FCC Certification Test Report

FCC Certification Test Report
for
Mad Catz, Inc.
FCC ID: P25WSMC8246B1103R

March 21, 2003

Prepared for:

Mad Catz, Inc.
7480 Mission Valley Road
San Diego, CA 92108

Prepared By:

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

FCC Certification Test Program

FCC Certification Test Report
for the
Mad Catz, Inc.
Model 8246 (D2038H) Lynx Wireless Controller Host
P25WSMC8246B1103R

March 21, 2003

WLL JOB# 7419

Prepared by:

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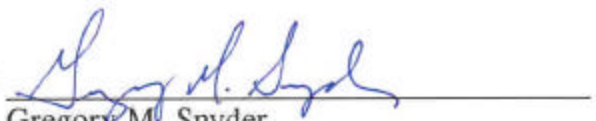

Gregory M. Snyder
Wireless/Telco Services Manager & Chief EMC Engineer

Abstract

This report has been prepared on behalf of Mad Catz, Inc. to support the attached Application for Equipment Authorization. The test report and application are submitted for an 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 Mad Catz, Inc. Model 8246 (D2038H) Lynx Wireless Controller Host.

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 Mad Catz, Inc. Model 8246 (D2038H) Lynx Wireless Controller Host complies with the limits for a Low Powered Transceiver device under Part 15.249 of the FCC Rules and Regulations.

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1 Introduction

1.1 Compliance Statement

The Mad Catz, Inc. Model 8246 (D2038H) Lynx Wireless Controller Host complies with the limits for a Low Powered Transceiver device under Part 15.249 of the FCC Rules and Regulations.

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 (USA):	Mad Catz, Inc. 7480 Mission Valley Road San Diego, CA 92108
Customer (Asia) (Grantee Holder)	Mad Catz (Asia) Ltd. Unit 1717-19, 17/F., Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, Hong Kong

Purchase Order Number: 021003-01

Quotation Number: 60637

1.4 Test Dates

Testing was performed from February 12, 2003 to February 17, 2003.

1.5 Test and Support Personnel

Washington Laboratories, LTD Greg Snyder, Ken Gemmell

1.6 Abbreviations

A	Ampere
Ac	alternating current
AM	Amplitude Modulation
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 Mad Catz, Inc. Model 8246 (D2038H) Lynx Wireless Controller Host is part of the wireless Controller system for the Sony™ PlayStation 2® video game system. The D2038H Wireless Controller Host is installed at the game controller port, and transmits and receives play commands to/from the Mad Catz D2038P controller pad (separate certification, FCC ID: P25WSMC8246B1103C).

The D2038HHost is only transmits "Rumble" data to the controller pad when initiated by the game play. The main use of the D2038H Host is for receiving commands from the controller pad for game play. For this reason the D2038H Host may be referred to as only a receiver in the user's manual.

The RF Controller Host pad is powered from the game console and has 4 selectable channels. Channels are selectable via a slide switch on the Controller. Table 1 lists the channels and frequencies along with other characteristics.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Mad Catz, Inc.
FCC ID Number	P25WSMC8246B1103R
EUT Name:	Lynx Wireless Controller Host
Model:	Model 8246 (D2038H)
FCC Rule Parts:	§15.249
Frequency Range:	906 MHz to 926.5 MHz: CH1 ~906M, CH2 ~926.5M, CH3 ~920M and CH4 ~913MHz
Maximum Output Power:	<1mW
Modulation:	FSK
Necessary Bandwidth:	223kHz
Keying:	Automatic
Type of Information:	Control
Number of Channels:	4
Power Output Level	Fixed
Antenna Type	Fixed/Integral
Interface Cables:	None
Power Source & Voltage:	120Vdc from the game console

2.2 Test Configuration

The Model 8246 (D2038H) Controller Host was configured with a Sony PlayStation 2 game console, a television set, and a Mad Catz D2038P Wireless Controller.

2.3 Testing Algorithm

The Model 8246 (D2038H) Controller Host was set up 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 Measurements

2.5.1 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
Antenna Research Associates DRG-118/A	Horn Antenna	1010	00004	10/20/03
Antenna Research Associates LPB-2520	Biconilog Antenna Site 2	1044	00007	6/19/03
Hewlett Packard 8449B	Pre-Amplifier	3008A00729	00066	2/11/04
Hewlett Packard 8564E	Spectrum Analyzer	3643A00657	00067	4/18/03
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.

To obtain the maximum possible repetition rate of transmit for the Host, it was necessary to have the Controller Pad nearby communicating to the Host. This situation caused the emissions from the controller pad to appear in the plots for the duty cycle.

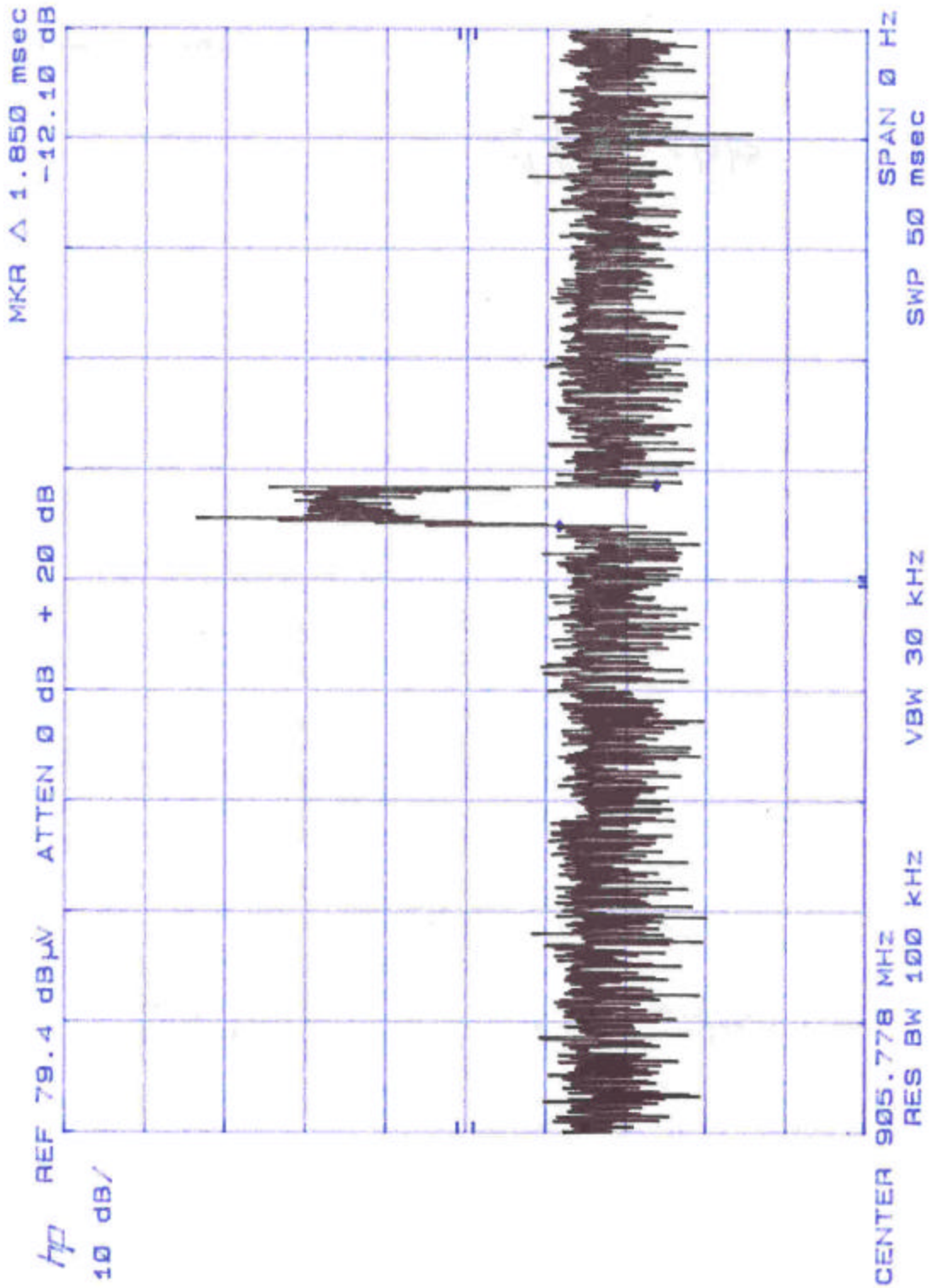

Figure 1. Duty Cycle Plot, Pulse Width

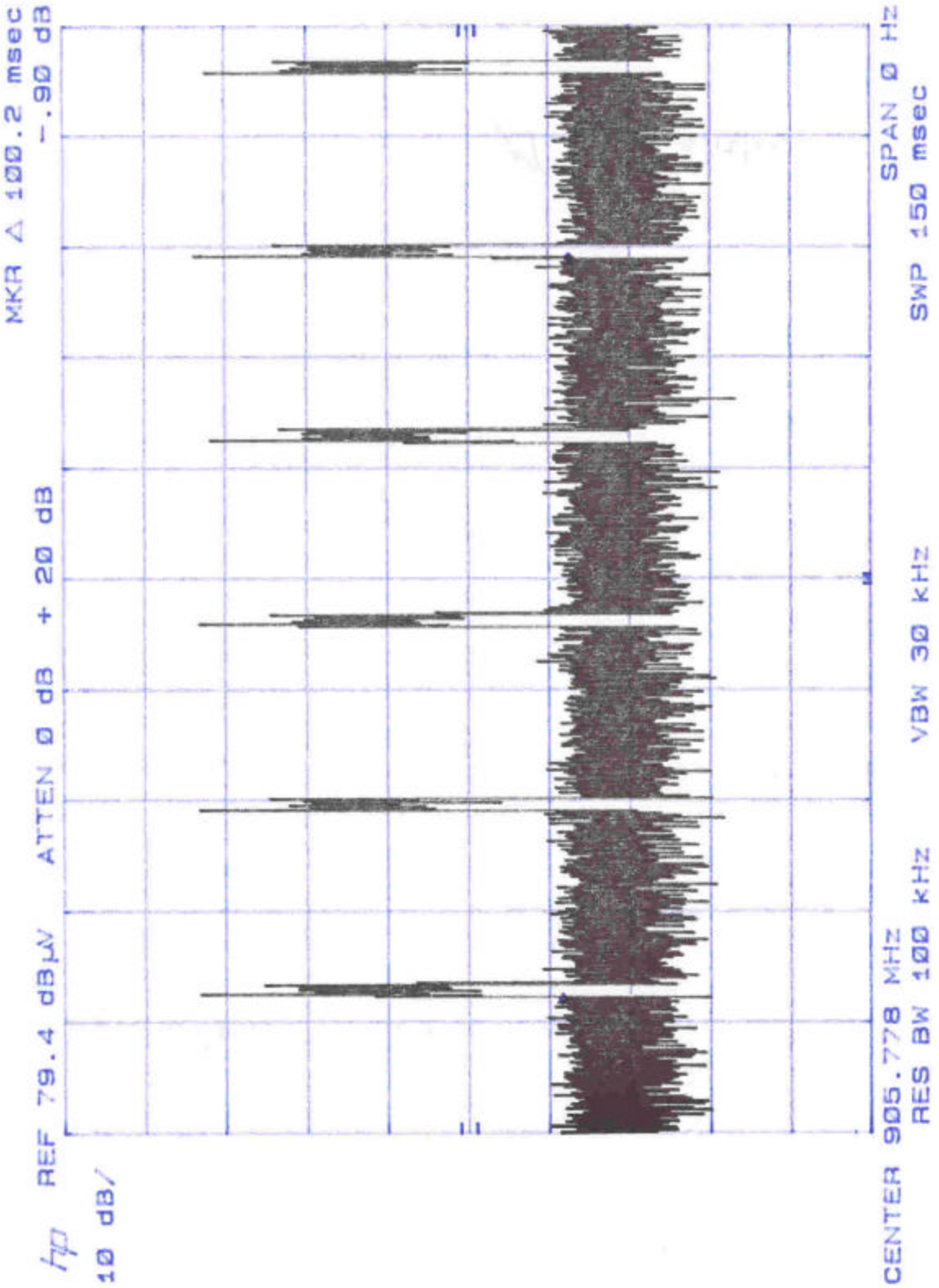

Figure 2. Duty Cycle Plot, Worst Case 100ms

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

On Time Per 100ms:

4 x 1.85ms = 7.4ms

Duty cycle calculation:

7.4ms/100ms = 7.4% on time = -22.6dB 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 as shown:

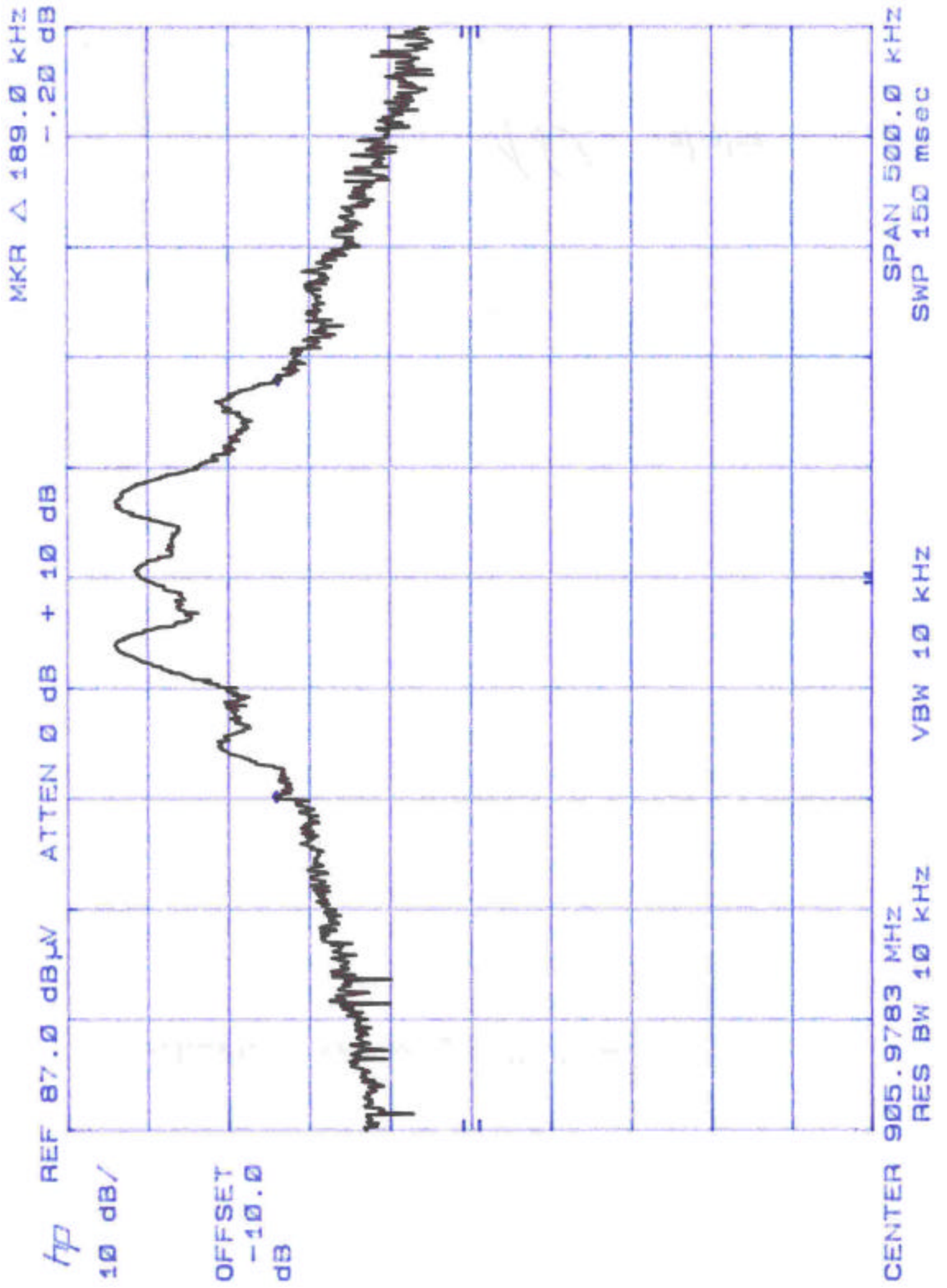

Figure 3. Occupied Bandwidth, Low Channel

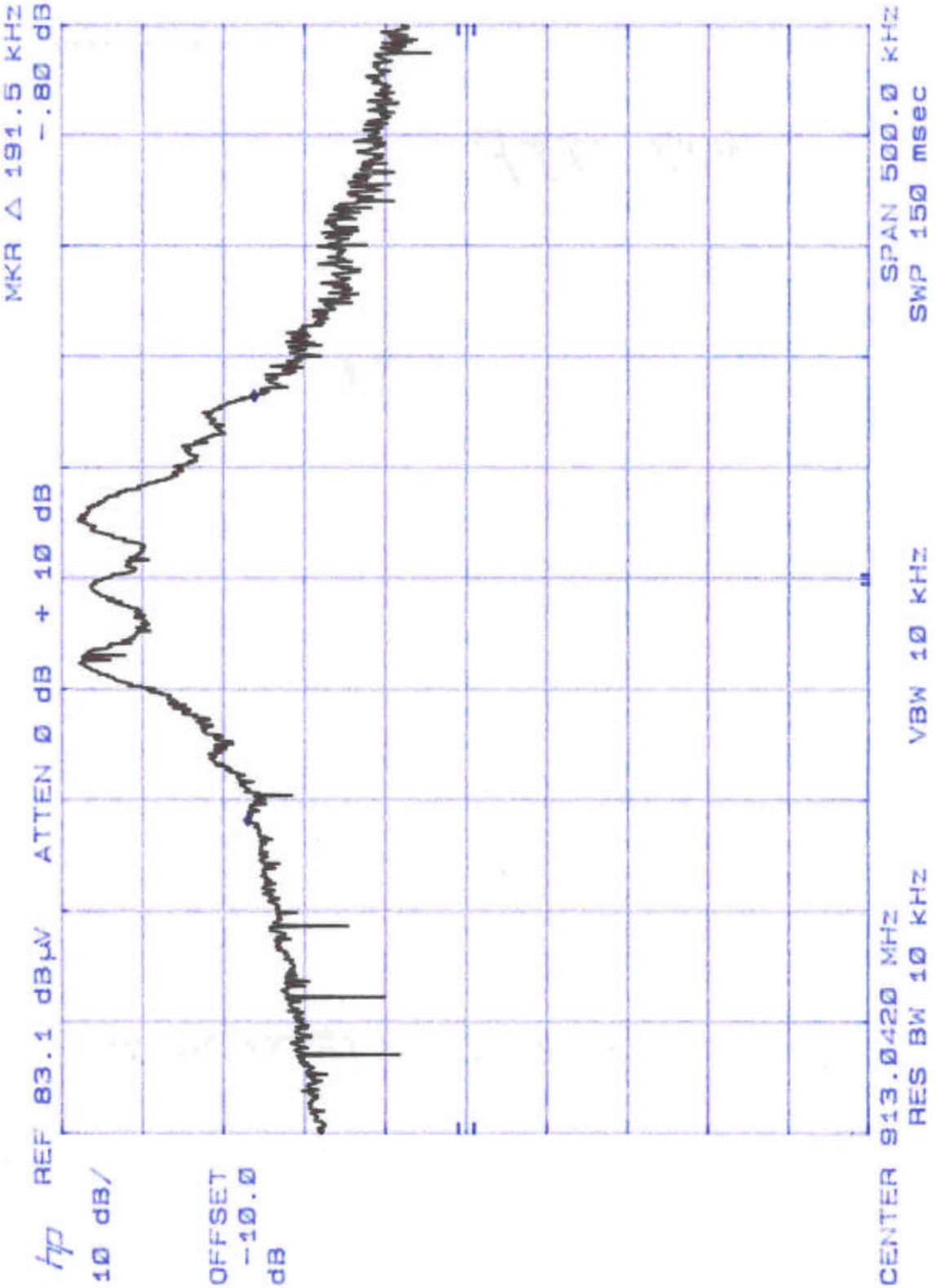

Figure 4. Occupied Bandwidth, Mid Channel

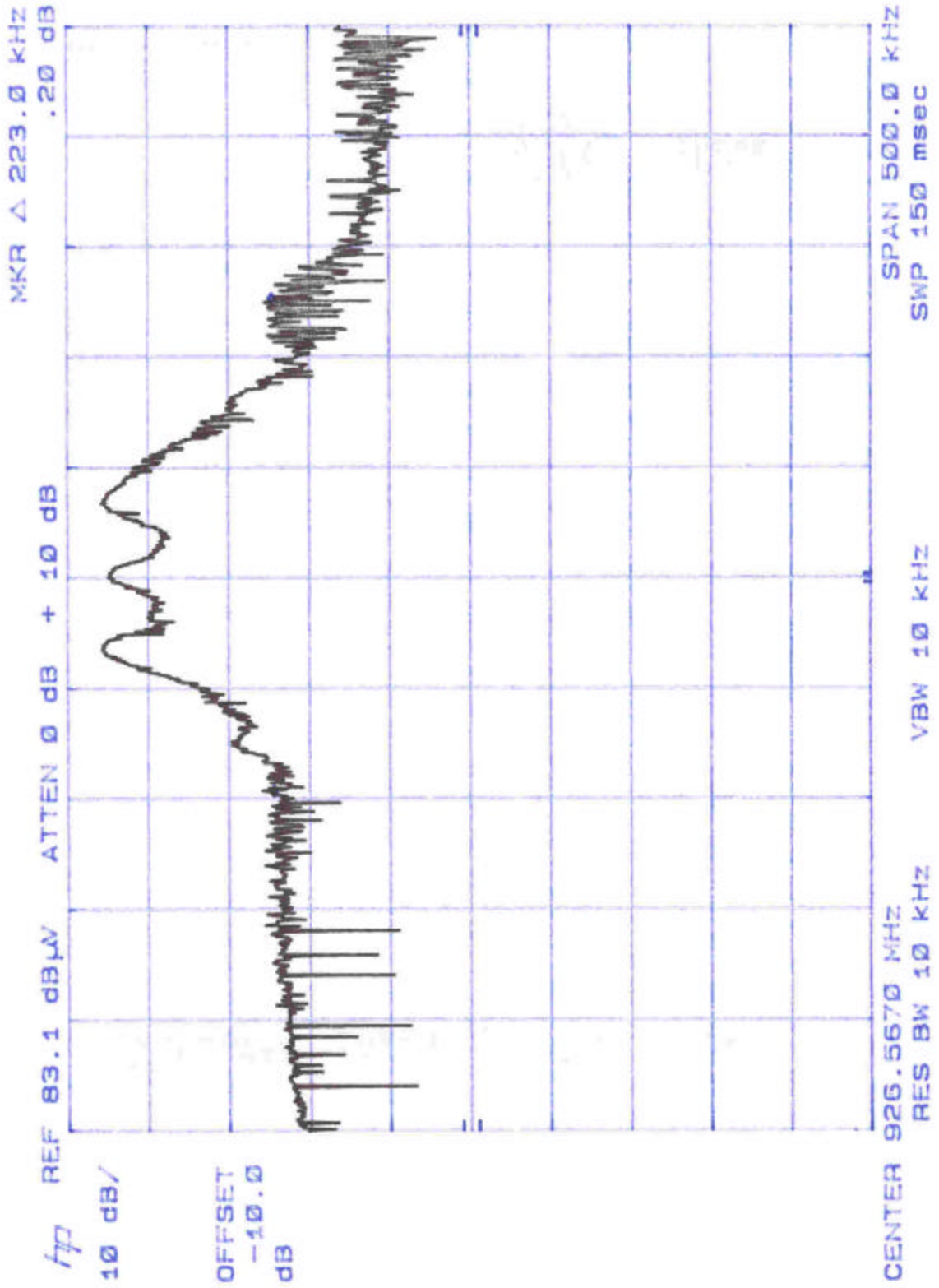

Figure 5. Occupied Bandwidth, High Channel

Table 3 provides a summary of the Occupied Bandwidth Results.

Table 3. Occupied Bandwidth Results

Frequency	Bandwidth
Low Channel 905.978MHz	189kHz
Mid Channel 913.042MHz	191.5kHz
High Channel 926.567MHz	223kHz

4.3 Radiated Emissions: (FCC Part §2.1053)

The EUT must comply with requirements for radiated emissions. 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. 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 10^{th} harmonic of the transmit frequency. The Controller Host 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

Table 5: Radiated Emission Test Data

CLIENT:	Mad Catz	DATE:	2/12/03
TESTER:	Ken Gemmell	JOB #:	7419
EUT Information:		**Test Requirements:**	
EUT:	Lynx Wireless Host	TEST STD:	FCC Part 15
CONFIGURATION:	Modulated Carrier	DISTANCE:	3m
		CLASS:	B
Test Equipment/Limit:			
ANTENNA:	A_00382	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
926.50	H	180.0	1.0	48.9	22.3	7.6	78.9	8773.4	50000.0	-15.1
926.50	V	180.0	1.0	52.2	22.3	7.6	82.2	12828.3	50000.0	-11.8
906.00	H	135.0	1.0	49.6	21.7	7.6	78.9	8770.9	50000.0	-15.1
906.00	V	180.0	1.0	50.3	21.7	7.6	79.6	9507.0	50000.0	-14.4
913.00	H	135.0	1.0	54.1	22.0	7.5	83.6	15210.3	50000.0	-10.3
913.00	V	180.0	1.0	49.3	22.0	7.5	78.8	8752.6	50000.0	-15.1

Table 6. Radiated Emissions Data, Average Above 1GHz

CLIENT:	Mad Catz	DATE:	2/19/2003
TESTER:	Ken Gemmell	JOB #:	7419
EUT Information:		**Test Requirements:**	
EUT:	Lynx Wireless Host	TEST STD:	FCC Part 15
DISTANCE:	3m	CLASS:	B
Test Equipment/Limit:			
ANTENNA:	A_00004	LIMIT:	LFCC_3m_Class_B
CABLE:	CSITE2_HF	AMPLIFIER:	A_00066

Frequency (MHz)	Pol H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) dBµV	Ant. Corr. dB/m	Cable Corr. dB	Amp Gain dB	Duty Cycle Corr db	Corr. Level dBµV/m	Corr. Level µV/m	Limit µV/m	Margin dB
Channel 1 (906 MHz)												
1812.00	H	180.0	1.0	54.3	28.3	3.1	35.6	-20.0	30.1	31.9	500.0	-23.9
2718.00	H	180.0	1.0	48.0	30.3	2.9	35.6	-20.0	25.6	19.0	500.0	-28.4
3624.00	H	180.0	1.0	46.9	31.4	2.8	35.5	-20.0	25.5	18.9	500.0	-28.5
4530.00	H	180.0	1.0	43.8	32.4	3.7	35.7	-20.0	24.2	16.3	500.0	-29.7
5436.00	H	0.0	1.0	41.1	33.9	4.3	35.8	-20.0	23.5	15.0	500.0	-30.5
6342.00	H	0.0	1.0	42.2	35.9	4.2	35.6	-20.0	26.7	21.6	500.0	-27.3
7248.00	H	0.0	1.0	43.8	37.8	4.5	35.9	-20.0	30.3	32.6	500.0	-23.7
8154.00	H	0.0	1.0	43.0	38.5	4.9	36.1	-20.0	30.2	32.5	500.0	-23.7
9060.00	H	0.0	1.0	43.7	39.1	4.9	36.2	-20.0	31.5	37.4	500.0	-22.5
1812.00	V	180.0	1.0	54.0	28.3	3.1	35.6	-20.0	29.8	31.0	500.0	-24.2
2718.00	V	180.0	1.0	47.3	30.3	2.9	35.6	-20.0	24.9	17.5	500.0	-29.1
3624.00	V	180.0	1.0	49.8	31.4	2.8	35.5	-20.0	28.4	26.3	500.0	-25.6
4530.00	V	180.0	1.0	43.1	32.4	3.7	35.7	-20.0	23.5	15.0	500.0	-30.5
5436.00	V	0.0	1.0	41.7	33.9	4.3	35.8	-20.0	24.1	16.1	500.0	-29.8
6342.00	V	0.0	1.0	40.4	35.9	4.2	35.6	-20.0	24.9	17.6	500.0	-29.0
7248.00	V	0.0	1.0	41.3	37.8	4.5	35.9	-20.0	27.7	24.3	500.0	-26.3
8154.00	V	0.0	1.0	42.6	38.5	4.9	36.1	-20.0	29.8	30.8	500.0	-24.2
9060.00	V	0.0	1.0	44.7	39.1	4.9	36.2	-20.0	32.5	42.0	500.0	-21.5
Channel 4 (913 MHz)												
1826.00	V	135.0	1.0	54.8	28.3	3.1	35.6	-20.0	30.7	34.2	500.0	-23.3
2739.00	V	180.0	1.0	49.3	30.3	2.9	35.6	-20.0	26.9	22.0	500.0	-27.1
3652.00	V	180.0	1.0	49.7	31.4	2.8	35.5	-20.0	28.4	26.3	500.0	-25.6
4565.00	V	0.0	1.0	42.8	32.5	3.8	35.8	-20.0	23.3	14.6	500.0	-30.7
5478.00	V	0.0	1.0	41.5	34.0	4.2	35.7	-20.0	24.0	15.9	500.0	-30.0
6391.00	V	0.0	1.0	42.1	36.1	4.2	35.6	-20.0	26.7	21.7	500.0	-27.2
7304.00	V	0.0	1.0	43.6	37.9	4.6	35.9	-20.0	30.1	32.2	500.0	-23.8
8217.00	V	0.0	1.0	43.0	38.5	4.9	36.1	-20.0	30.3	32.6	500.0	-23.7
9130.00	V	0.0	1.0	43.3	39.1	4.9	36.2	-20.0	31.2	36.2	500.0	-22.8
1826.00	H	135.0	1.0	52.9	28.3	3.1	35.6	-20.0	28.8	27.4	500.0	-25.2
2739.00	H	180.0	1.0	44.7	30.3	2.9	35.6	-20.0	22.3	13.0	500.0	-31.7

Frequency (MHz)	Pol H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) dBµV	Ant. Corr. dB/m	Cable Corr. dB	Amp Gain dB	Duty Cycle Corr db	Corr. Level dBµV/m	Corr. Level µV/m	Limit µV/m	Margin dB
3652.00	H	180.0	1.0	49.8	31.4	2.8	35.5	-20.0	28.5	26.6	500.0	-25.5
4565.00	H	0.0	1.0	41.4	32.5	3.8	35.8	-20.0	21.9	12.4	500.0	-32.1
5478.00	H	0.0	1.0	41.2	34.0	4.2	35.7	-20.0	23.7	15.3	500.0	-30.3
6391.00	H	0.0	1.0	41.0	36.1	4.2	35.6	-20.0	25.6	19.1	500.0	-28.4
7304.00	H	0.0	1.0	42.8	37.9	4.6	35.9	-20.0	29.3	29.2	500.0	-24.7
8217.00	H	0.0	1.0	43.1	38.5	4.9	36.1	-20.0	30.4	33.1	500.0	-23.6
9130.00	H	0.0	1.0	44.1	39.1	4.9	36.2	-20.0	31.9	39.5	500.0	-22.0
Channel 2 (926.5 MHz)												
1853.00	H	180.0	1.0	52.2	28.4	3.2	35.6	-20.0	28.3	25.9	500.0	-25.7
2779.50	H	225.0	1.0	47.5	30.4	2.9	35.7	-20.0	25.1	18.0	500.0	-28.9
3706.00	H	180.0	1.0	48.0	31.4	2.8	35.5	-20.0	26.7	21.7	500.0	-27.2
4632.50	H	0.0	1.0	42.3	32.6	3.9	35.8	-20.0	22.9	14.0	500.0	-31.0
5559.00	H	0.0	1.0	41.8	34.2	4.2	35.7	-20.0	24.5	16.8	500.0	-29.5
6485.50	H	0.0	1.0	42.5	36.3	4.2	35.6	-20.0	27.4	23.4	500.0	-26.6
7412.00	H	0.0	1.0	43.8	37.9	4.6	35.9	-20.0	30.4	33.2	500.0	-23.6
8338.50	H	0.0	1.0	43.3	38.6	4.9	36.1	-20.0	30.7	34.1	500.0	-23.3
9265.00	H	0.0	1.0	43.2	39.2	5.0	36.3	-20.0	31.2	36.2	500.0	-22.8
1853.00	V	180.0	1.0	53.8	28.4	3.2	35.6	-20.0	29.8	31.0	500.0	-24.1
2779.50	V	180.0	1.0	48.0	30.4	2.9	35.7	-20.0	25.5	18.9	500.0	-28.4
3706.00	V	135.0	1.0	47.4	31.4	2.8	35.5	-20.0	26.1	20.2	500.0	-27.9
4632.50	V	0.0	1.0	42.1	32.6	3.9	35.8	-20.0	22.8	13.7	500.0	-31.2
5559.00	V	0.0	1.0	42.7	34.2	4.2	35.7	-20.0	25.3	18.5	500.0	-28.6
6485.50	V	0.0	1.0	43.8	36.3	4.2	35.6	-20.0	28.7	27.2	500.0	-25.3
7412.00	V	0.0	1.0	43.1	37.9	4.6	35.9	-20.0	29.7	30.6	500.0	-24.3
8338.50	V	0.0	1.0	43.0	38.6	4.9	36.1	-20.0	30.4	32.9	500.0	-23.6
9265.00	V	0.0	1.0	43.4	39.2	5.0	36.3	-20.0	31.4	37.1	500.0	-22.6

Table 7. Radiated Emissions Data, Peak Above 1GHz

CLIENT: Mad Catz
DATE: 2/19/2003
TESTER: Ken Gemmell
JOB #: 7419

EUT Information:
EUT: Lynx Wireless Host
DISTANCE: 3m

Test Requirements:
TEST STD: FCC Part 15
CLASS: B

Test Equipment/Limit:
ANTENNA: A_00004
CABLE: CSITE2_HF
LIMIT: LFCC_3m_Class_B
AMPLIFIER: A_00066

Frequency (MHz)	Pol H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) dBµV	Ant. Corr. dB/m	Cable Corr. dB	Amp Gain dB	Corr. Level dBµV/m	Corr. Level µV/m	Limit µV/m	Margin dB
Channel 1 (906 MHz)											
1812.00	H	180.0	1.0	54.3	28.3	3.1	35.6	50.1	319.9	5000	-23.9
2718.00	H	180.0	1.0	48.0	30.3	2.9	35.6	45.6	190.5	5000	-28.4
3624.00	H	180.0	1.0	46.9	31.4	2.8	35.5	45.6	190.5	5000	-28.4
4530.00	H	180.0	1.0	43.8	32.4	3.7	35.7	44.2	162.2	5000	-29.8
5436.00	H	0.0	1.0	41.1	33.9	4.3	35.8	43.5	149.6	5000	-30.5
6342.00	H	0.0	1.0	42.2	35.9	4.2	35.6	46.7	216.3	5000	-27.3
7248.00	H	0.0	1.0	43.8	37.8	4.5	35.9	50.2	323.6	5000	-23.8
8154.00	H	0.0	1.0	43.0	38.5	4.9	36.1	50.3	327.3	5000	-23.7
9060.00	H	0.0	1.0	43.7	39.1	4.9	36.2	51.5	375.8	5000	-22.5
1812.00	V	180.0	1.0	54.0	28.3	3.1	35.6	49.8	309.0	5000	-24.2
2718.00	V	180.0	1.0	47.3	30.3	2.9	35.6	44.9	175.8	5000	-29.1
3624.00	V	180.0	1.0	49.8	31.4	2.8	35.5	48.5	266.1	5000	-25.5
4530.00	V	180.0	1.0	43.1	32.4	3.7	35.7	43.5	149.6	5000	-30.5
5436.00	V	0.0	1.0	41.7	33.9	4.3	35.8	44.1	160.3	5000	-29.9
6342.00	V	0.0	1.0	40.4	35.9	4.2	35.6	44.9	175.8	5000	-29.1
7248.00	V	0.0	1.0	41.3	37.8	4.5	35.9	47.7	242.7	5000	-26.3
8154.00	V	0.0	1.0	42.6	38.5	4.9	36.1	49.9	312.6	5000	-24.1
9060.00	V	0.0	1.0	44.7	39.1	4.9	36.2	52.5	421.7	5000	-21.5
Channel 4 (913 MHz)											
1826.00	V	135.0	1.0	54.8	28.3	3.1	35.6	50.6	338.8	5000	-23.4
2739.00	V	180.0	1.0	49.3	30.3	2.9	35.6	46.9	221.3	5000	-27.1
3652.00	V	180.0	1.0	49.7	31.4	2.8	35.5	48.4	263.0	5000	-25.6
4565.00	V	0.0	1.0	42.8	32.5	3.8	35.8	43.3	146.2	5000	-30.7
5478.00	V	0.0	1.0	41.5	34.0	4.2	35.7	44	158.5	5000	-30.0
6391.00	V	0.0	1.0	42.1	36.1	4.2	35.6	46.8	218.8	5000	-27.2

Frequency (MHz)	Pol H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) dBµV	Ant. Corr. dB/m	Cable Corr. dB	Amp Gain dB	Corr. Level dBµV/m	Corr. Level µV/m	Limit µV/m	Margin dB
7304.00	V	0.0	1.0	43.6	37.9	4.6	35.9	50.2	323.6	5000	-23.8
8217.00	V	0.0	1.0	43.0	38.5	4.9	36.1	50.3	327.3	5000	-23.7
9130.00	V	0.0	1.0	43.3	39.1	4.9	36.2	51.1	358.9	5000	-22.9
1826.00	H	135.0	1.0	52.9	28.3	3.1	35.6	48.7	272.3	5000	-25.3
2739.00	H	180.0	1.0	44.7	30.3	2.9	35.6	42.3	130.3	5000	-31.7
3652.00	H	180.0	1.0	49.8	31.4	2.8	35.5	48.5	266.1	5000	-25.5
4565.00	H	0.0	1.0	41.4	32.5	3.8	35.8	41.9	124.5	5000	-32.1
5478.00	H	0.0	1.0	41.2	34.0	4.2	35.7	43.7	153.1	5000	-30.3
6391.00	H	0.0	1.0	41.0	36.1	4.2	35.6	45.7	192.8	5000	-28.3
7304.00	H	0.0	1.0	42.8	37.9	4.6	35.9	49.4	295.1	5000	-24.6
8217.00	H	0.0	1.0	43.1	38.5	4.9	36.1	50.4	331.1	5000	-23.6
9130.00	H	0.0	1.0	44.1	39.1	4.9	36.2	51.9	393.6	5000	-22.1
Channel 2 (926.5 MHz)											
1853.00	H	180.0	1.0	52.2	28.4	3.2	35.6	48.2	257.0	5000	-25.8
2779.50	H	225.0	1.0	47.5	30.4	2.9	35.7	45.1	179.9	5000	-28.9
3706.00	H	180.0	1.0	48.0	31.4	2.8	35.5	46.7	216.3	5000	-27.3
4632.50	H	0.0	1.0	42.3	32.6	3.9	35.8	43	141.3	5000	-31.0
5559.00	H	0.0	1.0	41.8	34.2	4.2	35.7	44.5	167.9	5000	-29.5
6485.50	H	0.0	1.0	42.5	36.3	4.2	35.6	47.4	234.4	5000	-26.6
7412.00	H	0.0	1.0	43.8	37.9	4.6	35.9	50.4	331.1	5000	-23.6
8338.50	H	0.0	1.0	43.3	38.6	4.9	36.1	50.7	342.8	5000	-23.3
9265.00	H	0.0	1.0	43.2	39.2	5.0	36.3	51.1	358.9	5000	-22.9
1853.00	V	180.0	1.0	53.8	28.4	3.2	35.6	49.8	309.0	5000	-24.2
2779.50	V	180.0	1.0	48.0	30.4	2.9	35.7	45.6	190.5	5000	-28.4
3706.00	V	135.0	1.0	47.4	31.4	2.8	35.5	46.1	201.8	5000	-27.9
4632.50	V	0.0	1.0	42.1	32.6	3.9	35.8	42.8	138.0	5000	-31.2
5559.00	V	0.0	1.0	42.7	34.2	4.2	35.7	45.4	186.2	5000	-28.6
6485.50	V	0.0	1.0	43.8	36.3	4.2	35.6	48.7	272.3	5000	-25.3
7412.00	V	0.0	1.0	43.1	37.9	4.6	35.9	49.7	305.5	5000	-24.3
8338.50	V	0.0	1.0	43.0	38.6	4.9	36.1	50.4	331.1	5000	-23.6
9265.00	V	0.0	1.0	43.4	39.2	5.0	36.3	51.3	367.3	5000	-22.7

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.

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.

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

Table 8: AC Power Line Conducted Emissions Test Data Sheet

CLIENT:	Mad Catz	DATE:	2/25/03
TESTER:	Ken Gemmell	JOB #:	7420
TEST STANDARD:	FCC Part 15	CLASS:	FCC_B
TEST VOLTAGE:	120 VAC UNIT ONLY		

LINE 1 - NEUTRAL

Frequency MHz	Voltage (QP) dBuV	Voltage uV	FCC Limit uV	Margin dB
2.30	34.8	55.0	250.0	-13.2
6.63	23.5	15.0	250.0	-24.5
16.99	26.0	20.0	250.0	-22.0
8.54	19.9	9.9	250.0	-28.1
29.22	30.1	32.0	250.0	-17.9
3.52	22.9	14.0	250.0	-25.1

LINE 2 - PHASE

Frequency MHz	Voltage (QP) dBuV	Voltage uV	FCC Limit uV	Margin dB
2.30	35.6	60.3	250.0	-12.4
6.63	24.2	16.2	250.0	-23.8
16.99	26.1	20.2	250.0	-21.9
8.54	20.2	10.2	250.0	-27.8
29.22	30.1	32.0	250.0	-17.9
3.52	23.2	14.5	250.0	-24.8