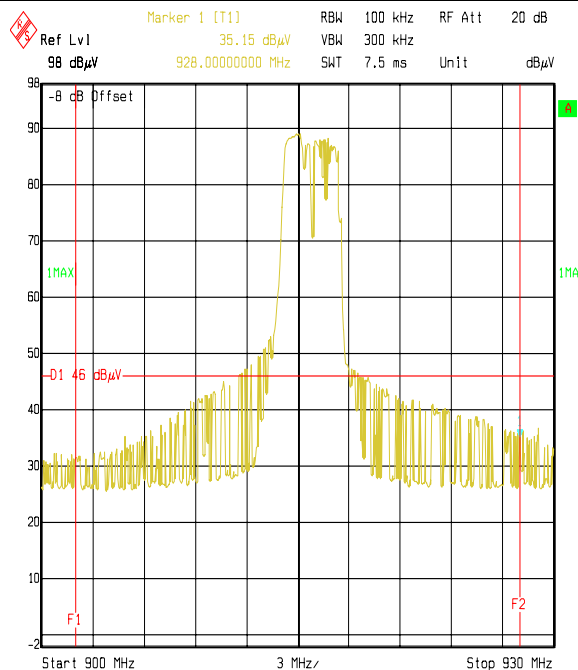
### Results:

#### Bottom Band Edge

Frequency (MHz)	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
902	31.3	46.0	14.7	Complied

#### Top Band Edge

Frequency (MHz)	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
928	35.2	46.0	10.8	Complied



Title: Band Edges  
 Comment A: 48270JD03 Base Unit  
 Date: 16.MAY 2006 09:56:38

Test of: **Satellite Tracking Of People LLC**  
          **BluBox**  
To: **FCC Part 15.249**

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## **8. Measurement Uncertainty**

8.1. 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.

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

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

8.4. 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".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
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%	+/- 2.94 dB

8.5. 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.

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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## **9. Measurement Methods**

### **9.1. Radiated Emissions**

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

In either case the measurement was made at the appropriate distance using a measuring receiver with a Quasi-Peak detector for measurements below 1000 MHz and an Average detector for measurements above 1000 MHz.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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### **Radiated Emissions (Continued)**

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limits as stated in Section 15.33

The final field strength was determined as the indicated level in dB $\mu$ V plus cable loss and antenna factor.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements Below 1 GHz	Final Measurements Above 1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak / Average
Mode:	Max Hold	Not applicable	Max Hold
Bandwidth:	(120 kHz < 1 GHz) (1 MHz > 1 GHz)	120 kHz	1 MHz
Amplitude Range:	100 dB	100 dB	100 dB
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

Test of:      **Satellite Tracking Of People LLC**  
              **BluBox**  
To:           **FCC Part 15.249**

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## **9.2. Transmitter 20 dB Bandwidth**

The EUT and spectrum analyser was configured for transmitter radiated emissions measurements.

To determine the occupied bandwidth, a resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of at least the same value was used. The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level. The bandwidth was determined at the points where the 20 dB reference crossed the profile of the emission.

Test of: Satellite Tracking Of People LLC  
 BluBox  
 To: FCC Part 15.249

### **Appendix 1. Test Equipment Used**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A031	Horn Antenna	Eaton	91889-2	557
A059	Log Periodic Antenna	EMCO	3146	8902-2378
A1534	Preamplifier 1-26.5 GHz	Hewlett Packard	8449B OPT H02	3008A00405
A254	Horn Antenna	Flann Microwave	14240-20	139
A255	Horn Antenna	Flann Microwave	16240-20	519
A259	Bilog Antenna	Chase	CBL6111	1513
A428	Horn Antenna	Flann Microwave	12240-20	134
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027
M028	Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RF); 860 161/007 (DU)
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986_022
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990

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

Test of: Satellite Tracking Of People LLC  
BluBox  
To: FCC Part 15.249

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## **Appendix 2. Test Configuration Drawings**

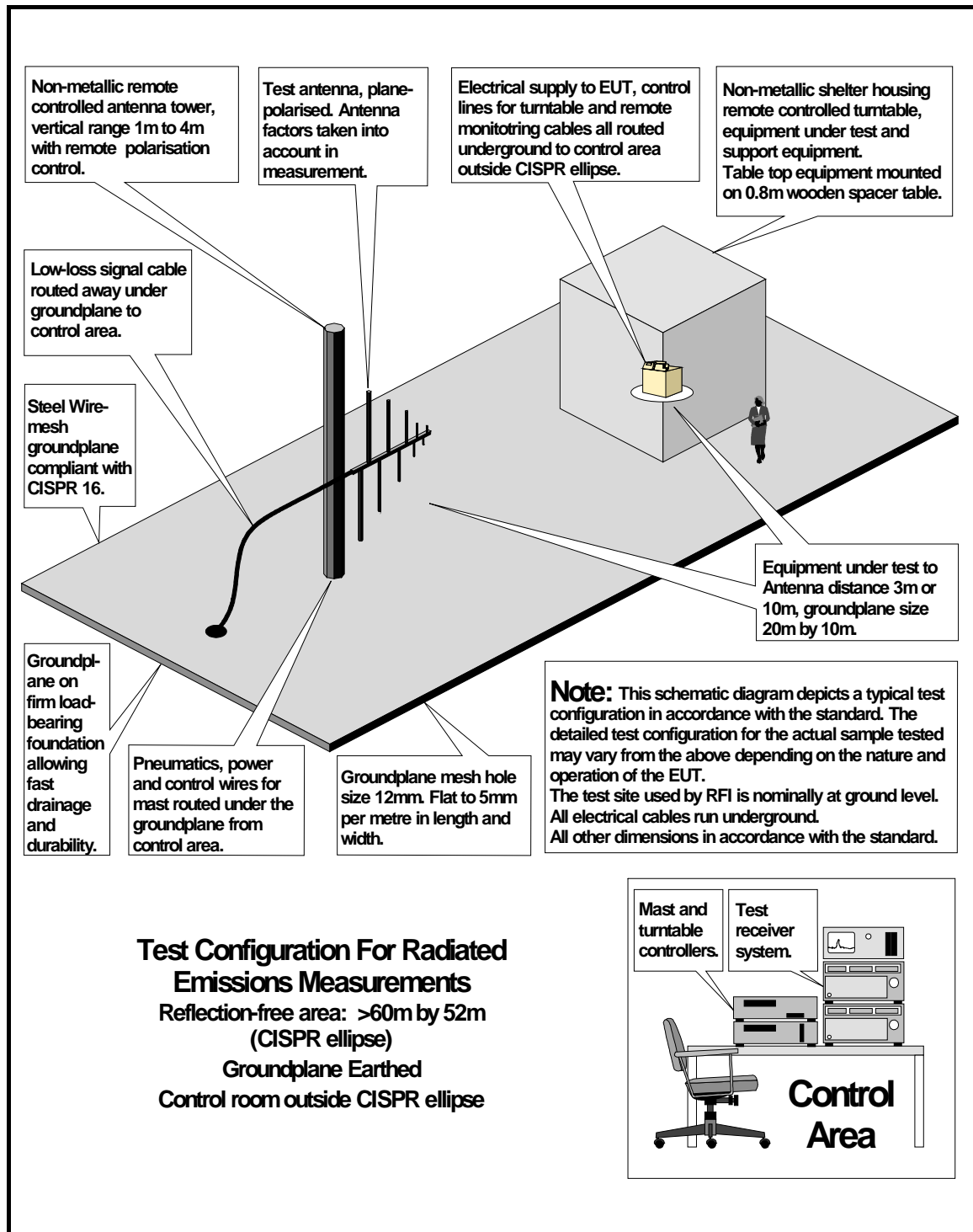
This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\48270JD05\EMIRAD	Test configuration for measurement of radiated emissions.



Test of: Satellite Tracking Of People LLC  
 BluBox  
 To: FCC Part 15.249

DRG48270JD05\EMIRAD



**Test of:      Satellite Tracking Of People LLC**  
**BluBox**  
**To:             FCC Part 15.249**

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