FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

XBOX 360 WIRELESS RACING WHEEL WITH FORCE FEEDBACK

MODEL NUMBER: WRW01

FCC ID: C3KWRW01

REPORT NUMBER: 06U10508-1B

ISSUE DATE: AUGUST 29, 2006

Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
-	8/28/2006	Initial Issue	A. Ilarina
B	8/29/2006	Remove MPE section	A. Ilarina

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORPORATION
ONE MICROSOFT WAY
REDMOND, WA 98052-6399

EUT DESCRIPTION: XBOX 360 WIRELESS RACING WHEEL WITH FORCE FEEDBACK

MODEL: WRW01

SERIAL NUMBER: 0152

DATE TESTED: AUGUST 08 - 21, 2006

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with most of the requirements set forth in the above standards. Testing the average time of occupancy is not feasible, therefore the demonstration of compliance with this requirement is based on the theory of operation as documented in this report. The test results show that the equipment tested is capable of demonstrating compliance with the remaining requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

ALVIN ILARINA
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a frequency hopping transceiver.

During the final tests, a special design test accessory (RTX Unity) was used to control the frequency channel and enable continuous transmission.

Proprietary communication protocol is detailed in the theory of operation.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402 - 2482	3.43	2.20

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a directional patch antenna, with a maximum peak gain of –2.1 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was BAT-menu-V0107.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2442 MHz.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
NoteBook	ACER	ASPIRE3002LCi	LXA550526352601E7FEM00	DoC
RTX Unity	MS	Xbox MS	76	N/A
Converter	MS	Xbox MS	209358	N/A
Converter	KEYSPAN	USA-19113	N/A	DoC
USB HUB	STOR	QU24WR	N/A	DoC

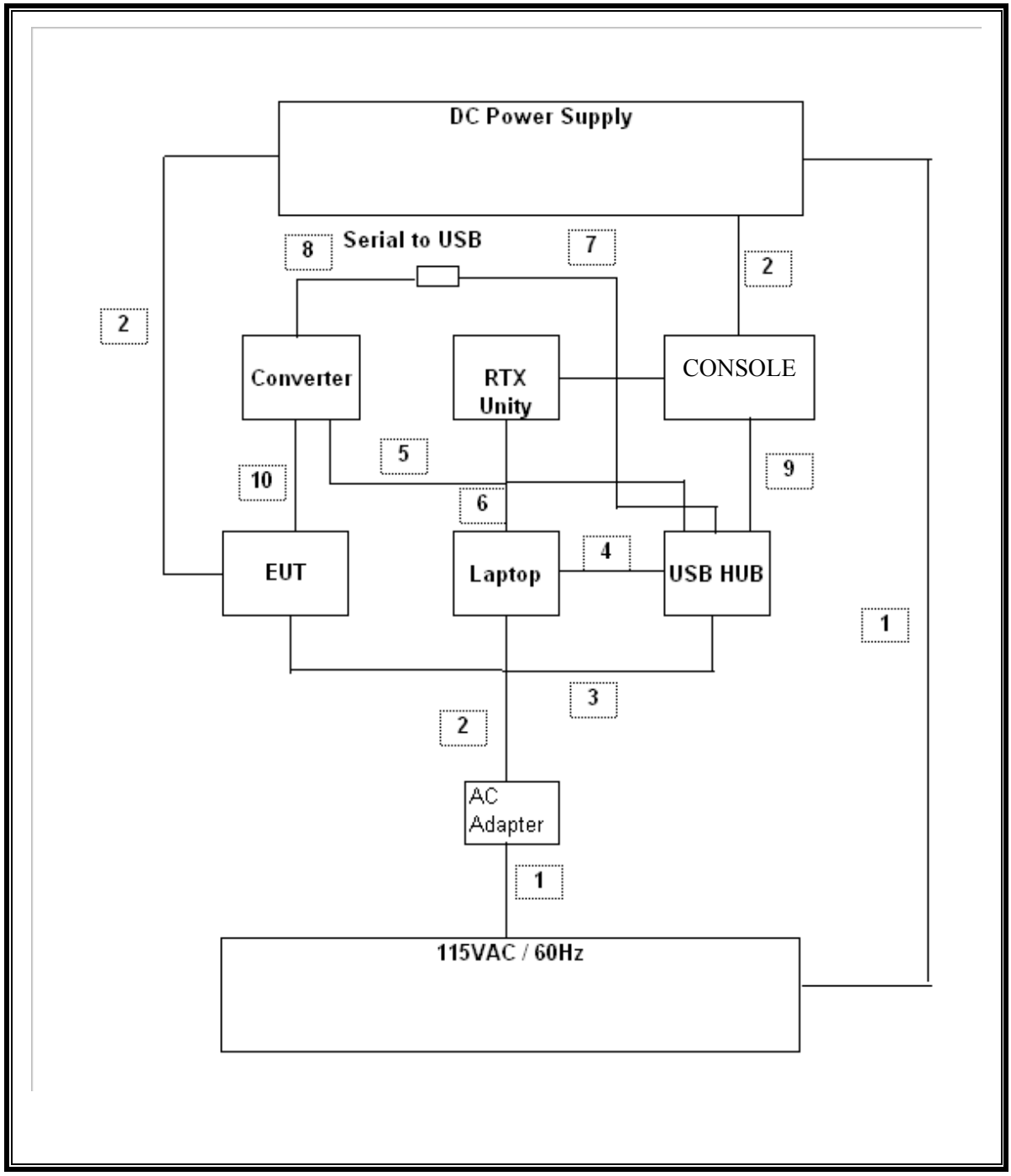
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	US 115V	Un-shielded	2m	
2	DC	3	DC	Shielded	1m	Ferrite on cables
3	USB	1	USB	Shielded	.5m	
4	USB	1	USB	Shielded	1m	
5	USB	1	USB	Shielded	1.5m	
6	USB	1	USB	Shielded	1.5m	
7	Serial	1	DB9	Un-shielded	.5m	
8	USB	1	USB	Shielded	.5m	
9	USB	1	USB	Shielded	.5m	
10	Serial	1	DB9	Shielded	.5m	

TEST SETUP

The EUT was tested in a standalone configuration once it was setup for testing with the laptop.

SETUP DIAGRAM FOR EMISSIONS TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42510266	10/19/06
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	2/4/07
RF Filter Section	Agilent / HP	85420E	3705A00256	2/4/07
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	9/3/06
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/06
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	8/30/06
EMI Test Receiver	R & S	ESHS 20	827129/006	11/3/06
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/2/07
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/2/07
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/07
Preamplifier, 1 ~ 26 GHz	Agilent / HP	8449B	3008A00931	8/1/07
4.0 High Pass Filter	Microtronics	HPM13351	4	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	29800	6/12/07

7. LIMITS AND RESULTS

7.1. ANTENNA PORT CHANNEL TESTS

7.1.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

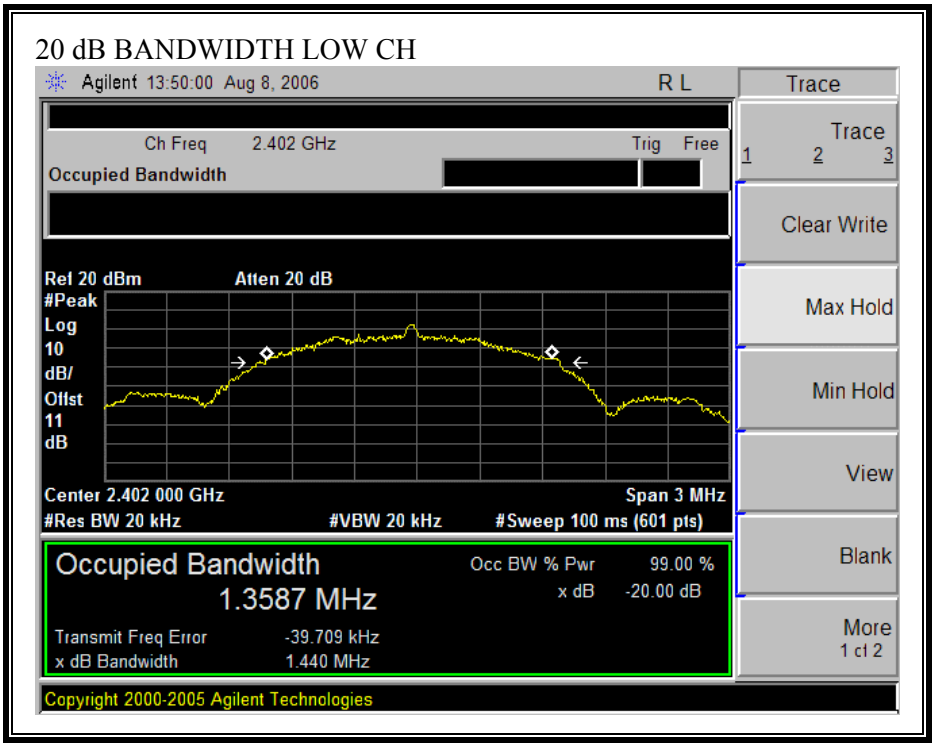
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 20 dB bandwidth. The VBW is set to >= the RBW. The sweep time is coupled.

RESULTS

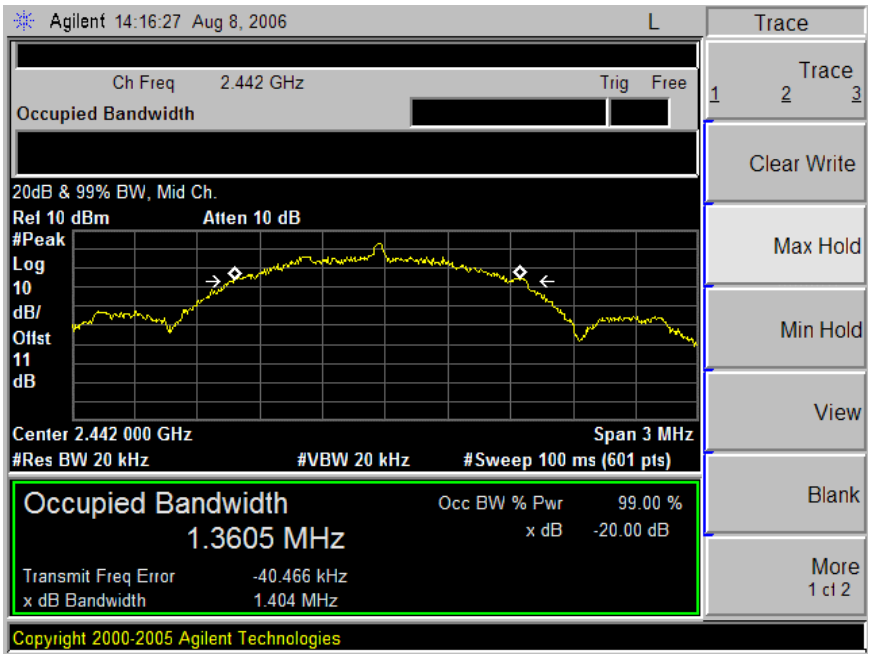
No non-compliance noted:

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	1440
Middle	2442	1404
High	2482	1565

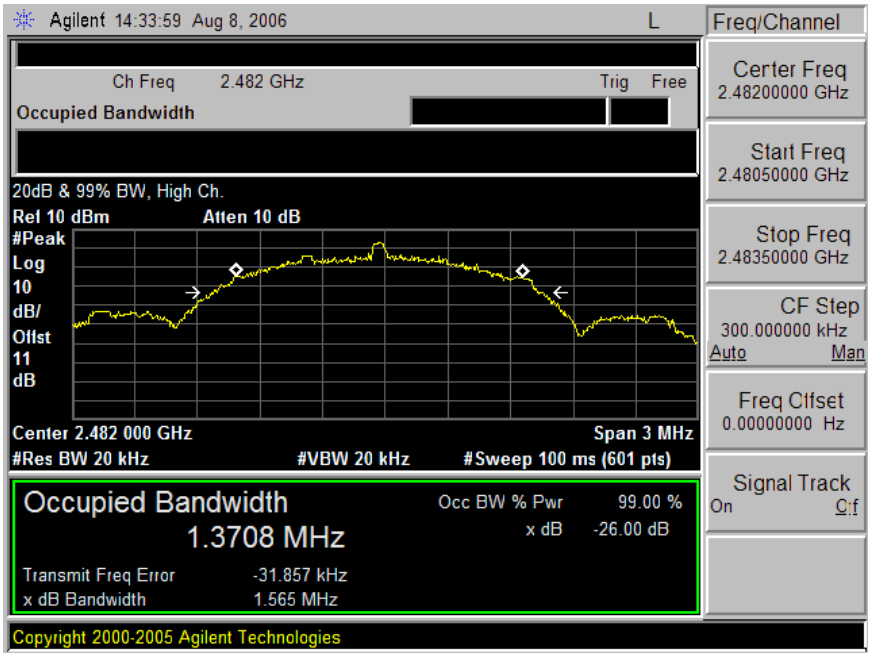
20 dB BANDWIDTH



20 dB BANDWIDTH MID CH



20 dB BANDWIDTH HIGH CH



7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

§15.247 (a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

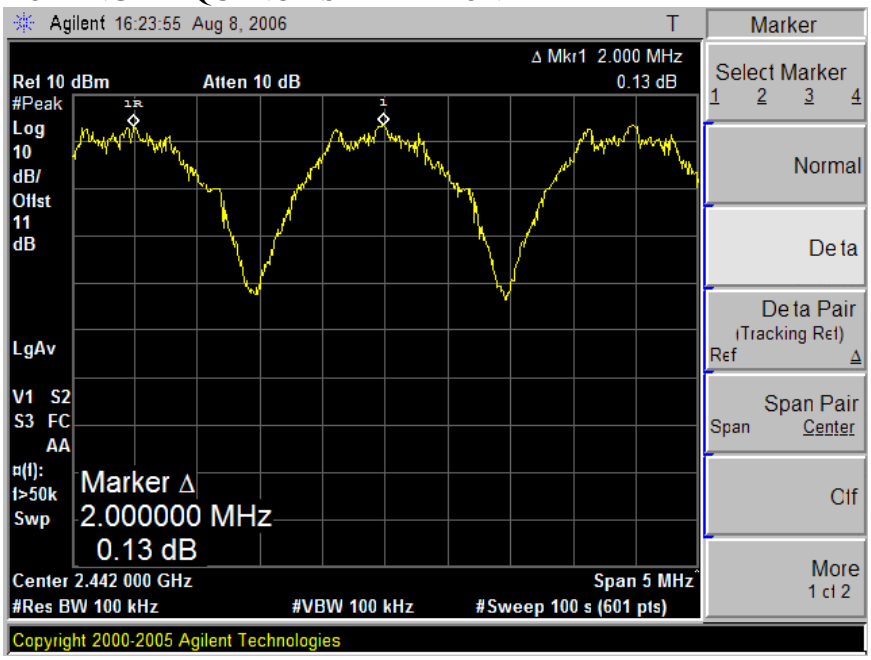
RESULTS

No non-compliance noted:

Channel Separation	20 dB Bandwidth	Margin
2 MHz	1.565 MHz	435kHz

HOPPING FREQUENCY SEPARATION

HOPPING FREQUENCY SEPARATION



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

§15.247 (a) (1) (iii) Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 1 % of the span. The analyzer is set to Max Hold.

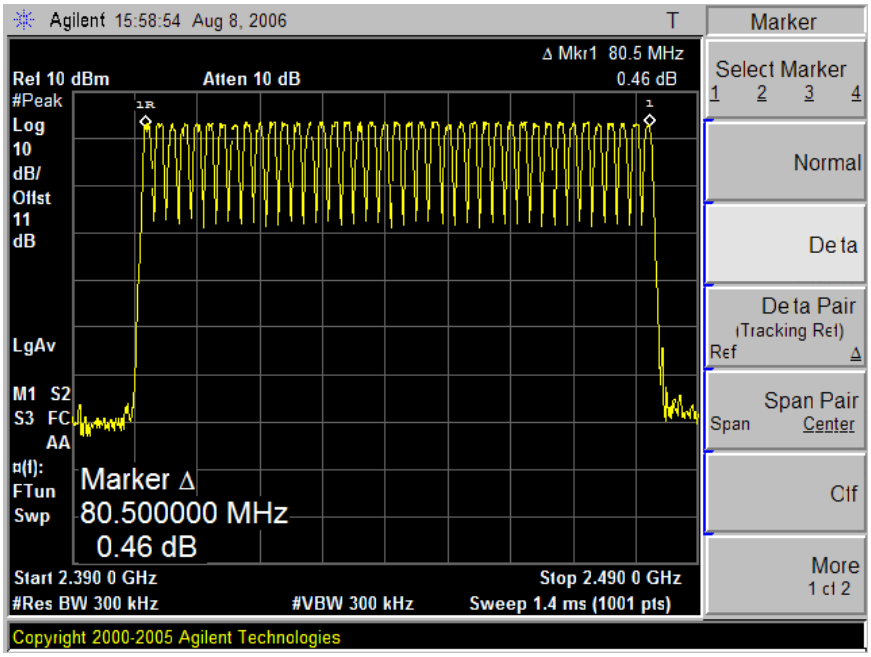
RESULTS

No non-compliance noted:

41 Channels observed.

NUMBER OF HOPPING CHANNELS

NUMBER OF HOPPING CHANNELS



7.1.4. AVERAGE TIME OF OCCUPANCY

CHANNEL OCCUPANCY AND DWELL TIME LIMIT

While the equipment is operating (transmitting and/or receiving) each channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of channels.

The window period is 0.4 seconds times 41 channels = 16.4 seconds

TEST PROCEDURE
The hopping sequence is 524,287 frequencies long before it repeats therefore testing for this parameter is not feasible. Compliance is demonstrated by the manufacturer's declaration of the theory of operation as stated below.

RESULTS
MANUFACTURERS DECLARATION Adaptive frequency hopping is used by the host firmware in the baseband chip to continuously assess channel performance and mark channels as bad if performance is not acceptable. When marked as bad, channels will be deleted from the hopping table for a minimum of 5 seconds. No less than 20 channels will be used no matter how bad the interference, to comply with ETSI 300 328 V1.6.1. There are 4 frequencies used in every 8 mS frame of the protocol, for an average hopping rate of about 500 hops/sec.

The worst-case, longest dwell time per channel is 3147 us in every 8ms when you have 2 or more wireless game pads and wireless voice devices. This includes both receiving and transmitting. The worst-case, longest transmitting dwell time per channel for the Xbox RF module is 568 us in every 8 ms under these same conditions.

For host, the longest dwell time is (981+758)*750ns = 1304.24 us in 8 ms this is only for TX from devices to host. The longest dwell time for channel for RX is 1229*2*750ns = 1843us.

The worst-case, longest dwell time per channel for the game controller is 1657 us in every 8 ms. This includes both receiving and transmitting. The worst-case, longest transmitting dwell time per channel for Xbox RF module is 922 us in every 8 ms.

Per controller, the longest TX dwell time is 1229*750ns = 921.75us in 8ms. The longest RX dwell time is 981*750ns = 735us in 8 ms. If AFH is used, the longest dwell time is 168 ms in every 328 ms period. This can occur when we have only 20 channels left and the 21 removed channels are consecutive in the hopping sequence.

27,594 unique frequency hopping polynomials are used by the console. The hopping sequence is 524,287 frequencies long before it repeats.

The polynomials are selected such that on average no hopping frequency channel is occupied for more than 0.4 seconds within any 16.4 second window.

7.1.5. PEAK OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is –2.1 dBi, therefore the limit is 21 dBm.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

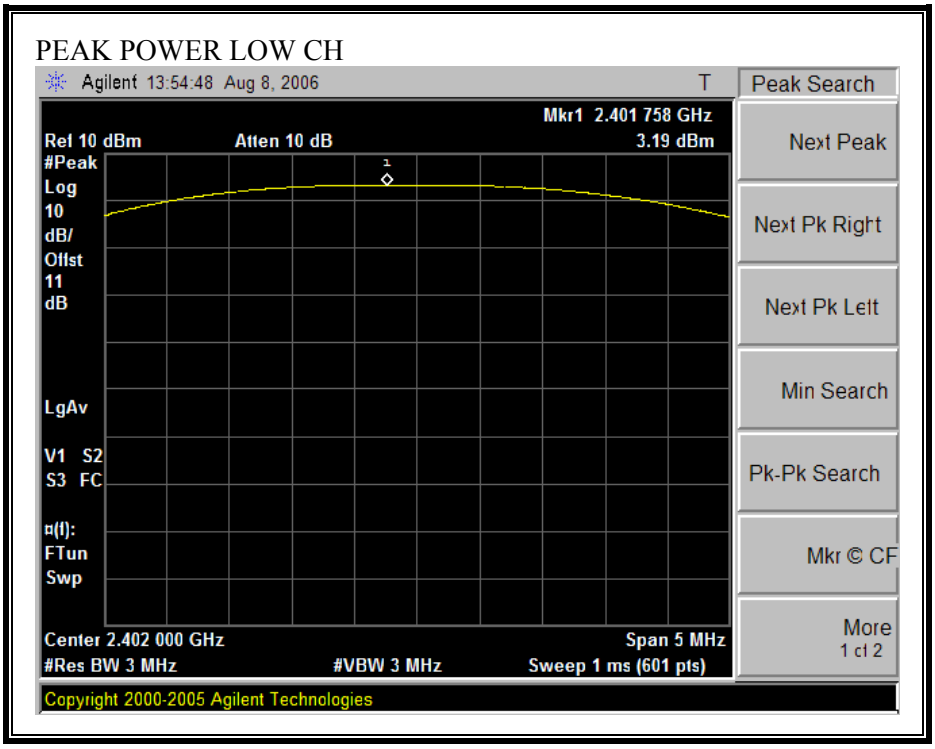
RESULTS

No non-compliance noted:

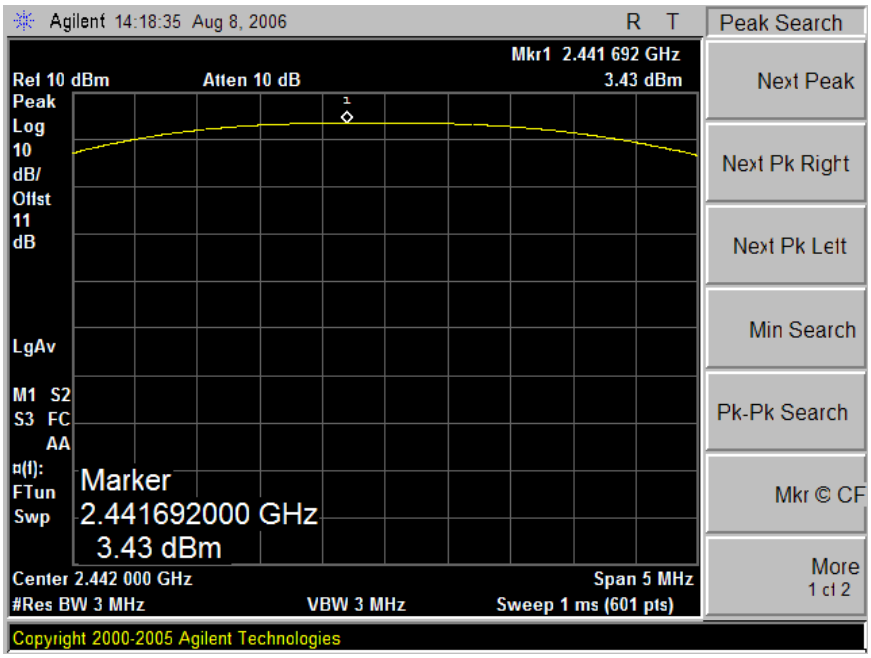
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.19	21.00	-17.81
Middle	2442	3.43	21.00	-17.57
High	2482	3.11	21.00	-17.89

OUTPUT POWER

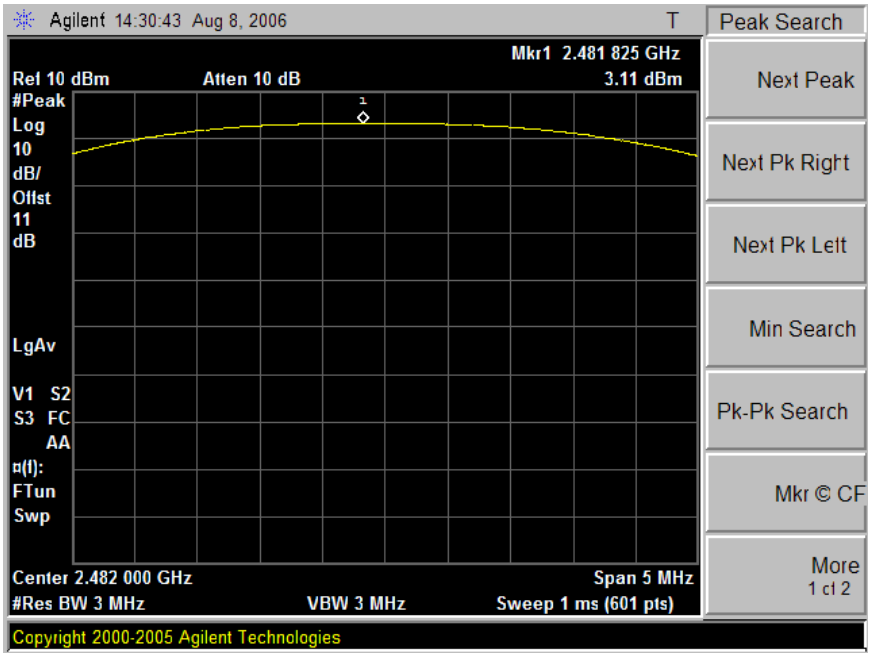
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



7.1.6. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-7.47
Middle	2442	-7.74
High	2482	-7.51

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

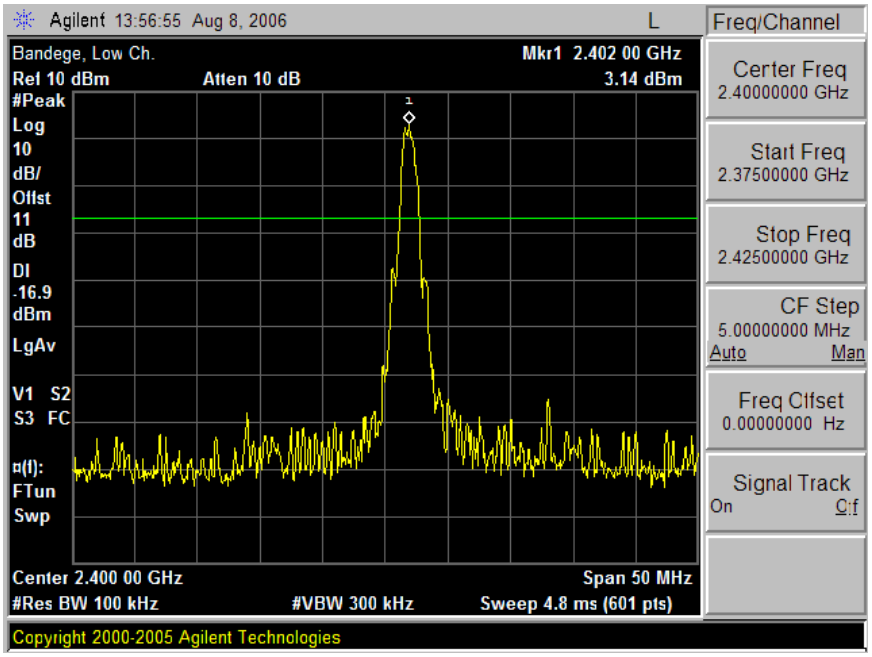
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

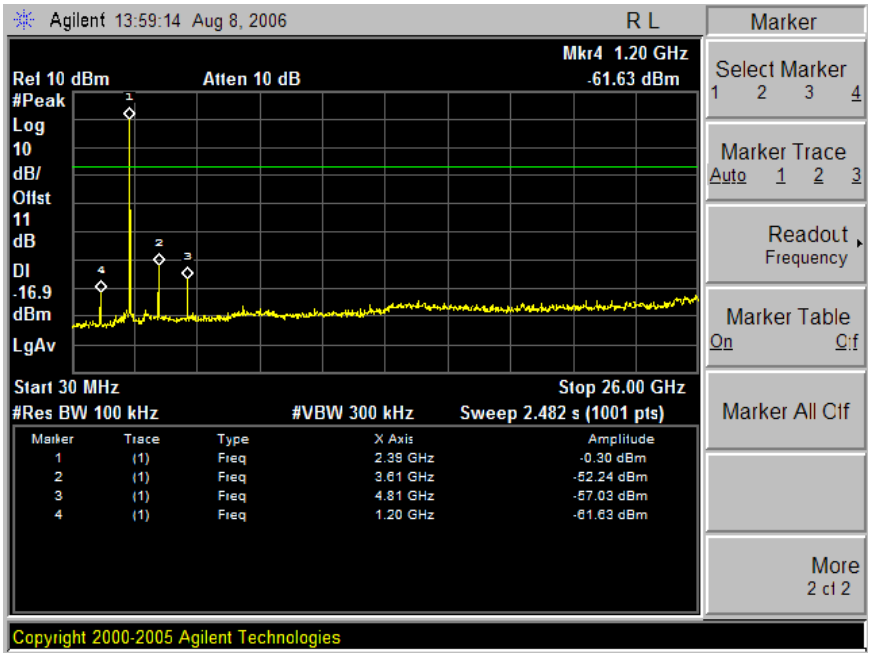
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE

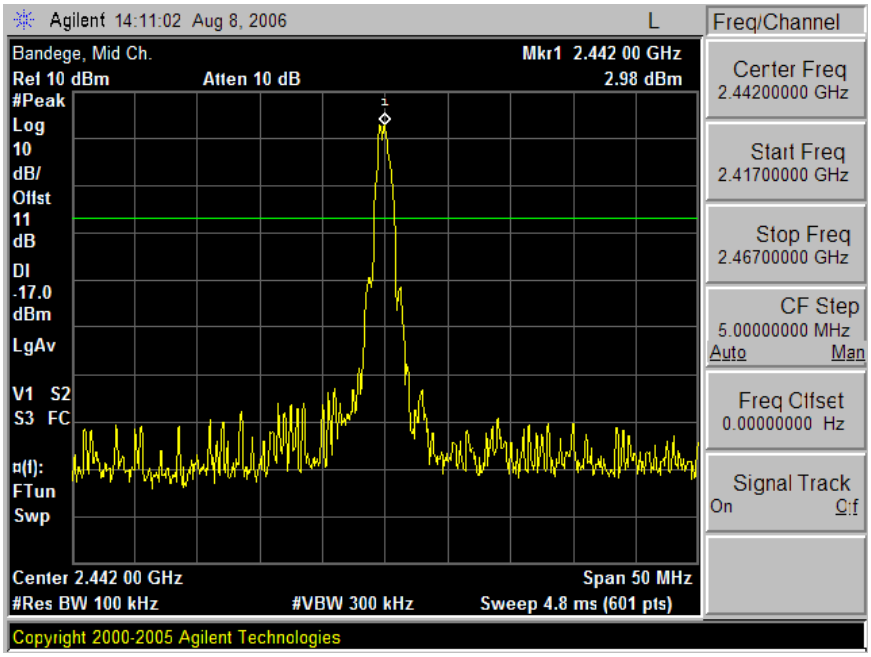


LOW CHANNEL SPURIOUS

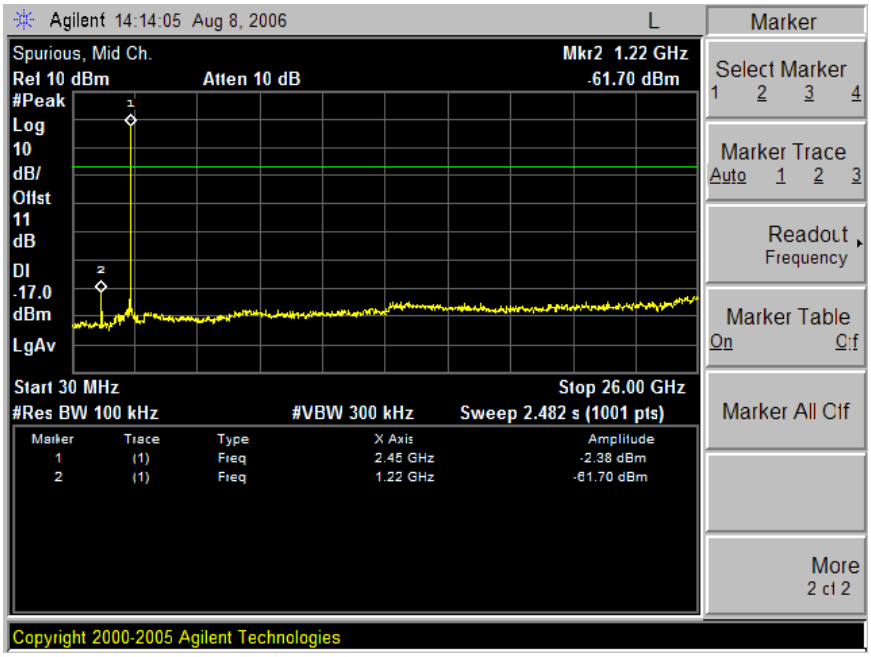


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

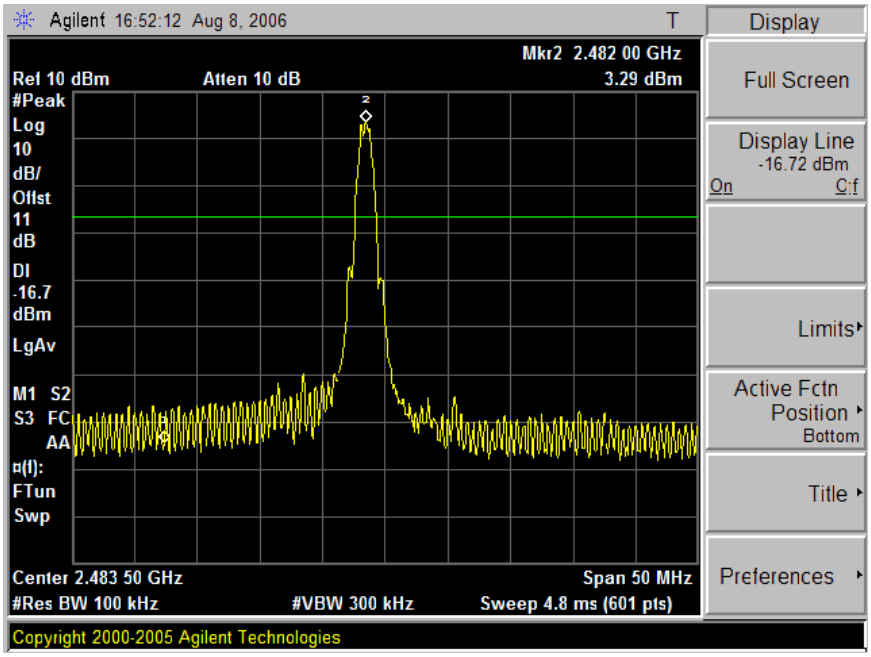


MID CHANNEL SPURIOUS

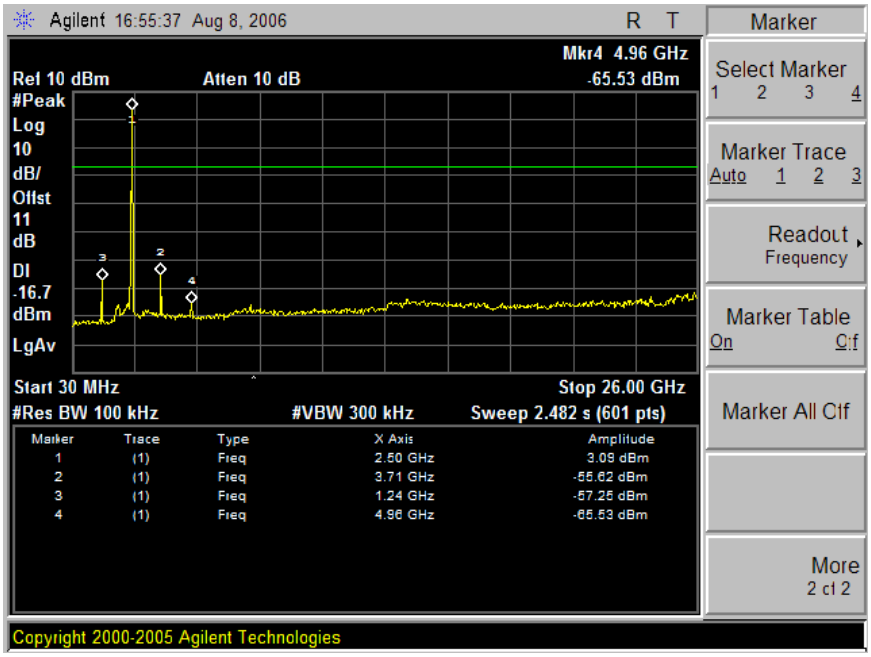


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE

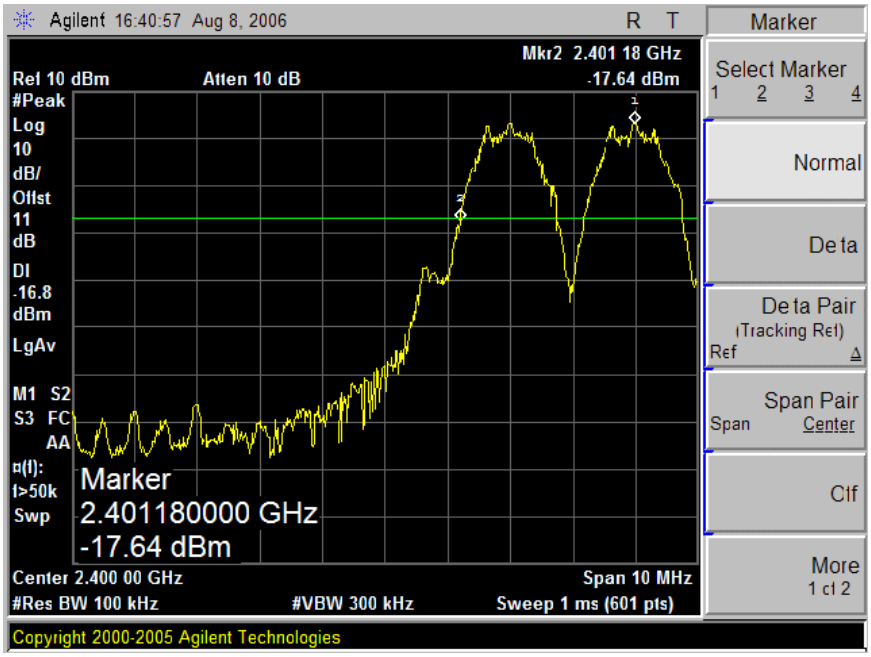


HIGH CHANNEL SPURIOUS

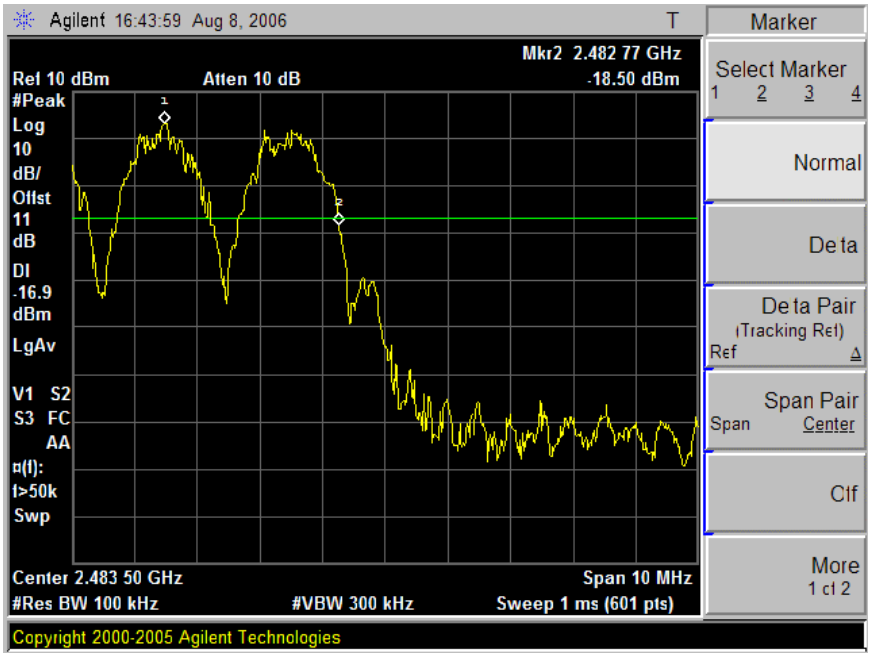


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

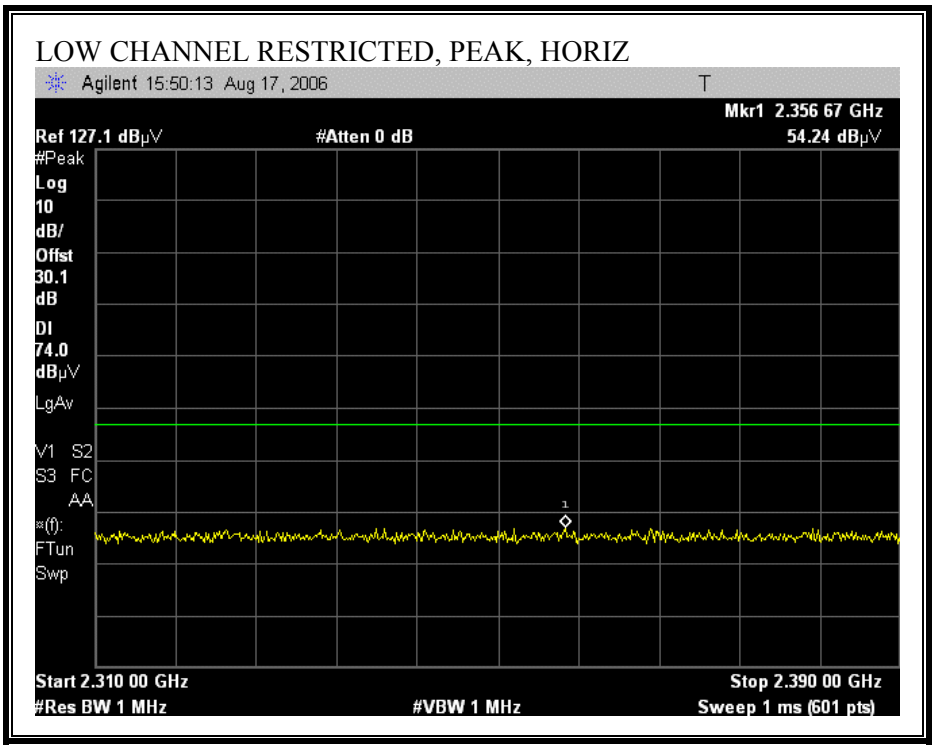
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

The EUT was tested inside the host system and in stand-alone configuration.

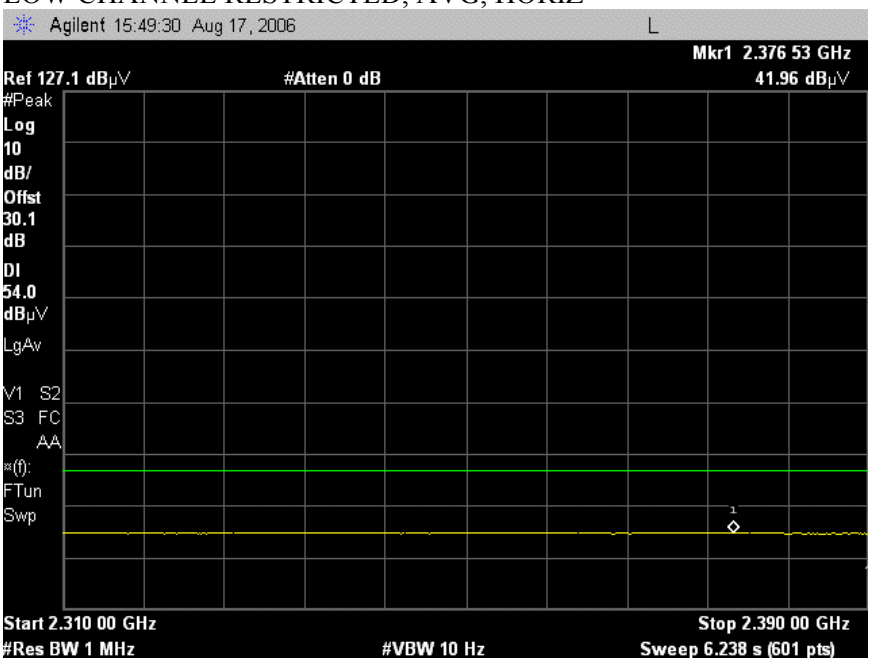
The data reported represents the worse case.

7.2.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

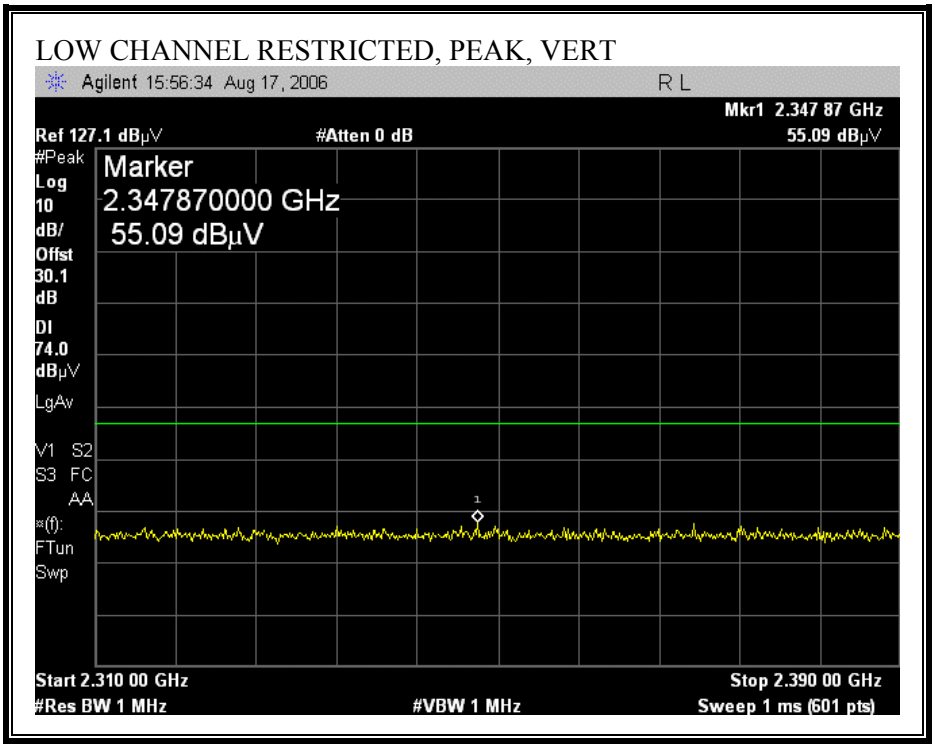
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



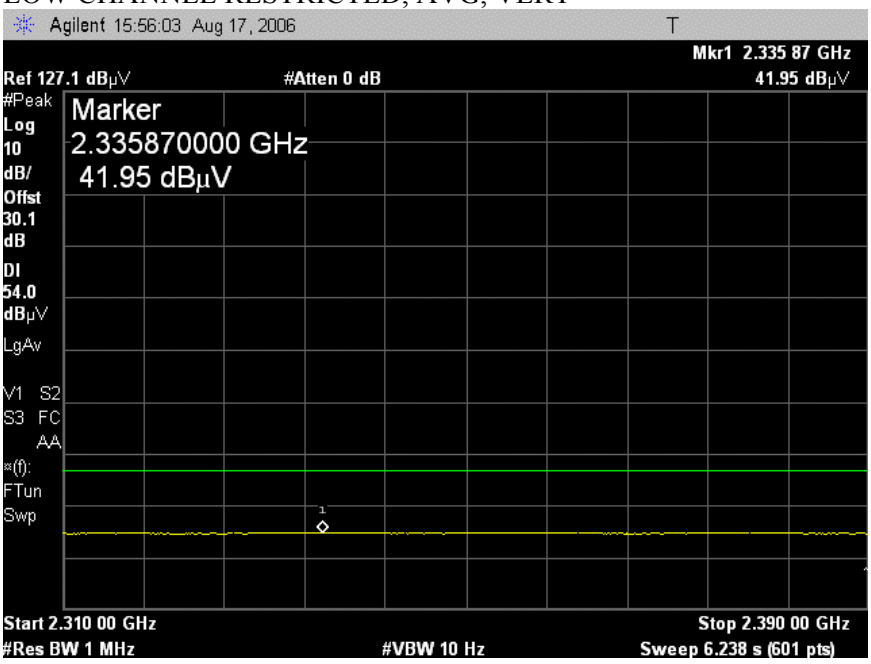
LOW CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

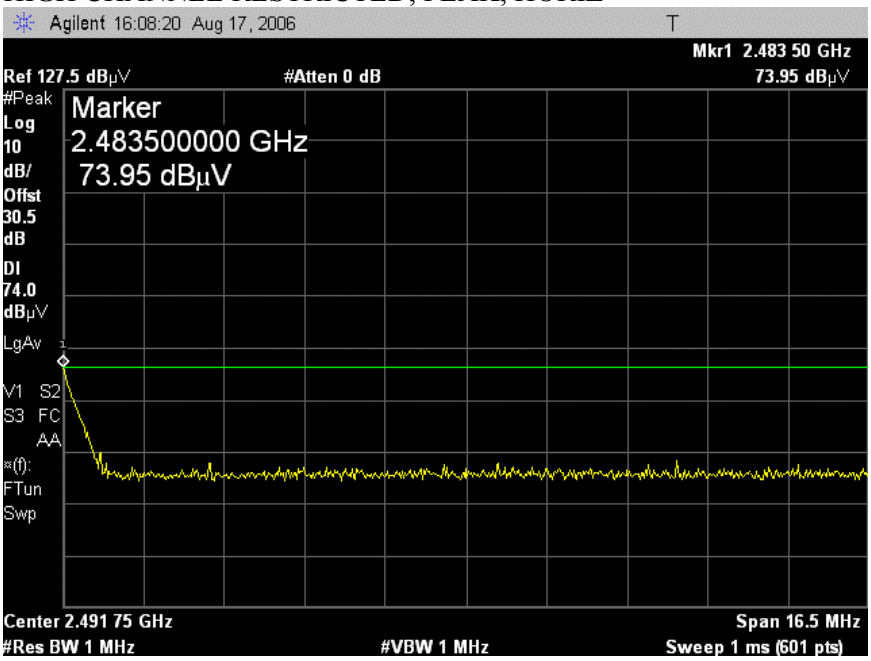


LOW CHANNEL RESTRICTED, AVG, VERT



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

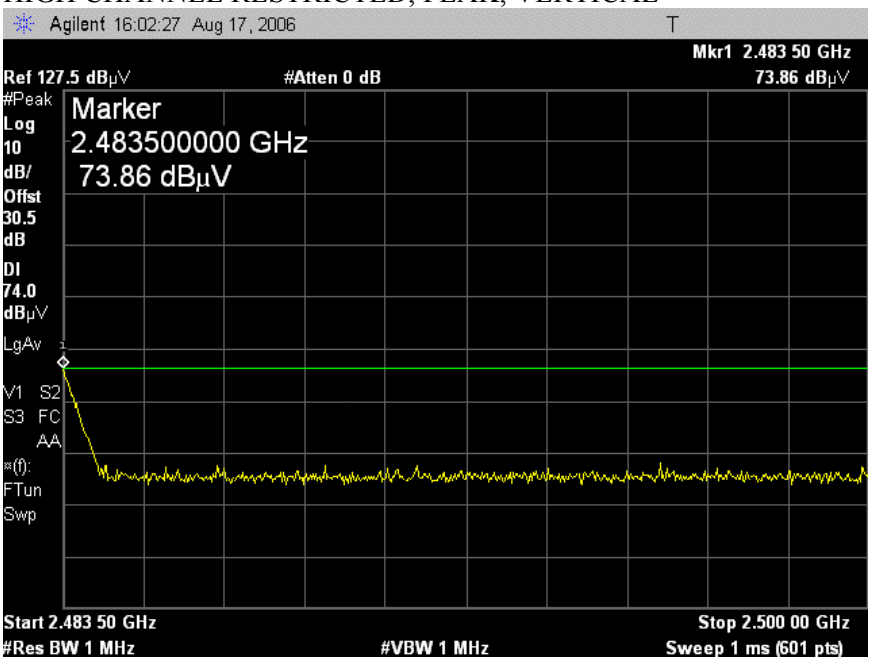
HIGH CHANNEL RESTRICTED, PEAK, HORIZ



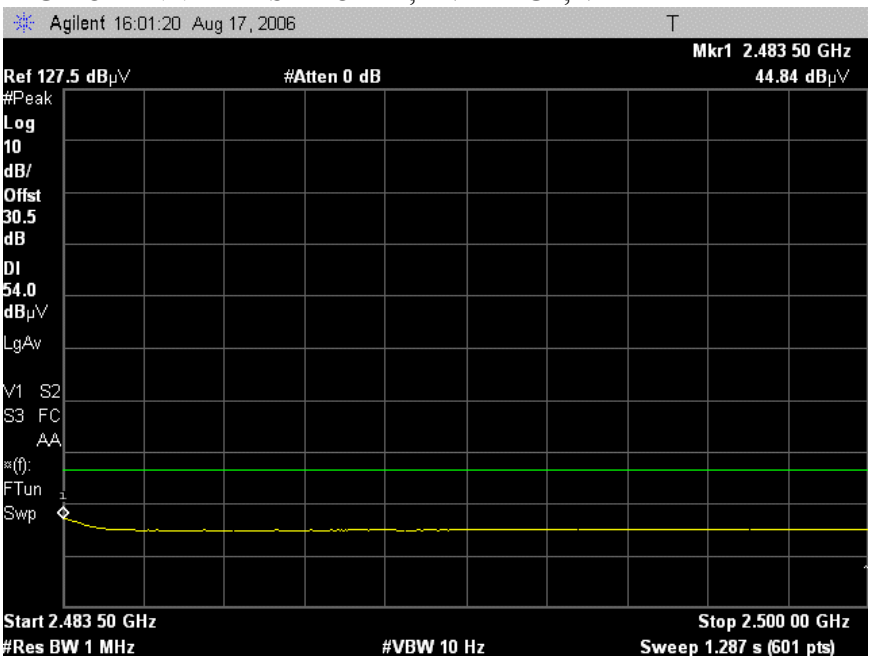
HIGH CHANNEL RESTRICTED, AVERAGE, HORIZ

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERTICAL



HIGH CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Morgan Hill 5m Chamber

Company: Microsoft
Project #: 06U10508
Date: 08/19/06
Test Engineer: Frank Ibahim
Configuration: EUT with peripherals
S/N: 0152
Mode: TX ON

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T60; S/N: 2238 @3m	T87 Miteq 924342		T89; ARA 18-26GHz; S/N:1049

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	Thanh 208946003		R_001

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel (2402 MHz)															
1.330	3.0	70.0	49.1	26.3	1.7	-44.9	0.0	0.0	53.1	32.2	74	54	-20.9	-21.8	V
4.804	3.0	58.7	40.5	33.0	2.6	-45.3	0.0	0.0	49.0	30.8	74	54	-25.0	-23.2	V
1.205	3.0	68.7	58.2	25.9	1.6	-44.9	0.0	0.0	51.4	40.9	74	54	-22.6	-13.1	H
4.804	3.0	57.9	40.4	33.0	2.6	-45.3	0.0	0.0	48.2	30.7	74	54	-25.8	-23.3	H
Mid Channel (2442 MHz)															
1.330	3.0	70.6	50.8	26.3	1.7	-44.9	0.0	0.0	53.7	33.9	74	54	-20.3	-20.1	V
4.884	3.0	58.1	40.5	33.1	2.6	-45.3	0.0	0.0	48.5	30.8	74	54	-25.5	-23.2	V
1.205	3.0	65.4	54.4	25.9	1.6	-44.9	0.0	0.0	48.1	37.1	74	54	-25.9	-16.9	H
4.884	3.0	57.4	40.2	33.1	2.6	-45.3	0.0	0.0	47.8	30.6	74	54	-26.2	-23.4	H
High Channel (2482 MHz)															
1.330	3.0	71.6	48.1	26.3	1.7	-44.9	0.0	0.0	54.7	31.2	74	54	-19.3	-22.8	V
4.964	3.0	56.9	40.7	33.1	2.7	-45.4	0.0	0.0	47.3	31.1	74	54	-26.7	-22.9	V
1.205	3.0	70.6	60.5	25.9	1.6	-44.9	0.0	0.0	53.3	43.2	74	54	-20.7	-10.8	H
4.964	3.0	59.1	41.8	33.1	2.7	-45.4	0.0	0.0	49.5	32.2	74	54	-24.5	-21.8	H

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

EUT was scanned from 1 GHz to 25 GHz, no other emissions from EUT were detected.

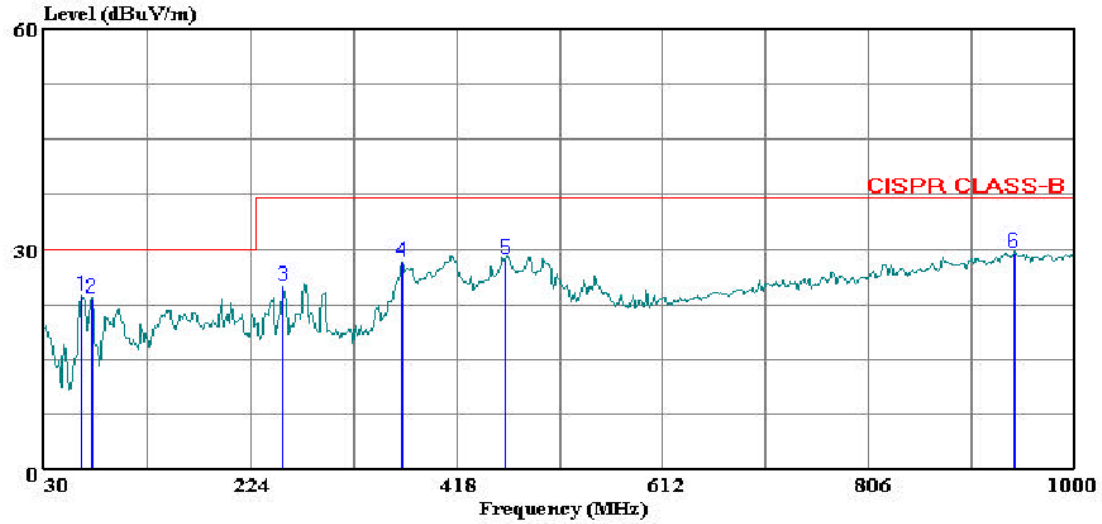
7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT AND DATA

COMPLIANCE Engineering Services, Inc.
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 6 File#: Microsoft 06U10508.EMI
Date: 08-19-2006 Time: 16:16:35



(Audix ATC)
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B HORIZONTAL
Test Operator: : Frank Ibrahim
Company: : MicroSoft
Project #: : 06U10508
Configuration: : EUT/Laptop and support devices
Mode of Operation: TX ON at Mid Channel
Serial Number: : 0152
Test Target : EN 55022 Class B

Page: 1

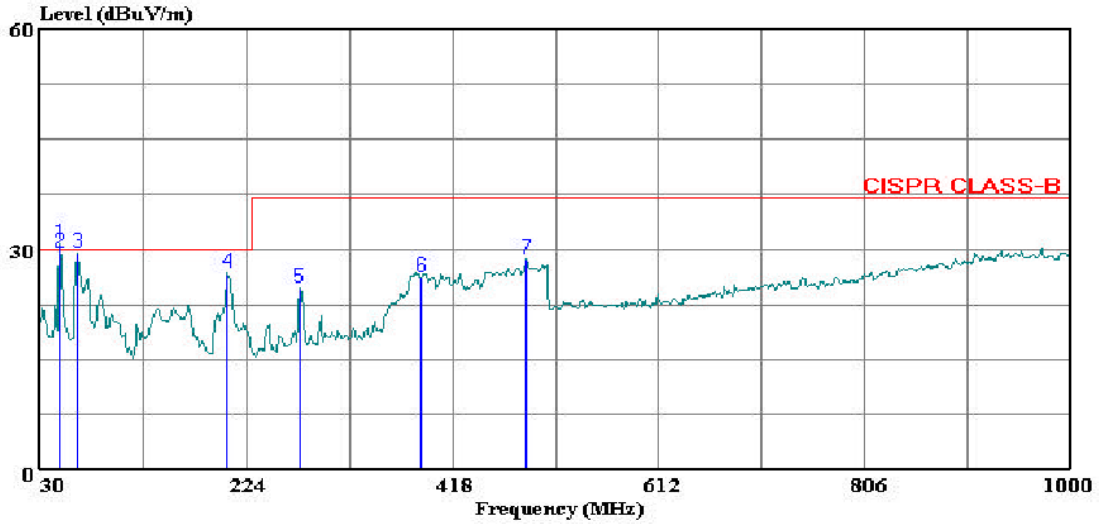
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	65.890	14.64	9.09	23.73	30.00	-6.27	Peak
2	74.620	14.15	9.14	23.29	30.00	-6.71	Peak
3	255.040	10.73	14.09	24.82	37.00	-12.18	Peak
4	366.590	10.93	17.31	28.24	37.00	-8.76	Peak
5	464.560	9.11	19.50	28.61	37.00	-8.39	Peak
6	942.770	3.11	26.43	29.54	37.00	-7.46	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT

COMPLIANCE Engineering Service, Inc.
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 4 File#: Microsoft 06U10508.EMI
Date: 08-19-2006 Time: 16:03:31



(Audix ATC)
Trace: 1 Ref Trace:

Condition: CISPR CLASS-B VERTICAL
Test Operator : Frank Ibrahim
Company : MicroSoft
Project #: : 06U10508
Configuration: : EUT/Laptop and support devices
Mode of Operation: TX ON at Mid Channel
Serial Number: : 0152
Test Target : EN 55022 Class B

Page: 1

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	*	48.430	20.54	10.29	30.83	30.00	0.83	Peak
2		48.430	19.20	10.29	29.49	30.00	-0.51	QP
3		65.890	20.32	9.09	29.41	30.00	-0.59	Peak
4		206.540	13.26	13.61	26.87	30.00	-3.13	Peak
5		274.440	10.00	14.76	24.76	37.00	-12.24	Peak
6		388.900	8.33	17.80	26.13	37.00	-10.87	Peak
7		487.840	8.59	20.00	28.59	37.00	-8.41	Peak

7.3. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

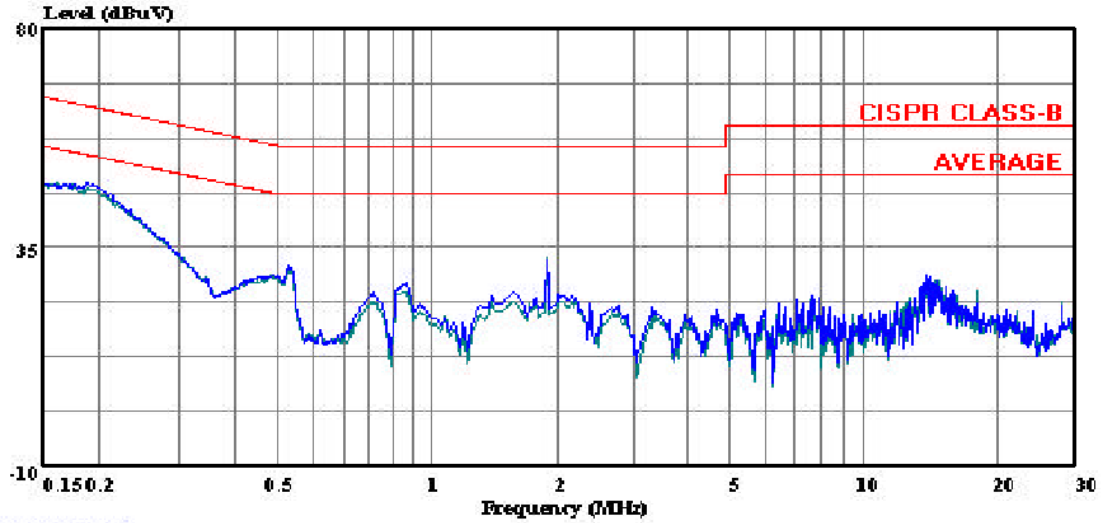
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	48.34	--	--	0.00	65.94	55.94	-17.60	-7.60	L1
0.19	46.90	--	--	0.00	64.04	54.04	-17.14	-7.14	L1
2.00	32.90	--	--	0.00	56.00	46.00	-23.10	-13.10	L1
0.15	48.02	--	--	0.00	65.94	55.94	-17.92	-7.92	L2
0.19	47.96	--	--	0.00	63.91	53.91	-15.95	-5.95	L2
2.00	32.62	--	--	0.00	56.00	46.00	-23.38	-13.38	L2
6 Worst Data									

LINE 1 and Line 2 RESULTS

Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 8 File#: lc0821.EMI Date: 08-21-2006 Time: 15:15:31



Trace: 4 Ref Trace:

Condition: CISPR CLASS-B
Test Operator : Frank Ibrahim
Project # : 06U10508
Company : Microsoft
EUT configuration: EUT with peripherals
Mode of operation: TX ON at Mid Channel
S/N : 0152
Power Source : 115 VAC, 60 Hz
: PEAK: L1(Green), L2(Blue)