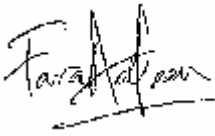


TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Test Report Serial No:
RFI\MPTE1\RP47271JD01A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager:	
 pp	
Tested By: Fara Razally 	Checked By: Nigel Davison 
Report Copy No: PDF01	
Issue Date: 27 July 2005	Test Dates: 26 June 2005

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The results in this report apply only to the sample(s) tested.

Test of: **Satellite Tracking Of People LLC.**
 BlueTag3

To: **FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002**

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Test of: Satellite Tracking Of People LLC.
 BlueTag3
To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Table of Contents

1. Client Information4

2. Equipment Under Test (EUT)5

3. Test Results.....8

4. Deviations from the Test Specification9

5. Operation of the EUT During Testing..... 10

6. Summary of Test Results 11

7. Measurements, Examinations and Derived Results 13

8. Measurement Uncertainty52

9. Measurement Methods53

Appendix 1. Test Equipment Used61

Appendix 2. Test Configuration Drawings.....63

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

1. Client Information

Company Name:	Satellite Tracking Of People LLC.
Address:	4801 Woodway Drive Suite 100W Houston Texas 77056 United States
Contact Name:	Mr Brian Moran

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

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:	BluTag
Model Name or Number:	BluTag3
Unique Type Identification:	TR3002-6436
Serial Number:	TR3002-6436
FCC ID Number:	FCC ID: S5EAA70038
Country of Manufacture:	UK
Date of Receipt:	09 May 2005

2.2. Accessories

The following accessories were supplied with the EUT:

Description:	AC Charger
Brand Name:	MPW
Model Name or Number:	None Stated
Serial Number:	None Stated
Cable Length and Type:	2 core, 1.6m
Connected to Port:	AC Charger Port

2.3. Description of EUT

The equipment under test is a personal tracking device incorporating GSM 850 and GSM 1900 technology.

2.4. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

2.5. Additional Information Related to Testing

Power Supply Requirement:			
Intended Operating Environment:	With GSM Coverage		
Equipment Category:	GSM 850/GSM 1900		
Type of Unit:	Portable (Standalone battery powered device)		
Transmit Frequency Range:	GSM 850 Part 22:	824.2 MHz to 848.8 MHz	
	GSM 1900 Part 24:	1850.2 MHz to 1909.8 MHz	
Transmit Channels Tested:	Channel ID		Channel Number
	Bottom	Part 22	128
		Part 24	512
	Middle	Part 22	190
		Part 24	660
	Top	Part 22	251
		Part 24	810
Receive Frequency Range:	Part 22:	869.2 MHz to 893.8 MHz	
	Part 24:	1930.2 MHz to 1989.8 MHz	
Receive Channels Tested:	Channel ID		Channel Number
	Bottom	Part 22	128
		Part 24	512
	Middle	Part 22	190
		Part 24	660
	Top	Part 22	251
		Part 24	810
Max Power Output (ERP) GSM 850 Part 22	21.3 dBm		
Max Power Output (ERP) GSM 1900 Part 24	28.9 dBm		

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

2.6. Port Identification

Port	Description	Type/Length	Applicable
1	Enclosure	-	Y
2	AC Charger Connector	2 Core, 1.6m	Y

2.7. Support Equipment

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

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

3. Test Results

Reference:	FCC Part 22: 2004 Subpart H (Cellular Radiotelephone Service)
Title:	Code of Federal Regulations, Part 22 (47CFR22) Personal Communication Services.

Reference:	FCC Part 24 Subpart E: 2004 (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.

3.1. 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 (1987)

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.

3.2. 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.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

4. Deviations from the Test Specification

None

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

5. Operation of the EUT during Testing

5.1. Operating Modes

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

Transmitter Modes:

For carrier output power, occupied bandwidth and final transmitter radiated measurements, testing was performed at full power on top, middle and bottom channels of the assigned frequency block. For the frequency stability testing, measurements were performed at full power on the top and bottom channels of the assigned frequency block at -30°C through to +50°C in 10° increments. All transmitter radiated spurious pre-scan tests were performed at full power on the top channel of the assigned frequency block. Final measurements were then performed on the top, middle and bottom channels if an emission was identified.

Receiver/Idle Modes:

Testing was performed with the call terminated from the GSM Test Simulator and the phone left in its Idle Mode.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

AC Charger connected.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

6. Summary of Test Results

6.1. FCC Part 22

Range of Measurements	Specification Reference	Port Type	Compliance Status
Receiver/Idle AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107	AC Mains Input	Complied
Receiver/Idle Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter Effective Radiated Power (ERP)	C.F.R. 47 FCC Part 22: 2004 Section 22.913(a)	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 22: 2004 Section 22.355	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 22: 2004 Section 22.355	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 22: 2004 Section 2.1049	Antenna	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 22: 2004 Section 2.1053/22.917	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 22: 2004 Section 2.1053/22.917	Antenna	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

6.2. FCC Part 24

Range of Measurements	Specification Reference	Port Type	Compliance Status
Idle Mode AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107	AC Mains Input	Complied
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter Effective Isotropic Radiated Power (EIRP)	C.F.R. 47 FCC Part 24: 2004 Section 24.232	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 24: 2004 Section 24.235	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 24: 2004 Section 24.235	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 24: 2004 Section 24.238	Antenna	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 24: 2004 Section 2.1053/24.238	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 2: 2004 Section 2.1053/24.238	Antenna	Complied

6.3. 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.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

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.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2. Test Results – FCC Part 22

7.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107

The EUT was configured as for ac conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels present on the ac mains line of the EUT.

Results:

Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.20063	Live	48.50	63.58	15.08	Complied
0.30038	Live	40.75	60.23	19.48	Complied
0.40099	Live	35.71	57.83	22.12	Complied
0.50076	Live	39.92	56.00	16.08	Complied
0.59963	Live	34.67	56.00	21.33	Complied
0.70023	Live	36.36	56.00	19.64	Complied
1.20004	Live	34.29	56.00	21.71	Complied
2.70111	Live	37.99	56.00	18.01	Complied
4.40271	Live	39.67	56.00	16.33	Complied
5.20397	Neutral	39.52	60.00	20.48	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

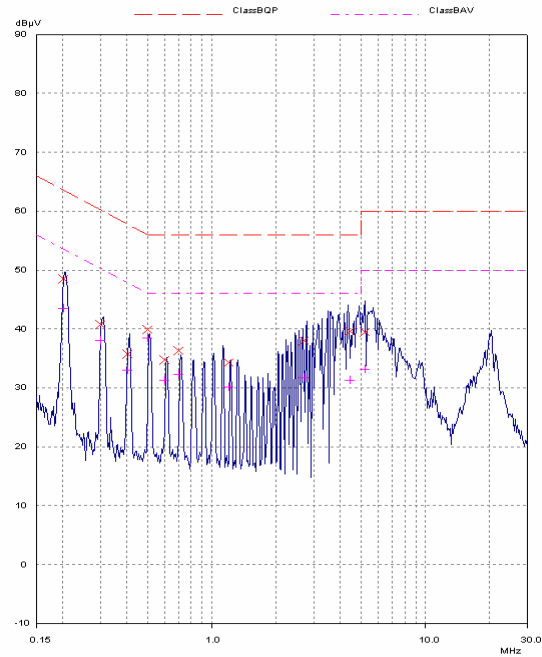
Average Detector Measurements on Live and Neutral Lines (Continued)

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.20063	Live	43.52	53.58	10.06	Complied
0.30038	Live	38.03	50.23	12.20	Complied
0.40099	Live	33.02	47.83	14.81	Complied
0.50076	Live	38.47	46.00	7.53	Complied
0.59963	Live	31.36	46.00	14.64	Complied
0.70023	Live	32.25	46.00	13.75	Complied
1.20004	Live	30.17	46.00	15.83	Complied
2.70111	Neutral	31.69	46.00	14.31	Complied
4.40271	Neutral	31.29	46.00	14.71	Complied
5.20397	Neutral	33.14	50.00	16.86	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107 (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.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.2. Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

The EUT was configured as for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum receiver or standby radiated emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
780.078	Vert	29.5	46.0	16.5	Complied

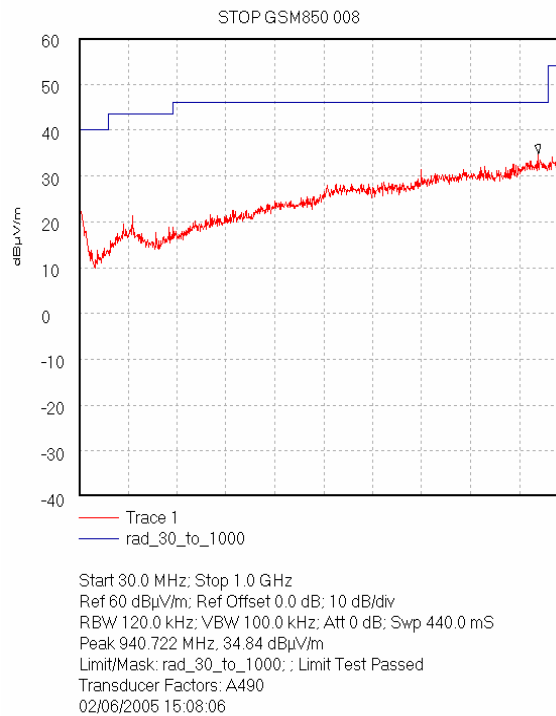
Note(s):

- 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.*

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz) (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.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.3. Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 5.0 GHz)

Results:

Peak Level

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4.6413	Vert	17.9	24.2	1.8	43.9	74.0	30.1	Complied

Average Level

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4.6413	Vert	4.5	24.2	1.8	30.5	54.0	23.5	Complied

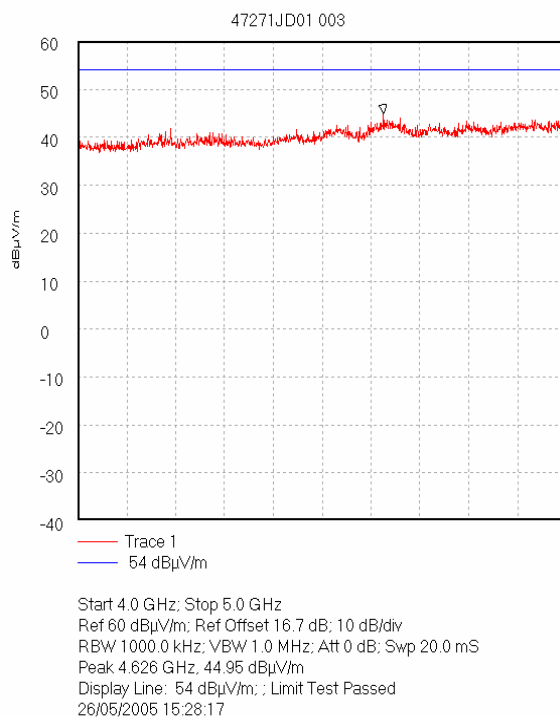
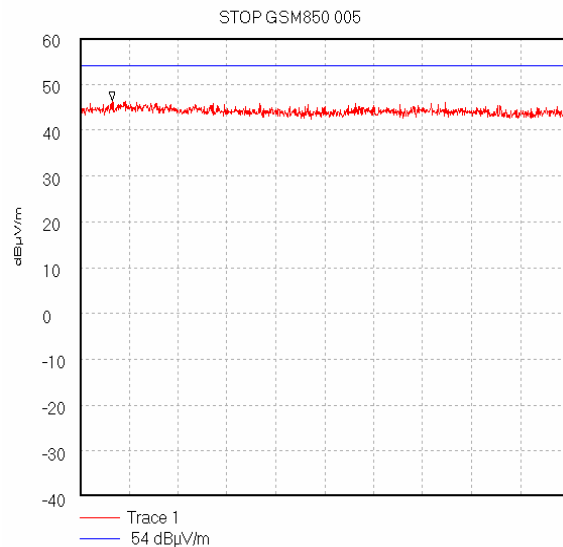
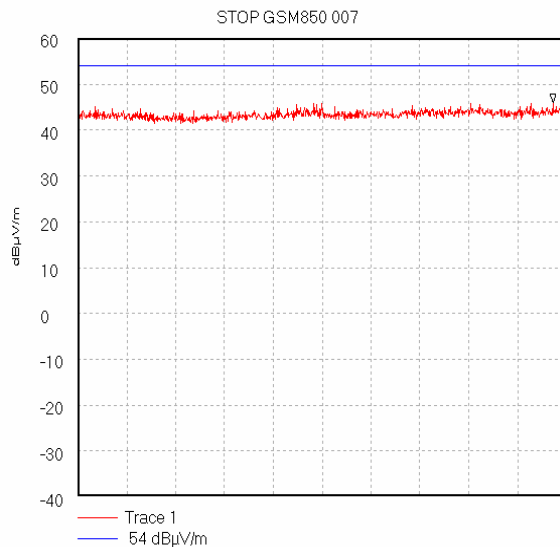
Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver; the highest peak noise floor reading of the measuring receiver recorded was 43.9 dB μ V/m at 4.6413 Ghz.
-

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 5.0 GHz) (Continued)



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

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.4. Transmitter Effective Radiated Power (ERP): Section 22.913(a)

The EUT was configured as for effective radiated power as described in section 9 of this report.

Tests were performed to identify the maximum effective radiated power (ERP).

Results:

Channel	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	824.2	21.3	38.4	17.1	Complied
Middle	836.6	20.1	38.4	18.3	Complied
Top	848.8	20.3	38.4	18.1	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.5. Transmitter Frequency Stability (Temperature Variation): Section 22.355

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

Results:

Bottom Channel (824.2 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	824.200001	1	0.001	2.5	2.499	Complied
-20	824.199999	-1	0.001	2.5	2.499	Complied
-10	824.199997	-3	0.004	2.5	2.496	Complied
0	824.199993	-7	0.008	2.5	2.492	Complied
10	824.199994	-6	0.007	2.5	2.493	Complied
20	824.199995	-5	0.006	2.5	2.494	Complied
30	824.199995	-5	0.006	2.5	2.494	Complied
40	824.199999	-1	0.001	2.5	2.499	Complied
50	824.199998	-2	0.002	2.5	2.498	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Transmitter Frequency Stability (Temperature Variation): Section 22.355 (Continued)

Results:

Top Channel (848.8 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	848.800013	13	0.015	2.5	2.485	Complied
-20	848.800012	12	0.014	2.5	2.486	Complied
-10	848.800019	19	0.022	2.5	2.478	Complied
0	848.800015	15	0.018	2.5	2.482	Complied
10	848.800017	17	0.020	2.5	2.480	Complied
20	848.800023	23	0.027	2.5	2.473	Complied
30	848.800036	36	0.042	2.5	2.458	Complied
40	848.800016	16	0.019	2.5	2.481	Complied
50	848.800017	17	0.020	2.5	2.480	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.6. Transmitter Frequency Stability (Voltage Variation): Section 22.355

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

Results:

Bottom Channel (824.2 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
93.5	824.199997	-3	0.004	2.5	2.496	Complied
126.5	824.200004	4	0.005	2.5	2.495	Complied

Top Channel (848.8 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
93.5	848.800024	24	0.028	2.5	2.472	Complied
126.5	848.800017	17	0.020	2.5	2.480	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.7. Transmitter Occupied Bandwidth: Section 2.1049

The EUT was configured as for occupied bandwidth measurements as described in section 9 of this report.

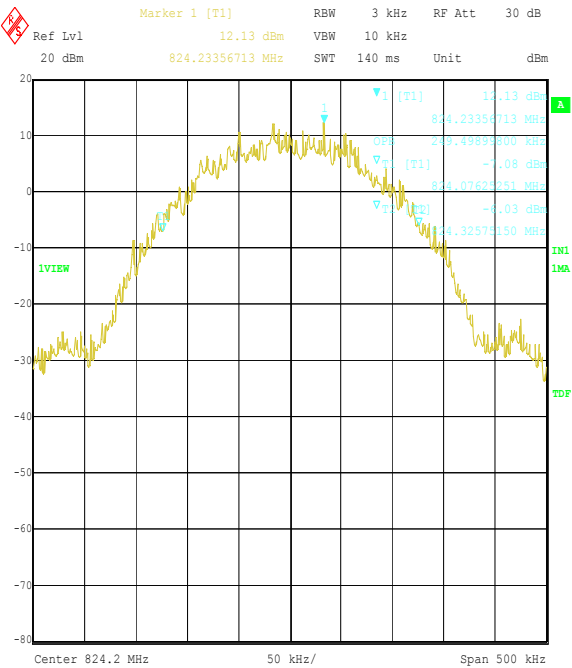
Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

Results:

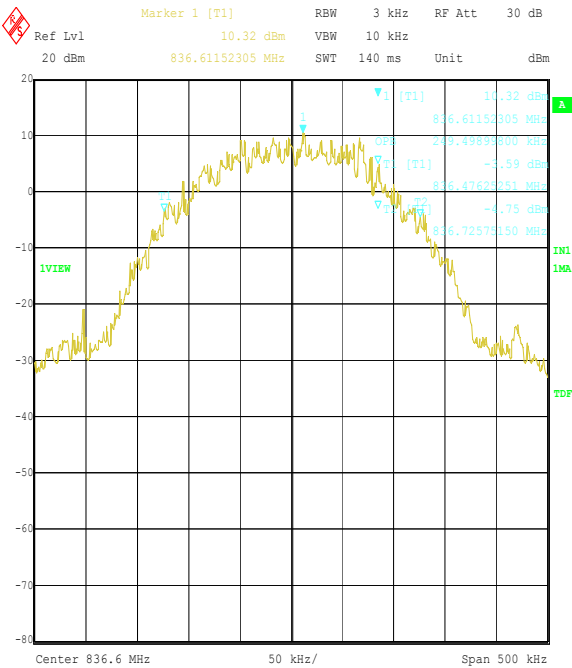
Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	824.2	3.0	10.0	249.498998
Middle	836.6	3.0	10.0	249.498998
Top	848.8	3.0	10.0	247.676252

Test of: Satellite Tracking Of People LLC.
BlueTag3
To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

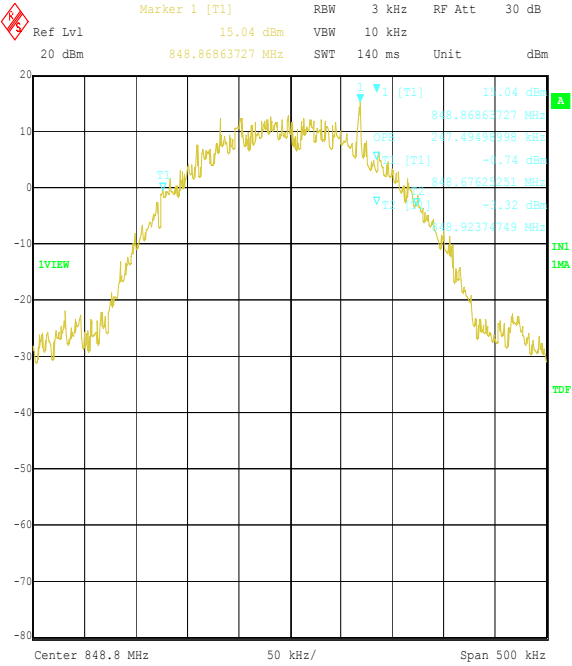
Transmitter Occupied Bandwidth: Section 2.1049 (Continued)



Title: SATELLITE TRACKING OF PEOPLE FCC PART 22 GSM850
Comment A: OCCUPIED BANDWIDTH BOTTOM CHANNEL
Date: 26.MAY.2005 17:40:59



Title: SATELLITE TRACKING OF PEOPLE FCC PART 22 GSM850
Comment A: OCCUPIED BANDWIDTH MIDDLE CHANNEL
Date: 26.MAY.2005 17:39:41



Title: SATELLITE TRACKING OF PEOPLE FCC PART 22 GSM850
Comment A: OCCUPIED BANDWIDTH TOP CHANNEL
Date: 26.MAY.2005 17:38:03

Note: The occupied bandwidth is measured using the internal OBW function of the measurement analyser. The analyser automatically configures the measurement bandwidths to make an accurate measurement. The results can be observed in the right hand corner of the graphs.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.8. Transmitter Out of Band Radiated Emissions: Section 2.1053 & 22.917

The EUT was configured as for transmitter radiated emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
4944.782	-42.9	-13.0	29.2	Complied

Middle Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5019.680	-42.3	-13.0	29.3	Complied

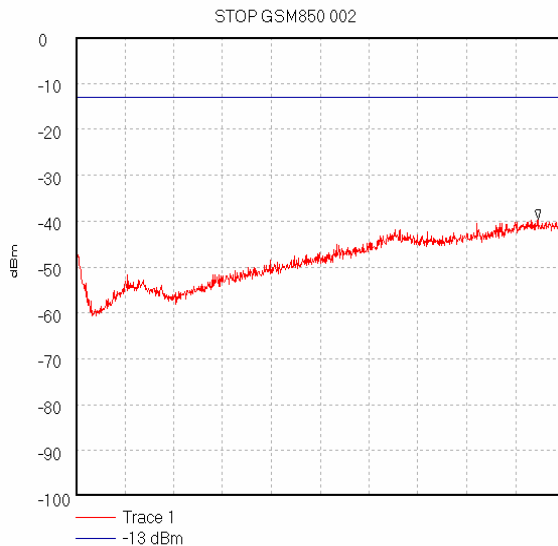
Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
5092.466	-40.4	-13.0	27.4	Complied

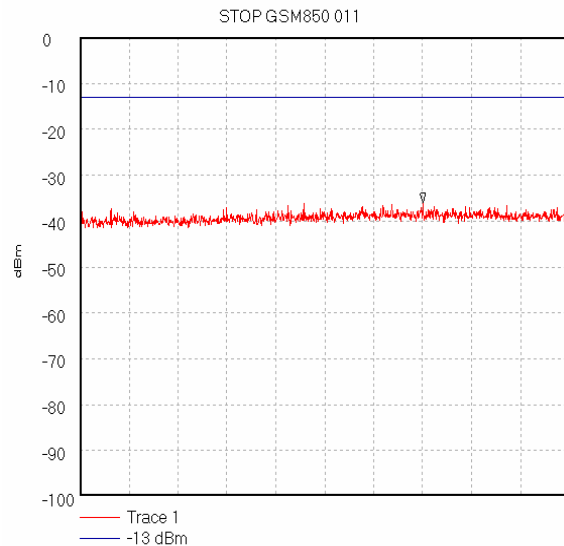
Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

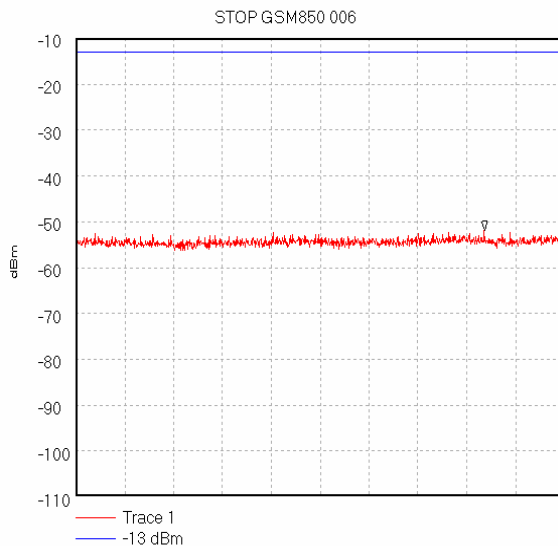
Transmitter Out of Band Radiated Emissions: Section 2.1053 & 22.917 (Continued)



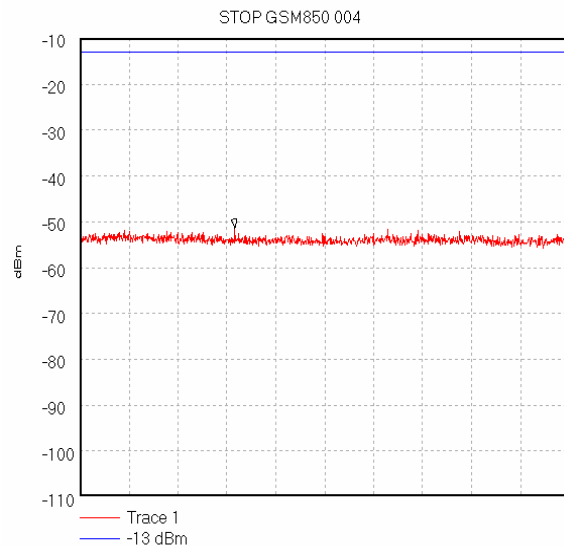
Start 30.0 MHz; Stop 824.2 MHz
Ref 0 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 30 dB; Swp 360.0 mS
Peak 781.843 MHz, -39.58 dBm
Display Line: -13 dBm; Limit Test Passed
Transducer Factors: A490
17/05/2005 15:36:24



Start 848.8 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 30 dB; Swp 80.0 mS
Peak 954.808 MHz, -35.95 dBm
Display Line: -13 dBm; Limit Test Passed
Transducer Factors: A490
17/05/2005 15:42:22



Start 1.0 GHz; Stop 2.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.837 GHz, -51.92 dBm
Display Line: -13 dBm;
Transducer Factors: 1 to 2
17/05/2005 16:54:46

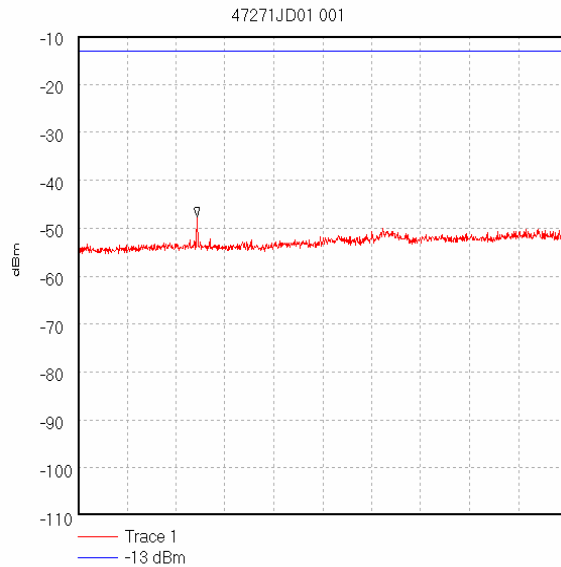


Start 2.0 GHz; Stop 4.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.633 GHz, -51.41 dBm
Display Line: -13 dBm;
Transducer Factors: 2 to 4
17/05/2005 15:57:03

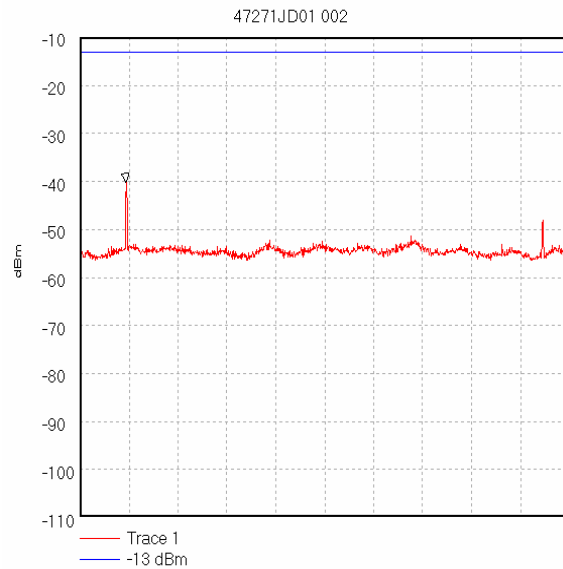
Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

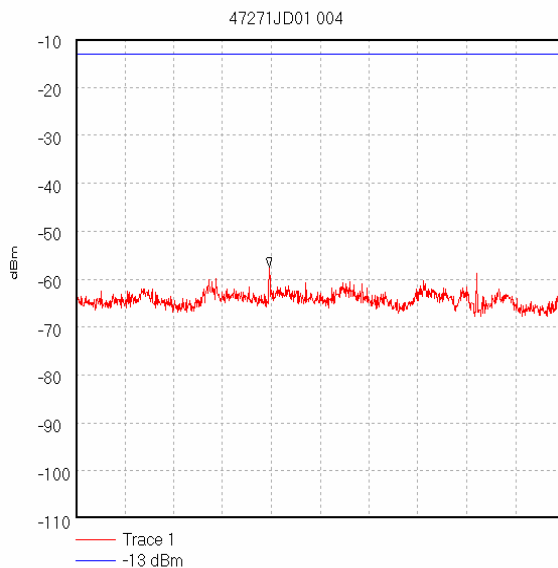
Transmitter Out of Band Radiated Emissions: Section 2.1053 & 22.917 (Continued)



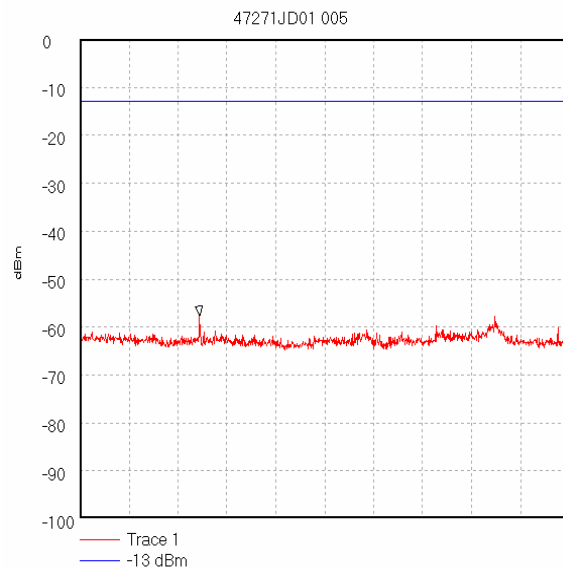
Start 4.0 GHz; Stop 5.0 GHz
Ref -10 dBm; Ref Offset 26.2 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 4.243 GHz, -47.6 dBm
Display Line: -13 dBm;
26/05/2005 14:58:29



Start 5.0 GHz; Stop 6.0 GHz
Ref -10 dBm; Ref Offset 26.2 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 5.094 GHz, -40.14 dBm
Display Line: -13 dBm;
26/05/2005 15:18:27



Start 6.0 GHz; Stop 8.0 GHz
Ref -10 dBm; Ref Offset 18.8 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 6.791 GHz, -57.53 dBm
Display Line: -13 dBm;
26/05/2005 15:37:27



Start 8.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 22.8 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 8.489 GHz, -57.64 dBm
Display Line: -13 dBm;
26/05/2005 15:42:31

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.2.9. Transmitter Radiated Emissions at Band Edges: Section 2: 1053 & 22.917

The EUT was configured as for transmitter radiated emission testing described in section 9 of this report.

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

Results:

Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-26.5	-13.0	13.5	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
849	-25.8	-13.0	12.8	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3. Test Results – FCC Part 24

7.3.1. Idle Mode AC Conducted Spurious Emissions: Section 15.107

The EUT was configured as for ac conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emissions levels present on the ac mains line of the EUT.

Results:

Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.19841	Live	61.57	63.68	2.11	Complied
0.29300	Live	49.38	60.44	11.06	Complied
0.39738	Neutral	45.09	57.91	12.82	Complied
0.49677	Live	45.59	56.05	10.46	Complied
0.78980	Live	45.80	56.00	10.20	Complied
1.08608	Live	44.45	56.00	11.55	Complied
2.46643	Live	42.77	56.00	13.23	Complied
4.14645	Live	37.75	56.00	18.25	Complied
5.81328	Neutral	49.81	60.00	10.19	Complied
6.20123	Live	47.35	60.00	12.65	Complied
20.59120	Live	44.86	60.00	15.14	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

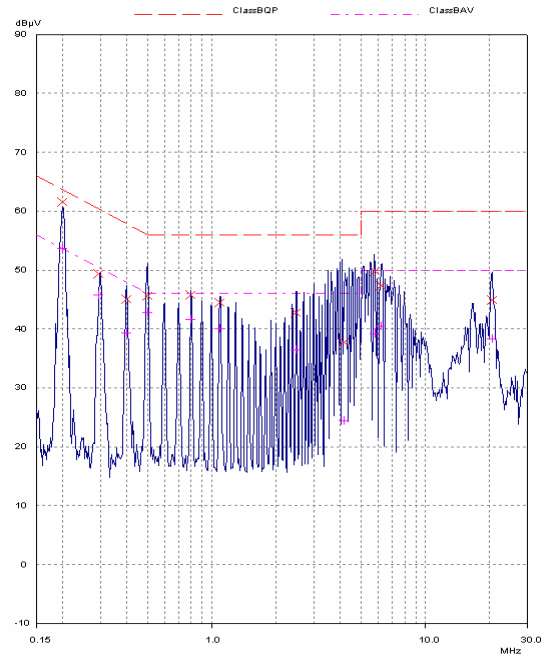
Average Detector Measurements on Live and Neutral Lines – Continued

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.19841	Live	53.67	53.68	0.01	Complied
0.29300	Live	45.75	50.44	4.69	Complied
0.39738	Live	39.30	47.91	8.61	Complied
0.49677	Live	42.83	46.05	3.22	Complied
0.78980	Live	41.66	46.00	4.34	Complied
1.08608	Live	40.03	46.00	5.97	Complied
2.46643	Live	36.40	46.00	9.60	Complied
4.14645	Neutral	24.47	46.00	21.53	Complied
5.81328	Live	39.22	50.00	10.78	Complied
6.20123	Live	40.49	50.00	9.51	Complied
20.5912	Live	38.28	50.00	11.72	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Idle Mode AC Conducted Spurious Emissions: Section 15.107 (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.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.2. Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

The EUT was configured as for receiver radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum receiver or standby radiated emission levels.

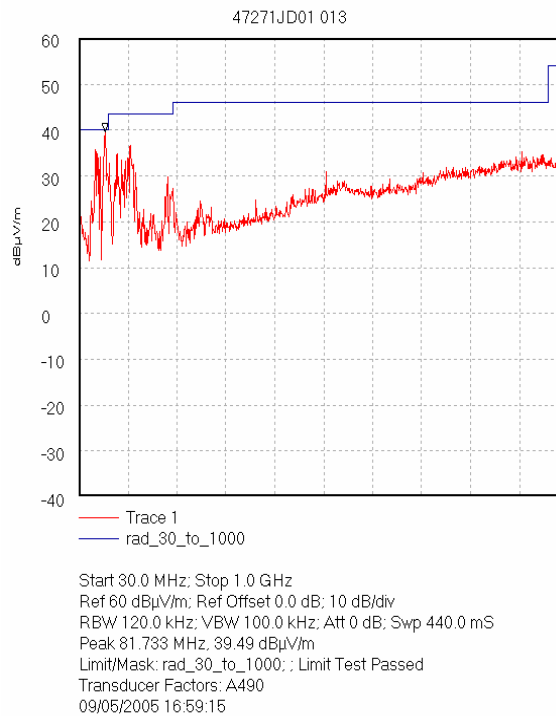
Results:

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
81.693	Vert	23.0	40.0	17.0	Complied
117.508	Vert	27.5	43.5	16.0	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz) (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.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.3. Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10.0 GHz)

Results:

Peak Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
8.5628	Vert	18.0	30.5	2.5	51.0	74.0	23.0	Complied

Average Level:

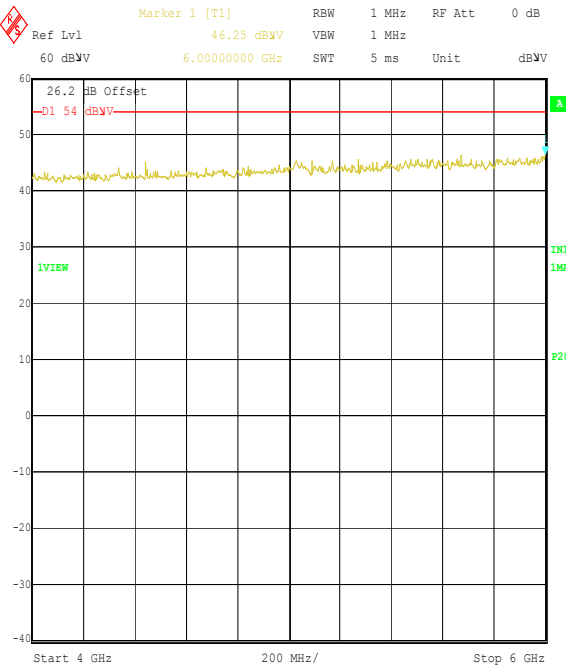
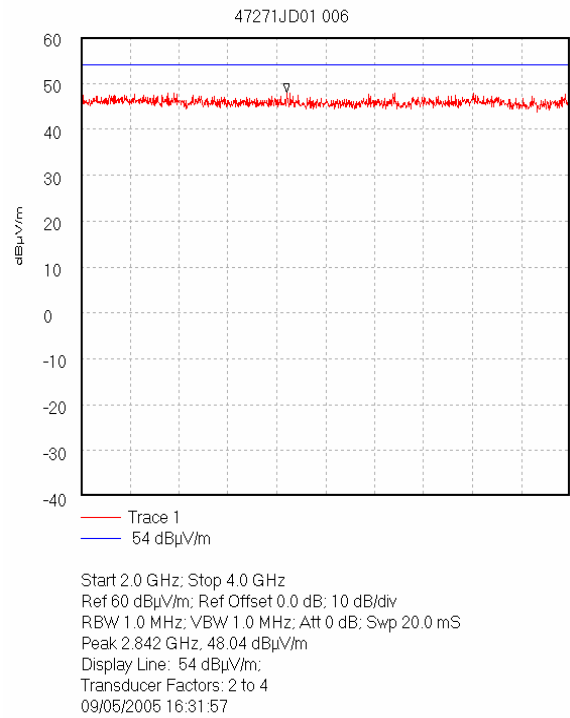
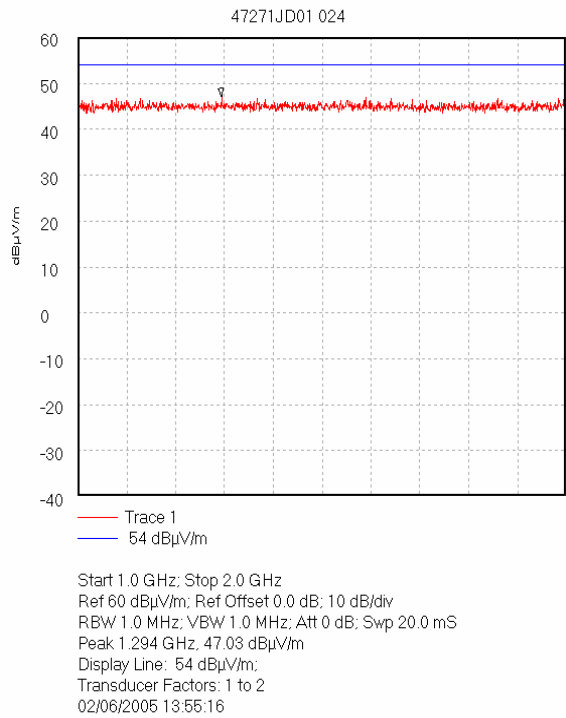
Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
8.5628	Vert	4.3	30.5	2.5	37.3	54.0	16.7	Complied

Note(s):

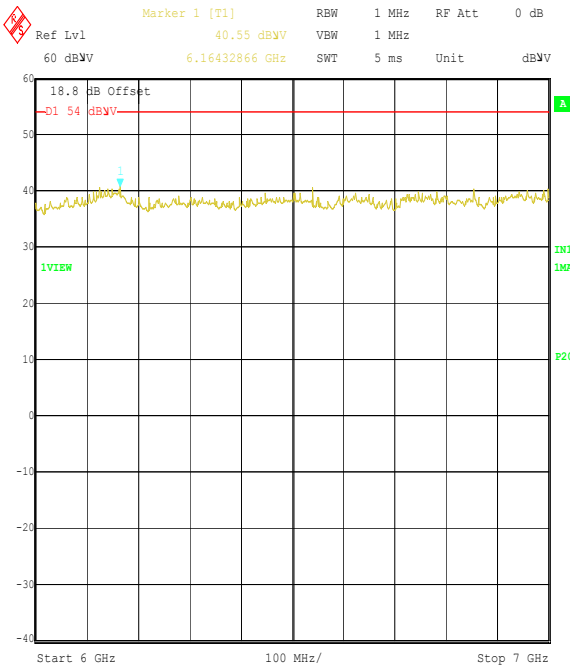
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.
-

Test of: Satellite Tracking Of People LLC.
BlueTag3
To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10.0 GHz) (Continued)



Title: 47271JD01 Satellite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions RX Mode
Date: 11.MAY.2005 20:11:09

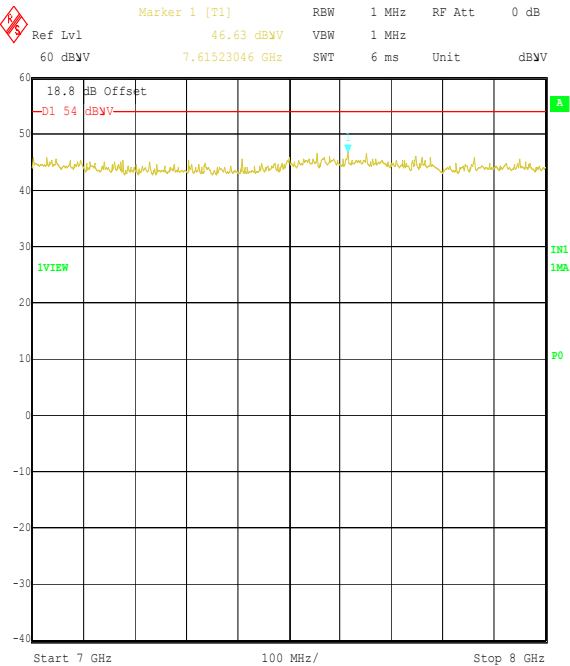


Title: 47271JD01 Satellite Tracking of People FCC Part 24
Comment A: Radiated Spurious Emissions RX Mode
Date: 2.JUN.2005 14:15:32

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

Test of: Satellite Tracking Of People LLC.
BlueTag3
To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength
Measurements (Frequency Range: 1 to 10.0 GHz) (Continued)



Title: 47271JD01 Satellite Tracking of People FCC Part 24
Comment A: Radiated Spurious Emissions RX Mode
Date: 2.JUN.2005 14:16:16



Title: 47271JD01 Sattelite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions RX Mode
Date: 11.MAY.2005 20:41:37

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

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.4. Transmitter Effective Isotropic Radiated Power (EIRP): Section 24.232

The EUT was configured as for effective isotropic radiated power as described in section 9 of this report.

Tests were performed to identify the maximum effective isotropic radiated power (EIRP).

Results:

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	1850.2	Vert	28.9	33.0	4.1	Complied
Middle	1879.8	Vert	28.2	33.0	4.8	Complied
Top	1909.8	Vert	25.8	33.0	7.2	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.5. Transmitter Frequency Stability (Temperature Variation): Section 24.235

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

Results:

Bottom Channel (1850.2 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	109	1850.199891	1850.0	0.199891	Complied
-20	106	1850.199894	1850.0	0.199894	Complied
-10	104	1850.199896	1850.0	0.199896	Complied
0	103	1850.199897	1850.0	0.199897	Complied
10	114	1850.199886	1850.0	0.199886	Complied
20	142	1850.199858	1850.0	0.199858	Complied
30	86	1850.199914	1850.0	0.199914	Complied
40	144	1850.199856	1850.0	0.199856	Complied
50	111	1850.199889	1850.0	0.199889	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Transmitter Frequency Stability (Temperature Variation): Section 24.235 (Continued)

Results:

Top Channel (1909.8 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	14	1909.800014	1910.0	0.199986	Complied
-20	12	1909.800012	1910.0	0.199988	Complied
-10	09	1909.800009	1910.0	0.199991	Complied
0	12	1909.800012	1910.0	0.199988	Complied
10	20	1909.800020	1910.0	0.199980	Complied
20	26	1909.800026	1910.0	0.199974	Complied
30	-16	1909.799983	1910.0	0.200017	Complied
40	15	1909.800015	1910.0	0.199985	Complied
50	28	1909.800028	1910.0	0.199972	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.6. Transmitter Frequency Stability (Voltage Variation): Section 24.235

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

Results:

Bottom Channel (1850.2 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
93.5	87	1850.199912	1850	0.199912	Complied
126.5	101	1850.199898	1850	0.199898	Complied

Top Channel (1909.8 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
93.5	20	1909.800020	1910	0.199980	Complied
126.5	14	1909.800014	1910	0.199986	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.7. Transmitter Occupied Bandwidth: Section 24.238

The EUT was configured as for occupied bandwidth measurements as described in section 9 of this report.

Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

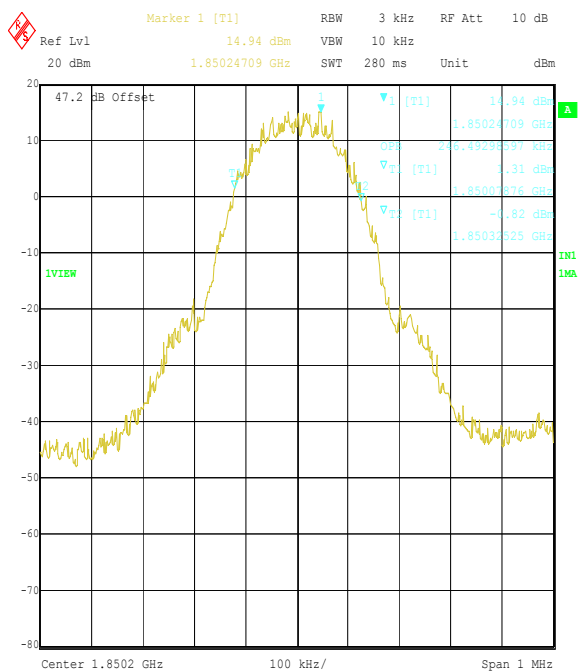
Results:

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	3.0	10.0	246.492986
Middle	1879.8	3.0	10.0	248.496994
Top	1909.8	3.0	10.0	246.492986

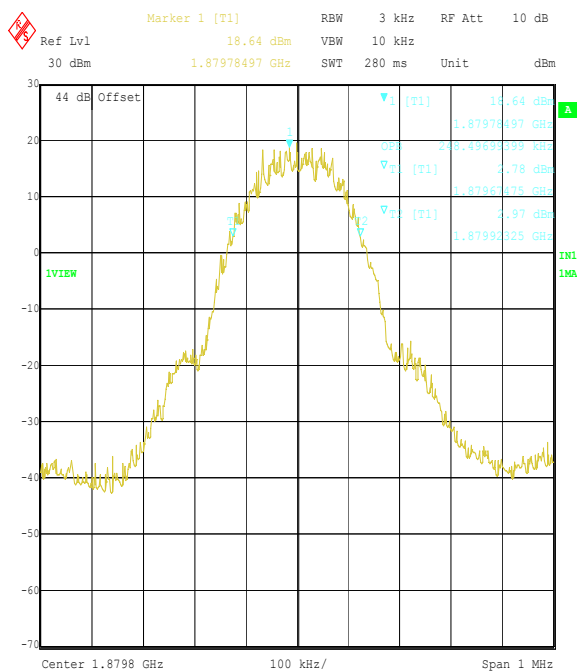
Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

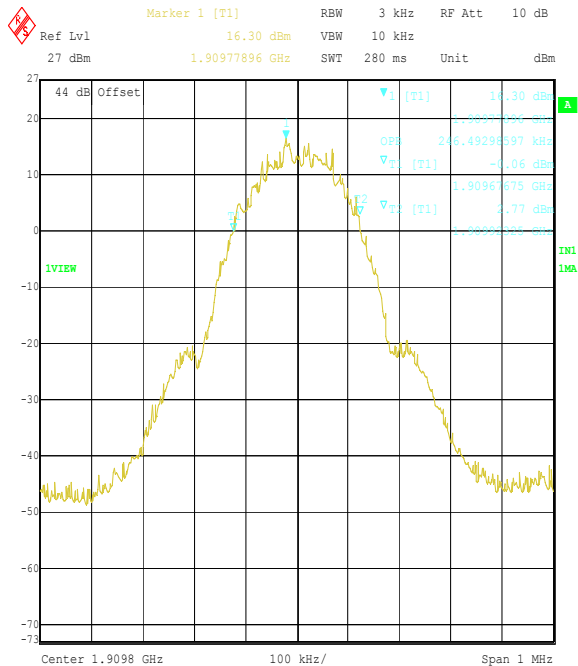
Transmitter Occupied Bandwidth: Section 24.238 (Continued)



Title: 47271JD01 Satellite Tracking of People EUT: BlueTag3
Comment A: FCC Part 24 Transmitter Occupied Bandwidth Bottom Channel
Date: 11.MAY.2005 21:24:44



Title: 47271JD01 Satellite Tracking of People EUT: BlueTag3
Comment A: FCC Part 24 Transmitter Occupied Bandwidth Middle Channel
Date: 11.MAY.2005 21:10:52



Title: 47271JD01 Satellite Tracking of People EUT: BlueTag3
Comment A: FCC Part 24 Transmitter Occupied Bandwidth Top Channel
Date: 11.MAY.2005 21:07:27

Note: The occupied bandwidth is measured using the internal OBW function of the measurement analyser. The analyser automatically configures the measurement bandwidths to make an accurate measurement. The results can be observed in the right hand corner of the graphs.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.8. Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238

The EUT was configured as for transmitter radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7400.876	-51.6	-13.0	38.6	Complied

Middle Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7519.277	-51.5	-13.0	38.5	Complied

Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
7639.279	-53.7	-13.0	40.7	Complied

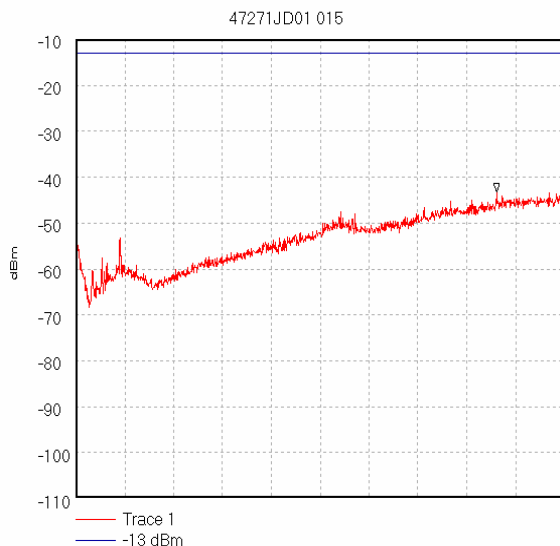
Note(s):

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.
-

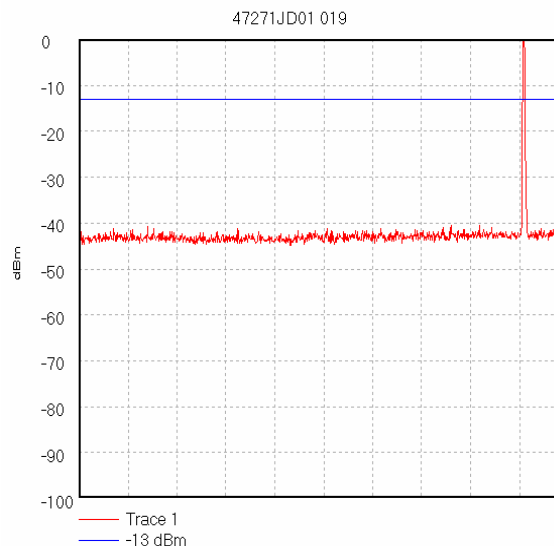
Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

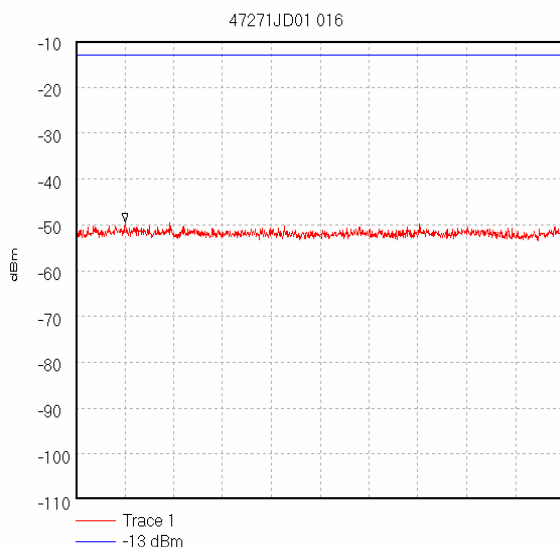
Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)



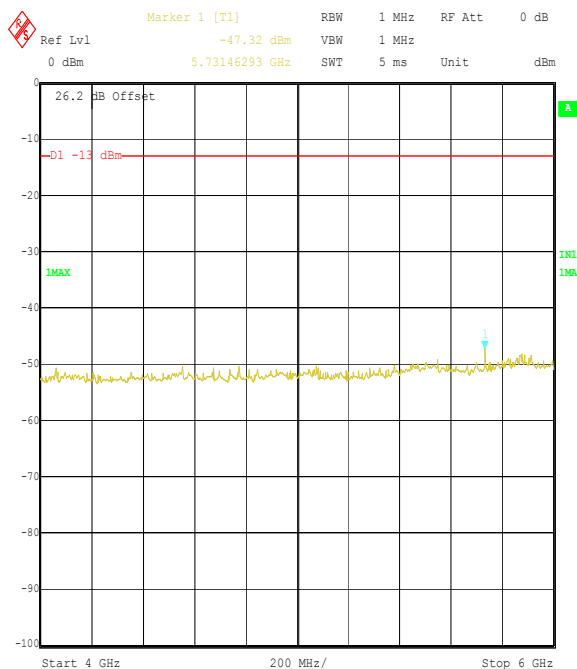
Start 30.0 MHz; Stop 1.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 20 dB; Swp 440.0 mS
Peak 866.356 MHz, -43.34 dBm
Display Line: -13 dBm; Limit Test Passed
Transducer Factors: A490
12/05/2005 18:49:51



Start 1.0 GHz; Stop 2.0 GHz
Ref 0 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 20.0 mS
Peak 1.91 GHz, 3.98 dBm
Display Line: -13 dBm;
Transducer Factors: 1 to 2
12/05/2005 19:59:33



Start 2.0 GHz; Stop 4.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.202 GHz, -49.51 dBm
Display Line: -13 dBm;
Transducer Factors: 2 to 4
12/05/2005 18:56:54



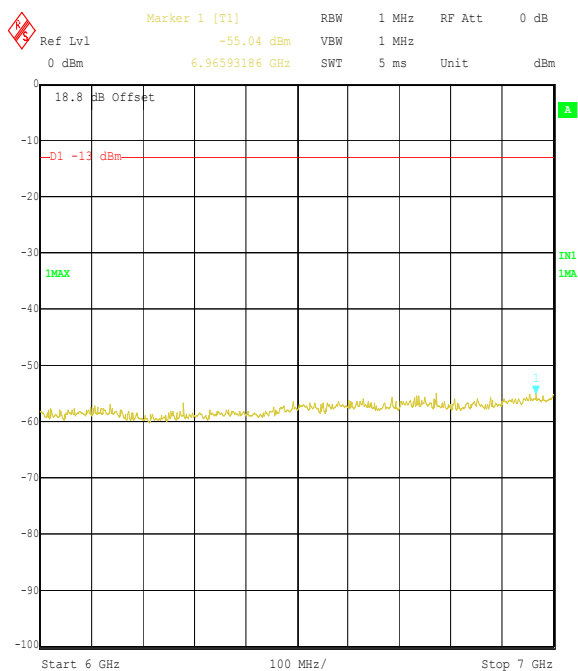
Title: 47271JD01 Satellite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 11.MAY.2005 20:08:50

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

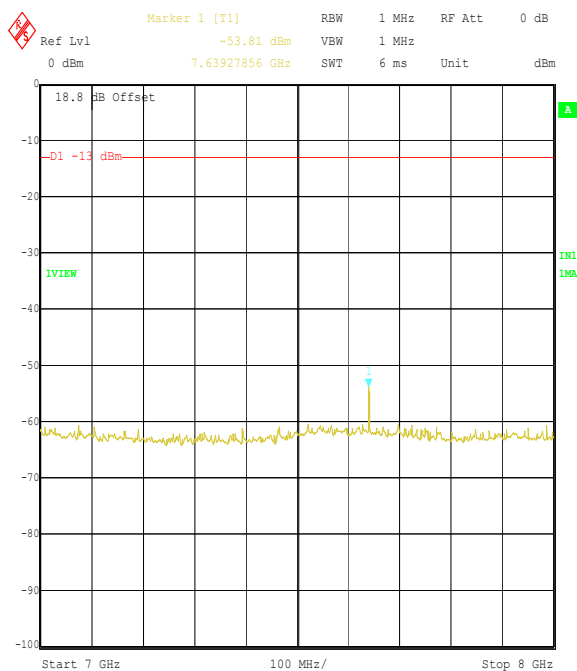
Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

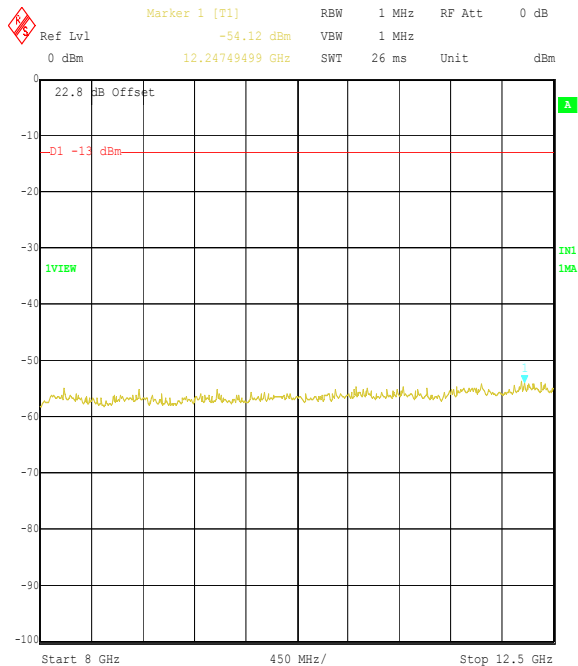
Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)



Title: 47271JD01 Satellite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 11.MAY.2005 20:36:40



Title: 47271JD01 Satellite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 11.MAY.2005 20:37:31

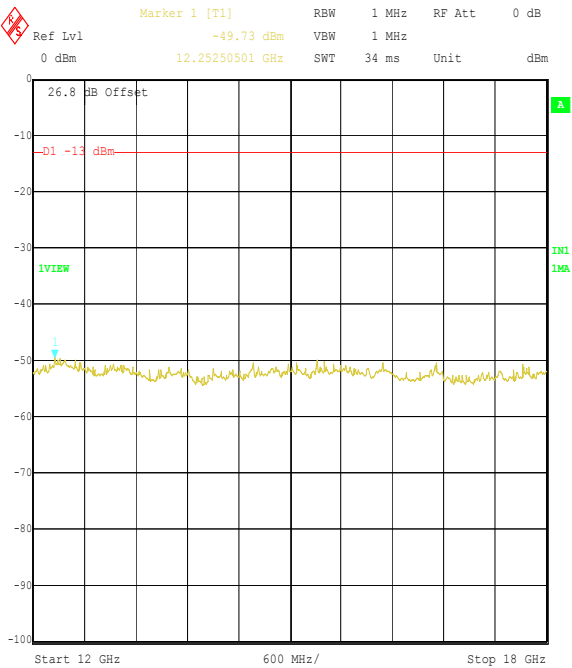


Title: 47271JD01 Satellite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 11.MAY.2005 20:39:57

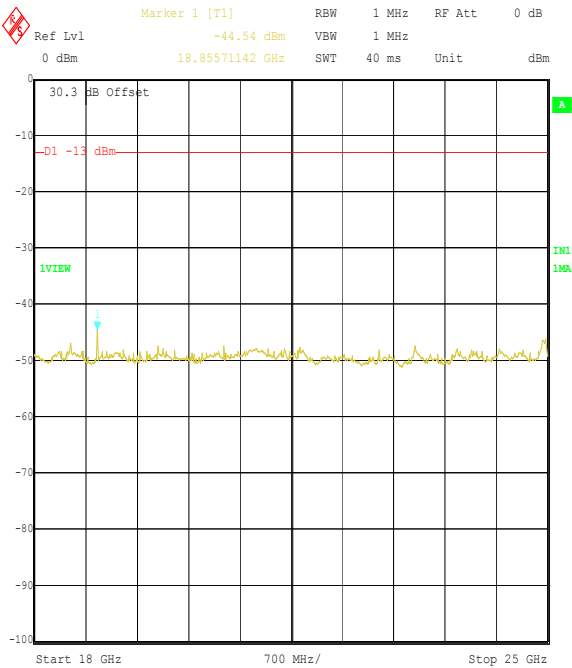
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test of: Satellite Tracking Of People LLC.
BlueTag3
To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)



Title: 47271JD01 Sattelite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 11.MAY.2005 20:45:26



Title: 47271JD01 Sattelite Tracking Of People FCC Part 24
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 11.MAY.2005 20:48:00

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

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)

Integrated Power Over 1 MHz Strip Band: 1911 to 1912 MHz

1st 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	387	6	164
2	268	7	156
3	186	8	179
4	331	9	239
5	122	10	287
Total Peak Power:		2319 nW/MHz	

Integrated Power Over 1 MHz Strip Band: 1912 to 1913 MHz

2nd 1 MHz block immediately outside adjacent frequency block

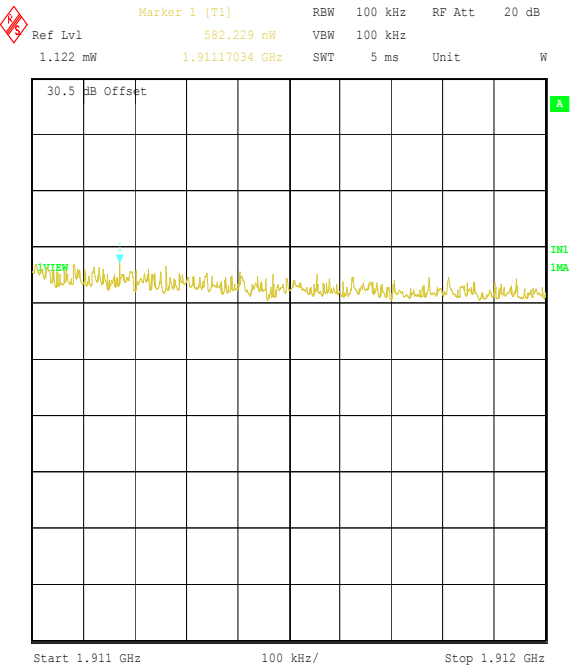
100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	136	6	97
2	109	7	162
3	107	8	113
4	110	9	123
5	128	10	99
Total Peak Power:		1184 nW/MHz	

Results:

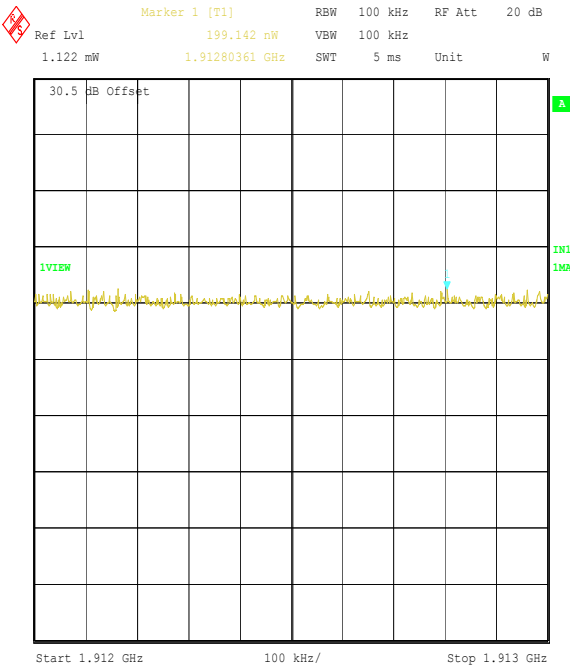
Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1911 to 1912	2319	-26.3	-13.0	13.3	Complied
1912 to 1913	1184	-29.3	-13.0	16.3	Complied

Test of: Satellite Tracking Of People LLC.
BlueTag3
To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)



Title: 47271JD01 Satellite Tracking of People EUT: Blutag 3
Comment A: FCC Part 24 Transmitter Out of Band Radiated Emissions
Date: 12.MAY.2005 21:40:00



Title: 47271JD01 Satellite Tracking of People EUT: Blutag 3
Comment A: FCC Part 24 Transmitter Out of Band Radiated Emissions
Date: 12.MAY.2005 21:43:23

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

7.3.9. Transmitter Radiated Emissions at Band Edges: Section 2.1053 & 24.238

The EUT was configured as for transmitter radiated emissions testing described in section 9 of this report.

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

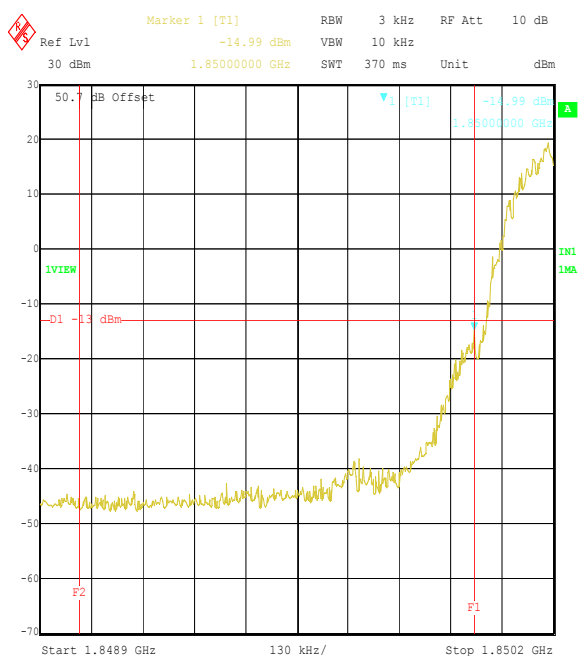
Results:

Bottom Band Edge

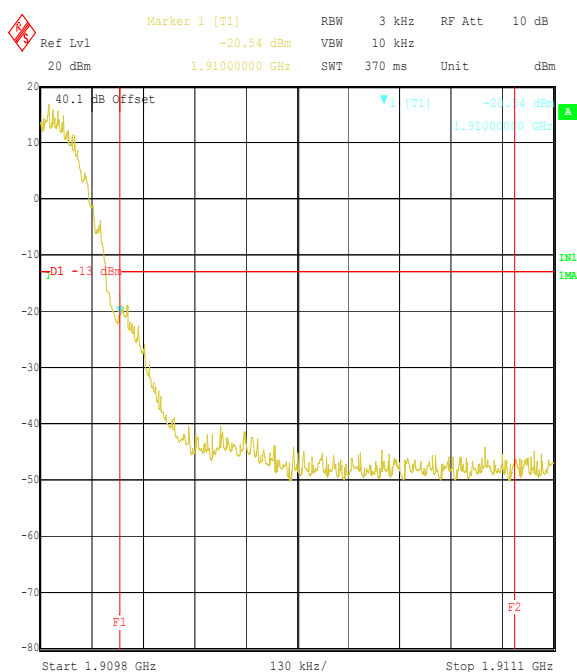
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-15.0	-13.0	2.0	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910	-20.5	-13.0	7.5	Complied



Title: 47271JD01 Satellite Tracking of People EUT: BlueTag3
Comment A: FCC Part 24 Transmitter Radiated Emissions at Bottom Band Edge
Date: 11.MAY.2005 21:35:12



Title: 47271JD01 Satellite Tracking of People EUT: BlueTag3
Comment A: FCC Part 24 Transmitter Radiated Emissions at Top Band Edge
Date: 11.MAY.2005 21:37:37

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

8. 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
Effective Radiated Power (ERP)	Not applicable	95%	±1.78 dB
Frequency Stability	Not applicable	95%	±20 Hz
Minimum Bandwidth	Not applicable	95%	±0.12%
Occupied Bandwidth	824 to 849 MHz	95%	± 0.12%
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 26 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.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

9. Measurement Methods

9.1. Effective Radiated Power (ERP)

ERP measurements were performed in accordance with the standard, against appropriate limits.

The ERP was measured with the EUT arranged on a non-conducting turntable on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4. The transmitter was fitted with an integral antenna; as such all radiated tests were performed with the unit operating into the integral antenna.

The level of the ERP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal plane. The EUT was oriented in the X plane. The test antenna was then raised and lowered until a maximum peak was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the vertical polarity.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For ERP measurements a dipole antenna was used. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The ERP was calculated as:-

$$\text{ERP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Effective Radiated Power (ERP) (Continued)

Circumstances where the signal generator could not produce the desired power substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The ERP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated ERP to obtain the substituted EUT ERP.

$$\text{Delta (dB)} = \text{EUT} - \text{SG}$$

Where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual ERP is calculated as:

$$\text{ERP SG} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

The EUT ERP is calculated as:

$$\text{ERP EUT} = \text{ERP SG} + \text{Delta.}$$

The test equipment settings for ERP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	≥ Emission Bandwidth
Amplitude Range:	100 dB
Sweep Time:	Coupled

Test of: Satellite Tracking Of People LLC.
BlueTag3
To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

9.2. FCC Part 2.1055: Frequency Stability

The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an access port.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30 to 50 °C.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions.

Measurements were made on the top and bottom channels.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

The frequency error measured was converted to an error in ppm using the following formula as defined by TIA_EIA_603A :-

$$\text{ppm error} = \left(\frac{MCF_{\text{MHz}}}{ACF_{\text{MHz}}} - 1 \right) * 10^6$$

where MCF_{MHz} is the measured carrier frequency in MHz
 ACF_{MHz} is the assigned carrier frequency in MHz

The measured ppm had to be less then the relevant limits in order to comply.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

9.3. Occupied Bandwidth

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function and a GSM test set via a bi-directional coupler to its antenna port.

Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels.

As the EUT is a PCS phone, no modulation input port was available. A call was thus set up using the PCS/GSM simulator and using normal modulation. The Occupied Bandwidth was measured in this configuration.

The occupied bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB or ESIB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the spectrum analyser user manual for this measurement, i.e., $RBW \geq 1\%$ of occupied bandwidth. A value of 3 kHz was used.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

9.4. AC Mains Conducted Emissions

AC mains conducted emission measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT was powered with 115V 60 Hz AC mains supplied via a line impedance stabilisation network (LISN).

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

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

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz	9 kHz
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

9.5. Transmitter Radiated Emissions

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency. The scans were performed within a screened chamber in order to identify frequencies on which the EUT was generating spurious. This procedure identified the frequencies from the EUT, which required further examination. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit by characterising the screen room using a known signal source set at exactly the same location as the EUT. The signal source was derived from either a horn antenna or a dipole dependant on the frequency band under investigation. Any levels within 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a peak detector was used for final measurements at each frequency recorded in the screen room.

The levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the vertical polarisation. 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. The procedure was repeated for the horizontal polarisation.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The radiated power was calculated as:-

$$\text{EIRP/ERP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Transmitter Radiated Emissions (Continued)

The limit in the standard states that emissions shall be attenuated by at least $43 + 10 \log (P)$ dB below the transmitter power (P), where (P) is the maximum measured fundamental power for the channel under test. This limit always reduces to -13dBm therefore, the limit line presented on the accompanying plots is set to -13dBm.

Any spurious measured were then compared to the -13dBm limit. The requirement is for the emission to be less than -13dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

It should be noted that FCC Part 22.917 states that the 1st MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found by calculating 1% of the bandwidth measured in the transmitter occupied bandwidth section of this report. The next largest available bandwidth above this calculated figure was, therefore, used i.e. 3 kHz.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

9.6. Receiver Radiated Emissions

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to the upper frequency detailed in Section 15.33(b) were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT, which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit. Levels within 20dB of this limit were measured where possible, on occasion, the receiver noise floor came within the 20dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a quasi peak detector was used for measurements below 1000 MHz, for measurements above 1000 MHz average and peak detectors were used.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. 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. The procedure was repeated for the vertical polarisation.

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

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

Receiver Function	Initial Scan	Final Measurements <1GHz	Final Measurements ≥1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz <1GHz) (1MHz ≥1GHz)	120 kHz	1 MHz (If applicable)
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A028	Horn Antenna	Eaton	91888-2	304
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A059	3146 Log Periodic Antenna	EMCO	3146	8902-2378
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A1069	ESH3-Z5	Rohde & Schwarz	ESH3-Z5	837469/012
A1360	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	A1360-20112003
A1362	Eaton	Stoddart Aircraft Radio Co., Inc.	91889-1	N/A
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A258	Zenith Variable Power Supply	Zenith Electric	SVA 10	None
A259	Bilog Antenna	Chase	CBL6111	1513
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A428	WG 12 horn	Flann	12240-20	134
A429	WG 16 horn	Flann	16240-20	561
A430	WG 18 horn	Flann	18240-20	425
A436	WG 20 horn	Flann	20240-20	330
A553	Bi-log Antenna	Chase	CBL6111A	1593
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None
L0753	Anritsu	Anritsu	MT8820A	6K00000633
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M028	FSB Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RF), 860 161/007 (Display)

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M090	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001
M1093	Will tek	Will tek	4202S	0513018
M1124	Rohde & Schwarz	Rohde & Schwarz	ESIB26	100046K
M128	Fluke 76 DVM	Fluke	76	65340273
M165	Thermocouple Meter	RS Components	206-3738	63101536
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
M505	Analyser Display Unit	Rohde & Schwarz	ESAI-D	825316/010
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990
S207	Site 7	RFI	7	330
S209	Site 9	RFI	9	
S212	Site 12	RFI	12	

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

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

Appendix 2. Test Configuration Drawings

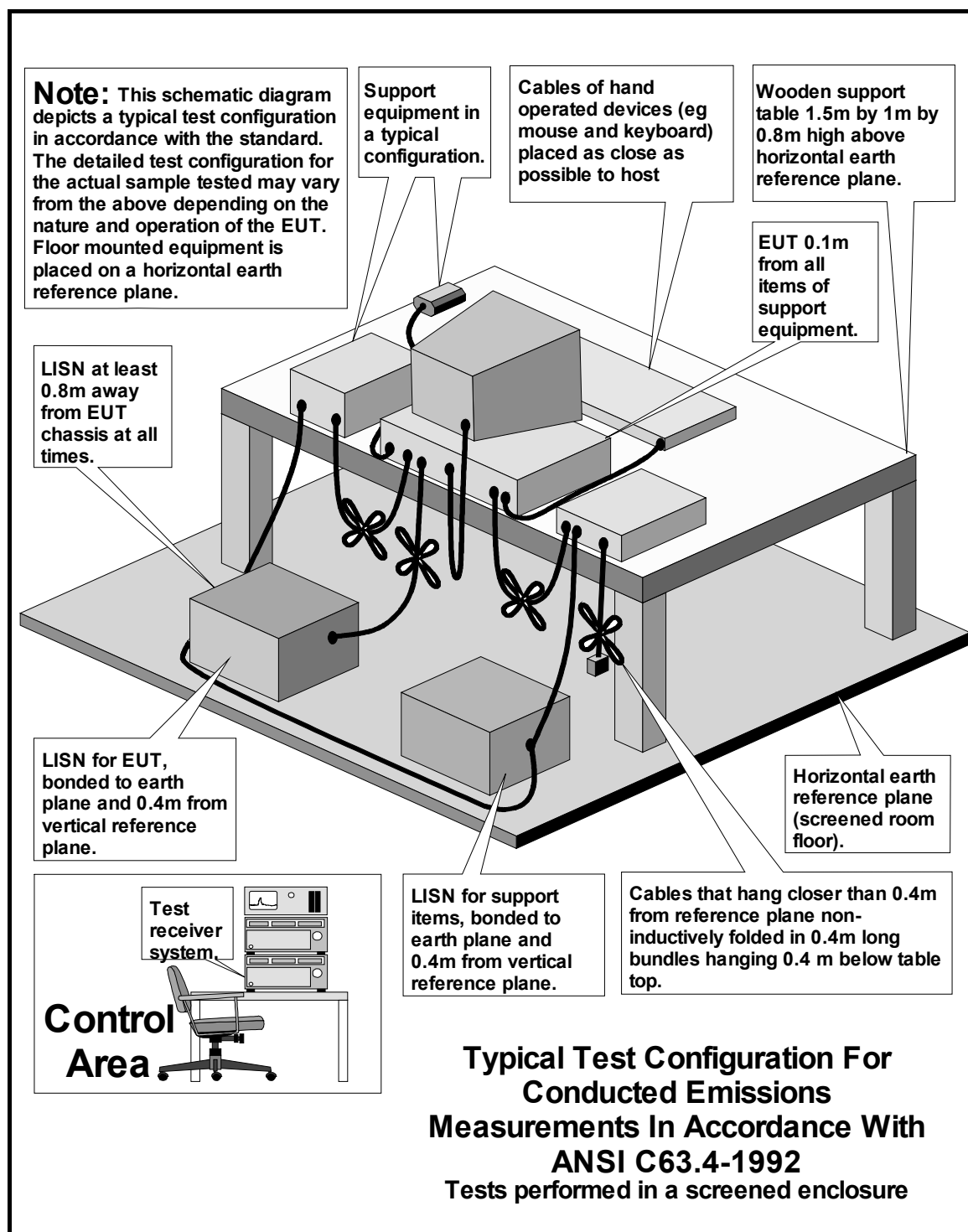
This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47271JD01\EMICON	Test configuration for measurement of conducted emissions.
DRG\47271JD01\EMIRAD	Test configuration for measurement of radiated emissions.

Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

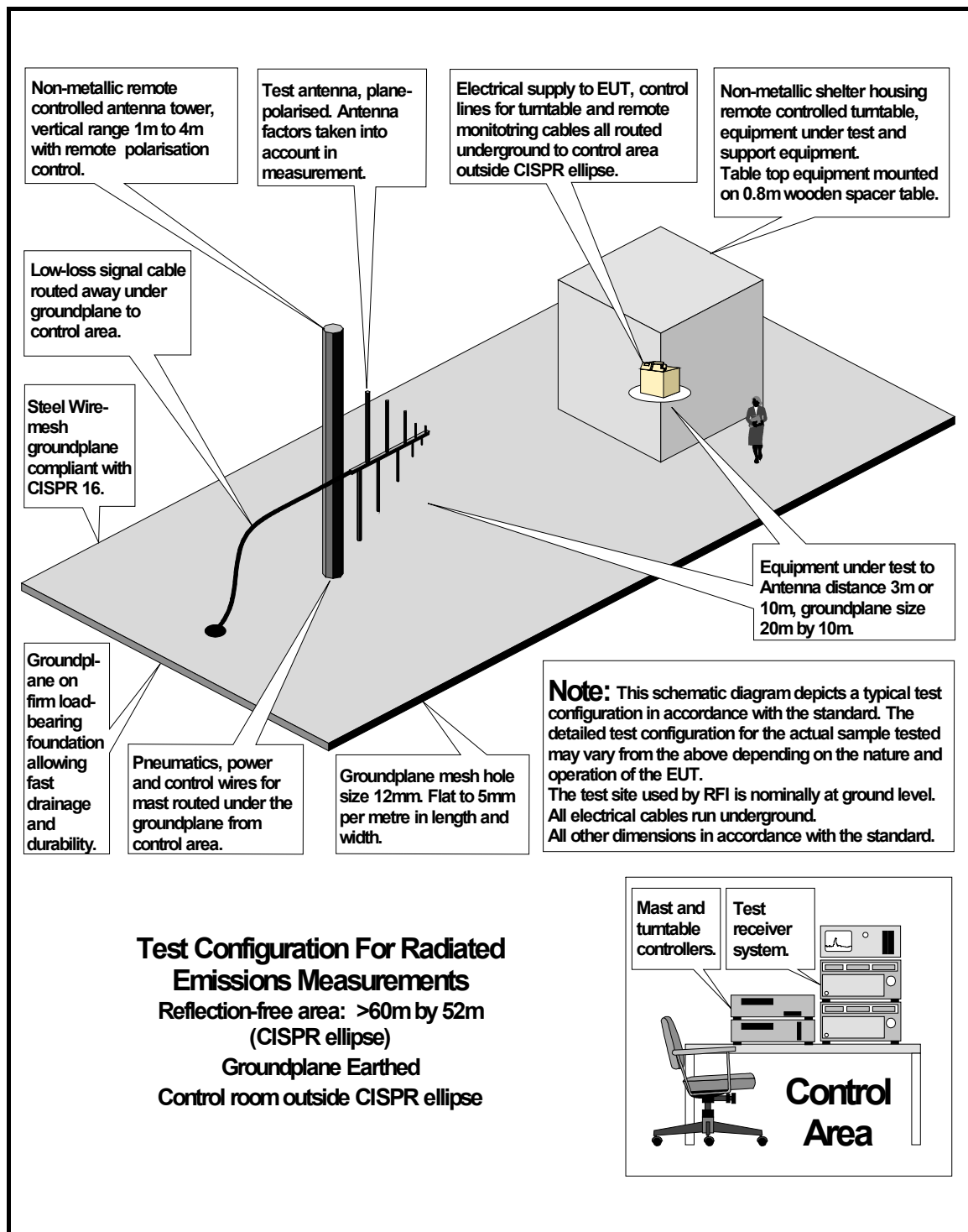
DRG\47271JD01\EMICON



Test of: Satellite Tracking Of People LLC.
BlueTag3

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

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**Test of: Satellite Tracking Of People LLC.
 BlueTag3**

To: FCC Part 22: 2004 (Subpart H) and FCC Part 24 (Subpart E): 2002

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