FCC Certification Test Report

FCC Certification Test Report
for
Pelican Accessories
O7X-G3-2

January 30, 2003

Prepared for:

Pelican Accessories
1840 East 27th Street
Vernon, CA 90058

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

FCC Certification Test Program

FCC Certification Test Report

for the

Pelican Accessories

K9993H (PL-7008) Nintendo® Game Cube™ Wireless Controller Host ("Dongle")

O7X-G3-2

January 30, 2003

WLL JOB# 7294

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Abstract

This report has been prepared on behalf of Pelican Accessories to support the attached Application for Equipment Authorization. The test report and application are submitted for a Intentional Radiator under Part 15.249 of the FCC Rules and Regulations. This Federal Communication Commission (FCC) Certification Test Report documents the test configuration and test results for a Pelican Accessories K9993H (PL-7008) Nintendo® Game Cube™ Wireless Controller Host ("Dongle").

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The Pelican Accessories K9993H (PL-7008) Nintendo® Game Cube™ Wireless Controller Host ("Dongle") complies with the limits for a Intentional Radiator device under Part 15.249 of the FCC Rules and Regulations.

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1 Introduction

1.1 Compliance Statement

The Pelican Accessories K9993H (PL-7008) Nintendo® Game Cube™ Wireless Controller Host ("Dongle") complies with the limits for a Intentional Radiator device under Part 15.249 of the FCC Rules and Regulations.

This test report reflects the testing performed for the certification of the K9993H. Separate testing was performed for the digital and receiver portion under the DoC process.

1.2 Test Scope

Tests for radiated and conducted emissions were performed. All measurements were performed according to the 1992 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer: Pelican Accessories
1840 East 27th Street
Vernon, CA 90058

Quotation Number: 60385

1.4 Test Dates

Testing was performed from October 10, 2002 to October 14, 2002.

1.5 Test and Support Personnel

Washington Laboratories, LTD James Ritter

1.6 Abbreviations

A	Ampere
Ac	alternating current
AM	Amplitude Modulation
amb	Ambient
Amps	Amperes
b/s	bits per second
BW	Bandwidth
CE	Conducted Emission
cm	centimeter
CW	Continuous Wave
dB	decibel
dc	direct current
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FM	Frequency Modulation
G	giga - prefix for 10^9 multiplier
Hz	Hertz
IF	Intermediate Frequency
k	kilo - prefix for 10^3 multiplier
M	Mega - prefix for 10^6 multiplier
m	Meter
μ	micro - prefix for 10^{-6} multiplier
NB	Narrowband
LISN	Line Impedance Stabilization Network
RE	Radiated Emissions
RF	Radio Frequency
rms	root-mean-square
SN	Serial Number
S/A	Spectrum Analyzer
V	Volt

2 Equipment Under Test

2.1 EUT Identification & Description

The Pelican Accessories K9993H (PL-7008) Nintendo® Game Cube™ Wireless Controller Host ("Dongle") is part of the wireless controller system for the Nintendo® Game Cube™ video game system. The 'dongle' is used as the console interface that receives play commands from the wireless controller pad (Model: K9993P, separate certification) to the game system. The only information transmitted by the 'dongle' is a "rumble" command sent to the controller pad for controller pad rumble action.

The controller host is powered via the game system and has 8 selectable channels. Channels are selectable via slide switches on the unit. One slide switch is provided to allow the selection of band A or band B while the other switch allows the selection of four channels within each band. Table 1 lists the channels and frequencies along with other characteristics.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Pelican Accessories
FCC ID Number	O7X-G3-2
EUT Name:	Wireless Controller Host ("Dongle")
Model:	K9993H (PL-7008) Nintendo® Game Cube™ 'Dongle'
FCC Rule Parts:	§15.249
Frequency Range:	2 Bands; 4 Channels: Band A: CH1 ~903, CH2 ~923.5, CH3 ~916.5, CH4 ~909.5 MHz Band B: CH1 ~906, CH2 ~926.5, CH3 ~920, CH4 ~913 MHz
Maximum Output Power:	< 1mW
Modulation:	FSK
Occupied Bandwidth:	176 kHz
Keying:	Automatic
Type of Information:	Control
Number of Channels:	8
Power Output Level	Fixed
Antenna Type	Integral
Interface Cables:	None
Power Source & Voltage:	120VAC via the game console

2.2 Test Configuration

The K9993H (PL-7008) Nintendo® Game Cube™ 'Dongle' was configured with a video game console, K9993P wireless controller pad (separate certification) and a television set.

2.3 Testing Algorithm

The K9993H (PL-7008) Nintendo® Game Cube™ 'Dongle' was setup to continuously transmit rumble data. This is different than in normal use since the game will only occasionally call for rumble data to be transmitted.

Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

2.5 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (ANSI/TIA/EIA-603-93)

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

Table 2: Test Equipment List

Manufacturer & Model	Description	Serial Number	Property Number	Calibration Due Date
A.H. Systems SAS-200/518	Log Periodic Antenna	117	00001	3/1/03
Antenna Research Associates DRG-118/A	Horn Antenna	1010	00004	11/28/02
Antenna Research Associates LPB-2520	Biconilog Antenna Site 2	1044	00007	6/19/03
Hewlett Packard 8449B	Pre-Amplifier	3008A00729	00066	1/31/03
Hewlett Packard 8593A	Spectrum Analyzer	3009A00739	00074	6/6/2003
Hewlett Packard 85650A	Q.P. Adapter (Site 2)	2811A01283	00068	7/05/03
Hewlett Packard 85685A	RF Preselector (Site 2)	3221A01395	00071	5/17/03
Hewlett Packard 8568B	Spectrum Analyzer (Site 2)	2928A04750	00072	7/03/03
Solar Electronics 8012-50-R-24-BNC	LISN	8379493	00124	7/05/03

4 Test Results

4.1 Duty Cycle Correction

Measurements may be adjusted where pulsed RF is utilized to find the average level associated with a quantity. This calculation is applied to limits for pulsed licensed and unlicensed devices.

On time = $N_1L_1 + N_2L_2 + \ldots + N_{N-1}L_{N-1} + N_NL_N$, where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.

- For Licensed Transmitters basic formula can be stated as 20log[Duty Cycle]
- For Unlicensed Intentional Radiators under 47CFR Part 15, all duty cycle measurements compared to a 100 millisecond period
- i.e. duty cycle = on time/100 milliseconds or period, whichever is less
- Restating the basic formula:
    - Duty cycle = $(N_1L_1 + N_2L_2 + \ldots + N_{N-1}L_{N-1} + N_NL_N)/100$ or T, whichever is less

Where T is the period of the pulse train.

The following Figures show the plots of the modulated carrier. The spectrum analyzer was set to Zero Span and the video triggered to collect the pulse train of the modulation. Calculations of the duty cycle correction factor were obtained from time data provided by the plots.

Figure 1 depicts the pulse width of the Dongle emission. Figure 2 shows the maximum repetition of the Dongle pulse.

To obtain the maximum possible repetition rate of transmit for the Dongle, it was necessary to have the Controller Pad nearby communicating to the Dongle. This situation caused the emissions from the controller pad to appear in the plots for the duty cycle. These emissions are the lower amplitude emissions appearing on the plot.

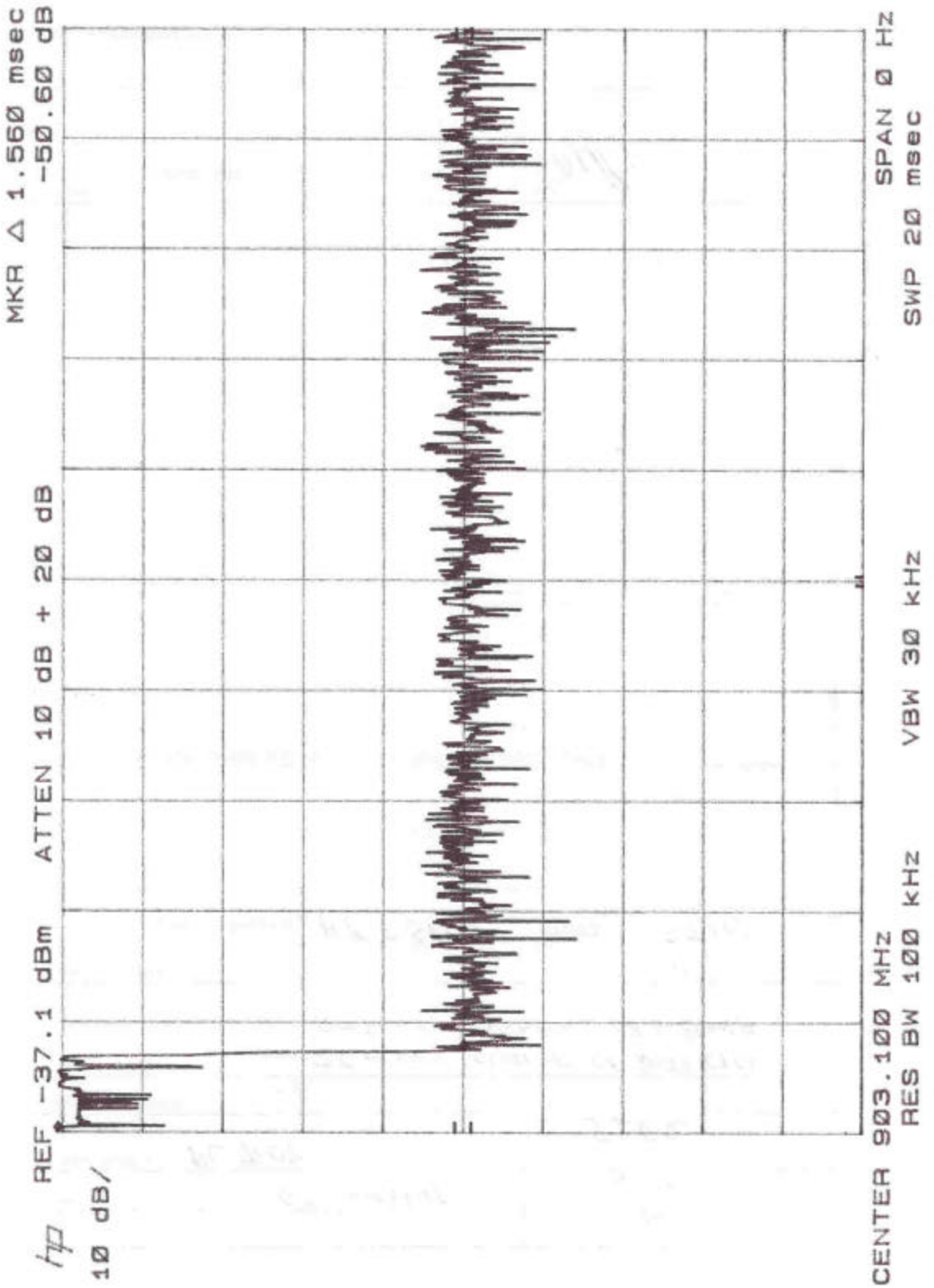

Figure 1. Duty Cycle Plot – Pulse Width

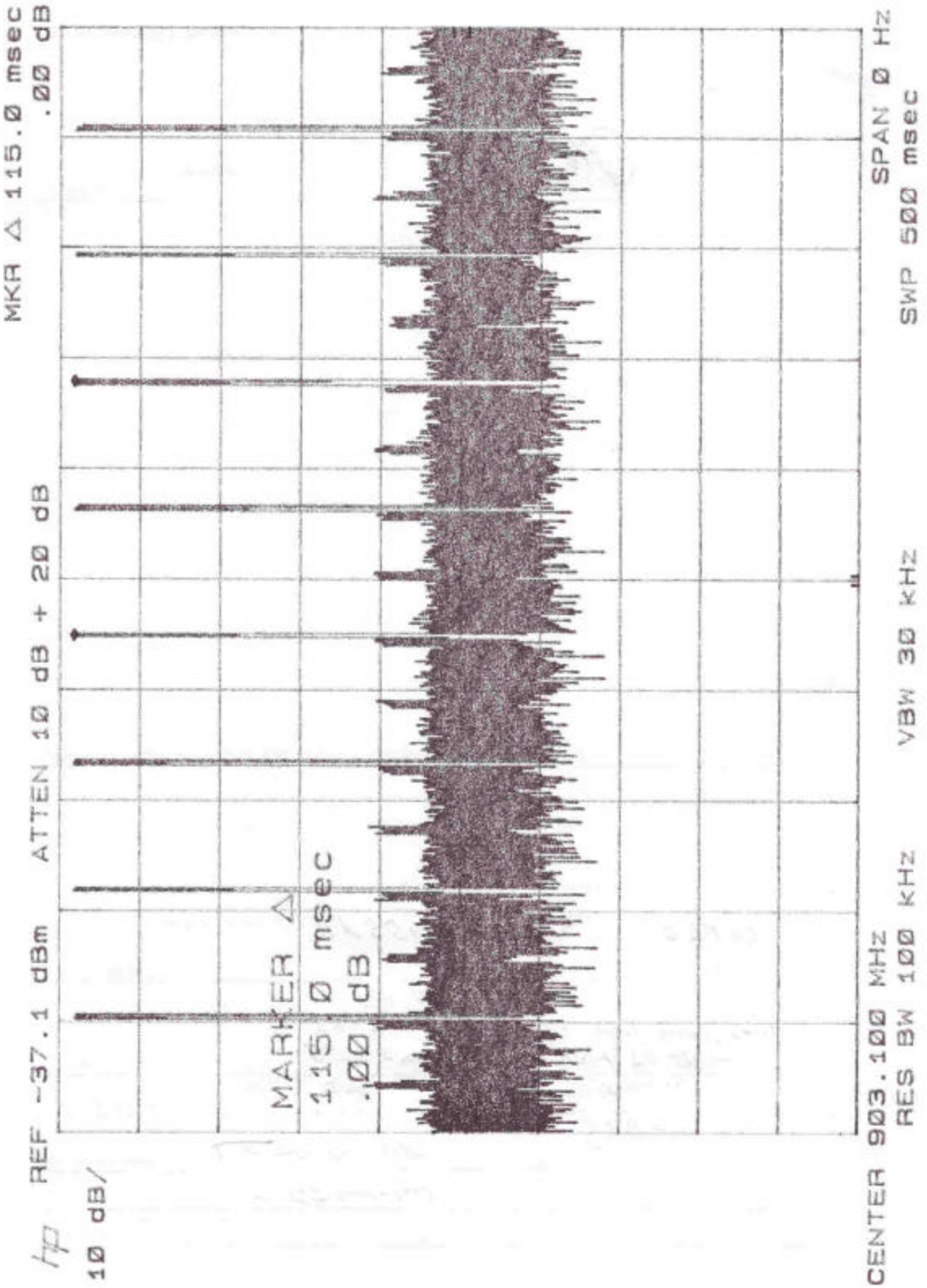

Figure 2. Duty Cycle Plots Worst-case

From the data in Figure 1 through Figure 2, the following calculations are made.

On Time Per 100ms:

2 x 1.56ms = 3.12ms

Duty cycle calculation:

3.12ms/100ms = 3.12% on time = -30.1dB duty cycle correction (Maximum 20dB allowed)

4.2 Occupied Bandwidth: (FCC Part §2.1049)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

At full modulation, the occupied bandwidth was measured for a low, middle and high channel as shown in Figure 3 through Figure 5:

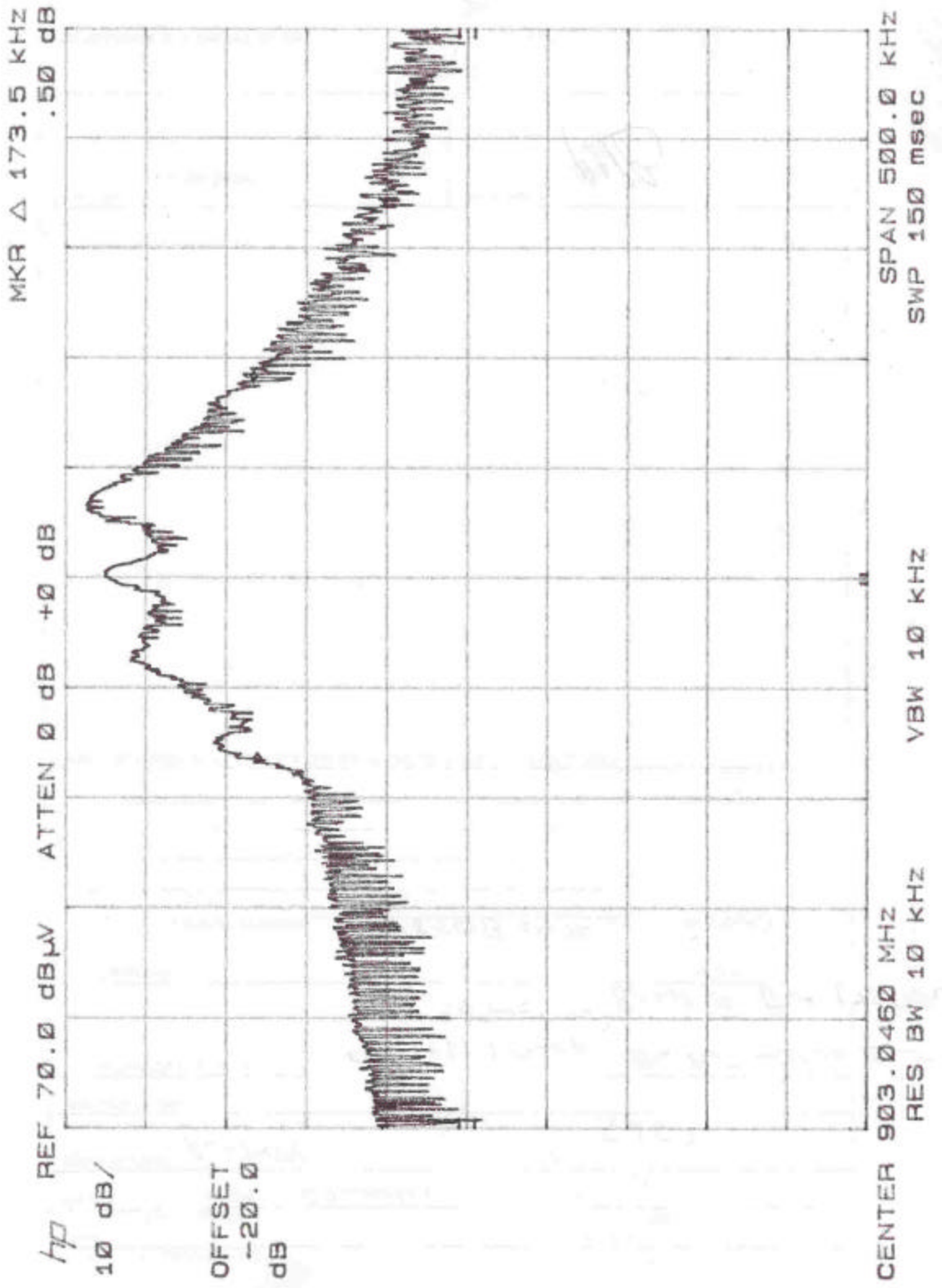

Figure 3. Occupied Bandwidth, Low

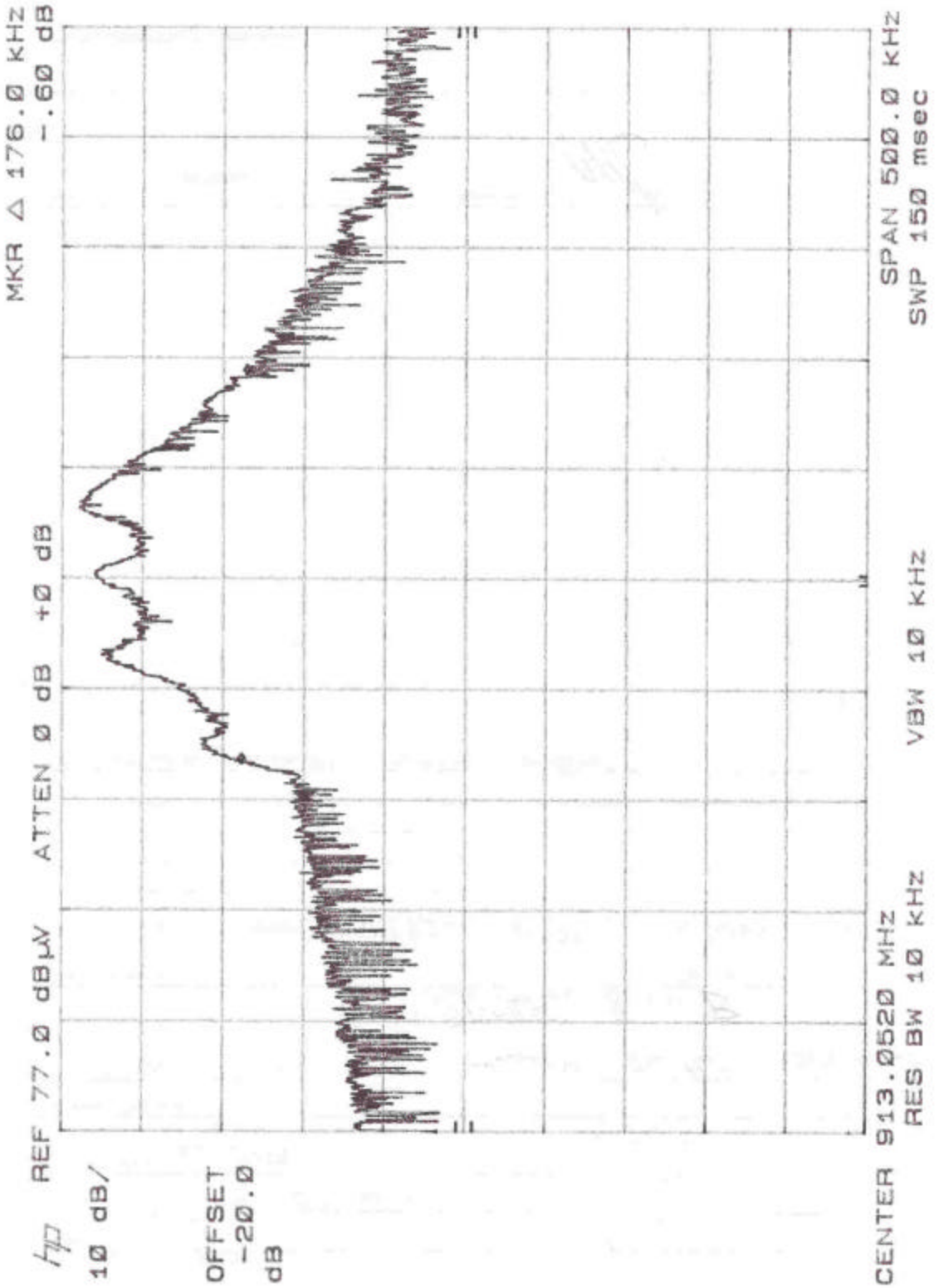

Figure 4. Occupied Bandwidth, Mid

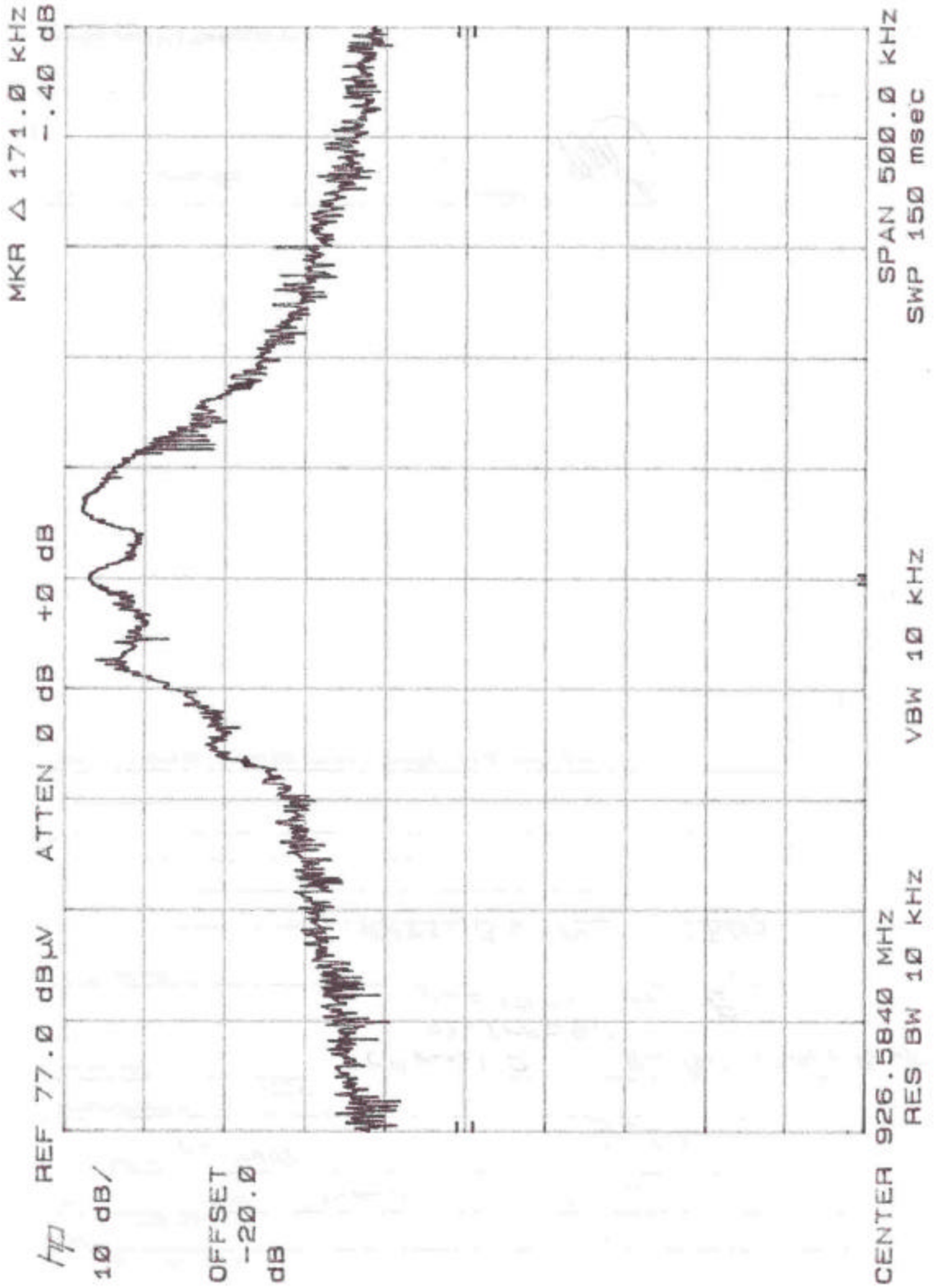

Figure 5. Occupied Bandwidth, High

Table 3 provides a summary of the Occupied Bandwidth Results.

Table 3. Occupied Bandwidth Results

Channel	Frequency	Bandwidth
Low Channel	903.056 MHz	173.5 kHz
Mid Channel	913.05 MHz	176 kHz
High Channel	926.58 MHz	171 kHz

4.3 Radiated Spurious Emissions: (FCC Part §2.1053)

The EUT must comply with the radiated emission limits of 15.249(a). The limits are as shown in the following table.

Table 4. Radiated Emissions Limits

Fundamental Frequency	**Field Strength of Fundamental (µV/m)**	**Field Strength of Harmonics (µV/m)**
902 – 928 MHz	50,000	500
2400 – 2483.5 MHz	50,000	500
5725 – 5875 MHz	50,000	500
24.00 – 24.25 MHz	250,000	2500

4.3.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	100kHz	>100kHz
>1000 MHz	1 MHz	1MHz (peak)

Emissions were measured to the 10th harmonic of the transmit frequency. The Dongle was tested in two orthogonal planes. Worst case emission levels are reported.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level):	V dBµV
Antenna Factor (Ant Corr):	AFdB/m
Cable Loss Correction (Cable Corr):	CCdB
Duty Cycle Correction (Average)	DCCdB
Amplifier Gain:	GdB
Electric Field (Corr Level):	EdBµV/m = VdBµV + AFdB/m + CCdB + DCCdB - GdB

*Note: The amplifier gain is listed at the top of the data sheet and is included in the final field strength calculation.

Table 5: Radiated Emissions Test Data

CLIENT:	Electrosource	DATE:	10/11/02
TESTER:	James Ritter	JOB #:	7294X
EUT Information:		**Test Requirements:**	
EUT:	G3 Wireless Dongle	TEST STANDARD:	FCC Part 15
CONFIGURATION:	Modulated Carrier	DISTANCE:	3m
CLOCKS:		CLASS:	B
Test Equipment/Limit:			
ANTENNA:	A_00029		
CABLE:	CSITE1_3m		
LIMIT:	LFCC_3m_Class_B		
AMPLIFIER (dB)	0		

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB
Ch1, A Band 903 MHz										
903.00	V	160.0	1.4	59.4	23.4	7.0	89.8	30747.1	50000.0	-4.2
903.00	H	290.0	3.0	58.2	23.4	7.0	88.6	26841.4	50000.0	-5.4
Ch 4, B Band 913 MHz										
913.10	V	165.0	1.5	57.9	23.1	6.8	87.8	24640.2	50000.0	-6.1
913.10	H	280.0	3.4	59.0	23.1	6.8	88.9	27934.1	50000.0	-5.1
Ch 2, B Band 926.5 MHz										
926.50	V	140.0	1.3	59.9	23.5	6.9	90.3	32591.5	50000.0	-3.7
926.50	H	300.0	2.8	60.5	23.5	6.9	90.9	34922.4	50000.0	-3.1

Table 6. Radiated Emission Data, Average Data Above 1GHz

CLIENT: Electrosource DATE: 10/11/02
TESTER: James Ritter JOB #: 7294X
EUT Information: **Test Requirements:**
EUT: G3 Wireless Dongle TEST STANDARD: FCC Part 15
CONFIGURATION: CW Constant TX DISTANCE: 3m
CLOCKS: CLASS: B
Test Equipment/Limit:
ANTENNA: A_00425
CABLE: CSITE1_HF
LIMIT: LFCC_3m_Class_B
AMPLIFIER (dB) 34 asset # 00066 Spectrum Analyzer asset # 00074 HP 8593A

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Duty Cycle Corr	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
Ch 1A-903.06												
1806.01	H	350.0	1.0	50.4	28.3	2.4	-20.0	27.0	22.5	500.0	-27.0	
2709.02	H	190.0	1.0	48.3	30.2	3.2	-20.0	27.7	24.3	500.0	-26.3	
3612.03	H	180.0	1.0	47.9	31.3	3.7	-20.0	28.9	28.0	500.0	-25.0	
4515.04	H	0.0	1.0	42.9	32.4	4.0	-20.0	25.3	18.4	500.0	-28.7	amb
5418.05	H	0.0	1.0	42.1	33.9	4.2	-20.0	26.2	20.4	500.0	-27.8	amb
6321.06	H	0.0	1.0	43.7	35.9	4.6	-20.0	30.2	32.2	500.0	-23.8	amb
7224.07	H	0.0	1.0	43.0	37.8	5.0	-20.0	31.8	38.9	500.0	-22.2	amb
8127.08	H	0.0	1.0	46.8	38.5	5.3	-20.0	36.5	67.2	500.0	-17.4	amb
9030.09	H	0.0	1.0	47.6	39.0	5.5	-20.0	38.2	81.0	500.0	-15.8	amb
1806.01	V	350.0	1.0	65.2	28.3	2.4	-20.0	41.9	124.4	500.0	-12.1	
2709.02	V	125.0	1.0	54.4	30.2	3.2	-20.0	33.8	49.2	500.0	-20.1	
3612.03	V	180.0	1.0	51.9	31.3	3.7	-20.0	33.0	44.4	500.0	-21.0	
4515.04	V	0.0	1.0	46.5	32.4	4.0	-20.0	28.9	27.8	500.0	-25.1	
5418.05	V	0.0	1.0	42.3	33.9	4.2	-20.0	26.4	20.8	500.0	-27.6	amb
6321.06	V	0.0	1.0	43.2	35.9	4.6	-20.0	29.7	30.6	500.0	-24.3	amb
7224.07	V	0.0	1.0	47.8	37.8	5.0	-20.0	36.6	67.5	500.0	-17.4	amb
8127.08	V	0.0	1.0	48.4	38.5	5.3	-20.0	38.1	80.6	500.0	-15.9	amb
9030.09	V	0.0	1.0	49.8	39.0	5.5	-20.0	40.3	103.9	500.0	-13.6	amb
Ch 4 B -913.016												
1826.03	H	20.0	1.0	58.1	28.3	2.4	-20.0	34.8	55.0	500.0	-19.2	
2739.05	H	45.0	1.0	52.3	30.3	3.2	-20.0	31.7	38.7	500.0	-22.2	
3652.06	H	125.0	1.0	49.2	31.4	3.7	-20.0	30.3	32.7	500.0	-23.7	
4565.08	H	75.0	1.0	45.2	32.5	4.0	-20.0	27.7	24.2	500.0	-26.3	
5478.10	H	0.0	1.0	40.0	34.0	4.2	-20.0	24.2	16.2	500.0	-29.8	amb
6391.11	H	0.0	1.0	42.1	36.1	4.7	-20.0	28.8	27.6	500.0	-25.2	amb
7304.13	H	0.0	1.0	45.6	37.9	5.0	-20.0	34.5	53.0	500.0	-19.5	amb

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Duty Cycle Corr	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
8217.14	H	0.0	1.0	46.4	38.5	5.3	-20.0	36.2	64.8	500.0	-17.7	amb
9130.16	H	0.0	1.0	46.8	39.1	5.5	-20.0	37.5	74.7	500.0	-16.5	amb
1826.03	V	350.0	1.0	66.9	28.3	2.4	-20.0	43.7	152.8	500.0	-10.3	
2739.05	V	45.0	1.0	52.7	30.3	3.2	-20.0	32.2	40.6	500.0	-21.8	
3652.06	V	125.0	1.0	51.8	31.4	3.7	-20.0	32.9	44.3	500.0	-21.0	
4565.08	V	75.0	1.0	40.5	32.5	4.0	-20.0	22.9	14.0	500.0	-31.0	amb
5478.10	V	0.0	1.0	40.0	34.0	4.2	-20.0	24.2	16.2	500.0	-29.8	amb
6391.11	V	0.0	1.0	41.2	36.1	4.7	-20.0	27.9	24.9	500.0	-26.1	amb
7304.13	V	0.0	1.0	43.2	37.9	5.0	-20.0	32.1	40.2	500.0	-21.9	amb
8217.14	V	0.0	1.0	42.3	38.5	5.3	-20.0	32.1	40.5	500.0	-21.8	amb
9130.16	V	0.0	1.0	44.2	39.1	5.5	-20.0	34.8	55.2	500.0	-19.1	amb
Ch 2 B-926.5												
1853.00	H	350.0	1.0	61.4	28.4	2.4	-20.0	38.3	82.2	500.0	-15.7	
2779.50	H	65.0	1.0	52.1	30.4	3.2	-20.0	31.7	38.2	500.0	-22.3	
3706.00	H	165.0	1.0	51.1	31.4	3.7	-20.0	32.3	41.0	500.0	-21.7	
4632.50	H	170.0	1.0	46.5	32.6	4.0	-20.0	29.0	28.3	500.0	-24.9	
5559.00	H	0.0	1.0	42.7	34.2	4.3	-20.0	27.2	22.8	500.0	-26.8	amb
6485.50	H	0.0	1.0	45.5	36.3	4.7	-20.0	32.5	42.2	500.0	-21.5	amb
7412.00	H	0.0	1.0	46.9	37.9	5.1	-20.0	35.9	62.4	500.0	-18.1	amb
8338.50	H	0.0	1.0	48.3	38.6	5.3	-20.0	38.2	81.7	500.0	-15.7	amb
9265.00	H	0.0	1.0	47.4	39.2	5.6	-20.0	38.2	81.2	500.0	-15.8	amb
1853.00	V	350.0	1.0	67.7	28.4	2.4	-20.0	44.6	169.5	500.0	-9.4	
2779.50	V	20.0	1.0	54.0	30.4	3.2	-20.0	33.6	47.7	500.0	-20.4	
3706.00	V	160.0	1.0	53.0	31.4	3.7	-20.0	34.2	51.1	500.0	-19.8	
4632.50	V	170.0	1.0	43.8	32.6	4.0	-20.0	26.3	20.8	500.0	-27.6	amb
5559.00	V	0.0	1.0	41.4	34.2	4.3	-20.0	25.8	19.5	500.0	-28.2	amb
6485.50	V	0.0	1.0	41.9	36.3	4.7	-20.0	28.9	28.0	500.0	-25.0	amb
7412.00	V	0.0	1.0	42.8	37.9	5.1	-20.0	31.8	39.0	500.0	-22.2	amb
8338.50	V	0.0	1.0	43.0	38.6	5.3	-20.0	32.9	44.2	500.0	-21.1	amb
9265.00	V	0.0	1.0	42.8	39.2	5.6	-20.0	33.7	48.2	500.0	-20.3	amb

Table 7. Radiated Emission Data, Peak Data Above 1GHz

CLIENT: Electrosource DATE: 10/11/02
TESTER: James Ritter JOB #: 7294X

EUT Information: **Test Requirements:**

EUT: G3 Wireless Dongle TEST STANDARD: FCC Part 15
CONFIGURATION: CW Constant TX DISTANCE: 3m
CLOCKS: CLASS: B

Test Equipment/Limit:

ANTENNA: A_00425
CABLE: CSITE1_HF
LIMIT: LFCC_3m_Class_B
AMPLIFIER (dB) 34 asset # 00066 Spectrum Analyzer asset # 00074 HP 8593A

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak)) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
Chan 1A-903.06											
1806.01	H	350.0	1.0	50.4	28.3	2.4	47.0	223.9	5000	-27.0	
2709.02	H	190.0	1.0	48.3	30.2	3.2	47.7	242.7	5000	-26.3	
3612.03	H	180.0	1.0	47.9	31.3	3.7	48.9	278.6	5000	-25.1	
4515.04	H	0.0	1.0	42.9	32.4	4.0	45.3	184.1	5000	-28.7	amb
5418.05	H	0.0	1.0	42.1	33.9	4.2	46.2	204.2	5000	-27.8	amb
6321.06	H	0.0	1.0	43.7	35.9	4.6	50.2	323.6	5000	-23.8	amb
7224.07	H	0.0	1.0	43.0	37.8	5.0	51.8	389.0	5000	-22.2	amb
8127.08	H	0.0	1.0	46.8	38.5	5.3	56.5	668.3	5000	-17.5	amb
9030.09	H	0.0	1.0	47.6	39.0	5.5	58.2	812.8	5000	-15.8	amb
1806.01	V	350.0	1.0	65.2	28.3	2.4	61.9	1244.5	5000	-12.1	
2709.02	V	125.0	1.0	54.4	30.2	3.2	53.8	489.8	5000	-20.2	
3612.03	V	180.0	1.0	51.9	31.3	3.7	53.0	446.7	5000	-21.0	
4515.04	V	0.0	1.0	46.5	32.4	4.0	48.9	278.6	5000	-25.1	
5418.05	V	0.0	1.0	42.3	33.9	4.2	46.4	208.9	5000	-27.6	amb
6321.06	V	0.0	1.0	43.2	35.9	4.6	49.7	305.5	5000	-24.3	amb
7224.07	V	0.0	1.0	47.8	37.8	5.0	56.6	676.1	5000	-17.4	amb
8127.08	V	0.0	1.0	48.4	38.5	5.3	58.1	803.5	5000	-15.9	amb
9030.09	V	0.0	1.0	49.8	39.0	5.5	60.3	1035.1	5000	-13.7	amb
Ch 4 B-913.016											
1826.03	H	20.0	1.0	58.1	28.3	2.4	54.8	549.5	5000	-19.2	
2739.05	H	45.0	1.0	52.3	30.3	3.2	51.7	384.6	5000	-22.3	
3652.06	H	125.0	1.0	49.2	31.4	3.7	50.3	327.3	5000	-23.7	
4565.08	H	75.0	1.0	45.2	32.5	4.0	47.7	242.7	5000	-26.3	
5478.10	H	0.0	1.0	40.0	34.0	4.2	44.2	162.2	5000	-29.8	amb
6391.11	H	0.0	1.0	42.1	36.1	4.7	48.8	275.4	5000	-25.2	amb
7304.13	H	0.0	1.0	45.6	37.9	5.0	54.5	530.9	5000	-19.5	amb
8217.14	H	0.0	1.0	46.4	38.5	5.3	56.2	645.7	5000	-17.8	amb
9130.16	H	0.0	1.0	46.8	39.1	5.5	57.5	749.9	5000	-16.5	amb

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak)) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
1826.03	V	350.0	1.0	66.9	28.3	2.4	63.7	1531.1	5000	-10.3	
2739.05	V	45.0	1.0	52.7	30.3	3.2	52.2	407.4	5000	-21.8	
3652.06	V	125.0	1.0	51.8	31.4	3.7	52.9	441.6	5000	-21.1	
4565.08	V	75.0	1.0	40.5	32.5	4.0	42.9	139.6	5000	-31.1	amb
5478.10	V	0.0	1.0	40.0	34.0	4.2	44.2	162.2	5000	-29.8	amb
6391.11	V	0.0	1.0	41.2	36.1	4.7	47.9	248.3	5000	-26.1	amb
7304.13	V	0.0	1.0	43.2	37.9	5.0	52.1	402.7	5000	-21.9	amb
8217.14	V	0.0	1.0	42.3	38.5	5.3	52.1	402.7	5000	-21.9	amb
9130.16	V	0.0	1.0	44.2	39.1	5.5	54.8	549.5	5000	-19.2	amb
Chan 2 B-926.5											
1853.00	H	350.0	1.0	61.4	28.4	2.4	58.3	822.2	5000	-15.7	
2779.50	H	65.0	1.0	52.1	30.4	3.2	51.7	384.6	5000	-22.3	
3706.00	H	165.0	1.0	51.1	31.4	3.7	52.3	412.1	5000	-21.7	
4632.50	H	170.0	1.0	46.5	32.6	4.0	49.0	281.8	5000	-25.0	
5559.00	H	0.0	1.0	42.7	34.2	4.3	47.2	229.1	5000	-26.8	amb
6485.50	H	0.0	1.0	45.5	36.3	4.7	52.5	421.7	5000	-21.5	amb
7412.00	H	0.0	1.0	46.9	37.9	5.1	55.9	623.7	5000	-18.1	amb
8338.50	H	0.0	1.0	48.3	38.6	5.3	58.2	812.8	5000	-15.8	amb
9265.00	H	0.0	1.0	47.4	39.2	5.6	58.2	812.8	5000	-15.8	amb
1853.00	V	350.0	1.0	67.7	28.4	2.4	64.6	1698.2	5000	-9.4	
2779.50	V	20.0	1.0	54.0	30.4	3.2	53.6	478.6	5000	-20.4	
3706.00	V	160.0	1.0	53.0	31.4	3.7	54.2	512.9	5000	-19.8	
4632.50	V	170.0	1.0	43.8	32.6	4.0	46.3	206.5	5000	-27.7	amb
5559.00	V	0.0	1.0	41.4	34.2	4.3	45.8	195.0	5000	-28.2	amb
6485.50	V	0.0	1.0	41.9	36.3	4.7	48.9	278.6	5000	-25.1	amb
7412.00	V	0.0	1.0	42.8	37.9	5.1	51.8	389.0	5000	-22.2	amb
8338.50	V	0.0	1.0	43.0	38.6	5.3	52.9	441.6	5000	-21.1	amb
9265.00	V	0.0	1.0	42.8	39.2	5.6	53.7	484.2	5000	-20.3	amb

4.4 Conducted Emissions (AC Power Line)

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 /50 mH Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50 output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 450 kHz to 30 MHz was measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

AC Power Line conducted emissions test data are included in Table 8.

Note: The conducted emissions reported herein are done to the specifications that were in effect prior to September 9, 2002 as allowed by the transition provisions of 15.37.

Table 8: AC Power Line Conducted Emissions Test Data Sheet

CLIENT:	Electrosource	DATE:	10/10/02
TESTER:	James Ritter	JOB #:	7294X
TEST STANDARD:	FCC Part 15	CLASS:	FCC_B
TEST VOLTAGE:	120 VAC		

LINE 1 - NEUTRAL

Frequency MHz	Voltage (QP) dBuV	Voltage uV	FCC Limit uV	Margin dB
0.48	41.3	116.1	250.0	-6.7
0.95	38.2	81.3	250.0	-9.8
1.08	41.0	112.2	250.0	-7.0
3.14	44.8	173.8	250.0	-3.2
3.26	45.3	184.1	250.0	-2.7
12.91	37.6	75.9	250.0	-10.4
13.50	38.0	79.4	250.0	-10.0
19.90	27.0	22.4	250.0	-21.0

LINE 2 - PHASE

Frequency MHz	Voltage (QP) dBuV	Voltage uV	FCC Limit uV	Margin dB
0.48	35.4	58.9	250.0	-12.6
0.95	36.1	63.8	250.0	-11.9
1.09	40.5	105.9	250.0	-7.5
3.14	46.0	199.1	250.0	-2.0
3.26	46.8	218.8	250.0	-1.2
12.90	40.1	101.2	250.0	-7.9
13.50	42.0	125.9	250.0	-6.0
19.80	32.4	41.7	250.0	-15.6