L.S. Compliance, Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012
262-375-4400 Fax: 262-375-4248

COMPLIANCE TESTING OF:

Lynx™ Wireless-Controller Game-Controller Unit

PREPARED FOR:

Mad Catz, incorporated
7480 Mission Valley Road
Suite 101
San Diego, CA 92108-4406

TEST REPORT NUMBER:

303325-GT

TEST DATE(S):

May through July 2003

Table of Contents

1. L. S. Compliance In Review

L. S. Compliance, Inc. is located in Cedarburg, Wisconsin – United States.

We may be contacted by:

Mail: L. S. Compliance, Inc.
W66 N220 Commerce Court
Cedarburg, Wisconsin 53012

Phone: 262-375-4400
Fax: 262-375-4248
E-mail: eng@lsr.com

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:

A2LA – American Association for Laboratory Accreditation
Accreditation based on ISO/IEC 17025 : 2003
with Electrical (EMC) Scope of Accreditation
A2LA Certificate Number: **1255.01**

U. S. Conformity Assessment Body (CAB) Validation
Validated by the European Commission as a U. S. Conformity Assessment Body operating under the U. S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union EMC Directive 89/336/EEC, Article 10.2.
Date of Validation: **March 26, 2003**

Federal Communications Commission (FCC) – USA
Listing of 3 Meter Semi-Anechoic Chamber based on 47CFR 2.948
FCC Registration Number: **90756**

Listing of 3 and 10 meter OATS based on 47CFR 2.948
FCC Registration Number: **90757**

Industry Canada
On-file, 3 Meter Semi-Anechoic Chamber based on 47CFR 2.948
File Number: **IC 3088**

On-file 3 and 10 Meter OATS based on RSS-210
File Number: **IC 3088-A**

2. A2LA Certificate of Accreditation

THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

L.S. COMPLIANCE, INC.
Cedarburg, WI

for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing. Testing and calibration laboratories that comply with this International Standard also operate in accordance with ISO 9001 or ISO 9002 (1994).

Presented this 26th day of March 2003.

President
For the Accreditation Council
Certificate Number 1255.01
Valid to January 31, 2005

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

3. A2LA Scope of Accreditation

American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

L.S. COMPLIANCE, INC.
W66 N220 Commerce Court
Cedarburg, WI 53012
James Blaha Phone: 262 375 4400

ELECTRICAL (EMC)

Valid to: January 31, 2003 Certificate Number: 1255-01

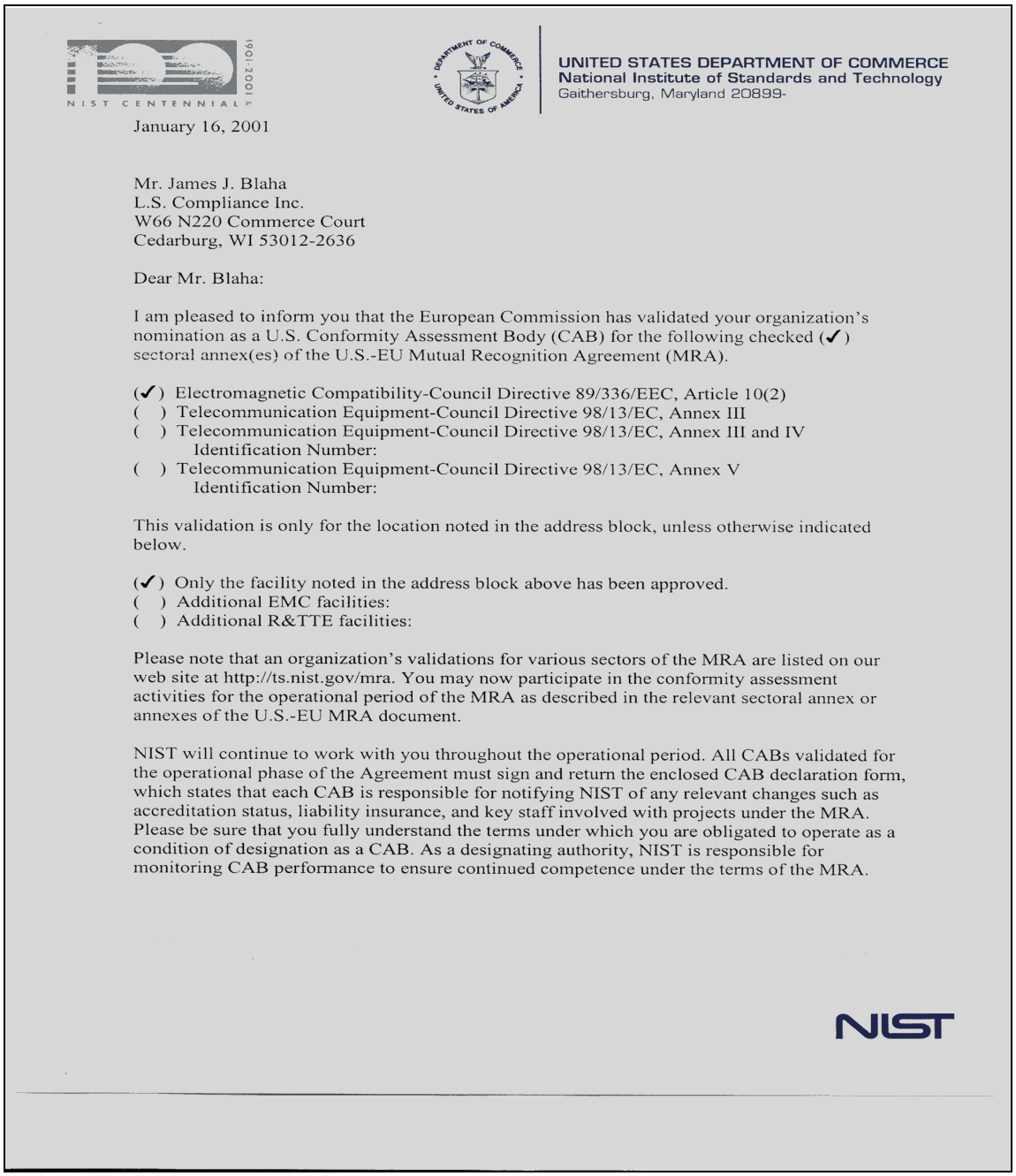
In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests:

Test	Test Method(s)
Conducted Emissions Continuous/Discontinuous	Code of Federal Regulations (CFR) 47, FCC Method Parts 15 and 18 using ANSI C63.4; EN: 55011, 55022, 55081-1, 55081-2; CISPR: 11, 22; CNS 13438
Radiated Emissions	Code of Federal Regulations (CFR) 47, FCC Method Parts 15 and 18 using ANSI C63.4; EN: 55011, 55022, 55081-1, 55081-2; CISPR: 11,22; CNS 13438
Conducted Immunity Fast Transients/Burst	IEC: 1000-4-4, 801-4; EN: 61000-4-4, 50082-1, 50082-2
Surge	IEC: 1000-4-5, 801-5; ENV 50142; EN: 61000-4-5, 50082-1, 50082-2
RF Fields	IEC: 1000-4-6, 801-6; ENV 50141; EN: 61000-4-6, 50082-1, 50082-2
Voltage Dips/Interruptions	IEC 1000-4-11; EN: 61000-4-11, 50082-1, 50082-2
Radiated Immunity RF Fields	IEC: 801-3, 1000-4-3; ENV 50140; EN: 61000-4-3, 50082-1, 50082-2
RF Fields (50 Hz)	IEC 1000-4-8; EN 61000-4-8
RF Fields (Pulse Mode)	EN: 50082-1, 50082-2; ENV 50204
Electrostatic Discharge (ESD)	IEC: 1000-4-2, 801-2; BSEN 60801-2; EN: 61000-4-2, 50082-1, 50082-2

(A2LA Cert. No. 1255.01) 06/26/01 Page 1 of 1

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644-3248 • Fax: 301-662 2974

4. Validation Letter – U.S. Competent Body for EMC Directive 89/336/EEC



UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

January 16, 2001

Mr. James J. Blaha
L.S. Compliance Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012-2636

Dear Mr. Blaha:

I am pleased to inform you that the European Commission has validated your organization's nomination as a U.S. Conformity Assessment Body (CAB) for the following checked (✓) sectoral annex(es) of the U.S.-EU Mutual Recognition Agreement (MRA).

(✓) Electromagnetic Compatibility-Council Directive 89/336/EEC, Article 10(2)
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III and IV
Identification Number:
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex V
Identification Number:

This validation is only for the location noted in the address block, unless otherwise indicated below.

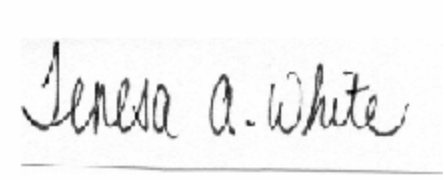
(✓) Only the facility noted in the address block above has been approved.
( ) Additional EMC facilities:
( ) Additional R&TTE facilities:

Please note that an organization's validations for various sectors of the MRA are listed on our web site at http://ts.nist.gov/mra. You may now participate in the conformity assessment activities for the operational period of the MRA as described in the relevant sectoral annex or annexes of the U.S.-EU MRA document.

NIST will continue to work with you throughout the operational period. All CABs validated for the operational phase of the Agreement must sign and return the enclosed CAB declaration form, which states that each CAB is responsible for notifying NIST of any relevant changes such as accreditation status, liability insurance, and key staff involved with projects under the MRA. Please be sure that you fully understand the terms under which you are obligated to operate as a condition of designation as a CAB. As a designating authority, NIST is responsible for monitoring CAB performance to ensure continued competence under the terms of the MRA.

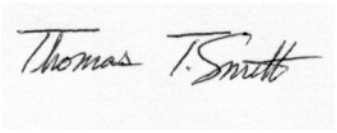
NIST

5. Signature Page



Prepared By: **July 21, 2003**

Teresa A. White, Document Coordinator **Date**



Tested By: **July 21, 2003**

Thomas T. Smith, EMC Engineer **Date**

Tested By: **July 21, 2003**

Abtin Spantman, EMC Engineer **Date**

Tested By: **signed by Mark Wolski** **July 21, 2003**

Mark Wolski, RF Engineer **Date**

Approved By: **July 21, 2003**

Kenneth L. Boston, EMC Lab Manager **Date**
PE #31926 Licensed Professional Engineer
Registered in the State of Wisconsin, United States

6. Product and General Information

Manufacturer:	Mad Catz, Incorporated
Model No.:	Game-Controller Unit
Serial No.:	Engineering Unit
Description:	2.4 GHz Wireless Controller for the X-Box video game system.

7. Product Description

The Mad Catz Lynx™ wireless controller is used with the X-box video game system to provide the user with the comfort of a remote controller with out the hindrance of cables and wires. There are two components to the Lynx™ wireless system: a "Game Controller", and a "Base Unit".

The Mad Catz Lynx™ system replaces the normally wired connection between the Handset game controller and the X-box. One of twelve possible channels is used in the 2.4 GHz ISM band, depending on the setting of the 'player number' switch and if any of the other channels are already occupied. The system supports up to four players and each player will use one of three possible channels:

Player Number	Channel Number	Frequency (MHz)
1	1	2408.448
	5	2433.024
	9	2457.600
2	2	2414.592
	6	2439.168
	10	2463.744
3	3	2420.736
	7	2445.312
	11	2469.888
4	4	2426.880
	8	2451.456
	12	2476.032

The Handset contains a Controller board and an RF Transceiver board. The Handset Controller board consists of the various game control devices such as switches and joy-sticks, which are multiplexed into the microprocessor, which in turn controls the RF transceiver.

The Base unit contains the same RF transceiver board, and a separate controller board with a microprocessor that controls the RF communications, and a microprocessor that interfaces with the game box.

A packetized protocol is used in bi-directional communications with the Base. To maximize battery life, the Handset microprocessor places itself and the RF transceiver board in a sleep mode immediately after a transaction is finished. The microprocessor's onboard sleep timer is used to wake the microprocessor up approximately 9 ms later. At this time data, is gathered from the game control devices, and the RF transceiver board is awakened to perform its internal self-alignment process. The data is then packetized in a proprietary format and sent (using a simple FSK protocol) to the Base unit. The Base unit receives the packet, decodes it to ensure the packet is valid, and returns a shorter Acknowledge message to the Handset. The entire transaction takes less than 500 microseconds.

8. Test Requirements

The tests were performed in order to determine the compliance of the Mad Catz Lynx™ Wireless System Game-Controller Unit with limits contained in various provisions of Title 47 CFR, FCC Part 15, including 15.109, 15.205, 15.207, and 15.247.

All radiated emissions tests were performed to measure the emissions in the frequency bands described by the above sections, and to determine whether said emissions are below the limits established by the above sections. These tests were performed in accordance with the procedure described in the 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 (ANSI C63.4-2001). Another document used as reference for the EMI receiver specification was the International Special Committee on Radio Interference CISPR 16-1 (2002). Measurement technique guidelines found in Appendix C to FCC 97-114 were also consulted.

9.

DECLARATION OF CONFORMITY

The Mad Catz Lynx™ Wireless System Game-Controller Unit was found to **MEET** the requirements as described within the specification of Title 47 CFR FCC, Part 15.247, Subpart c, for a digitally modulated spread spectrum transmitter.

10. Introduction

During May through July of 2003, a series of Radiated and Conducted Emission tests were performed on the Mad Catz Lynx™ Wireless System, Game-Controller Unit, here forth referred to as the "*Equipment Under Test*" or "*EUT*". These tests were performed using the procedures outlined in ANSI C63.4-2001 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.247 for a digital device. These tests were performed by Thomas T. Smith, EMC Engineer, Abtin Spantman, EMC Engineer, Mark Wolski, RF Engineer, and Kenneth Boston, EMC Lab Manager of L.S. Compliance, Incorporated.

11. Purpose

All Radiated and Conducted Emission tests upon the EUT were performed to measure the emissions in the frequency bands described in Title 47 CFR, FCC Part 15, including 15.35, 15.207, and 15.247 to determine whether these emissions are below the limits expressed within the standards. These tests were performed in accordance with the procedure described in the 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 (ANSI C63.4-2001). Another document used as a reference for the EMI Receiver specification was the Comite International Special Des Perturbations Radioelelectriques CISPR 16-1, 2002

12. Radiated Emissions Test

Test Setup

The test setup was assembled in accordance with Title 47, CRF FCC Part 15 and ANSI C63.4-2001. The EUT was placed on an 80cm high non-conductive table centered on a flush mounted 2-meter diameter turntable inside the 3 Meter Semi-Anechoic, FCC listed Chamber located at L. S. Compliance, Inc., Cedarburg, Wisconsin. The EUT was operated in continuous transmit mode, using power from three AA type batteries, onboard, connected in series, for a total voltage of 4.5 VDC. These batteries were checked constantly during the testing, and replaced as needed in order to insure testing with fresh batteries. The applicable radiated emission limits apply at a 3-meter measurement distance. Measurements above 6 GHz were performed at a 1-meter measurement distance. The calculations to determine the 3-meter limits are detailed in the following pages. Please refer to Appendix A for a list of the test equipment. The test sample was operated on one of three standard channels: low (Ch:1), medium (Ch:6) and high (Ch:12) to comply with FCC Part 15.35.

Channel 01: 2408.448 MHz
Channel 06: 2439.168 MHz
Channel 12: 2476.032 MHz

Test Procedure

Radiated Emission measurements were performed on the EUT in the 3 Meter Semi-Anechoic, FCC listed Chamber, located at L. S. Compliance, Inc. in Cedarburg, Wisconsin. The frequency range from 30 MHz to 25,000 MHz was scanned, and levels were manually noted at the various fixed degree settings of azimuth on the turntable and antenna height. The EUT was placed on a non-conductive table in the 3 Meter Semi-Anechoic Chamber, with the antenna mast placed such that the antenna was 3 meters separation from the test object during tests below 6 GHz, and at 1 meter separation during tests above 6 GHz. A Biconical Antenna was used to measure emissions from 30 MHz to 300 MHz, and a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz. A Double Ridged Waveguide Horn Antenna was used from 1 GHz to 18 GHz. A Pyramidal Horn Antenna was used from 18 GHz to 25 GHz. The maximum radiated emissions were found by raising and lowering the antenna between 1 and 4 meters in height, using both horizontal and vertical antenna polarities.

Test Equipment Utilized

A list of the test equipment and antennas utilized for the Radiated Emissions test can be found in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All calibrations of the antennas used were performed at an N.I.S.T. traceable site. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and a HP 8546A EMI Receiver. The resulting correction factors and the cable loss factors from these calibrations were entered into the HP 8546A EMI Receiver database. As a result, the data taken from the HP 8546A EMI Receiver accounts for the antenna correction factor as well as cable loss or other corrections, and can therefore be entered into the database as a corrected meter reading. The HP 8546A EMI Receiver was operated with a bandwidth of 120 kHz for measurements below 1 GHz, and a bandwidth of 1 MHz for measurements above 1 GHz. Both the Peak and Quasi-Peak Detector functions were utilized. From 6 GHz to 25 GHz, an Agilent E4407B Spectrum Analyzer was utilized along with the appropriate horn antenna.

Test Results

The EUT was found to MEET the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.247 for a digitally modulated spread spectrum transmitter. The frequencies with significant signals were recorded and plotted as shown in the Data Charts and Graphs.

CALCULATION OF RADIATED EMISSIONS LIMITS (in the 15.205 restricted bands)

The following table depicts the general radiated emission limits. These limits are obtained from Title 47 CFR, part 15.209a, for radiated emissions measurements, and are applied as limits in restricted bands as expressed in 47 CFR, part 15.205.

Frequency (MHz)	3 m Limit mV/m	3 m Limit dBmV/m
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
960-25,000	500	54.0

Sample conversion from field strength µV/m to dBµV/m:

$dB\mu V/m = 20 \log_{10}$ (3m limit)

from 30 - 88 MHz for example: $dB\mu V/m = 20 \log_{10}$ (100)

$40.0\ dB\mu V/m = 20 \log_{10}$ (100)

For measurements made at 1 meter, a 9.5 dB correction has been invoked.

960 MHz to 25,000 MHz

500 µV/m or 54.0 dBµV/m at 3 meters

54.0 + 9.5 = 63.5 dBµV/m at 1 meter

Note: Limits are conservatively rounded to the nearest tenth of a whole number.

Summary of Results and Conclusions

Based on the procedures outlined in this report, and the test results, it can be determined that the EUT does **MEET** the emission requirements of Title 47 CFR, FCC Part 15, Subpart C for a digitally modulated spread spectrum transmitter.

The enclosed test results pertain to the samples of the test item listed, and only for the tests performed per the data sheets. Any subsequent modification or changes to the test items could invalidate the data contained herein, and could therefore invalidate the findings of this report.

Measurement of Electromagnetic Radiated Emissions Within the 3 Meter FCC Listed Chamber

Manufacturer: Mad Catz, Incorporated
Date of Test: May through July 2003
Model Nos.: Lynx™ Wireless System Game-Controller Unit
Serial No.: Engineering Unit
Test Requirements: 15.247 and 15.205

Distance: 3 meter (f<6 GHz), 1 meter (F>6 GHz)	**Frequency Range Inspected:** 25 to 25,000 MHz
Configuration: Continuous Transmit	

Test Equipment Used:

Receiver: HP 8546A (Below 6 GHz),						Biconical Antenna: EMCO 93110B	
Receiver: Agilent E4407B (Above 6 GHz)						Log Periodic Antenna:EMCO 43146A	
Double-Ridged Wave Guide/Horn Antenna:EMCO 3115						Pyramidal Horn Antenna:EMCO 3160	
Detector(s) Used:	v	Peak	v	Quasi-Peak (f<1 GHz)	v	Average (f>1 GHz)	

The following table depicts the level of significant radiated emissions found

Frequency (MHz)	Antenna Polarity	Channel #	Antenna Height (m)	Azimuth (0^o 360^o)	EMI Meter Reading (dBuV/m)	15.247 Limit (dBuV/m)	Margin (dB)
1626.0	H	6	1.10	45	40.5	54.0	13.5
4818.0	H	1	1.00	50	50.6	54.0	3.4
4879.0	H	6	1.00	15	53.4	54.0	0.6
4953.0	H	12	1.00	315	53.6	54.0	0.4
7319.0	H	6	1.00	85	44.6	63.5	18.9
7430.0	H	12	1.00	85	48.2	63.5	15.3
8030.0	H	1	1.00	85	43.5	63.5	20.0
8132.0	H	6	1.00	85	44.9	63.5	18.6
8255.0	H	12	1.00	85	47.3	63.5	16.2

Notes: All other emissions seen, other than noise floor, were greater than 20 dB below the limit. All peak emissions seen were greater than 20 dB below the 74 dBµV/m limit, above 1 GHz.

Frequency (MHz)	Antenna Polarity	Channel #	Antenna Height (m)	Azimuth (0^o 360^o)	EMI Meter Reading (dBuV/m)	15.247 Limit (dBuV/m)	Margin (dB)
2408.5	H	1	1.50	50	91.9	125.0	33.1
2439.2	H	6	1.75	50	92.2	125.0	32.8
2476.0	H	12	1.45	25	89.4	125.0	35.6

Photos Taken During Radiated Emission Testing

Setup for the Radiated Emissions Test for the Game Controller Unit

Top-view of the EUT

Front view of the EUT

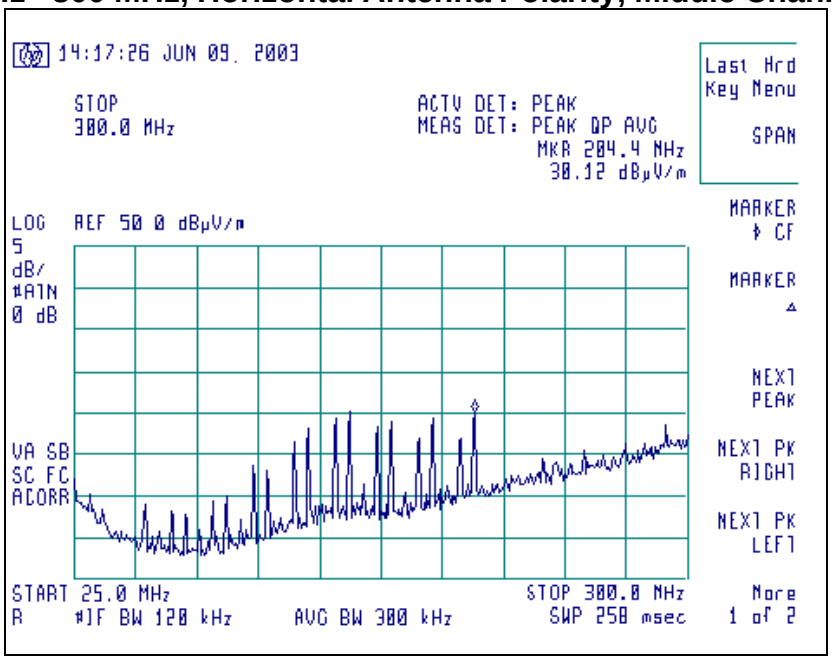
View of the EUT, as setup during radiated emissions tests, shown on side orientation for worst-case emissions.

Graphs made during Radiated Emission Testing

Note: Channel 6 (Middle channel) had the highest fundamental emissions, and was selected here for representative graphs.

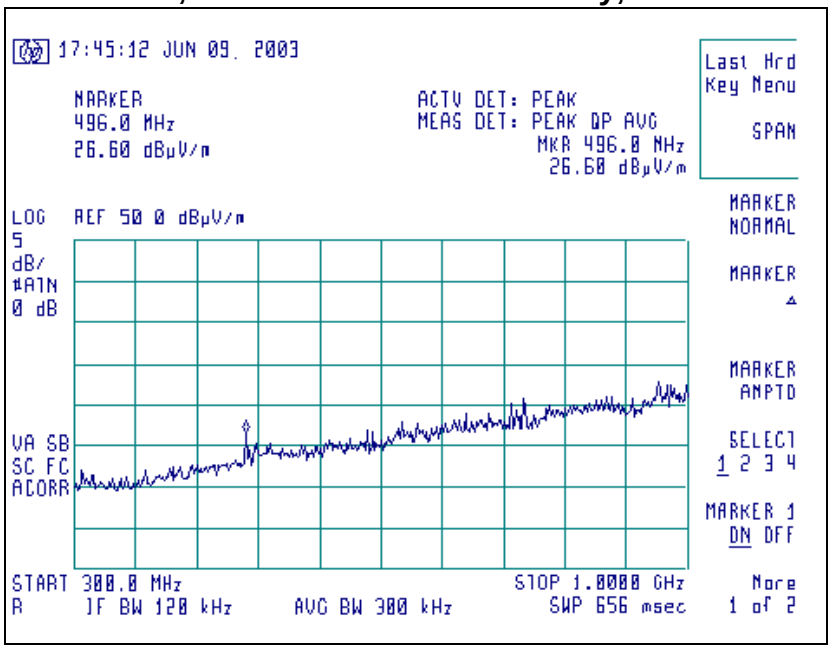
Signature Scan of Radiated Emissions, at 3 meter

25Hz - 300 MHz, Horizontal Antenna Polarity, Middle Channel.

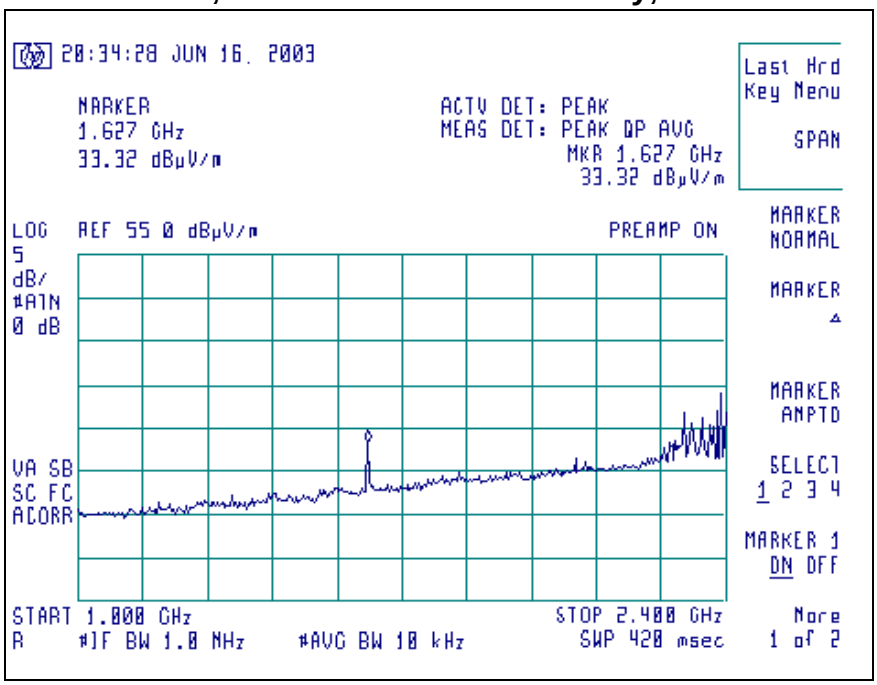


Signature Scan of Radiated Emissions, at 3 meter

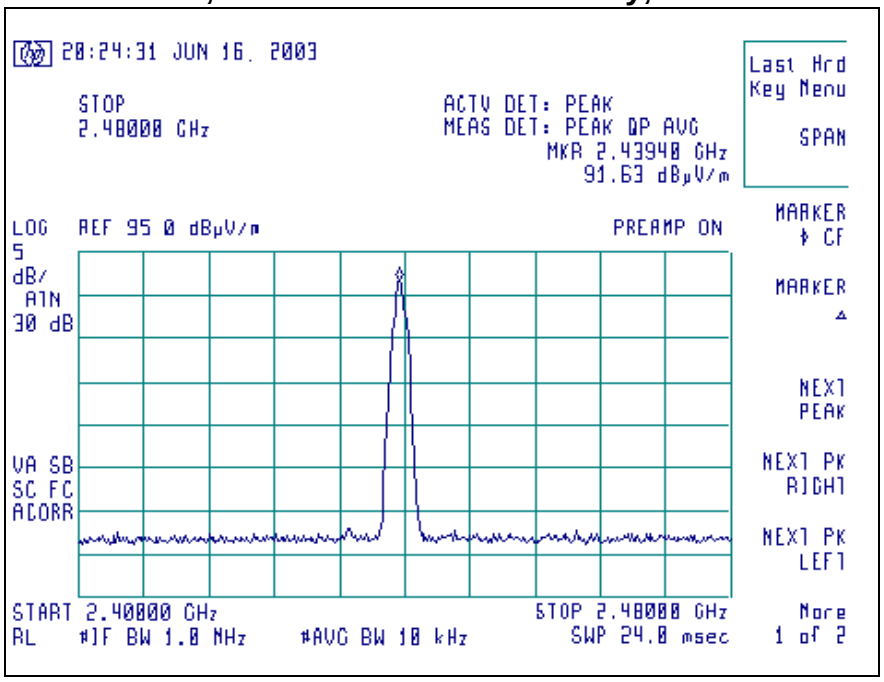
300 - 1000 MHz, Horizontal Antenna Polarity, Middle Channel.



Signature Scan of Radiated Emissions, at 3 meter
1000 –2400 MHz, Horizontal Antenna Polarity, Middle Channel.

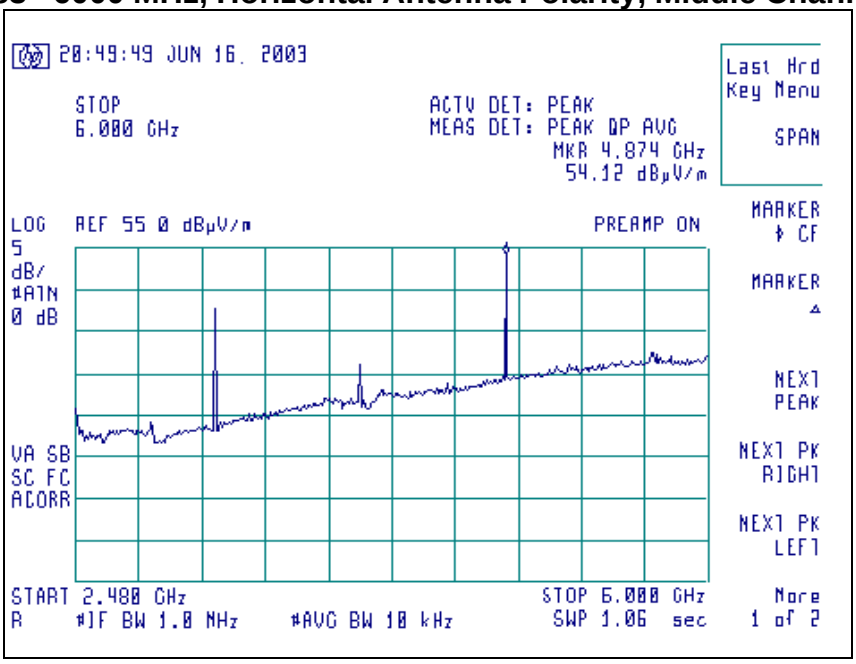


Signature Scan of Radiated Emissions, at 3 meter
2400 -2483MHz, Horizontal Antenna Polarity, Middle Channel.



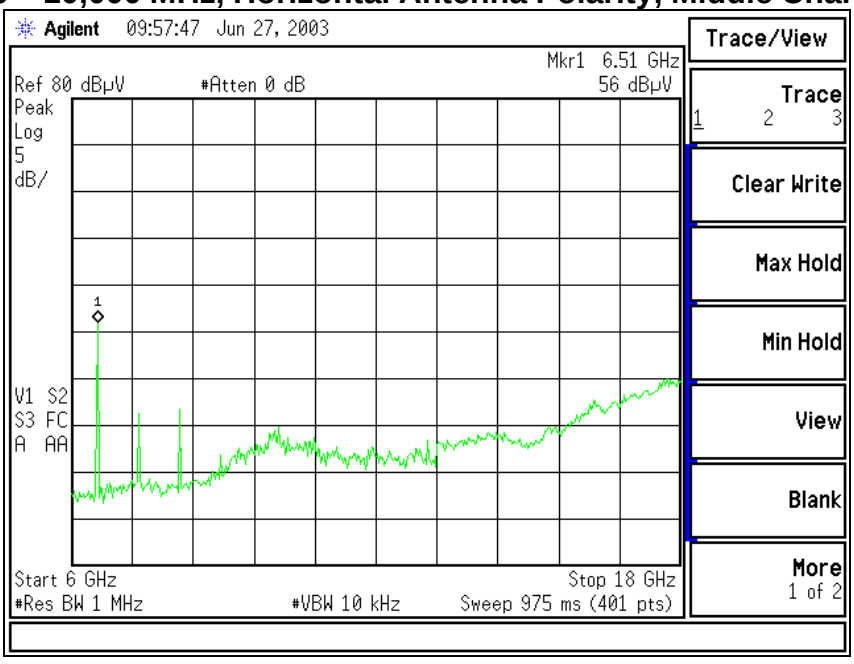
Signature Scan of Radiated Emissions, at 3 meter

2483 - 6000 MHz, Horizontal Antenna Polarity, Middle Channel.



Signature Scan of Radiated Emissions, at **1** meter

6000 – 10,000 MHz, Horizontal Antenna Polarity, Middle Channel.



Signature Scan of Radiated Emissions, at 1 meter

10,000 – 25,000 MHz, Horizontal Antenna Polarity, Middle Channel.

**Emissions at or below receiver system noise floor –
(seen to be 15 to 20 dB below 63.5 dBµV/m limit) scans omitted.

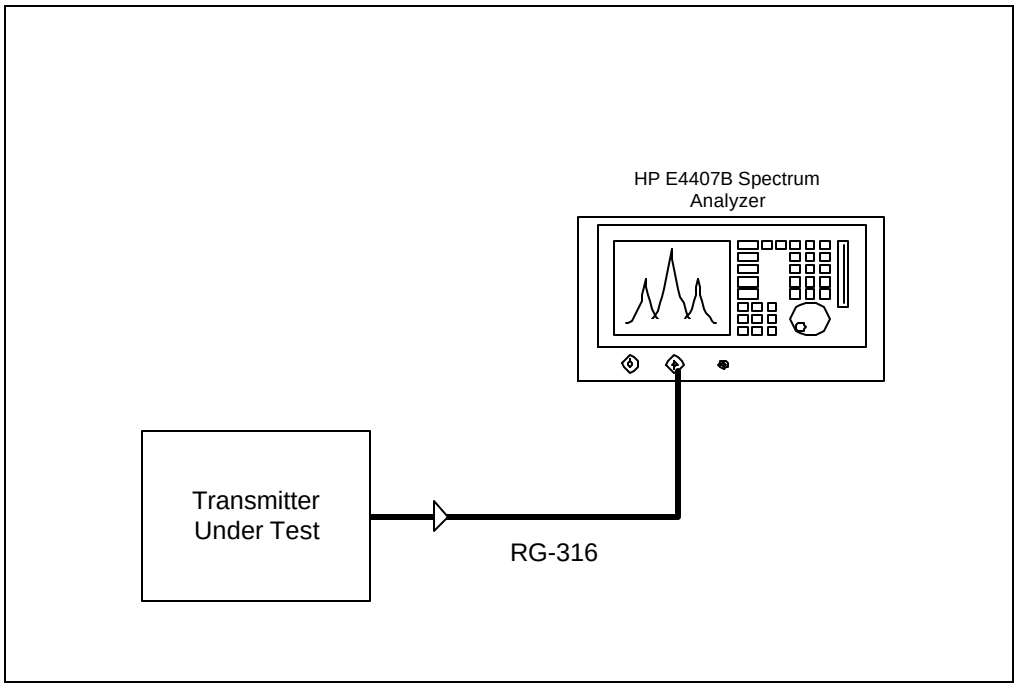
13. Conducted Emissions Test (AC Line)

Conducted Emission tests through the AC line is not applicable to this device.

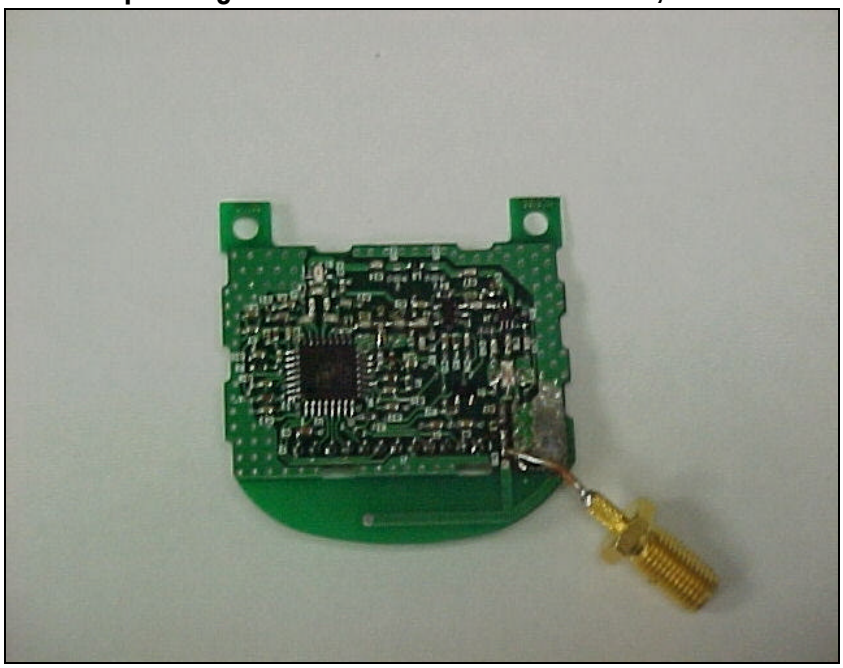
14. Power Output Test Performed

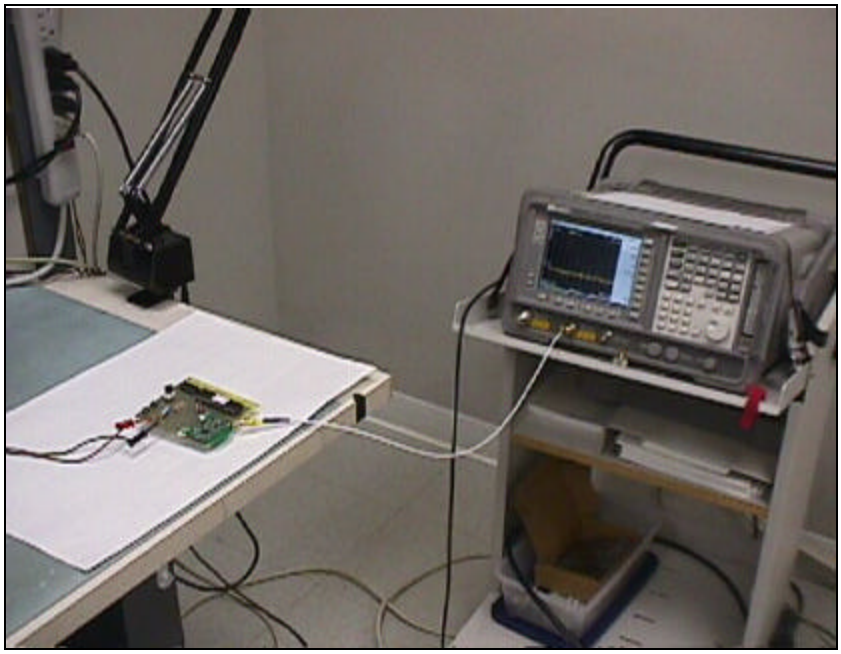
Conducted measurements were carried out on the RF Transceiver Board to verify conformance with the FCC Part 15.247.b.3 measurement. The PCB antenna on the transceiver was disconnected and the RF output port connected via a short jumper cable, to the input of the HP E4407B Spectrum Analyzer. The unit was configured to run in a normal continuous transmit mode, while being supplied with normal data packets as a modulation source. The HP receiver was set for a resolution bandwidth of 3 MHz, and the peak transmit signal was then stored. This power level was collected for three channels and can be seen in the chart presented below.

CHANNEL	CENTER FREQ (MHz)	LIMIT (dBm)	MEASURED POWER (dBm)	MARGIN (dB)
1	2408.450	30 dBm	-4.3	25.7
6	2439.170	30 dBm	-3.2	26.8
12	2476.030	30 dBm	-2.7	27.3

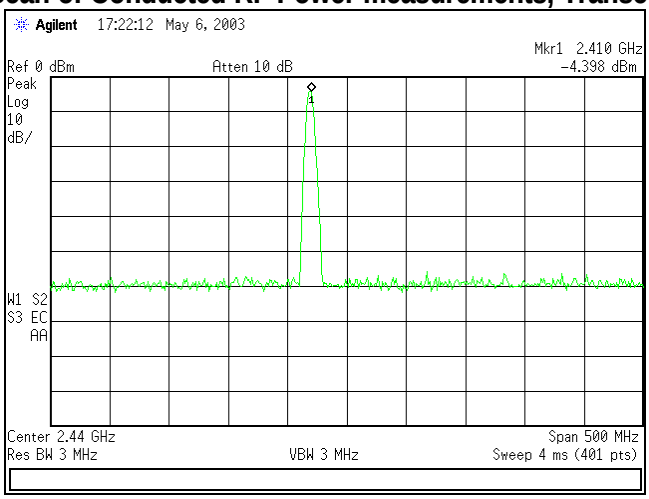


View of Test Setup During the Conducted RF measurements, RF Transceiver Board

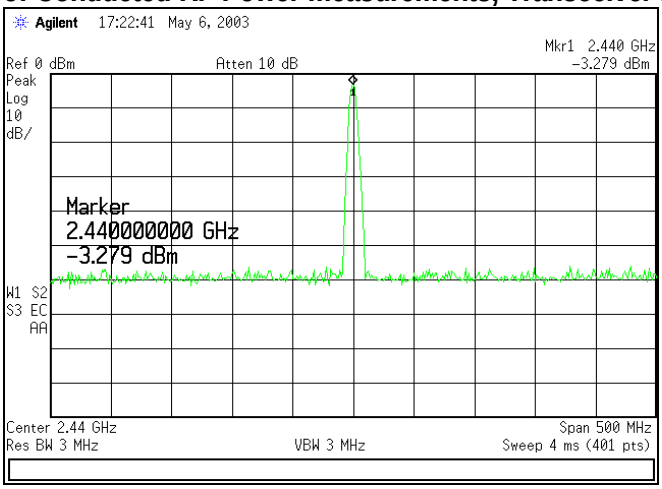




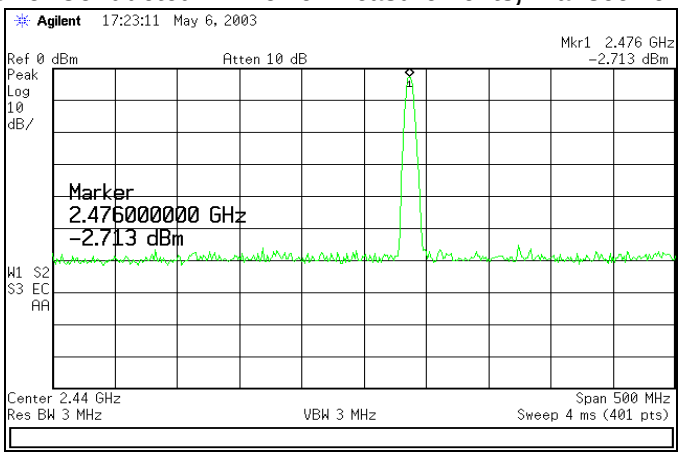
Typical Signature Scan of Conducted RF Power measurements, Transceiver, Low Channel



Signature Scan of Conducted RF Power measurements, Transceiver Middle Channel



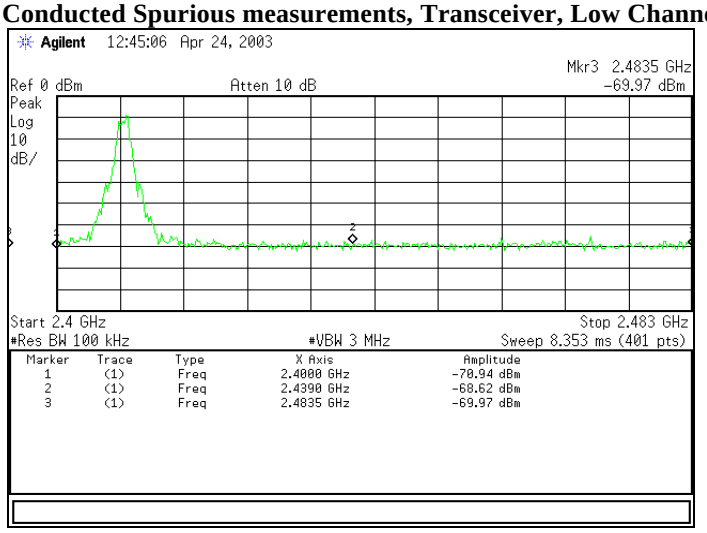
Signature Scan of Conducted RF Power measurements, Transceiver High Channel



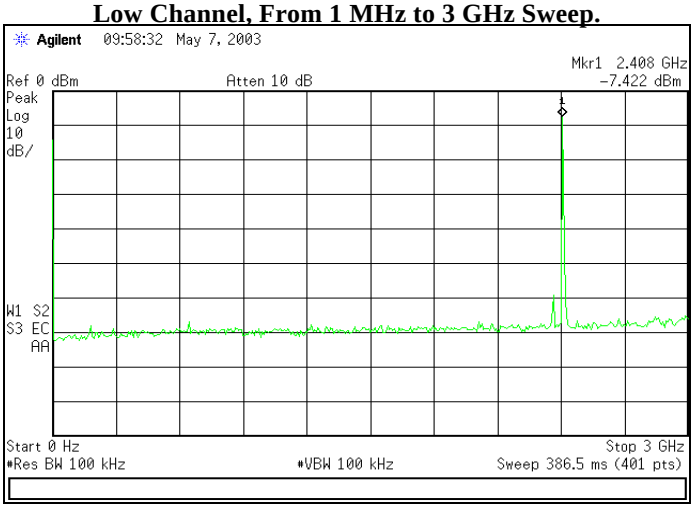
15. Conducted RF Test Setup and Measurements

FCC Part 15.247.c requires a measurement of conducted harmonic and spurious levels, as reference to the carrier frequency in a 100 kHz bandwidth. For this test, the transmitter was directly connected to the HP E4407B Spectrum Analyzer, through a very short Coaxial Cable. Plots were then taken, with any noticeable spurious or harmonic signals identified. No significant levels at any spurious products could be found within -20 dBc of the fundamental of the transmitter. Signals that were observed were greater than 50 dB down. (In the 100 kHz bandwidth)

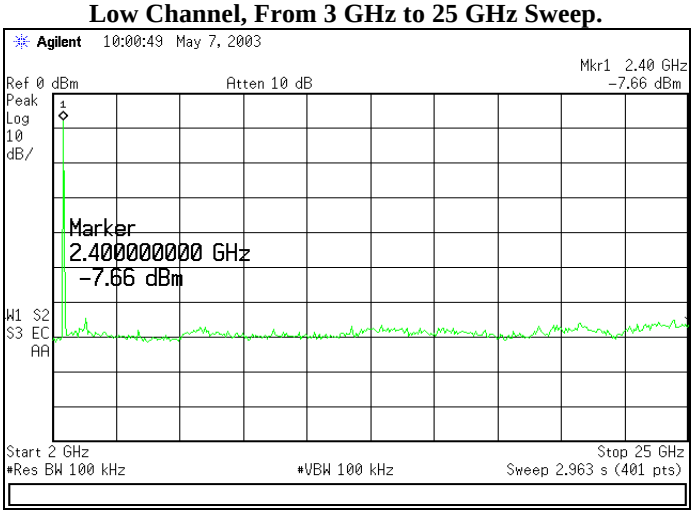
Signature Scan of Conducted Spurious measurements, Transceiver, Low Channel, at Band Edges.



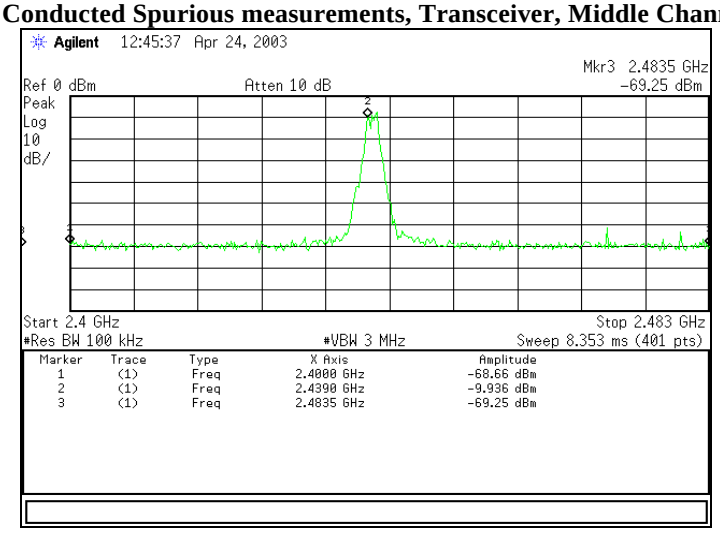
Signature Scan of Conducted Spurious measurements, Transceiver Low Channel, From 1 MHz to 3 GHz Sweep.



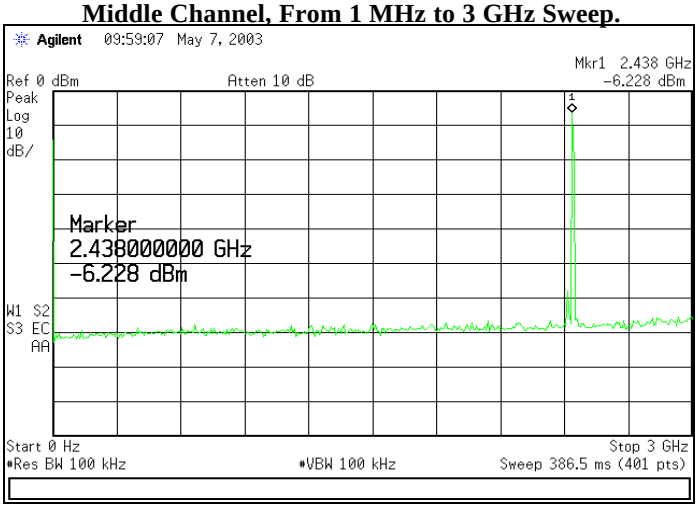
Signature Scan of Conducted Spurious measurements, Transceiver Low Channel, From 3 GHz to 25 GHz Sweep.



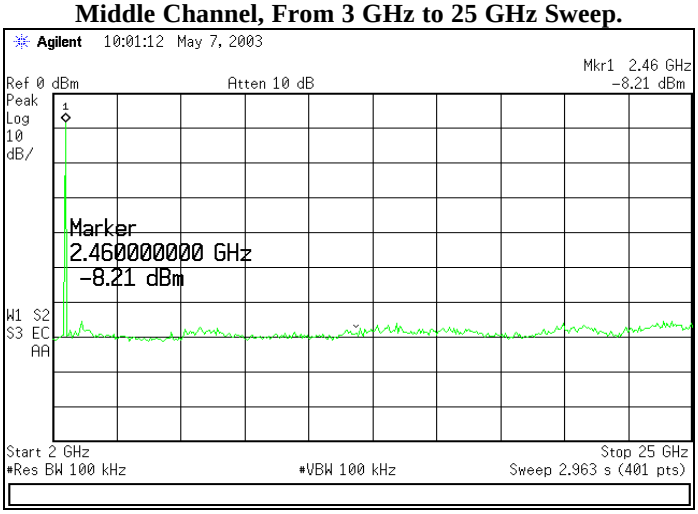
Signature Scan of Conducted Spurious measurements, Transceiver, Middle Channel, at Band Edges.



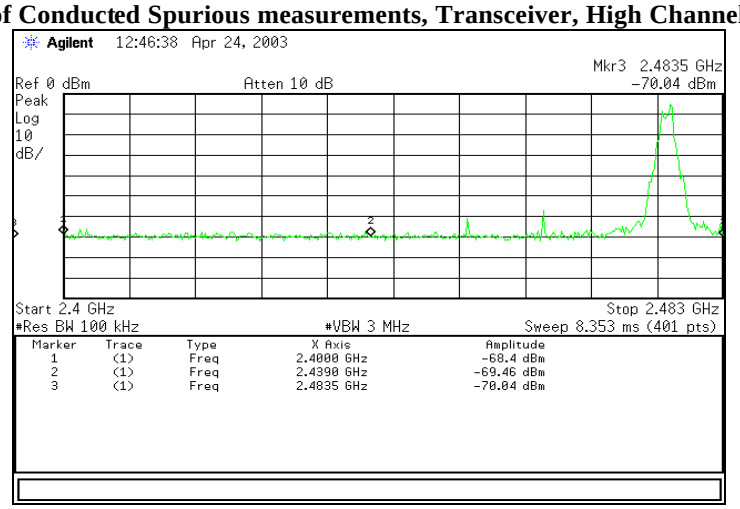
Signature Scan of Conducted Spurious measurements, Transceiver Middle Channel, From 1 MHz to 3 GHz Sweep.



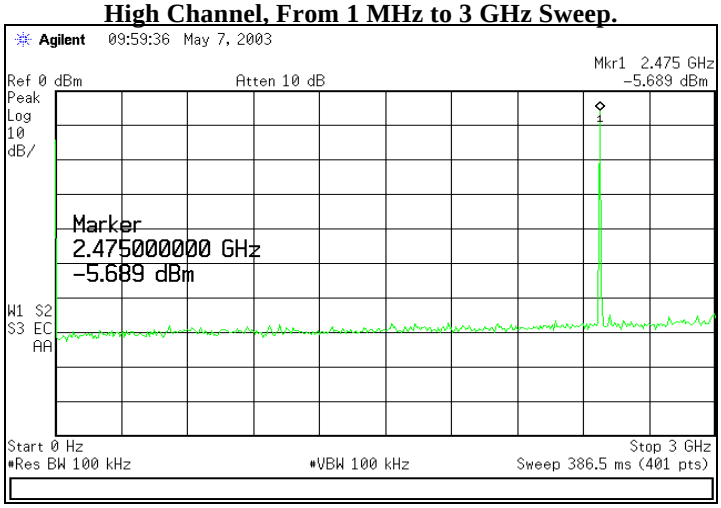
Signature Scan of Conducted Spurious measurements, Transceiver Middle Channel, From 3 GHz to 25 GHz Sweep.



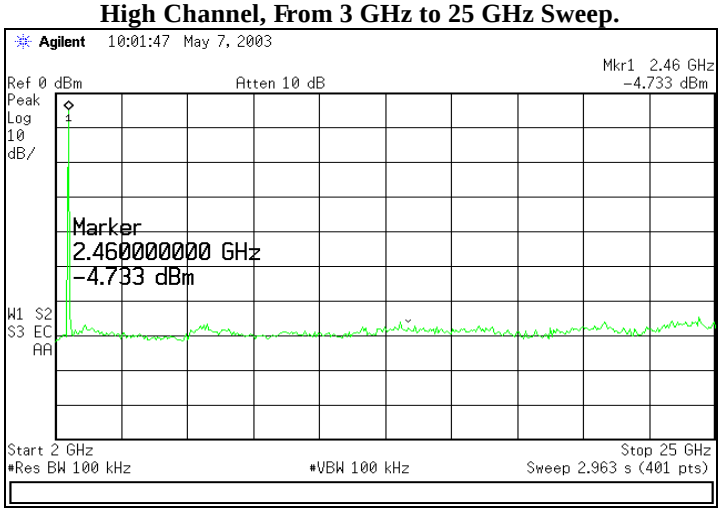
Signature Scan of Conducted Spurious measurements, Transceiver, High Channel, at Band Edges.



Signature Scan of Conducted Spurious measurements, Transceiver High Channel, From 1 MHz to 3 GHz Sweep.



Signature Scan of Conducted Spurious measurements, Transceiver High Channel, From 3 GHz to 25 GHz Sweep.

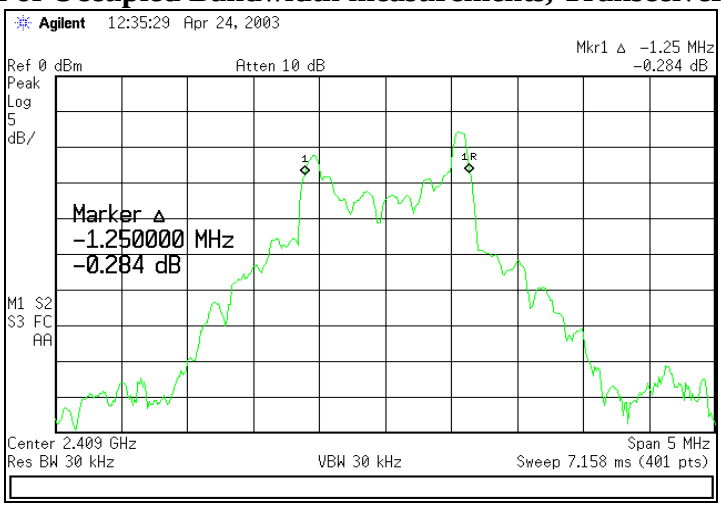


16. Occupied Bandwidth Measurements

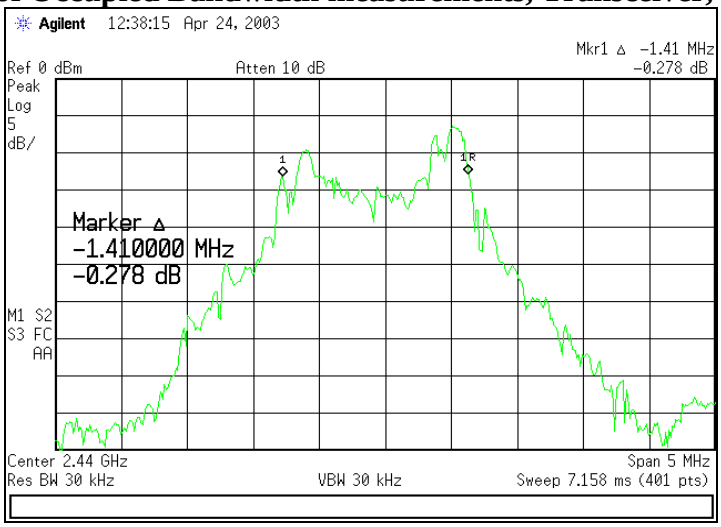
The 6 dB bandwidth requirement found in FCC Part 15.247.a.2 is a minimum of 500 kHz. Direct measurement of the transmitted signal, via a cabled connection to the HP E4407B Analyzer, was then used to determine the signal bandwidth. For each of the representative channels, refer to the graphs found on the following pages. From this data, the bandwidth of channel 3, which is the closest data to the specification limit, is 1250 kHz, which is above the minimum of 500 kHz.

CHANNEL	CENTER FREQ (MHz)	MEASURED 6 dB BW (kHz)	MINIMUM LIMIT (kHz)
1	2408.448	1250	500
6	2439.168	1410	500
12	2476.032	1280	500

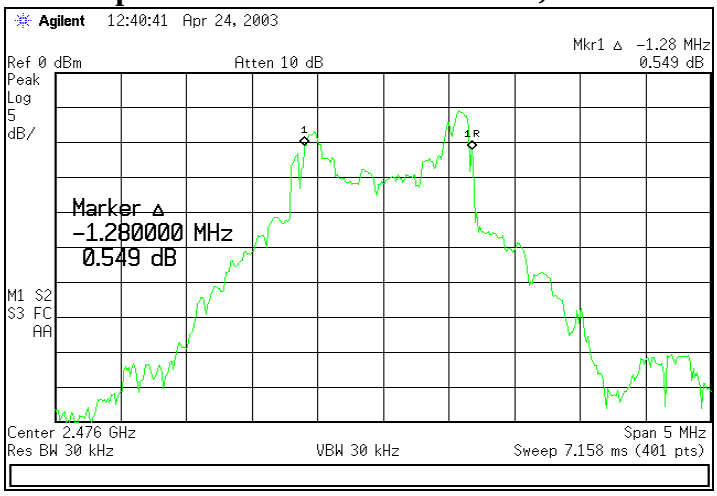
Signature Scan of Occupied Bandwidth measurements, Transceiver, Low Channel



Signature Scan of Occupied Bandwidth measurements, Transceiver, Middle Channel



Signature Scan of Occupied Bandwidth measurements, Transceiver, High Channel

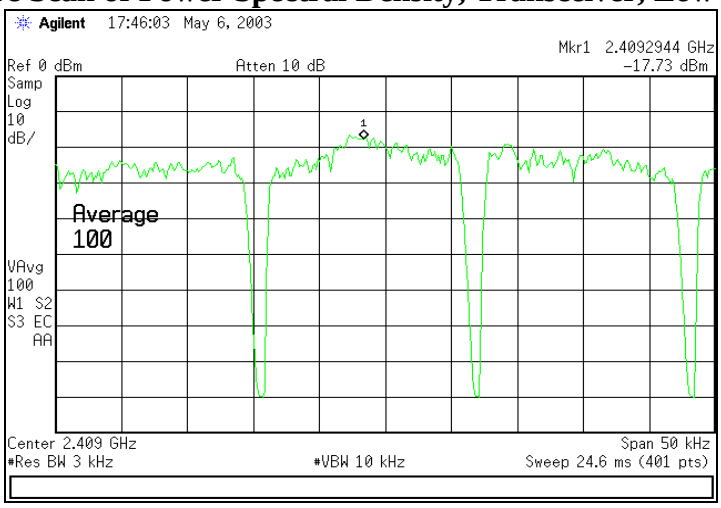


17. Power Spectral Density

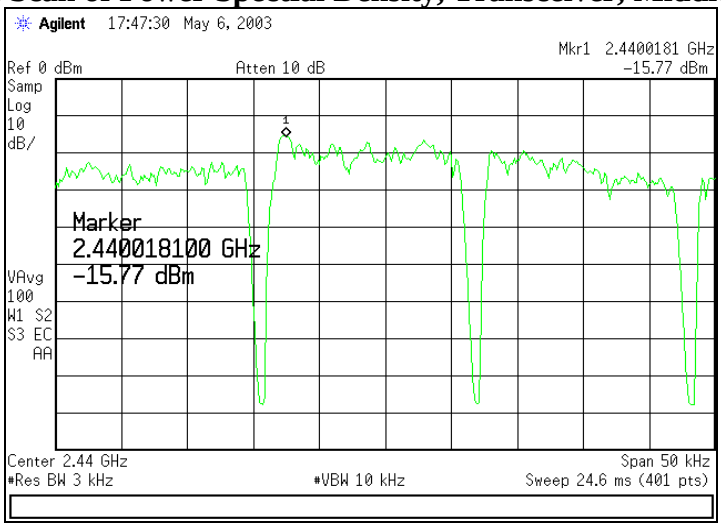
In accordance with FCC Part 15.247.d, the peak power spectral density should not exceed +8 dBm in any 3 kHz band. This measurement was performed along with the conducted power output readings performed as described in Section 14. The peak output frequency for each representative frequency was scanned, with a narrow bandwidth, and reduced sweep, and a power density measurement was performed by conducted measurement with the HP Analyzer. The highest density was found to be no greater than –15.7 dBm, which is under the allowable limit by more than 20 dB.

CHANNEL	CENTER FREQ	MEASURED P	SPEC	MARGIN
1	2408.448 MHz	-17.7 dBm	+8.0dBm	25.7
6	2439.168 MHz	-15.7 dBm	+8.0dBm	23.7
12	2476.032 MHz	-16.4 dBm	+8.0dBm	24.4

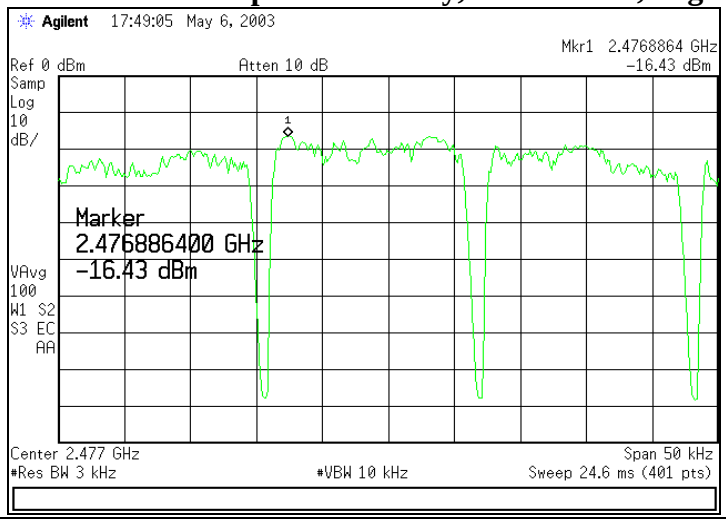
Signature Scan of Power Spectral Density, Transceiver, Low Channel



Signature Scan of Power Spectral Density, Transceiver, Middle Channel



Signature Scan of Power Spectral Density, Transceiver, High Channel



Appendix A
Test Equipment List

Asset #	Manufacturer	Model #	Serial #	Description	Date	Due
AA960008	EMCO	3816/2NM	9701-1057	Line Impedance Stabilization Network	9/19/02	9/19/03
AA960031	HP	119474A	3107A01708	Transient Limiter	6/19/03	6/19/04
AA960063	EMCO	3160-09	9809-1120	18-26 GHz Horn	6/10/03	6/10/04
AA960077	EMCO	93110B	9702-2918	Biconical Antenna	9/19/02	9/19/03
AA960078	EMCO	93146	9701-4855	Log-Periodic Antenna	9/19/02	9/19/03
AA960081	EMCO	3115	6907	Double Ridge Horn Antenna	11/12/02	11/12/03
CC00221C	Agilent	E4407B	US39160256	Spectrum Analyzer	10/28/02	10/28/03
EE960004	EMCO	2090	9607-1164	Device Controller	N/A	N/A
EE960013	HP	8546A	3617A00320	Receiver RF Section	9/20/02	9/20/03
EE960014	HP	85460A	3448A00296	Receiver Pre-Selector	9/20/02	9/20/03
EE960146	Advanced Microwave	WLA622-4	0123001	18-26 GHz Pre-amp	6/10/03	6/10/04
EE960147	Advanced Microwave	WLA612	0123101	5-18 GHz Pre-amp	6/10/03	6/10/04
N/A	LSC	Cable	0011	3 Meter ½" Armored Cable	6/19/03	6/19/04
N/A	LSC	Cable	0038	1 Meter RG 214 Cable	6/19/03	6/19/04
N/A	LSC	Cable	0050	10 Meter RG 214 Cable	6/19/03	6/19/04
N/A	Pasternack	Attenuator	N/A	10 dB Attenuator	6/19/03	6/19/04

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 Meter Chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3 Meter Chamber, Log Periodic Antenna	4.80 dB
Radiated Emissions	10 Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10 Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Meter Chamber, 3 Volts/Meter	1.128 Volts/Meter
Conducted Immunity	3 Volt level	1.0 V