




## TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Nextlink. To AS  
Bluespoon Spider

To: FCC Part 15.247: 2005 (Subpart C)

**Test Report Serial No:**  
RFI/MPTE2/RP47521JD03A

**Supersedes Test Report Serial No:**  
RFI/MPTE1/RP47521JD03A

<b>This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager:</b>   pp	
<b>Tested By: Raul Recio</b>   pp	<b>Checked By: Steven Wong</b>   pp
<b>Report Copy No: PDF01</b>	
<b>Issue Date: 20 June 2006</b>	<b>Test Dates: 14 February 2006 to 01 March 2006 and 06 June 2006 to 08 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

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## **1. Client Information**

<b>Company Name:</b>	Nextlink. To AS
<b>Address:</b>	Sandtofen 10 Gentofte 2820 Denmark
<b>Contact Name:</b>	Mr F Kabashi

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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:	Nextlink (Stereo Headset)
Model Name or Number:	Bluespoon Spider
Serial Number:	Not Stated
FCC ID Number:	QNYNXLSPIDER
Country of Manufacture:	China
Date of Receipt:	14 February 2006

### **2.2. Accessories**

The following accessories were supplied with the EUT:

Description:	Power Supply
Brand Name:	None Stated
Model Name or Number:	FW 7600U/06
Serial Number:	0605
Cable Length and Type:	1.5m, 2 Core Cable
Connected to Port:	EUT DC Input

### **2.3. Description of EUT**

The equipment under test is a *Bluetooth*<sup>®</sup> Stereo Headset.

### **2.4. Modifications Incorporated in EUT**

During the course of testing the EUT was not modified.

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## 2.5. Additional Information Related to Testing

Power Supply Requirement:	Internal battery supply of 4.2 V		
Intended Operating Environment:	Residential and Commercial		
Equipment Category:	Bluetooth Transceiver		
Type of Unit:	Portable (Standalone battery powered device)		
Transmit Frequency Range:	2400 MHz to 2483.5 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	2402
	Middle	40	2441
	Top	79	2480
Receive Frequency Range:	2400 MHz to 2483.5 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	2402
	Middle	40	2441
	Top	79	2480
Maximum Power Output (EIRP)	7.7 dBm		

## 2.6. Port Identification

Port	Description	Type/Length	Applicable
1	DC Input	Not Applicable	Y

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## **2.7. Support Equipment**

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

<b>Description:</b>	Interface Board
<b>Brand Name:</b>	CSR Development Port
<b>Model Name or Number:</b>	DEV-PC-1309C
<b>Serial Number:</b>	140897
<b>Cable Length and Type:</b>	Direct connection to an 18 pin interface (the 18 pin interface is discarded during testing after the Bluetooth test mode is enabled)
<b>Connected to Port:</b>	Bluetooth test mode interface

<b>Description:</b>	Laptop PC
<b>Brand Name:</b>	Dell
<b>Model Name or Number:</b>	Latitude D610
<b>Serial Number:</b>	CN-OD4571-48643-544-5681
<b>Cable Length and Type:</b>	1.5m Unshielded Standard RS232 Cable and 1m Ethernet cable (This is only used for enabling the Bluetooth test mode. The ports are disconnection during testing)
<b>Connected to Port:</b>	RS232 serial port and Ethernet port

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### **3. Test Results**

Reference:	FCC Part 15.247: 2005 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR22) (Intentional Radiators operating within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz)

#### **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.

DA00-705 (2000)

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

#### **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.

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

None.

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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.

For all transmit mode measurements the *Bluetooth* test mode was active and set to transmit on top, middle and bottom channels and hopping on all channels as necessary with the longest data packet size.

Receive mode measurements were performed with the EUT in *Bluetooth* mode and in its normal search mode.

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

The EUT was tested in the following configuration:

The AC / DC adaptor was plugged to the EUT during all tests.

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

Range of Measurements	Specification Reference	Port Type	Compliance Status
Idle Mode AC Conducted Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2005 Section 15.107	AC Mains	Complied
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2005 Section 15.109	Antenna	Complied
Transmitter AC Conducted Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2005 Section 15.207	AC Mains	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 15: 2005 Section 15.247(a)(1)	Antenna	Complied
Transmitter Carrier Frequency Separation	C.F.R. 47 FCC Part 15: 2005 Section 15.247(a)(1)	Antenna	Complied
Transmitter Average Time of Occupancy	C.F.R. 47 FCC Part 15: 2005 Section 15.247(a)(1)(iii)	Antenna	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2005 Section 15.247(b)(1)	Antenna	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2005 Sections 15.247(d) & 15.209(a)	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2005 Sections 15.247(d) & 15.209(a)	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 and RFI Global Services Ltd, Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG.

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## **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.

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## **7.2. Test Results**

### **7.2.1. 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 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 $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.17596	Neutral	44.13	64.67	20.54	Complied
0.18894	Neutral	43.22	64.08	20.86	Complied
0.39471	Neutral	40.02	57.96	17.94	Complied
0.45988	Neutral	36.46	56.69	20.23	Complied

##### **Average Detector Measurements on Live and Neutral Lines**

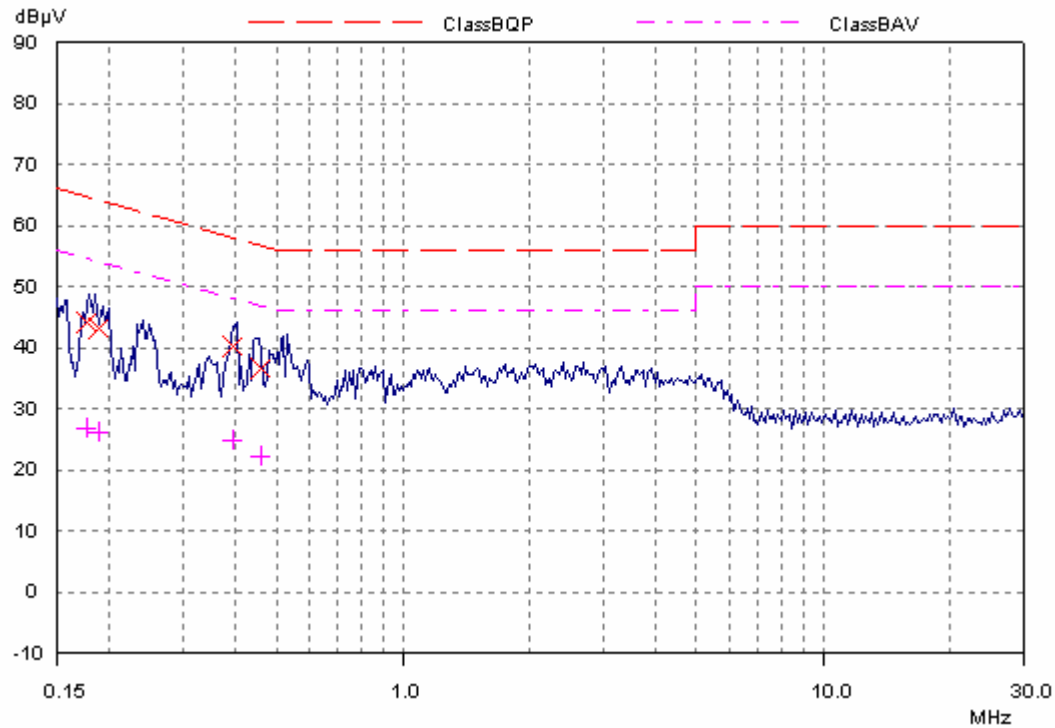
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.17596	Neutral	26.81	54.67	27.86	Complied
0.18894	Neutral	25.98	54.08	28.10	Complied
0.39471	Neutral	24.73	47.96	23.23	Complied
0.45988	Neutral	21.99	46.69	24.70	Complied

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**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.*

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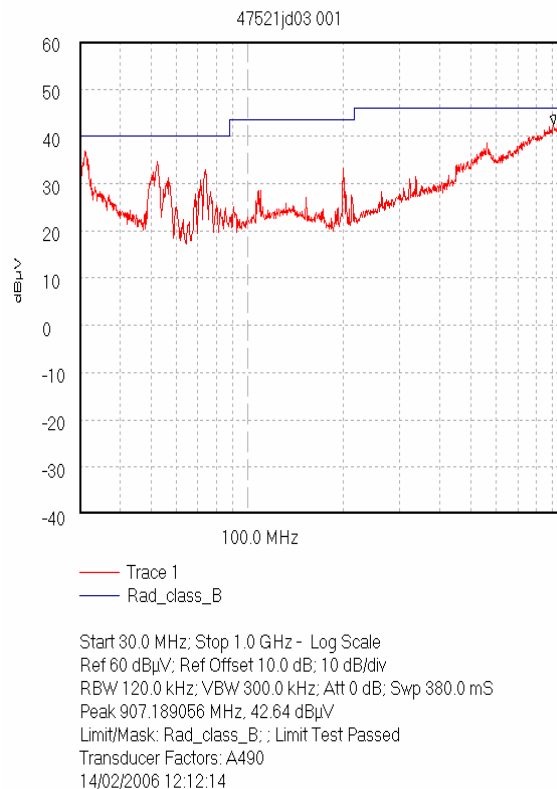
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### **7.2.2. Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)**

The EUT was configured as for 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	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
31.372	Vert.	27.9	40.0	12.1	Complied
52.172	Vert.	28.5	40.0	11.5	Complied
74.138	Vert.	18.9	40.0	21.1	Complied
198.372	Horiz.	23.0	40.0	17.0	Complied



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

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**7.2.3. Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz)**

**Results:**

**Highest Peak Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level** (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.761111*	Vert.	10.8	31.1	41.9	74.0	10.8	Complied

**Highest Average Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level** (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.761111*	Vert.	10.8	31.1	41.9	54.0	12.1	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 receiving was recorded as shown in the table above.

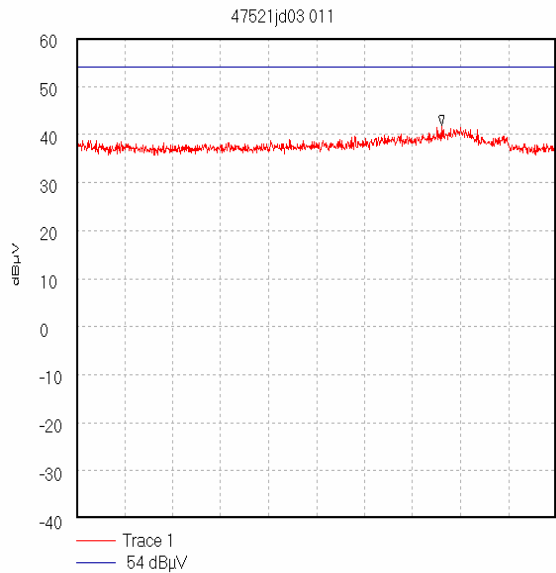
\*\*. The peak noise level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

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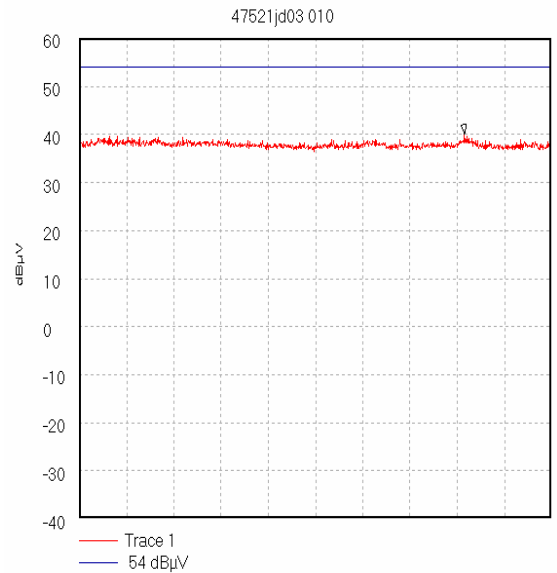


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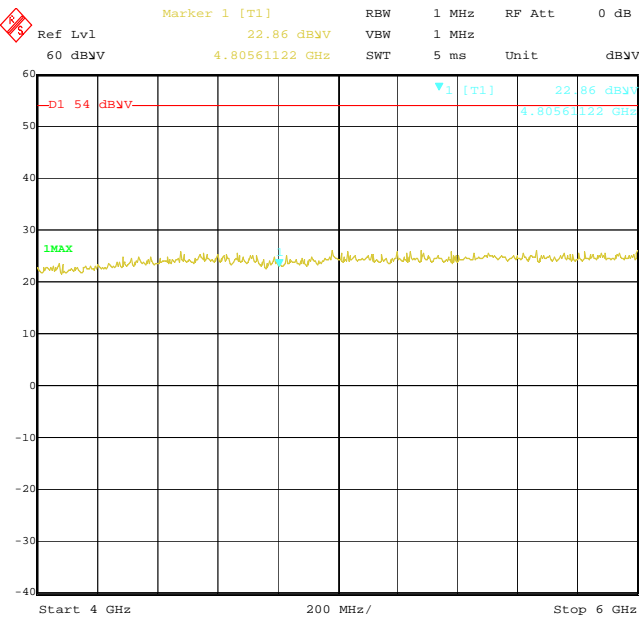
Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz) (Continued)



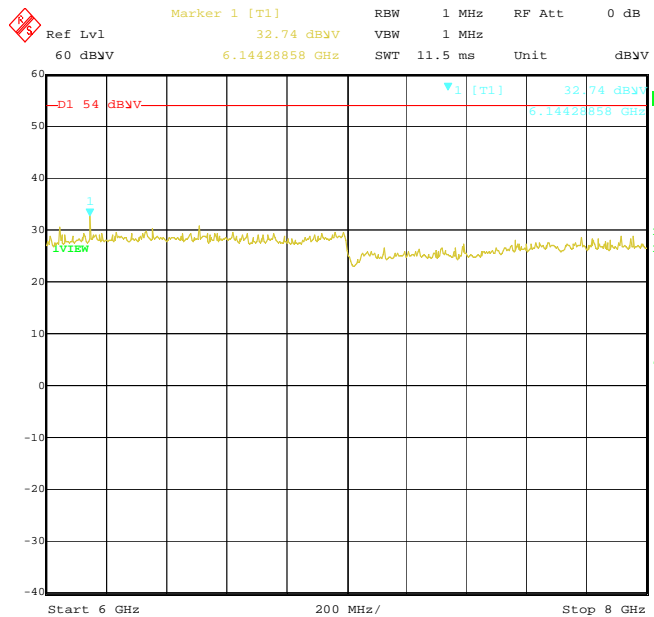
Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.761111 GHz, 41.87 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
Transducer Factors: 1 to 2  
14/02/2006 16:34:30



Start 2.0 GHz; Stop 4.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 3.631111 GHz, 40.12 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
Transducer Factors: 2 to 4  
14/02/2006 15:52:46



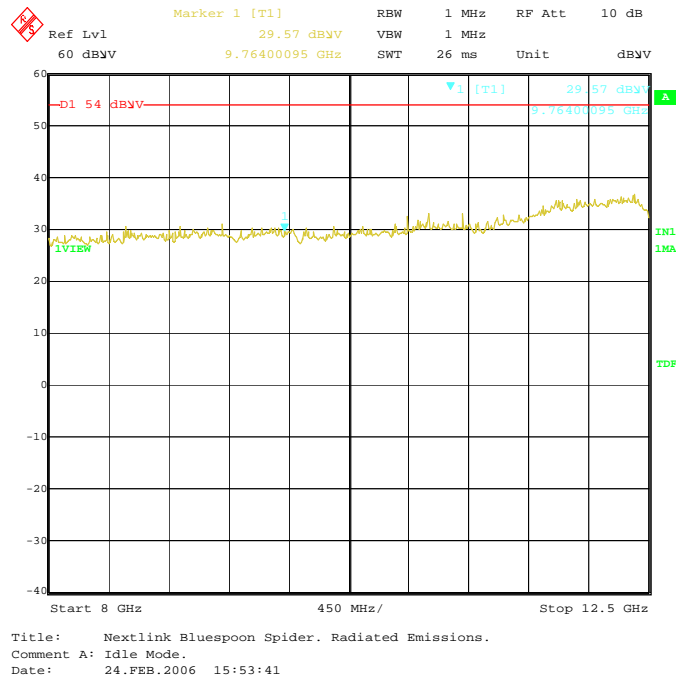
Title: Nextlink Bluespoon Spider. Radiated Emissions.  
Comment A: Idle Mode.  
Date: 24.FEB.2006 12:15:57



Title: Nextlink Bluespoon Spider. Radiated Emissions.  
Comment A: Idle Mode.  
Date: 24.FEB.2006 14:31:56

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Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz) (Continued)



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

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#### **7.2.4. Transmitter AC Conducted Spurious Emissions: Section 15.207**

The EUT was configured 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: Top Channel**

##### **Quasi-Peak Detector Measurements on Live and Neutral Lines**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.16086	Neutral	44.99	65.42	20.43	Complied
0.18663	Neutral	44.69	64.19	19.50	Complied
0.26029	Neutral	38.49	61.42	22.93	Complied
0.39914	Neutral	41.95	57.87	15.92	Complied
0.45871	Neutral	38.72	56.72	18.00	Complied

##### **Average Detector Measurements on Live and Neutral Lines**

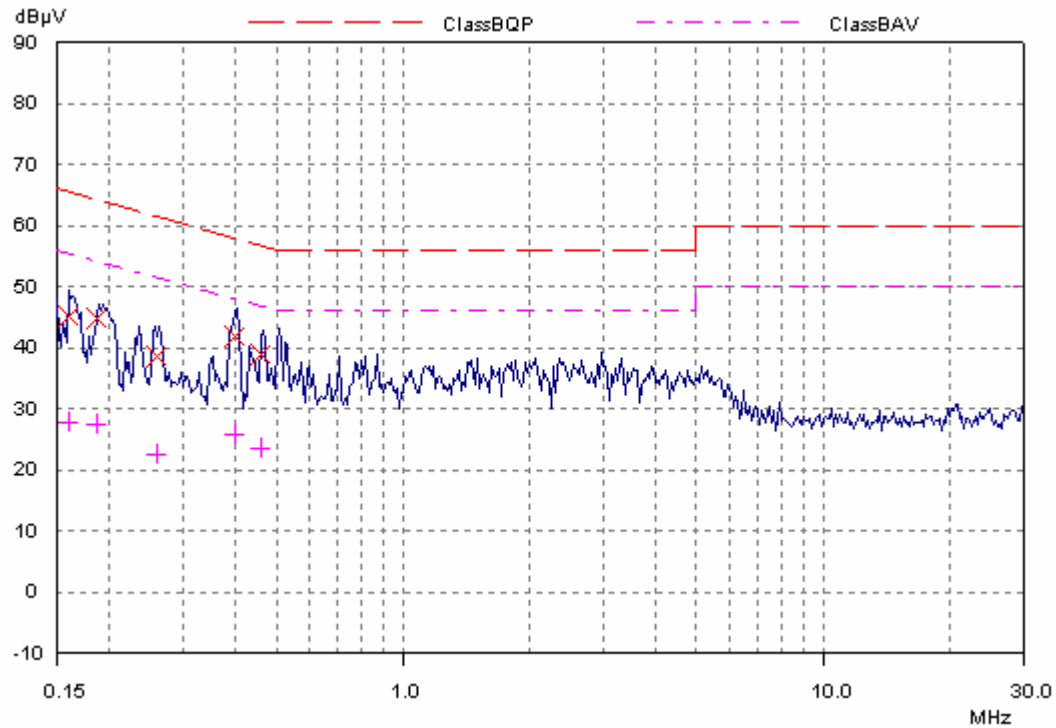
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.16086	Neutral	27.60	55.42	27.82	Complied
0.18663	Neutral	27.37	54.19	26.82	Complied
0.26029	Neutral	22.57	51.42	28.85	Complied
0.39914	Neutral	25.64	47.87	22.23	Complied
0.45871	Neutral	23.49	46.72	23.23	Complied

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**Transmitter AC Conducted Spurious Emissions: Section 15.207 (Continued)**



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

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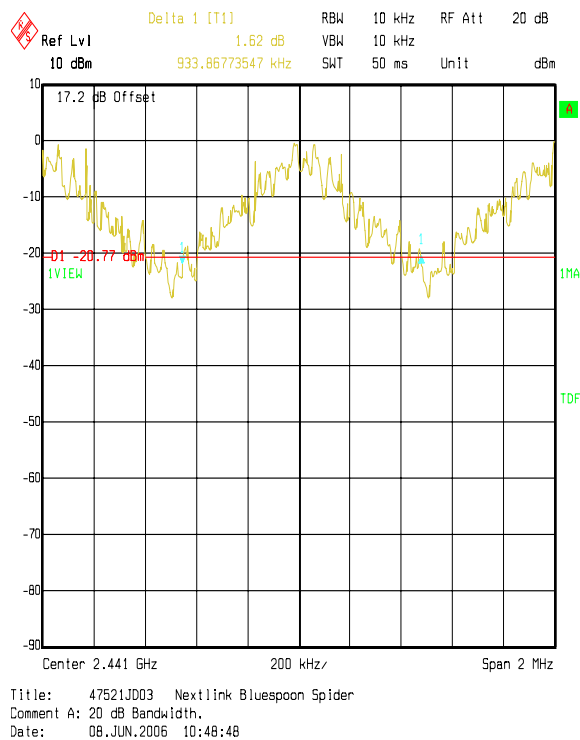
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### 7.2.5. Transmitter 20 dB Bandwidth: Section 15.247(a)(1)

The EUT was configured for 20 dB bandwidth measurements as described in section 9 of this report. Tests were performed to identify the 20 dB bandwidth.

### Results:

Transmitter 20 dB Bandwidth (kHz)	Limit (kHz)
933.868	None specified



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

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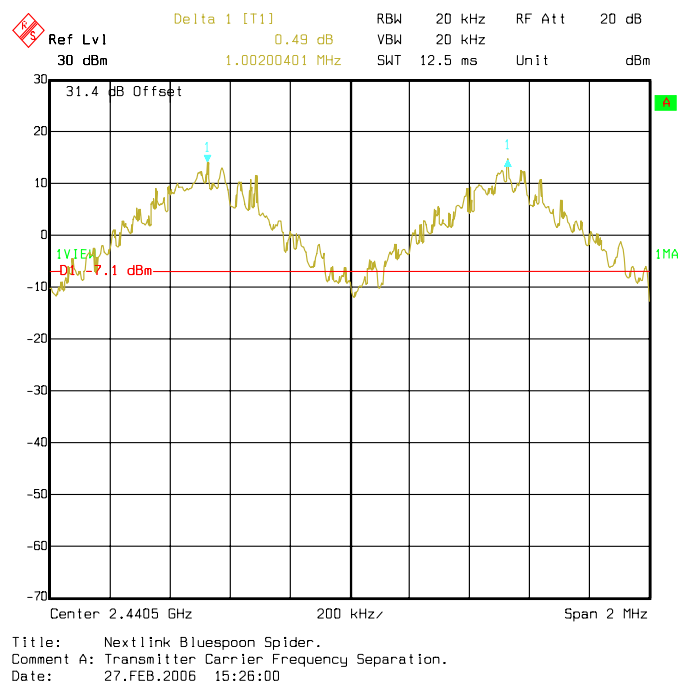
### 7.2.6. Transmitter Carrier Frequency Separation: Section 15.247(a)(1)

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

Tests were performed to identify the carrier frequency separation.

### Results:

Transmitter Carrier Frequency Separation (kHz)	Limit (> 20 dB BW) (kHz)	Margin (kHz)	Result
1002.004	885.772	116.232	Complied



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

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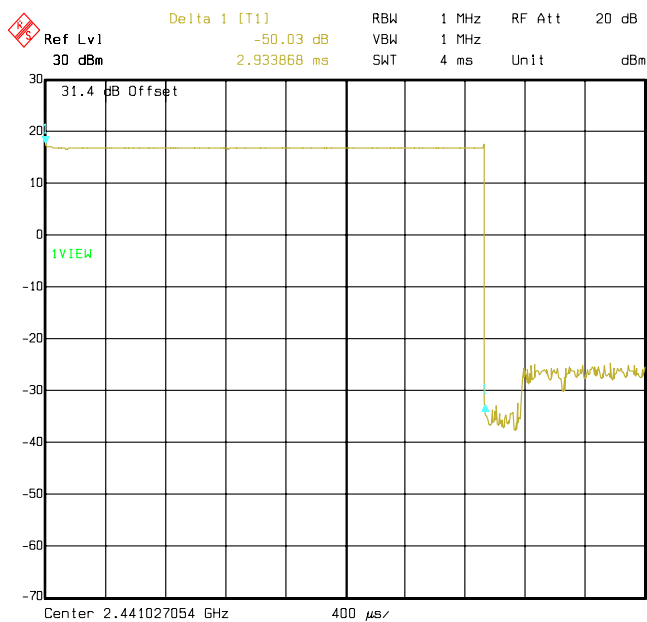
### 7.2.7. Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii)

The EUT was configured for average time of occupancy measurements as described in section 9 of this report.

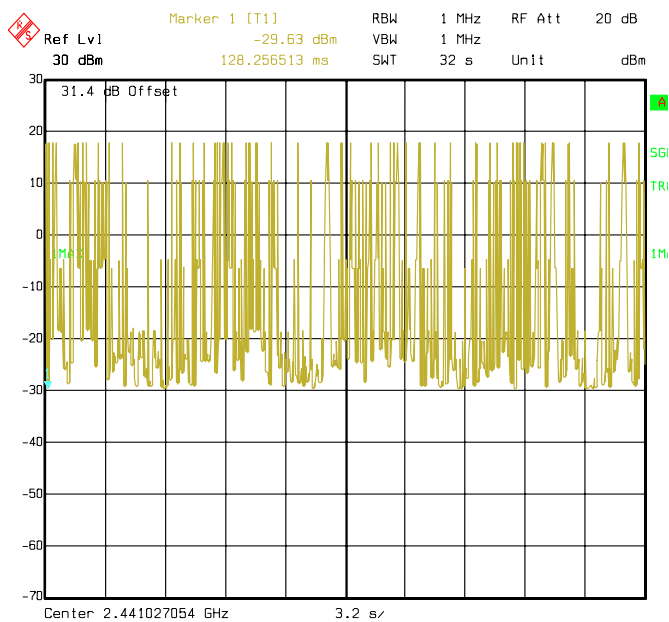
Tests were performed to identify the average time of occupancy in number of channels (79) x 0.4 seconds. The calculated period is 31.6 seconds.

#### Results:

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2933.868	66	0.194	0.4	0.206	Complied



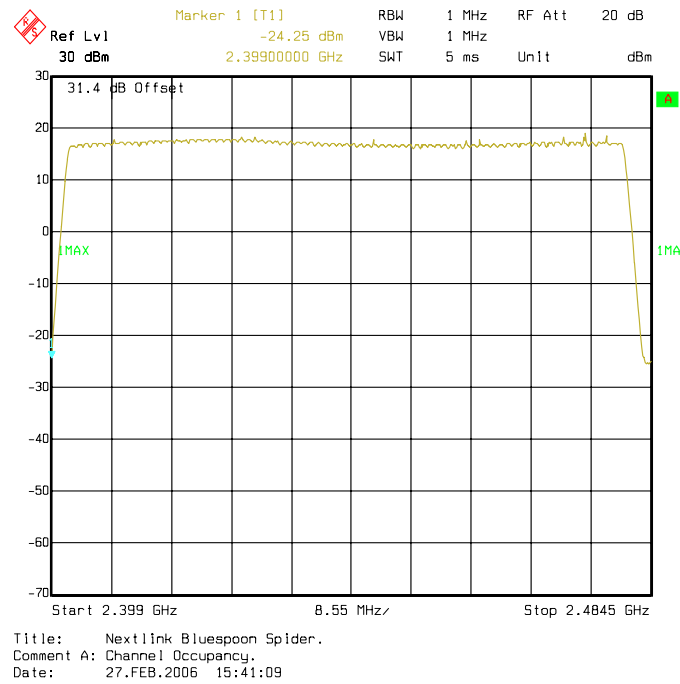
Title: Nextlink Bluespoon Spider.  
 Comment A: Emission Width  
 Date: 27.FEB.2006 15:30:50



Title: Nextlink Bluespoon Spider.  
 Comment A: Number of hops in 32s  
 Date: 27.FEB.2006 15:34:23

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Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii) (Continued)



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



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**7.2.8. Transmitter Maximum Peak Output Power: Section 15.247(b)(1)**

The EUT was configured for transmitter peak output power measurements as described in section 9 of this report.

Tests were performed to identify the transmitter maximum peak output power (ERP) of the EUT.

**Results:****Battery Powered**

Channel	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	7.7	30.0	22.3	Complied
Middle	6.3	30.0	23.7	Complied
Top	5.7	30.0	24.3	Complied

**AC Powered**

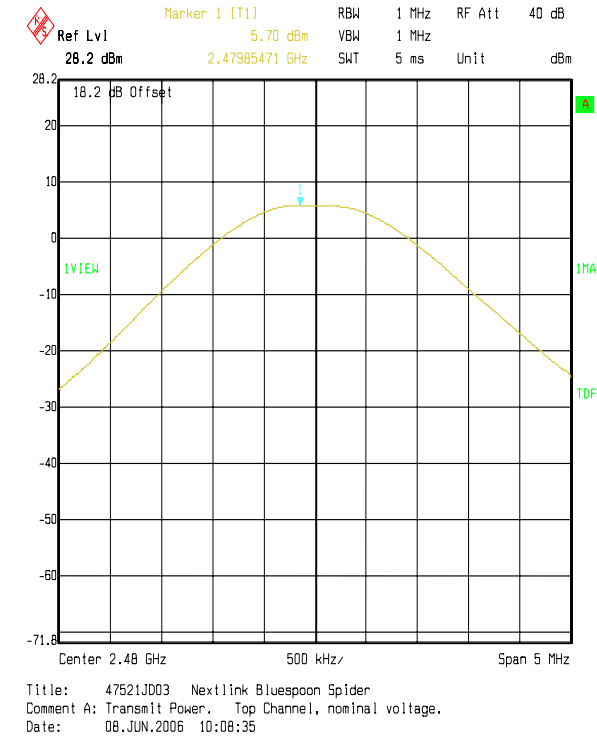
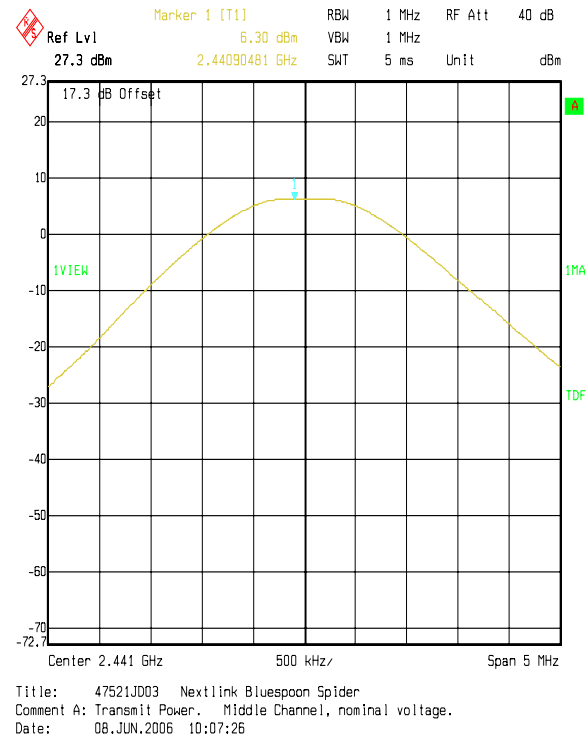
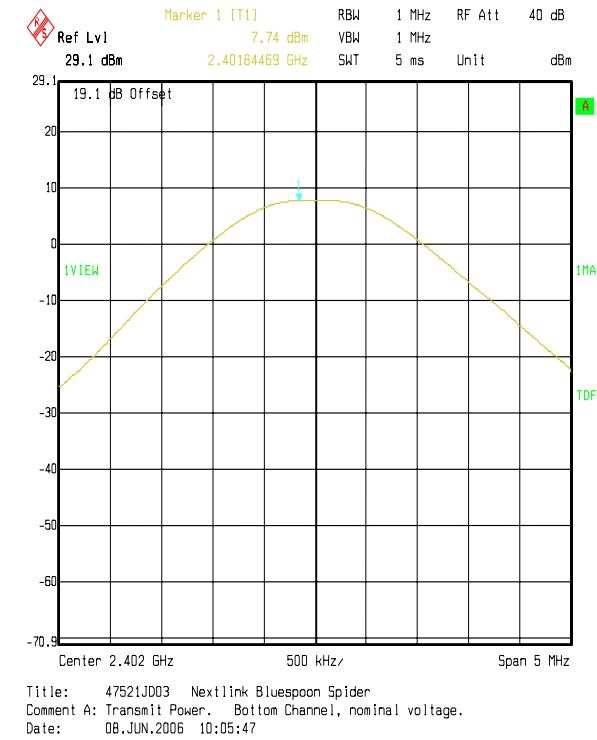
Channel	Input Voltage (AC)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	93.5	7.7	30.0	22.3	Complied
Bottom	110.0	7.7	30.0	22.3	Complied
Bottom	126.5	7.7	30.0	22.3	Complied
Middle	93.5	6.3	30.0	22.7	Complied
Middle	110.0	6.3	30.0	22.7	Complied
Middle	126.5	6.3	30.0	22.7	Complied
Top	93.5	5.7	30.0	24.3	Complied
Top	110.0	5.7	30.0	24.3	Complied
Top	126.5	5.7	30.0	24.3	Complied

**Note(s):**

1. These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.
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Transmitter Maximum Peak Output Power: Section 15.247(b)(1) (Continued)



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**7.2.9. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)****Electric Field Strength Measurements: 30 to 1000 MHz (emissions occurring in the restricted bands)**

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

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

**Results:****Top Channel**

Frequency (MHz)	Antenna Polarity	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
73.950	Vert.	19.5	40.0	20.5	Complied

**Note(s):**

1. The preliminary scans showed similar emission levels for each mode below 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to hopping mode only.
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**Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)****Electric Field Strength Measurements: 30 to 1000 MHz (emissions outside the restricted bands)**

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

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

**Results:****Top Channel**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
33.310	Vert.	26.9	93.6	66.7	Complied
49.400	Vert.	35.8	93.6	57.8	Complied
211.980	Horiz.	21.5	93.6	72.1	Complied

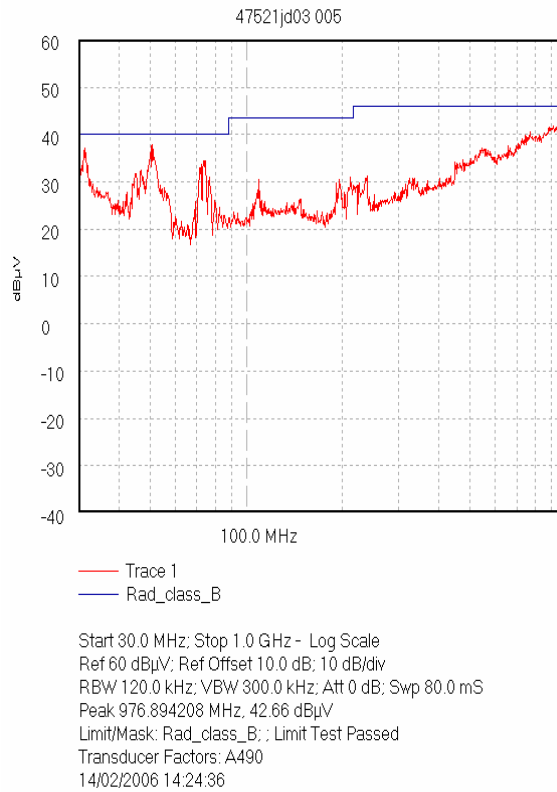
**Note(s):**

2. The preliminary scans showed similar emission levels for each mode below 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to hopping mode only.
-

Test of: Nextlink. To AS  
Bluespoon Spider  
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**Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)**



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

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Test of: Nextlink. To AS  
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### **Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)**

#### **Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in the restricted bands)**

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

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

#### **Results:**

##### **Highest Peak Level: Bottom Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Vert.	18.7	28.4	47.1	74.0	26.9	Complied
2.384047	Vert.	21.5	31.3	52.8	74.0	21.2	Complied
4.803846	Vert.	66.7	-16.0	50.7	74.0	23.3	Complied

##### **Highest Average Level: Bottom Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Vert.	7.4	28.4	35.8	54.0	18.2	Complied
2.384047	Vert.	4.8	31.3	36.1	54.0	17.7	Complied
4.803846	Vert.	46.8	-16.0	30.8	54.0	23.2	Complied

##### **Highest Peak Level: Middle Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Vert.	18.4	28.4	46.8	74.0	28.2	Complied
2.384047	Vert.	17.7	31.3	49.1	74.0	24.9	Complied
4.881729	Vert.	66.0	-16.0	50.4	74.0	23.6	Complied
7.323265	Vert.	69.3	-17.0	52.3	74.0	21.7	Complied

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Bluespoon Spider  
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**Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)**

**Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in the restricted bands) (Continued)**

**Highest Average Level: Middle Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Vert.	7.0	28.4	35.4	54.0	18.6	Complied
2.384047	Horiz.	5.7	31.3	37.0	54.0	17.0	Complied
4.881729	Vert.	46.7	-16.0	30.7	54.0	23.3	Complied
7.323265	Vert.	48.8	-17.0	31.8	54.0	22.2	Complied

**Highest Peak Level: Top Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Vert.	21.8	28.4	50.2	74.0	23.8	Complied
2.384047	Vert.	22.4	31.3	53.7	74.0	20.3	Complied
4.959622	Vert.	66.4	-15.7	50.7	74.0	23.3	Complied
7.439618	Vert.	69.3	-16.8	52.5	74.0	21.5	Complied

**Highest Average Level: Top Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Horiz.	10.2	28.4	38.6	54.0	15.4	Complied
2.384047	Vert.	7.8	31.3	39.1	54.0	14.9	Complied
4.959622	Vert.	46.2	-15.7	30.5	54.0	23.5	Complied
7.439618	Vert.	48.4	-16.8	31.6	54.0	22.4	Complied

**Highest Peak Level: Hopping Mode**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Horiz.	19.1	28.4	47.5	74.0	26.5	Complied
2.384047	Vert.	21.8	31.3	53.1	74.0	20.9	Complied
4.871636	Vert.	66.5	-16.0	50.5	74.0	23.5	Complied

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**Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)**

**Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in the restricted bands) (Continued)**

**Highest Average Level: Hopping Mode**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.654012	Horiz.	5.7	28.4	24.1	54.0	19.9	Complied
2.384047	Vert.	6.5	31.3	37.8	54.0	16.2	Complied
4.871636	Vert.	34.6	-16.0	18.6	54.0	35.4	Complied

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Test of: Nextlink. To AS  
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### **Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)**

#### **Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions outside the restricted bands)**

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

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

#### **Results:**

##### **Highest Peak Level: Bottom Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
7.205721	Vert.	69.3	-17.0	52.3	93.6	41.3	Complied
9.607960	Vert.	69.1	-13.6	55.5	93.6	38.1	Complied
14.412194	Vert.	52.8	-4.4	48.4	93.6	45.2	Complied

##### **Highest Peak Level: Middle Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
9.764001	Vert.	69.1	-13.6	55.5	93.6	38.1	Complied
14.646343	Vert.	58.4	-4.7	53.7	93.6	39.9	Complied

##### **Highest Peak Level: Top Channel**

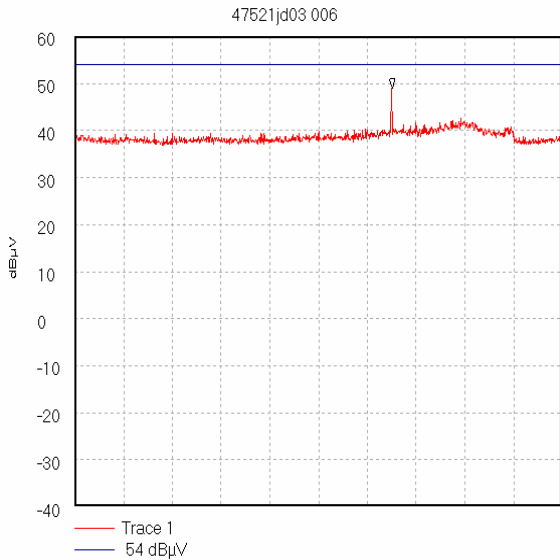
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
9.919717	Vert.	67.3	-13.9	53.4	93.6	40.2	Complied
14.879761	Vert.	52.5	-5.3	47.2	93.6	46.4	Complied

##### **Highest Peak Level: Hopping Mode**

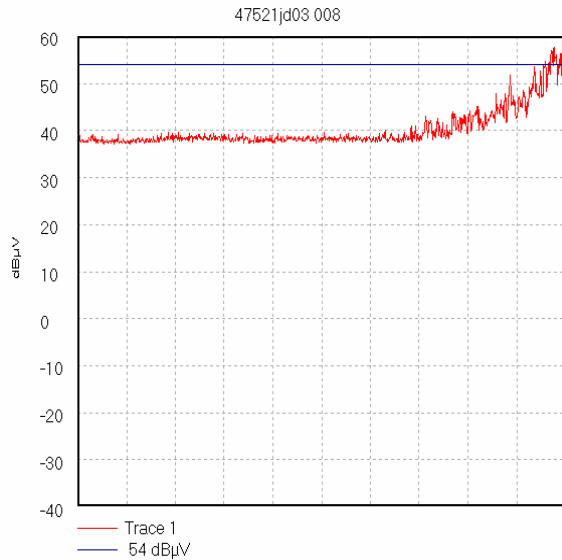
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
7.223276	Vert.	68.9	-17.0	51.9	93.6	41.7	Complied
9.808635	Vert.	34.1	-13.6	20.5	93.6	73.1	Complied
14.555082	Vert.	51.5	-4.4	47.1	93.6	46.5	Complied

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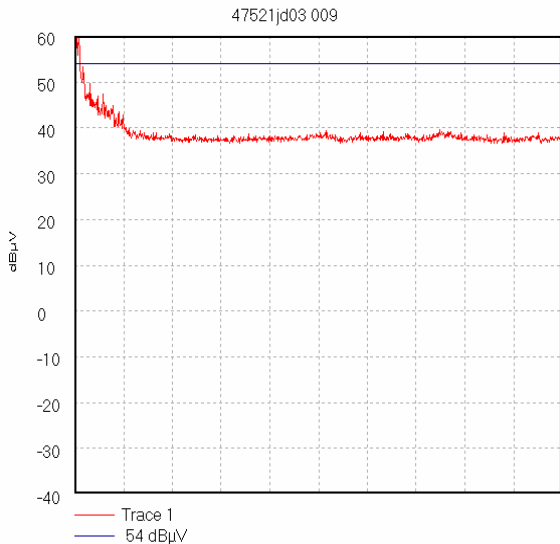
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



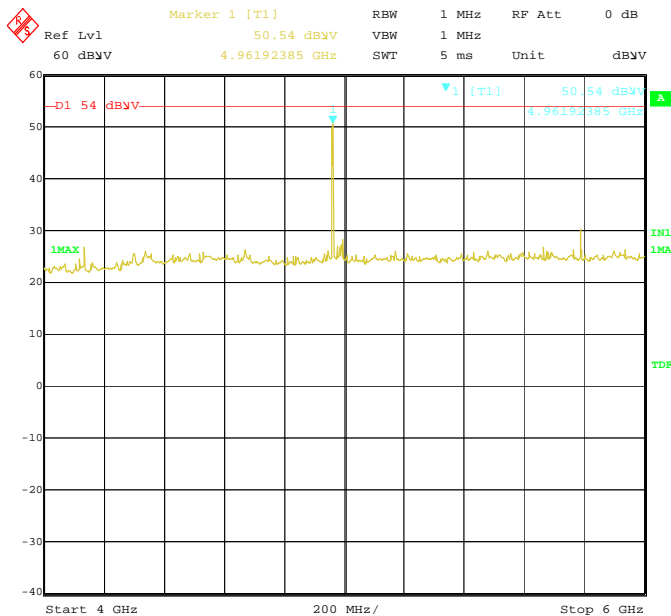
Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.651111 GHz, 49.01 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
Transducer Factors: 1 to 2  
14/02/2006 15:16:30



Start 2.0 GHz; Stop 2.4 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 2.398222 GHz, 59.52 dBµV  
Display Line: 54 dBµV; ; Limit Test Failed  
Transducer Factors: 2 to 4  
14/02/2006 15:39:24



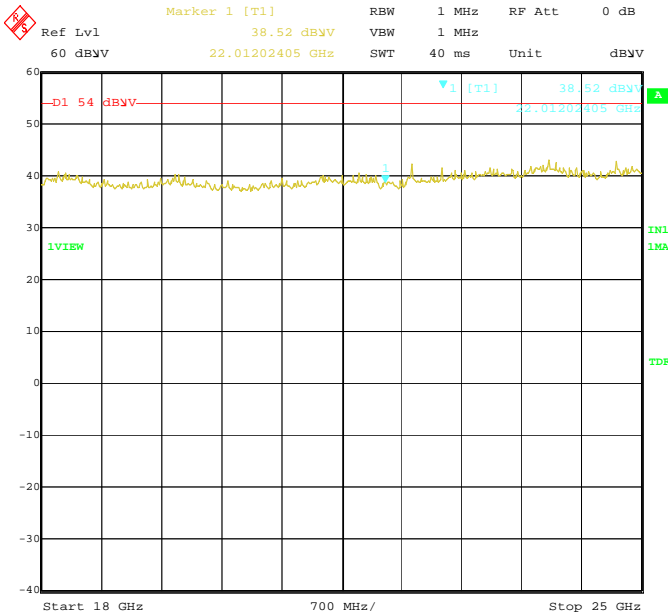
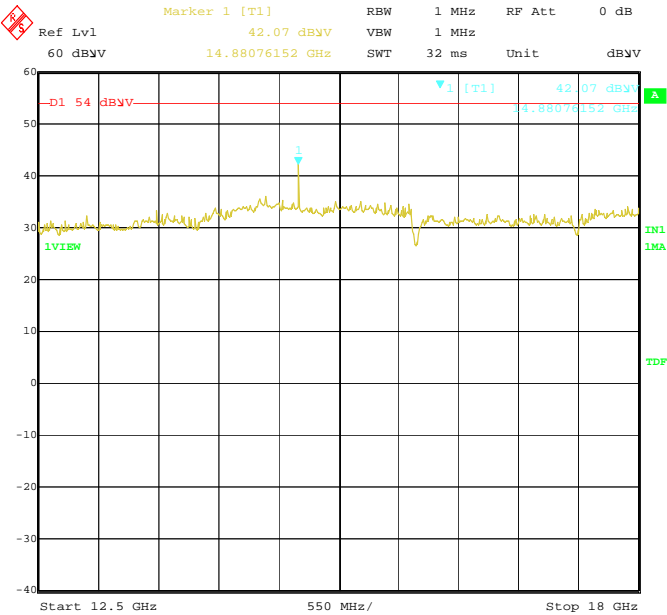
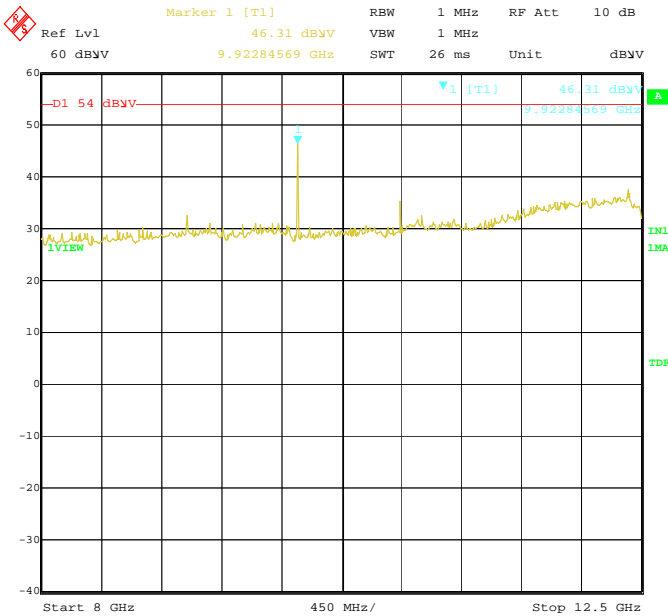
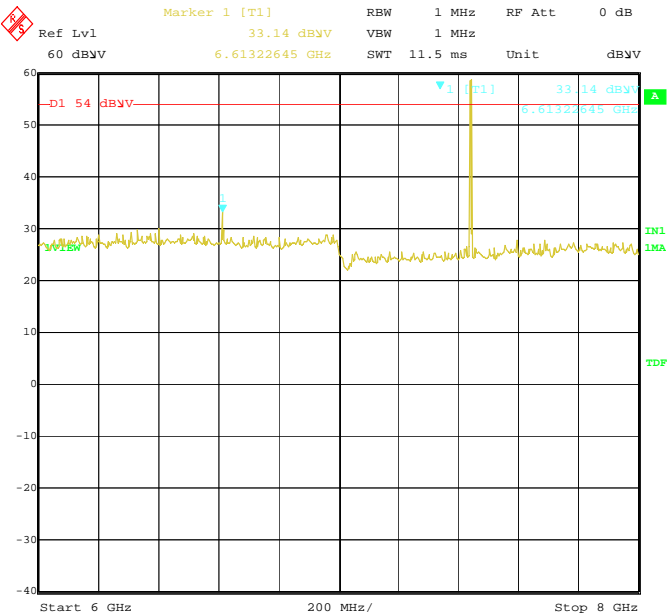
Start 2.4835 GHz; Stop 4.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 2.485185 GHz, 63.98 dBµV  
Display Line: 54 dBµV; ; Limit Test Failed  
Transducer Factors: 2 to 4  
14/02/2006 15:45:58



Title: Nextlink Bluespoon Spider. Radiated Emissions.  
Comment A: Tx Top Channel.  
Date: 24.FEB.2006 12:18:49

Test of: Nextlink. To AS  
Bluespoon Spider  
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Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



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

Test of: Nextlink. To AS  
Bluespoon Spider  
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**7.2.10. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a)****Electric Field Strength Measurements**

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

Tests were performed to identify the maximum radiated band edge emissions.

**Results:****Peak Power Level Hopping Mode:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4000	Vert.	22.3	31.3	53.6	85.1*	31.5	Complied
2.4835	Vert.	30.4	31.3	61.7	74.0	12.3	Complied

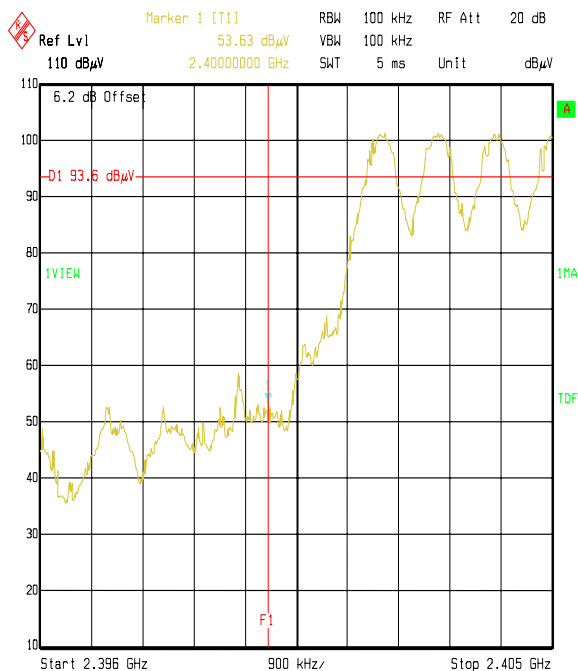
\*-20 dBc limit

**Average Power Level Hopping Mode:**

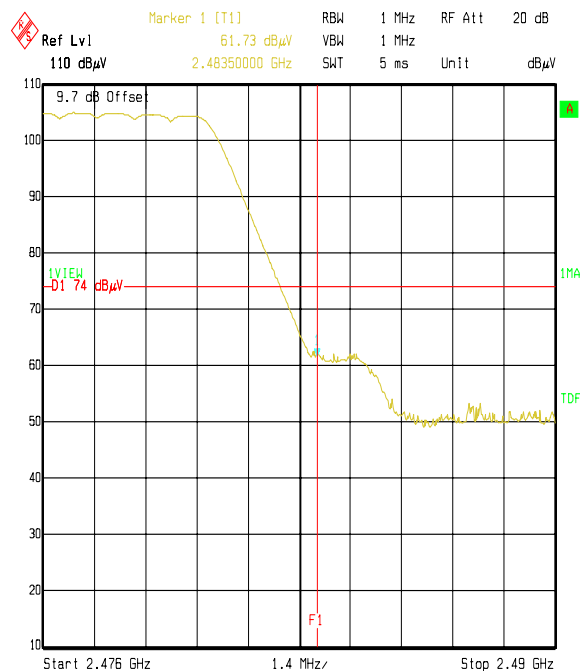
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4835	Vert.	1.7	31.3	33.0	54.0	21.0	Complied

---

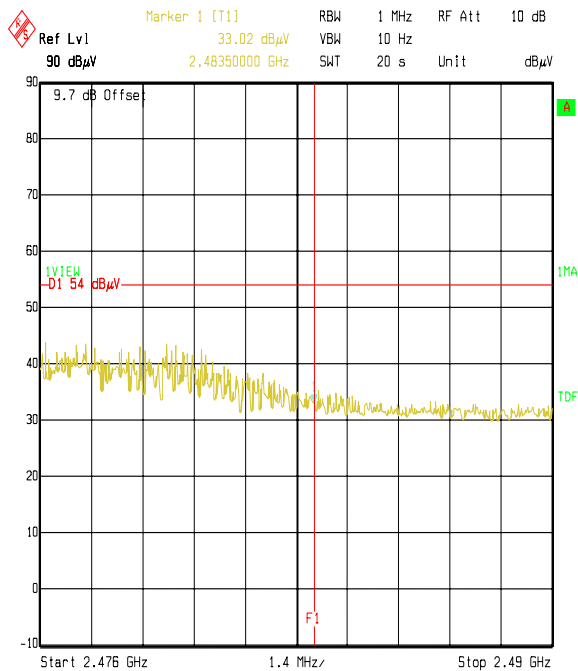
Test of: Nextlink. To AS  
Bluespoon Spider  
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**Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) (Continued)**

Title: 47521JD03 Nextlink Bluespoon Spider  
Comment A: Band Edge Emissions, Bottom Channel. Hopping ON.  
Date: 08.JUN.2006 10:42:37



Title: 47521JD03 Nextlink Bluespoon Spider  
Comment A: Band Edge Emissions, Pk. Top Channel. Hopping ON.  
Date: 08.JUN.2006 10:25:34



Title: 47521JD03 Nextlink Bluespoon Spider  
Comment A: Band Edge Emissions, Ave. Top Channel. Hopping ON.  
Date: 08.JUN.2006 10:23:56

Test of: Nextlink. To AS  
Bluespoon Spider  
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**7.2.11. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a)**

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

Tests were performed to identify the average radiated band edge emissions.

**Results:****Peak Power Level Static Mode:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4000	Vert.	22.9	31.3	54.2	85.1*	30.9	Complied
2.4835	Vert.	31.7	31.3	63.0	74.0	11.0	Complied

\*-20 dBc limit

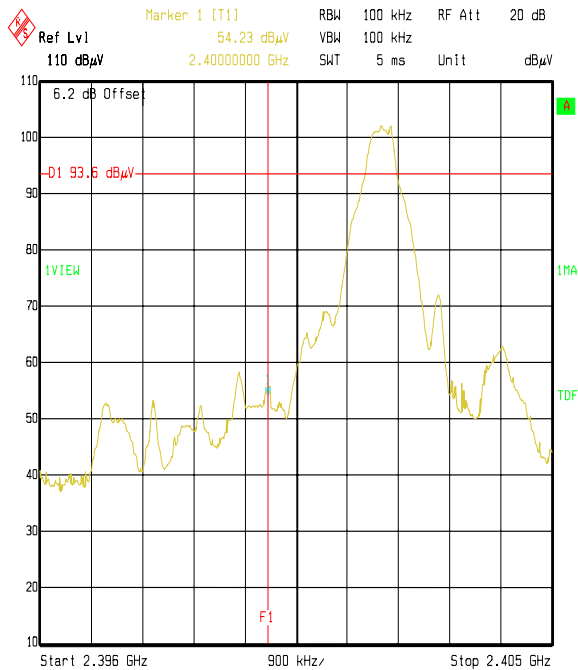
**Average Power Level Static Mode:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Antenna Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4835	Vert.	10.9	31.3	42.2	54.0	11.8	Complied

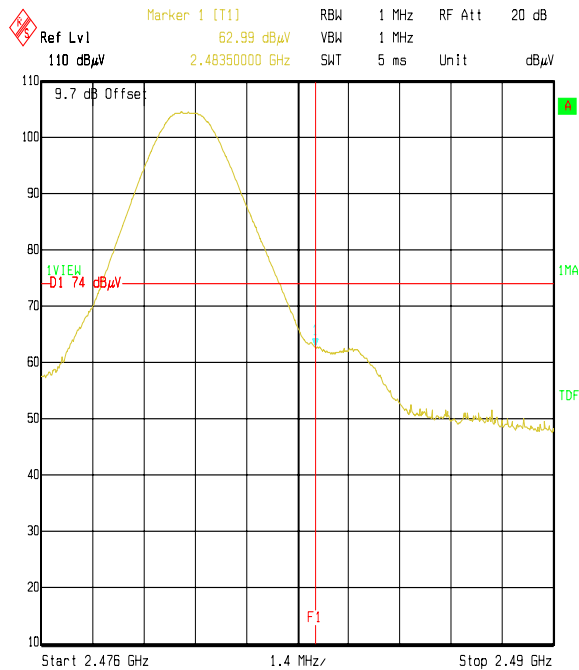
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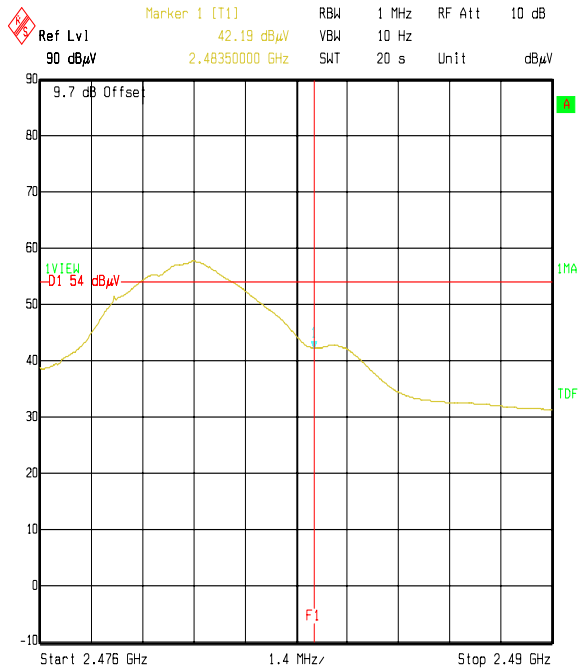
Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) (Continued)



Title: 47521JD03 Nextlink Bluespoon Spider  
Comment A: Band Edge Emissions. Bottom Channel. Hopping OFF.  
Date: 08.JUN.2006 10:39:55



Title: 47521JD03 Nextlink Bluespoon Spider  
Comment A: Band Edge Emissions. Top Channel. Hopping OFF.  
Date: 08.JUN.2006 10:16:29



Title: 47521JD03 Nextlink Bluespoon Spider  
Comment A: Band Edge Emissions. Ave. Top Channel. Hopping OFF.  
Date: 08.JUN.2006 10:20:48

Test of: Nextlink. To AS  
Bluespoon Spider  
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## **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
Transmitter Maximum Peak Output Power	Not applicable	95%	±2.94 dB
Conducted Emissions Antenna Port	30 MHz to 40 GHz	95%	±2.62 dB
Transmitter Carrier Frequency Separation	Not applicable	95%	±0.01 ppm
Transmitter Average Time of Occupancy	Not applicable	95%	±10 %
20 dB Bandwidth	Not applicable	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

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.

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## **9. Measurement Methods**

### **9.1. AC Mains Conducted Emissions**

AC mains conducted emissions 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 110V 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

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## **9.2. 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.

Where an emission fell inside a restricted band, measurements were made at the appropriate test distance using a measuring receiver with a quasi peak detector for measurements below 1000 MHz and an average and peak detector for measurements above 1000 MHz. A peak detector was used for all other measurements.

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.

All measurements on the open area test site were performed using broadband antennas in both vertical and horizontal polarisations.

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.

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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 <1 GHz	Final Measurements ≥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

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### **9.3. Carrier Frequency Separation / 20 dB Bandwidth**

The EUT and spectrum analyser was configured as for radiated measurements, and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine the bandwidth and separation of each transmission channel the measurement analyser was configured to measure two adjacent channels whilst the EUT was in hopping mode. The spectrum analyser was configured with a resolution bandwidth and video bandwidth greater than 1% of the frequency span.

The analyser was set for a maximum hold scan to capture the profile of the signal. The peak points on the two adjacent channels were noted and the separation between them recorded.

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 line intercepted the power envelope of the emission.

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#### **9.4. Average Time of Occupancy**

The EUT and spectrum analyser was configured as for radiated measurements, and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

First the maximum packet length was determined on the centre channel.

The measurement analyser was configured to the time domain mode by setting the span to zero with a sweep time sufficiently wide enough to measure one pulse.

The EUT was configured to operate in normal mode of operation. The pulse width of one transmission was then recorded. The measurement analyser was then configured in zero span i.e. in the time domain and the sweep time was set to 32 seconds (the closest allowable setting to 31.6 seconds). This 31.6 second period was determined by multiplying the number of channels the device operates over (79) by 0.4 seconds.

The number of transmissions within this period was noted and multiplied by the pulse width recorded earlier. This gives the maximum occupancy over 31.6 seconds.

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### **9.5. Peak Output Power**

The EUT and spectrum analyser were configured as for conducted antenna port measurements and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

Prior to testing being performed a suitable RF attenuator and cable, were calibrated for the required frequencies. For each frequency to be measured, the calibrated level of the attenuator and cable were entered as an offset into a spectrum analyser to compensate for the measurement set up.

To determine the transmitter output power, the EUT was operated at maximum power and a result was obtained from the spectrum analyser using peak detector and trace max hold.

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### **9.6. Effective Isotropic Radiated Power (EIRP)**

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

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

The level of the EIRP 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 horn antenna. 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 EIRP was calculated as:-

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

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**Effective Isotropic Radiated Power (EIRP) (Continued)**

Circumstances where the signal generator could not produce the desired a 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 EIRP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated EIRP to obtain the substituted EUT EIRP.

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

where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

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

The EUT EIRP is calculated as:

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

The test equipment settings for EIRP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

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### **9.7. Band Edge Compliance of RF Radiated Emissions**

The EUT and spectrum analyser were configured as for radiated measurements and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine band edge compliance, the analyser resolution bandwidth was set to  $\geq 1\%$  of the analyser span. The video bandwidth was set to be  $\geq$  to the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

A plot of the lower band edge of the allocated frequency band was produced. A marker was set to the level of the highest in band emission with a limit line set to 20 dB below this. The marker was then placed on the highest out of band emission (the specification states that either the band edge level must be measured or the highest out of band emission, whichever is the greater). The plots show that the highest out of band emission complies with the -20 dBc limit.

The above procedure was then repeated for the upper band edge except that, as the upper band edge fell on a restricted band edge (as defined in section 15.205(a)), the limit for the restricted band was applied instead of the -20 dBc limit i.e. the general limits defined in section 15.209(a).

Final measurements were performed on the worst-case configuration as described in Part 15.31(i).

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### **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	Horn Antenna	Eaton	91889-2	557
A1227	Pre Amplifier	Agilent	8449B	3008A01566
A1361	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	A1361-20112003
A1362	Horn Antenna	Stoddart	91889-1	N/A
A255	Horn Antenna	Flann	16240-20	519
A259	Bilog Antenna	Chase	CBL6111	1513
A428	Horn Antenna	Flann	12240-20	134
A442	Horn Antenna	Narda	645	8608
A553	Bi-log Antenna	Chase	CBL6111A	1593
L0799	AC Power Supply	Kikusui	PCR 1000LA	JA002944
M090	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K
M1149	Bluetooth Test Set	Anritsu	MT8852A	6K00001529
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986_022
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.

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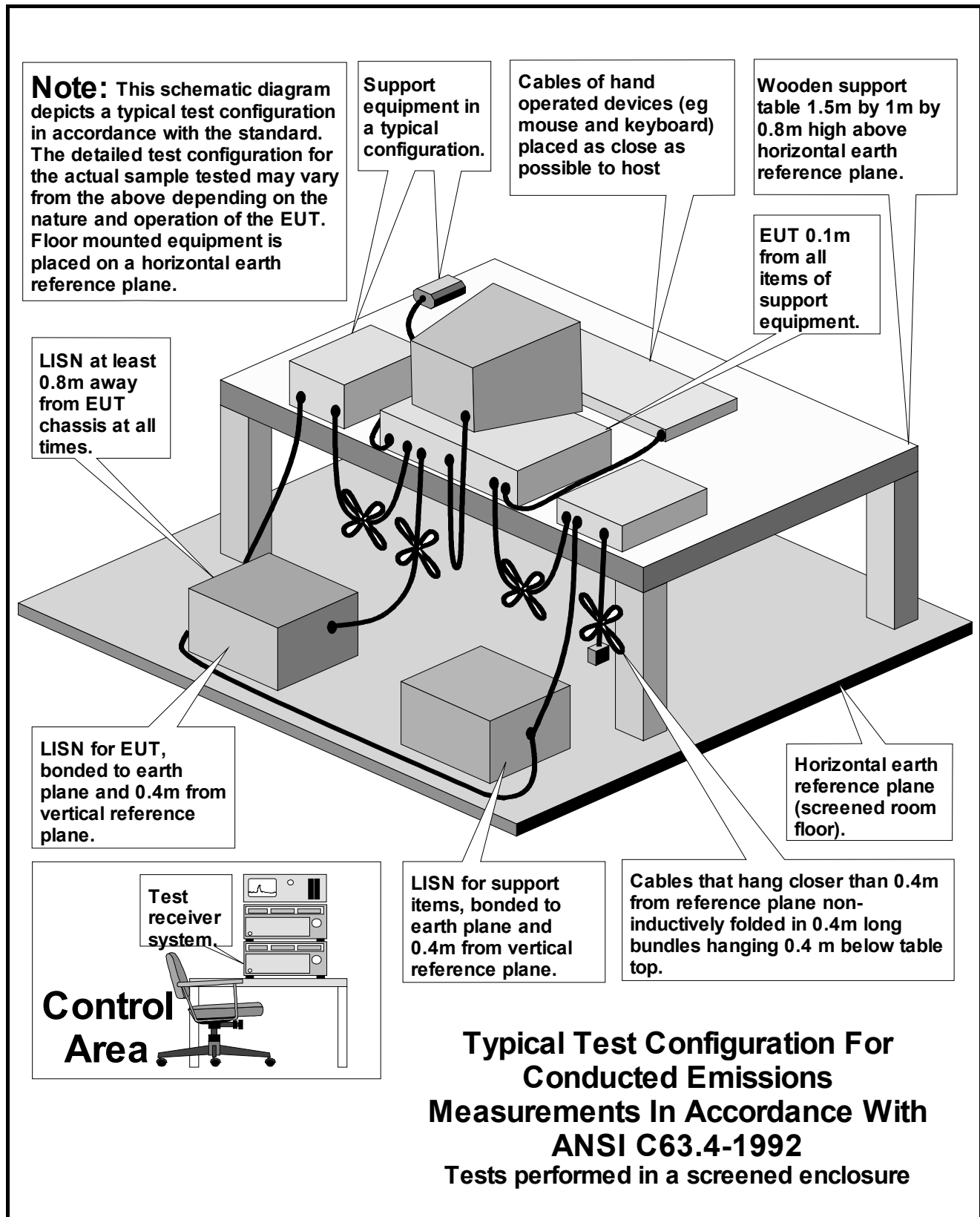
## **Appendix 2. Test Configuration Drawings**

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47521JD03\EMICON	Test configuration for measurement of conducted emissions.
DRG\47521JD03\EMIRAD	Test configuration for measurement of radiated emissions.

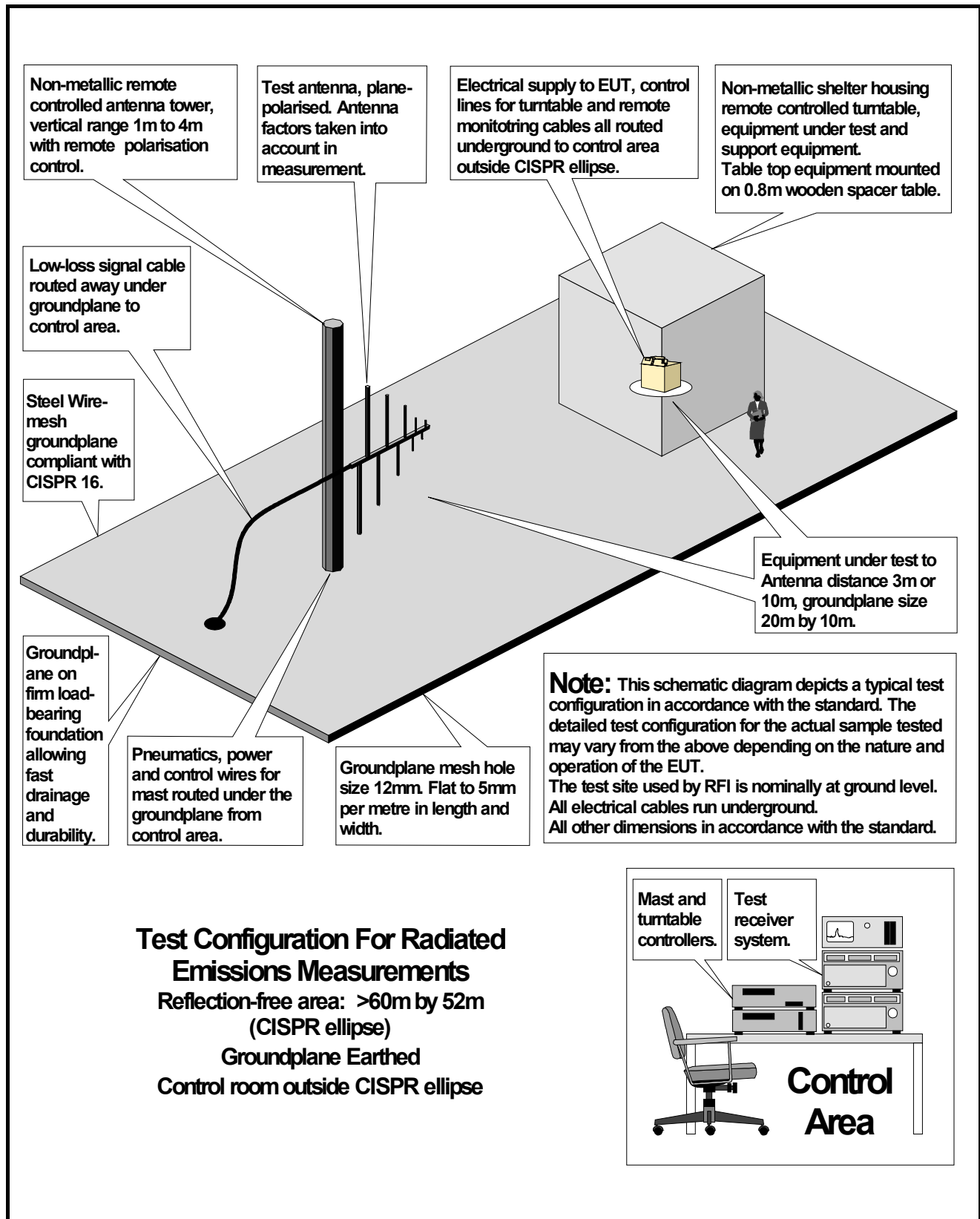
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