FCC CFR47 PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE

TEST REPORT

FOR

802.11b/g HALF SIZE MINI-PCI WLAN MODULE

MODEL NUMBER: PA3426U-1MPC

FCC ID: CJ6UPA3426WL

REPORT NUMBER: 05U3307-1

ISSUE DATE: MARCH 17, 2005

Prepared for
TOSHIBA CORPORATION DIGITAL MEDIA NETWORK COMPANY
2-9 SUEHIRO-CHO, OME
TOKYO, 198-8710, JAPAN

Prepared by
COMPLIANCE ENGINEERING SERVICES, INC.
d.b.a.
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888

LAB CODE:200065-0

Revision History

Rev.	Revisions	Revised By

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: TOSHIBA CORPORATION DIGITAL MEDIA NETWORK COMPANY
2-9 SUEHIRO-CHO, OME
TOKYO, 198-8710, JAPAN

EUT DESCRIPTION: 802.11 b/g HALF SIZE MINI-PCI WLAN MODULE

MODEL: PA3426U-1MPC

SERIAL NUMBER: 0011F5-32AFOF

DATE OF ORIGINAL TEST: JANUARY 03 Thru FEBRUARY 04, 2005

DATE OF ADDITIONAL TEST: MARCH 9-11, 2005

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 the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the 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:

THU CHAN / EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Original tests conducted by

CHIN PANG / EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Additional tests conducted by:

CHIN PANG / 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 an 802.11b/g transceiver WLAN.

The radio module is manufactured by Atheros.

Optionally the WLAN may be collocated with one Bluetooth transceiver BC04 (FCC ID: CJ6UPA3418BT).

5.2. CLASS II PERMISSIVE CHANGE DESCRIPTION

The EUT was originally tested and reported under CCS project no.: 04U3194, and granted by TCB on February 28, 2005. The major change filed under this application is:

- The EUT is being used in a different host.

Additional tests were conducted on radiated emissions and AC power line conducted emissions, while conducted emissions data remains the same as what was performed under CCS project no.: 04U3194.

5.3. MAXIMUM OUTPUT POWER

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

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	19.44	87.90
2412 - 2462	802.11g	22.97	198.15
2412 - 2462	802.11g Turbo	21.53	142.23

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes four PIFA Film type antennas, each has a maximum gain as follows:

1. HTL017: 4.24 dBi at 2.4GHz without cable loss;
2. HTL004: 4.18 dBi at 2.4GHz without cable loss;
3. HTL008: 2.89 dBi at 2.4GHz without cable loss;
4. TIAN01: 4.02 dBi at 2.4GHz without cable loss.

The HTL017 antenna, which has the highest gain, represents the worst-case scenario.

5.5. SOFTWARE AND FIRMWARE

The test firmware was installed in the EUT during testing.

The test utility software used during testing was "art program" rev. V5_2_b14.

5.6. 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 2412 MHz for both b and g modes.

The worst-case data rate for this channel is determined to be 1 Mb/s for b mode and 6 Mb/s for g mode, based on previous experience with 802.11b/g WLAN product design architectures.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Toshiba Libretto	XAL580TNHW	22062758J	DoC
AC Adapter	Toshiba	PA24404	0110C1123893	NA

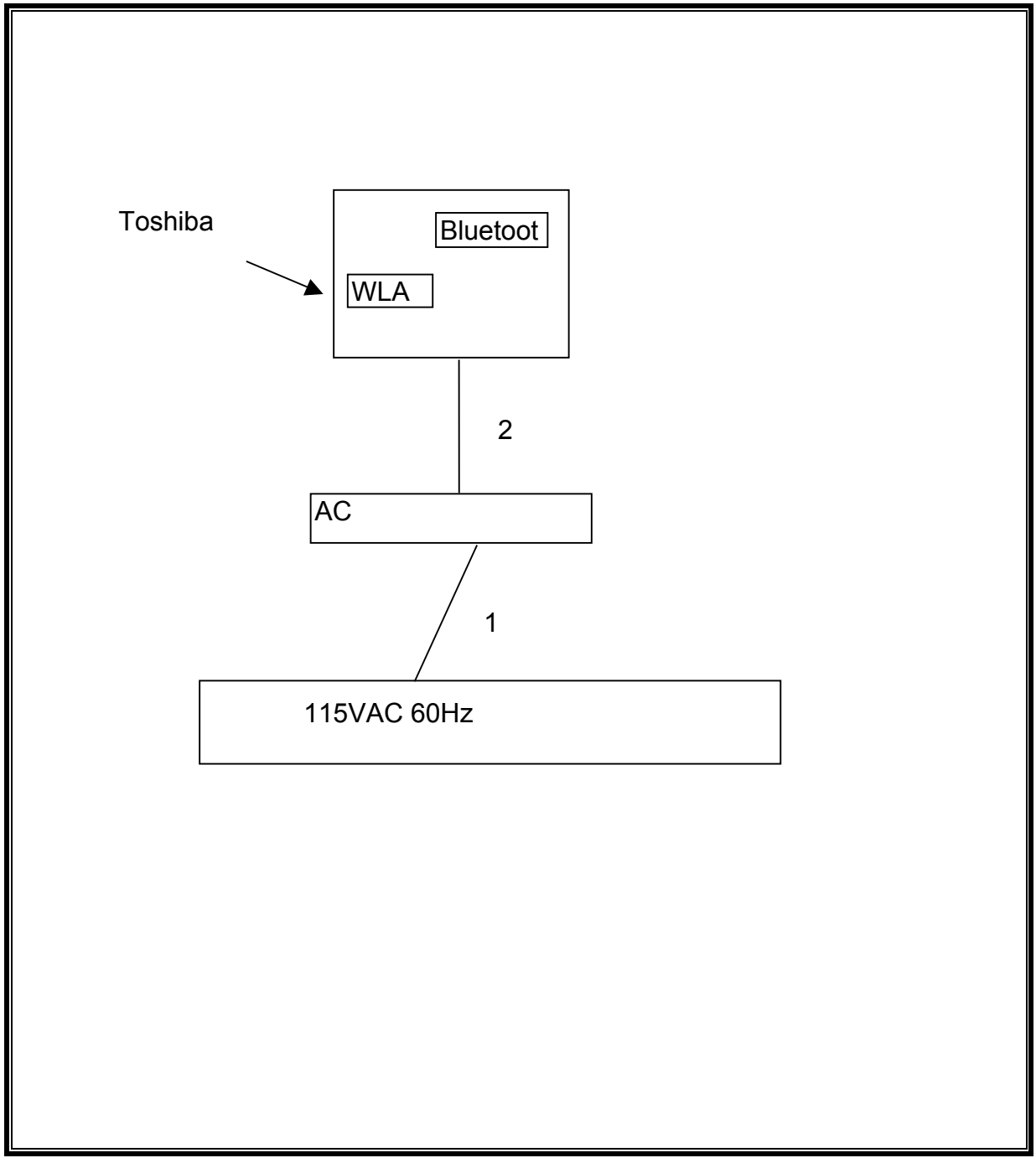
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	No
2	DC	1	DC	Un-shielded	1m	No

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR 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**
EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2005
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/05
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
EMI Test Receiver	R & S	ESIB40	100192	1/28/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29301	9/12/05
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/05
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	9/12/05
SA RF Section, 1.5 GHz	HP	85680B	2814A04227	2/22/06
SA Display Section 2	HP	85662A	2816A16696	5/24/05
Quasi-Peak Adaptor	HP	85650A	2811A01155	5/24/05
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	9/12/05
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-44	646456	8/17/05

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 2400 TO 2483.5 MHz BAND

7.1.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

No non-compliance noted:

802.11b Mode

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	12030	500	11530
Middle	2437	12000	500	11500
High	2462	12030	500	11530

802.11g Mode

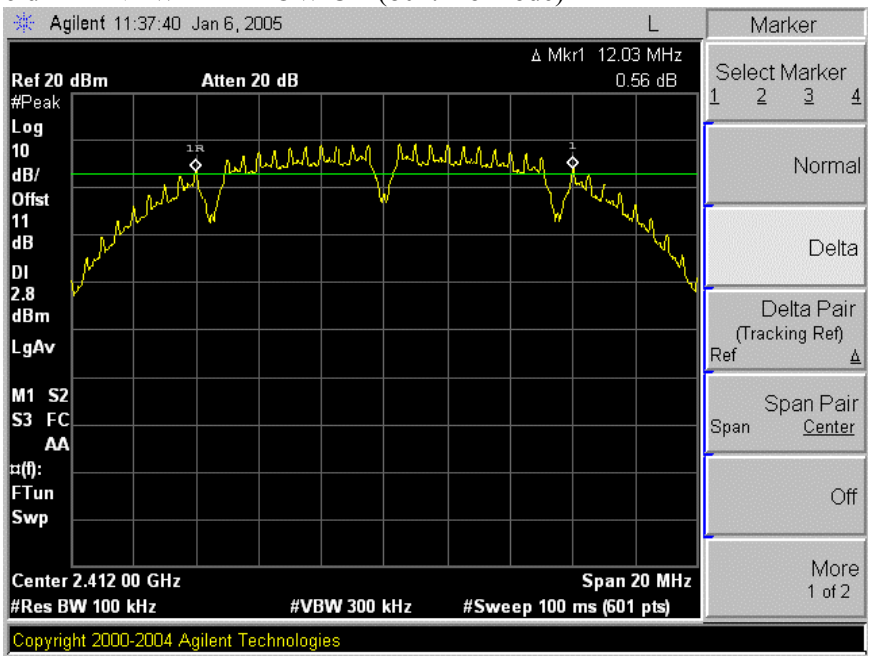
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	16400	500	15900
Middle	2437	16300	500	15800
High	2462	16400	500	15900

802.11g Turbo Mode

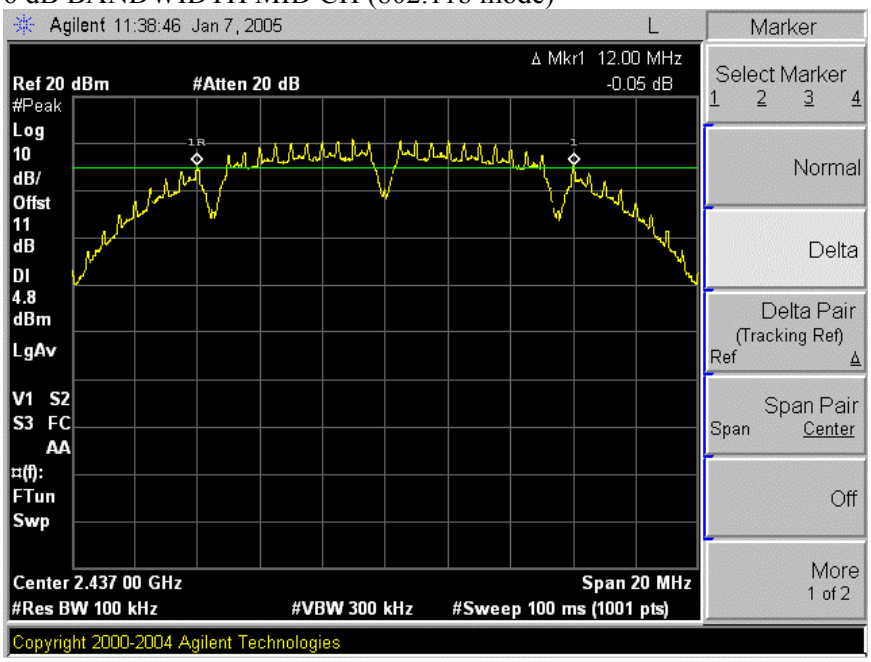
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Middle	2437	32500	500	32000

6 dB BANDWIDTH (802.11b MODE)

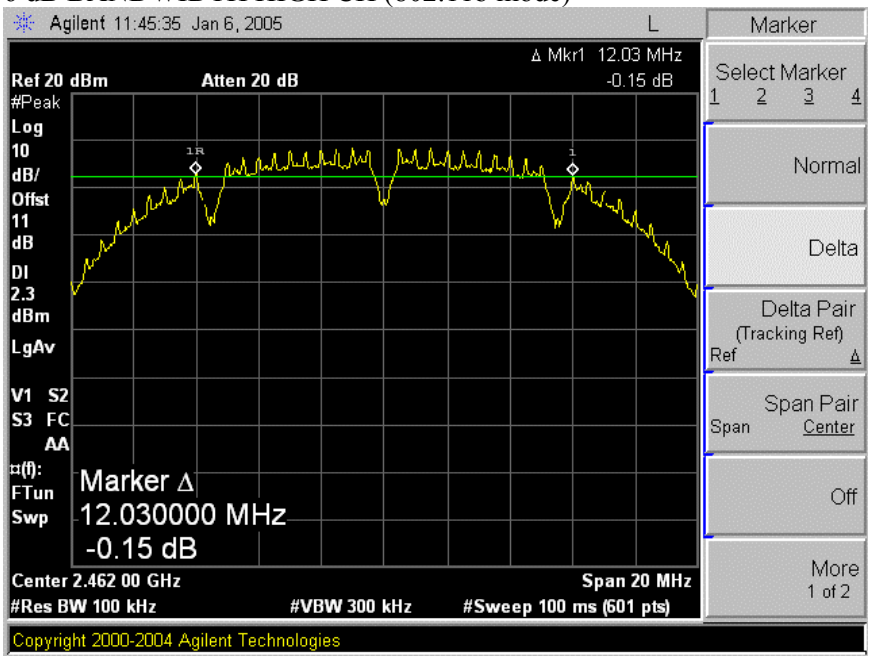
6 dB BANDWIDTH LOW CH (802.11b mode)



6 dB BANDWIDTH MID CH (802.11b mode)

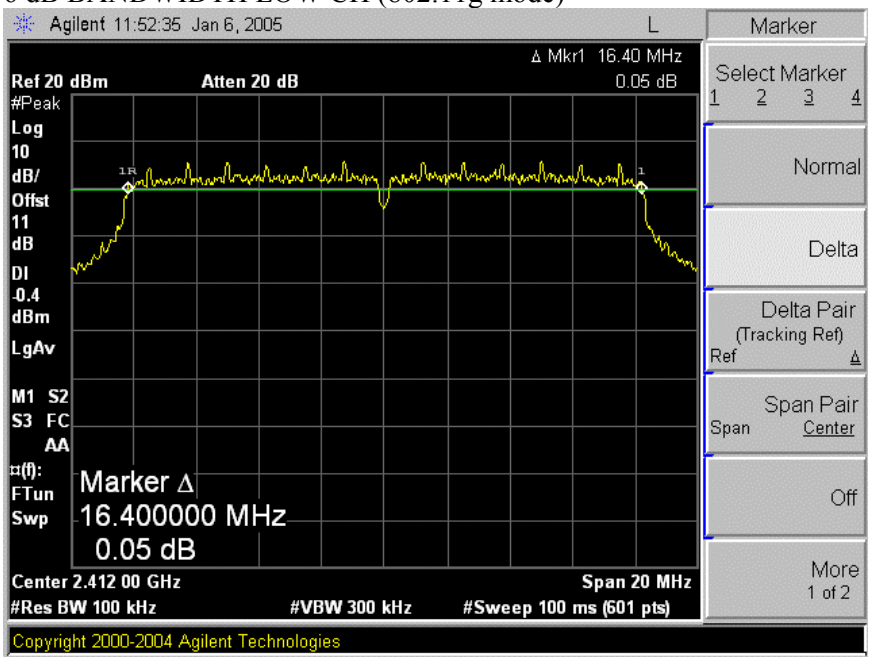


6 dB BANDWIDTH HIGH CH (802.11b mode)

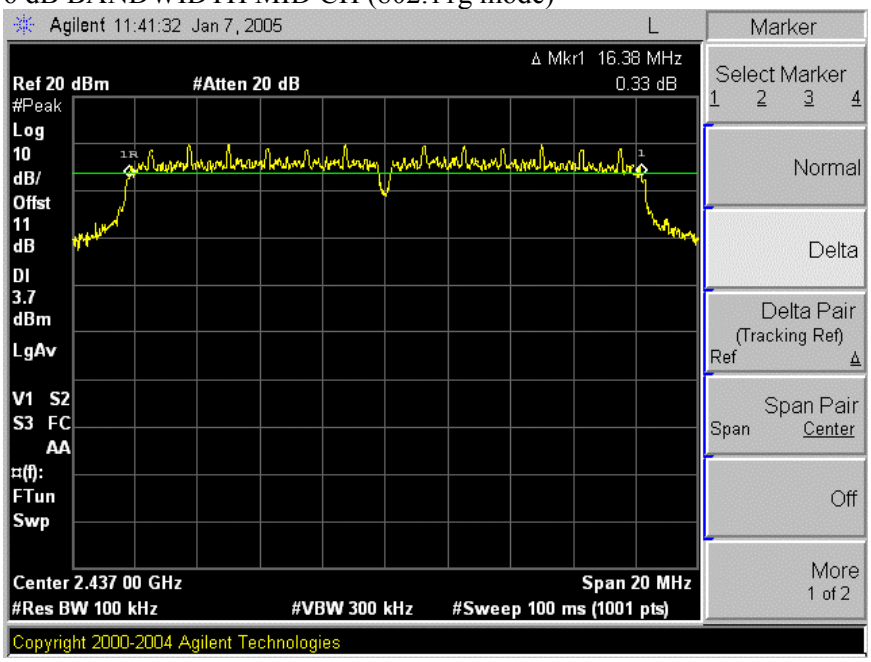


6 dB BANDWIDTH (802.11g MODE)

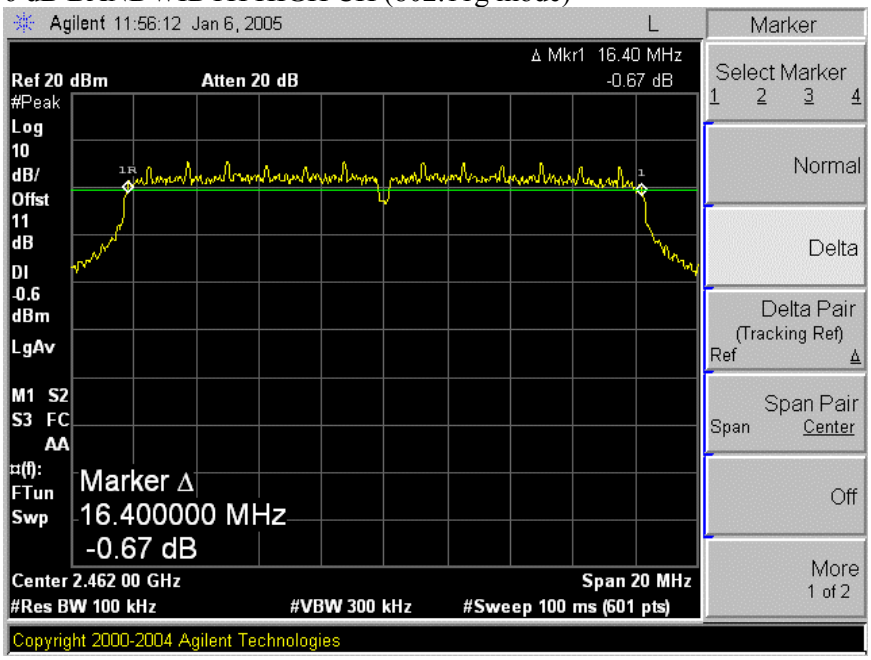
6 dB BANDWIDTH LOW CH (802.11g mode)



6 dB BANDWIDTH MID CH (802.11g mode)

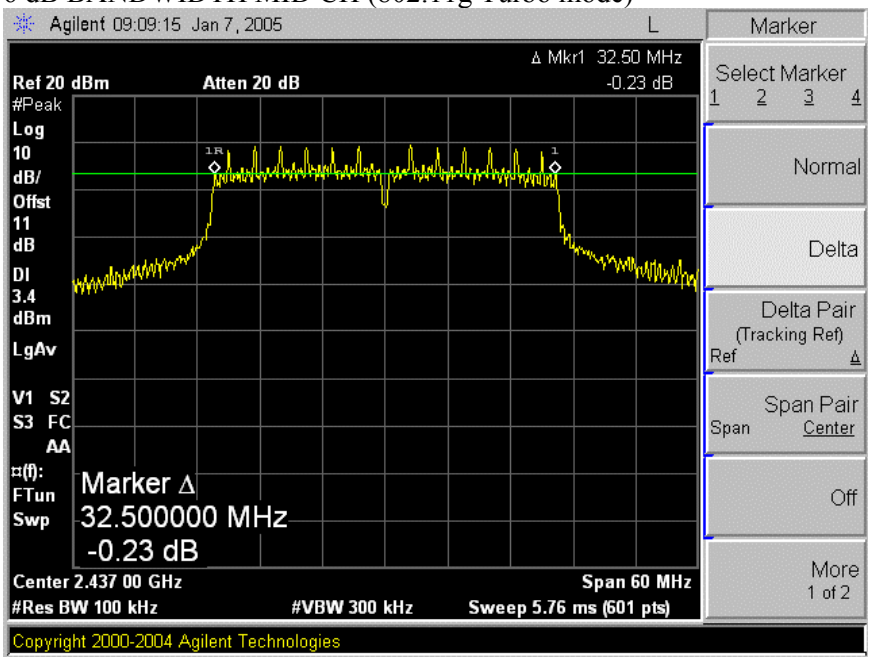


6 dB BANDWIDTH HIGH CH (802.11g mode)



6 dB BANDWIDTH (802.11g TURBO MODE)

6 dB BANDWIDTH MID CH (802.11g Turbo mode)



7.1.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

802.11b Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.8089
Middle	2437	15.8007
High	2462	15.8009

802.11g Mode

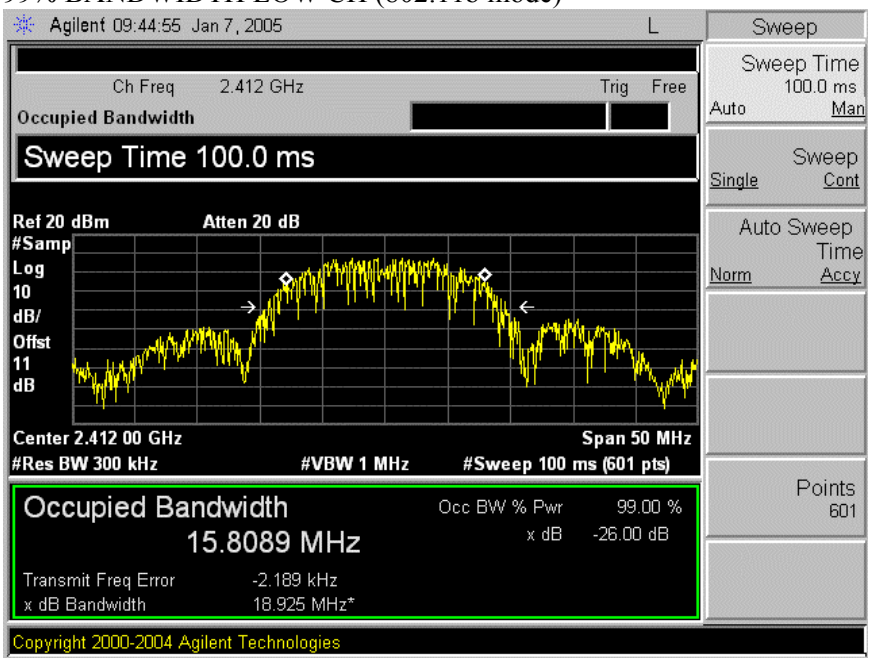
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.6204
Middle	2437	16.6343
High	2462	16.6233

802.11g Turbo Mode

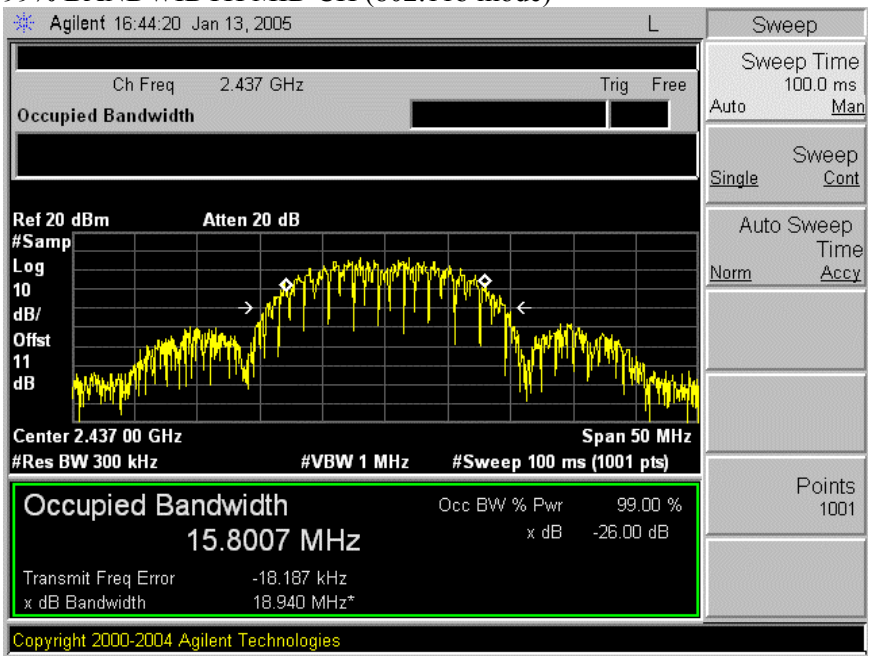
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Middle	2437	32.8648

99% BANDWIDTH (802.11b MODE)

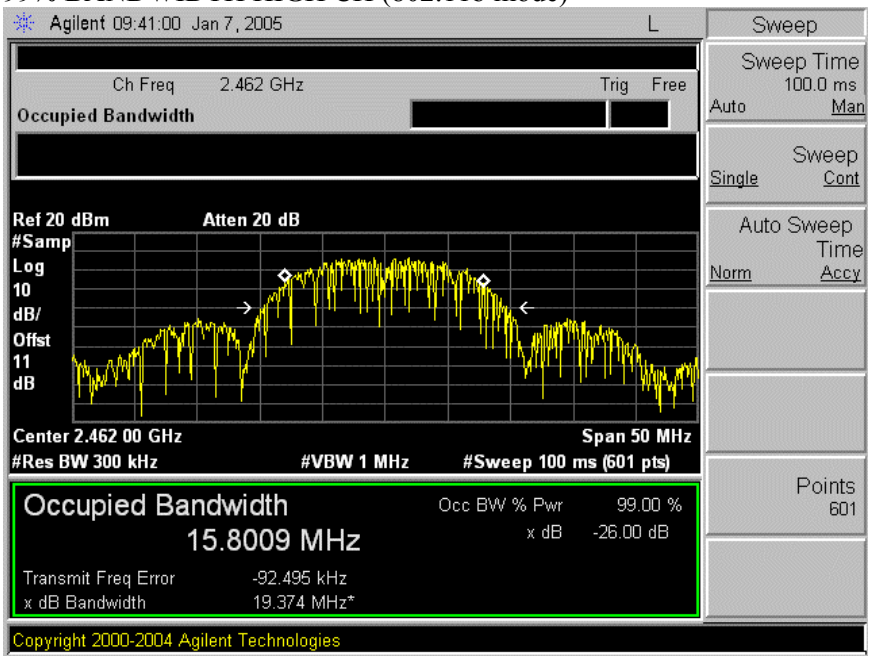
99% BANDWIDTH LOW CH (802.11b mode)



99% BANDWIDTH MID CH (802.11b mode)

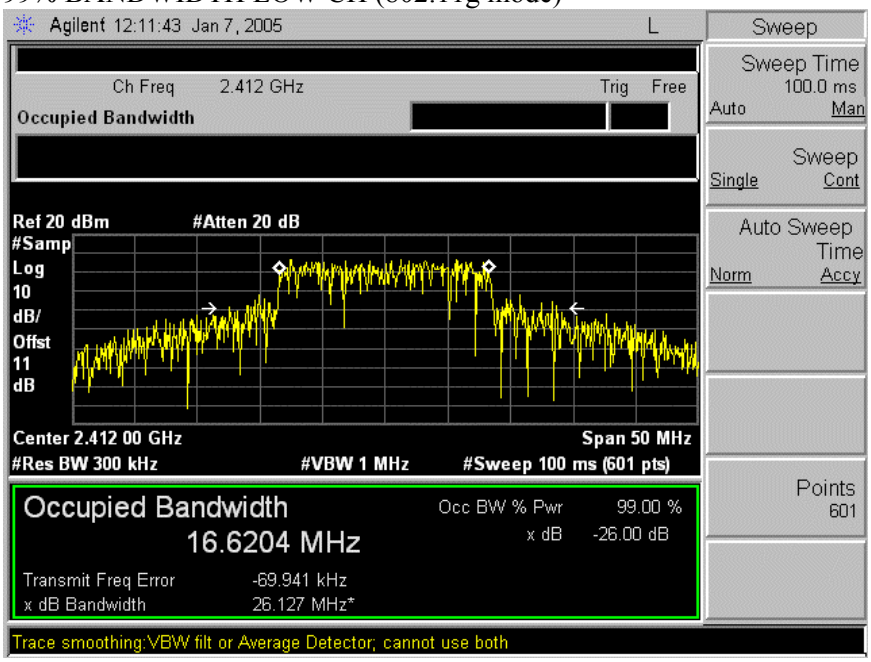


99% BANDWIDTH HIGH CH (802.11b mode)

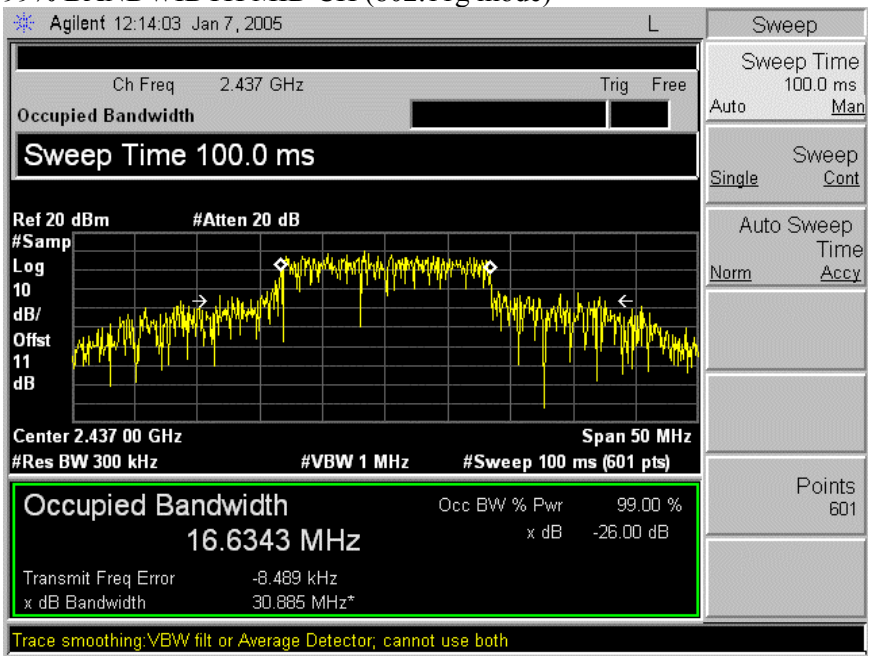


99% BANDWIDTH (802.11g MODE)

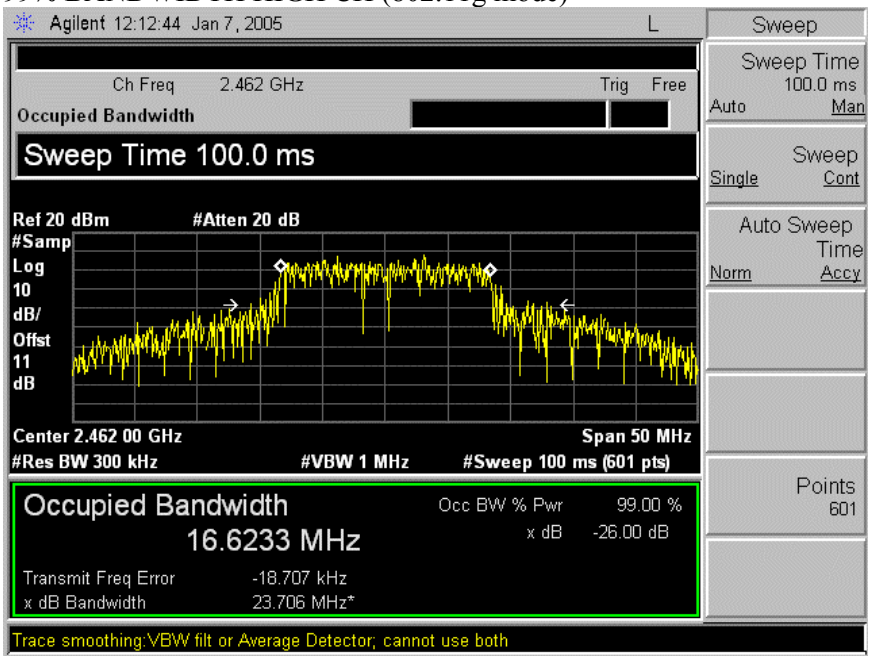
99% BANDWIDTH LOW CH (802.11g mode)



99% BANDWIDTH MID CH (802.11g mode)

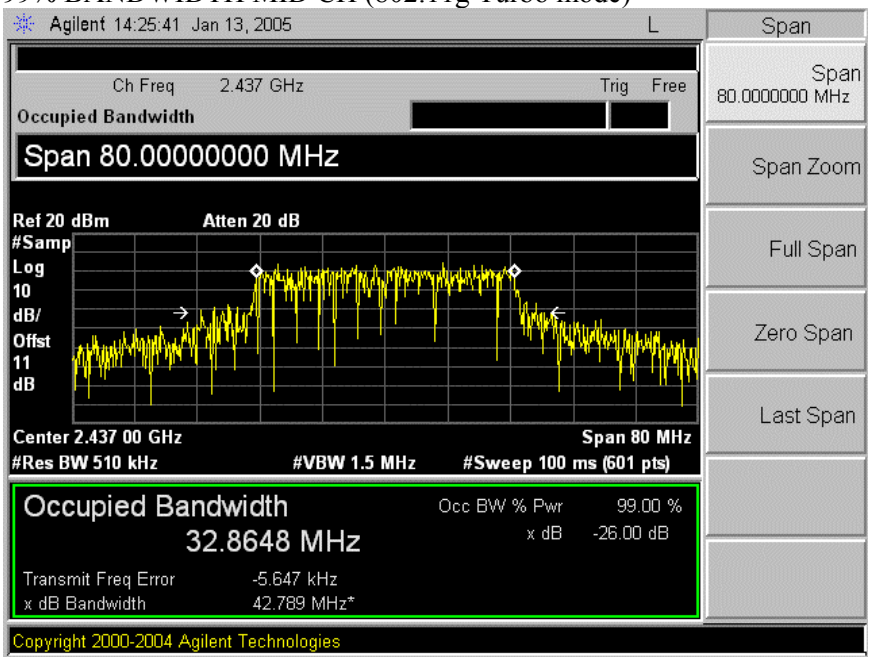


99% BANDWIDTH HIGH CH (802.11g mode)



99% BANDWIDTH (802.11g TURBO MODE)

99% BANDWIDTH MID CH (802.11g Turbo mode)



7.1.3. 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) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (4) Except as shown in paragraphs (b)(4) (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.

§15.247 (b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

The maximum antenna gain is 4.24 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

No non-compliance noted:

802.11b Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	19.44	30	-10.56
Middle	2437	19.39	30	-10.61
High	2462	19.40	30	-10.60

802.11g Mode

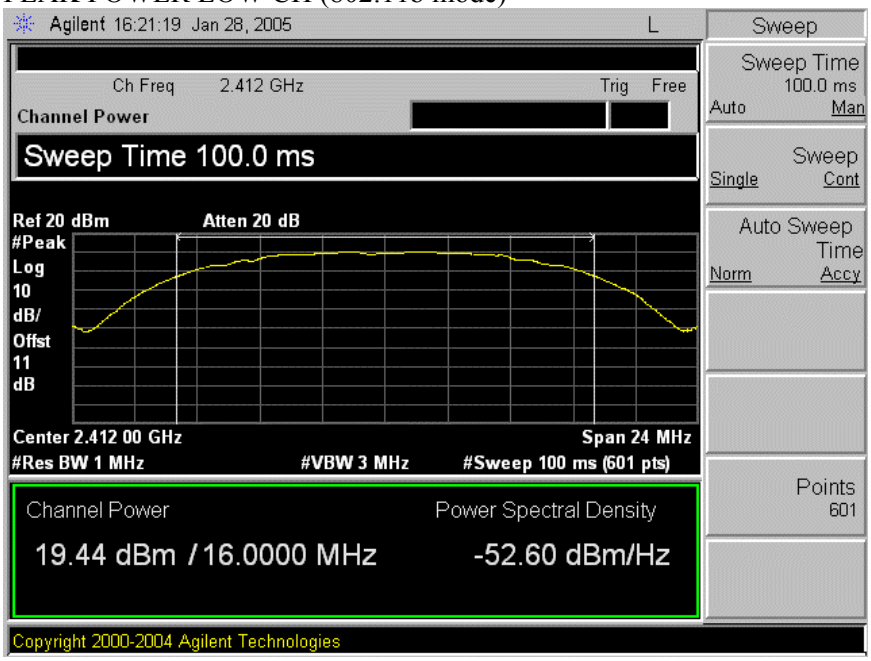
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.97	30	-7.03
Middle	2437	22.74	30	-7.26
High	2462	22.78	30	-7.22

802.11g Turbo Mode

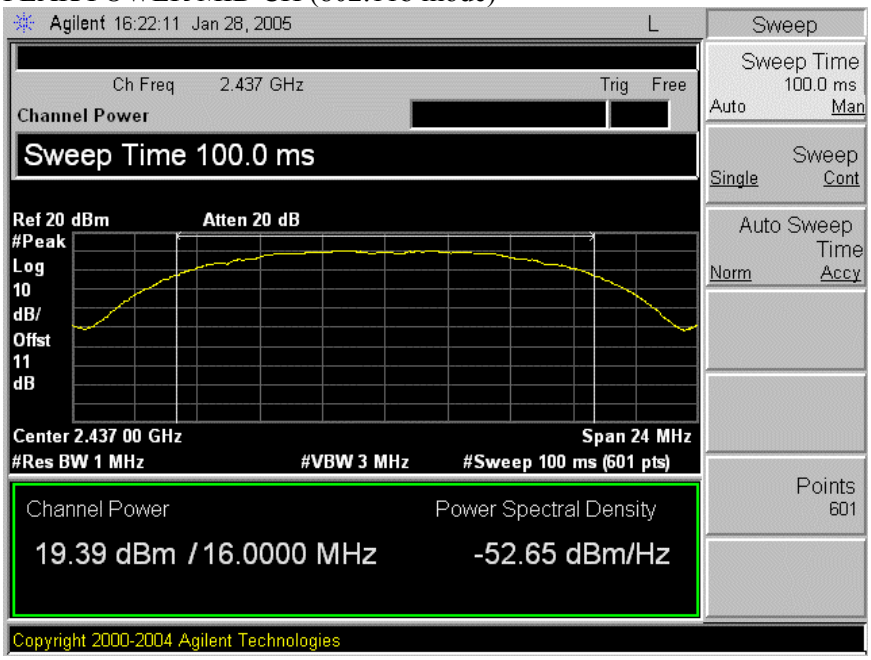
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Middle	2437	21.53	30	-8.47

OUTPUT POWER (802.11b MODE)

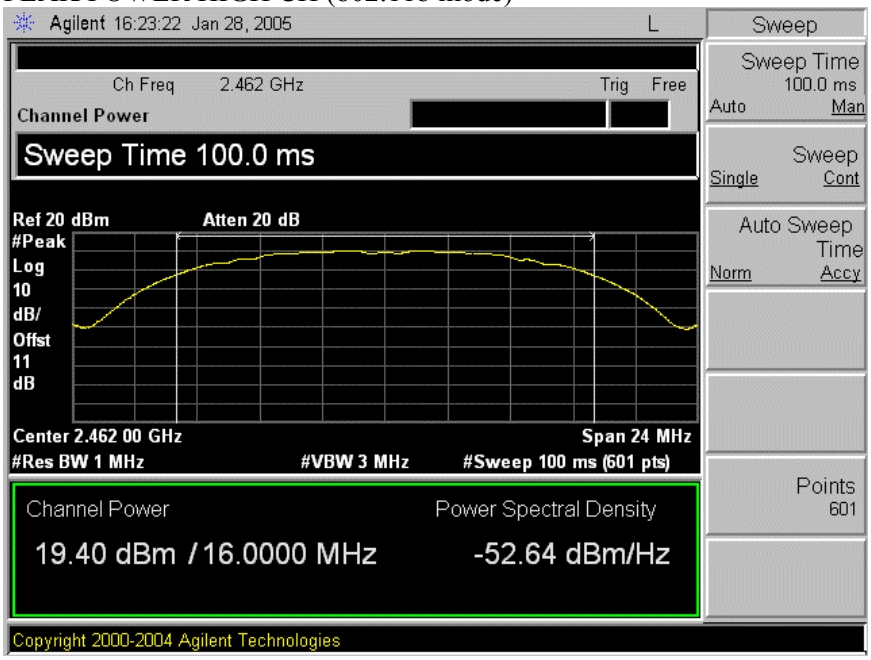
PEAK POWER LOW CH (802.11b mode)



PEAK POWER MID CH (802.11b mode)

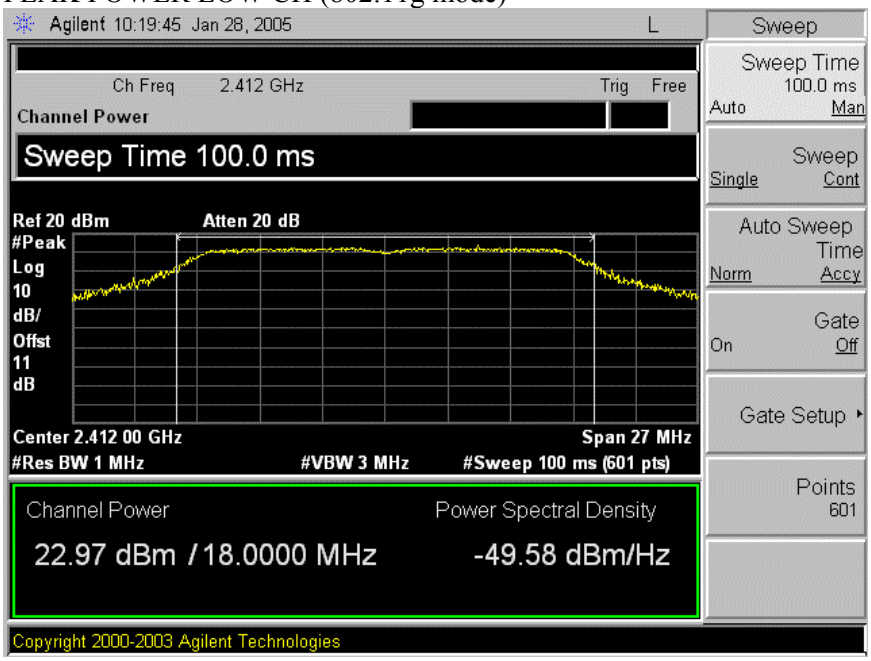


PEAK POWER HIGH CH (802.11b mode)

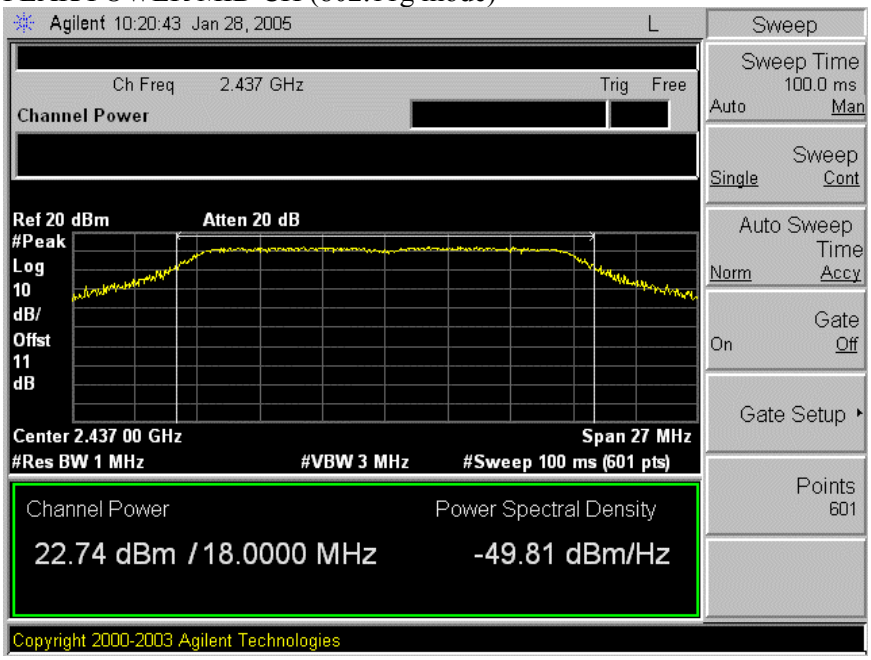


OUTPUT POWER (802.11g MODE)

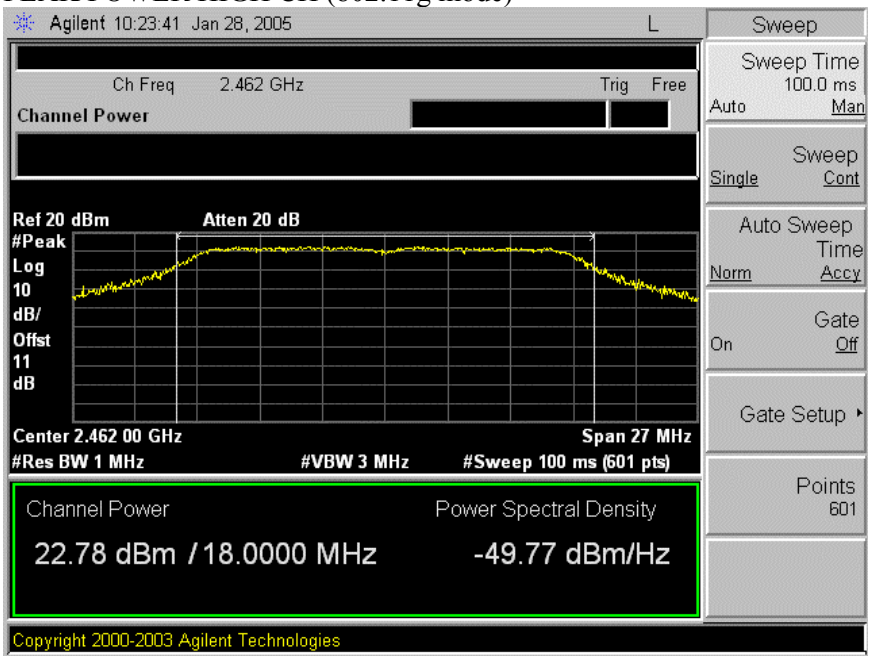
PEAK POWER LOW CH (802.11g mode)



PEAK POWER MID CH (802.11g mode)

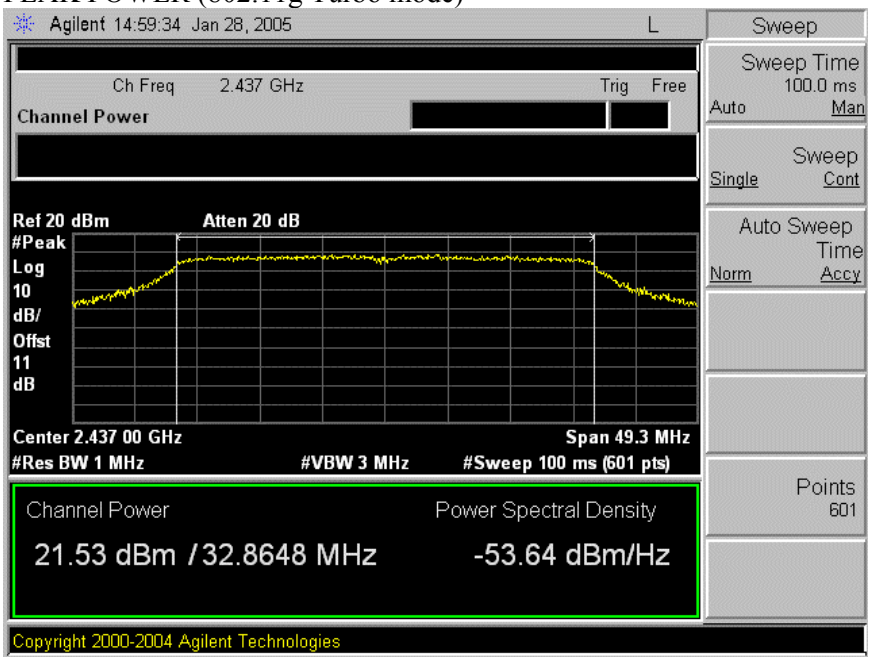


PEAK POWER HIGH CH (802.11g mode)



OUTPUT POWER (802.11g TURBO MODE)

PEAK POWER (802.11g Turbo mode)



7.1.4. 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 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	16.56
Middle	2437	16.39
High	2462	16.45

802.11g Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	15.21
Middle	2437	15.05
High	2462	15.12

802.11g Turbo Mode

Channel	Frequency (MHz)	Average Power (dBm)
Middle	2437	15.00

7.1.5. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

No non-compliance noted:

802.11b Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-8.39	8	-16.39
Middle	2437	-7.81	8	-15.81
High	2462	-8.34	8	-16.34

802.11g Mode

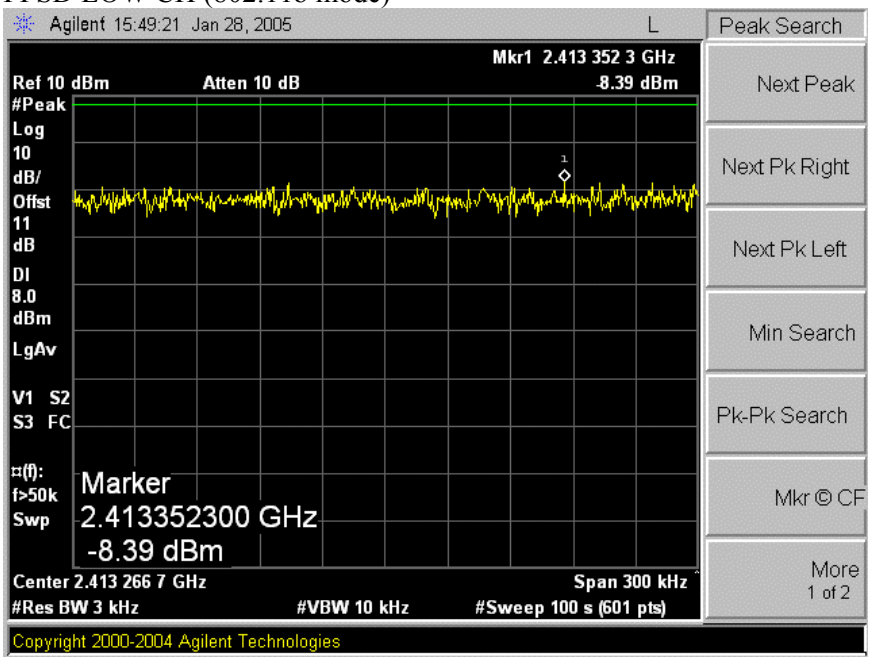
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-8.96	8	-16.96
Middle	2437	-8.18	8	-16.18
High	2462	-8.78	8	-16.78

802.11g Turbo Mode

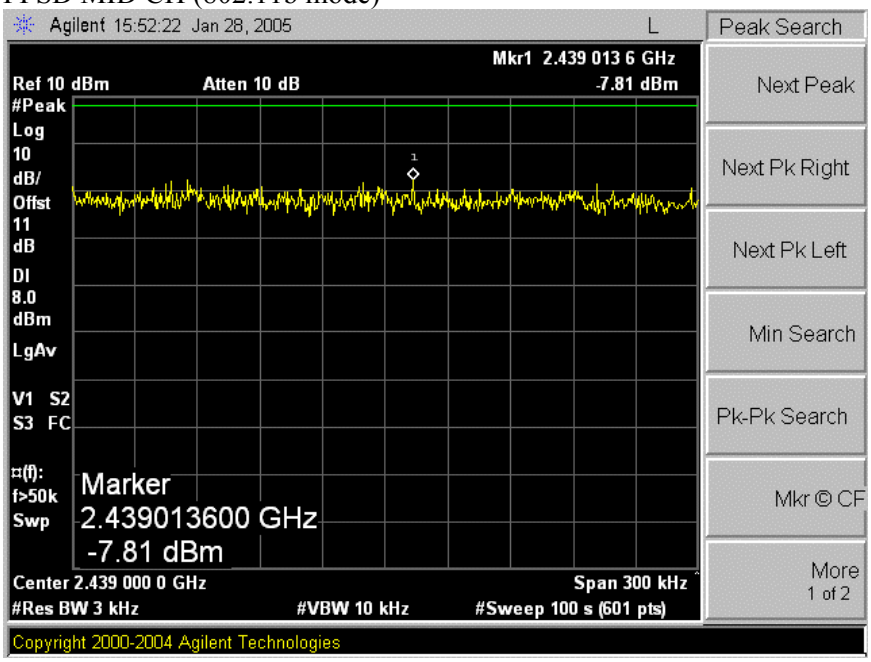
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Middle	2437	-9.61	8	-17.61

PEAK POWER SPECTRAL DENSITY (802.11b MODE)

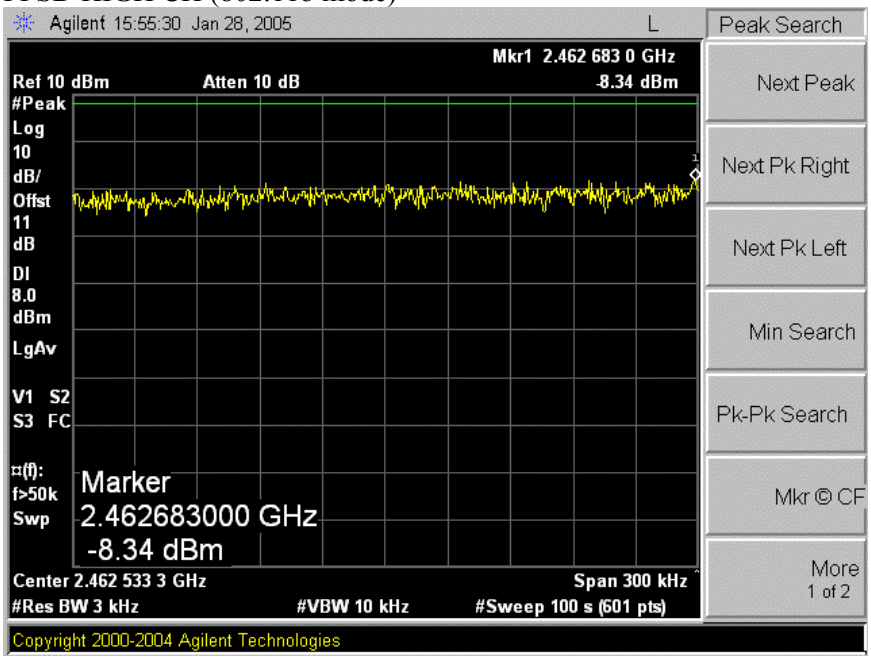
PPSD LOW CH (802.11b mode)



PPSD MID CH (802.11b mode)

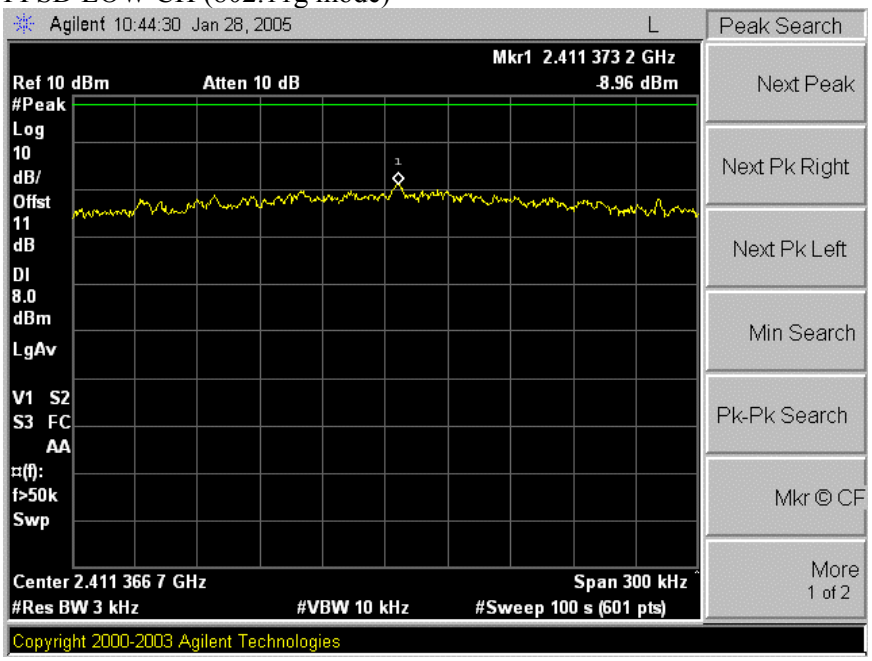


PPSD HIGH CH (802.11b mode)

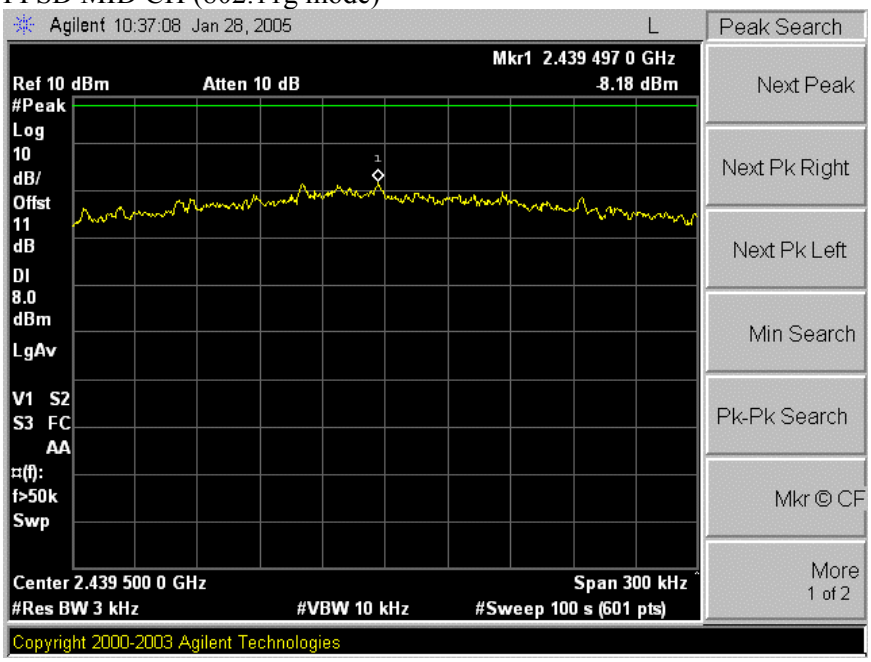


PEAK POWER SPECTRAL DENSITY (802.11g MODE)

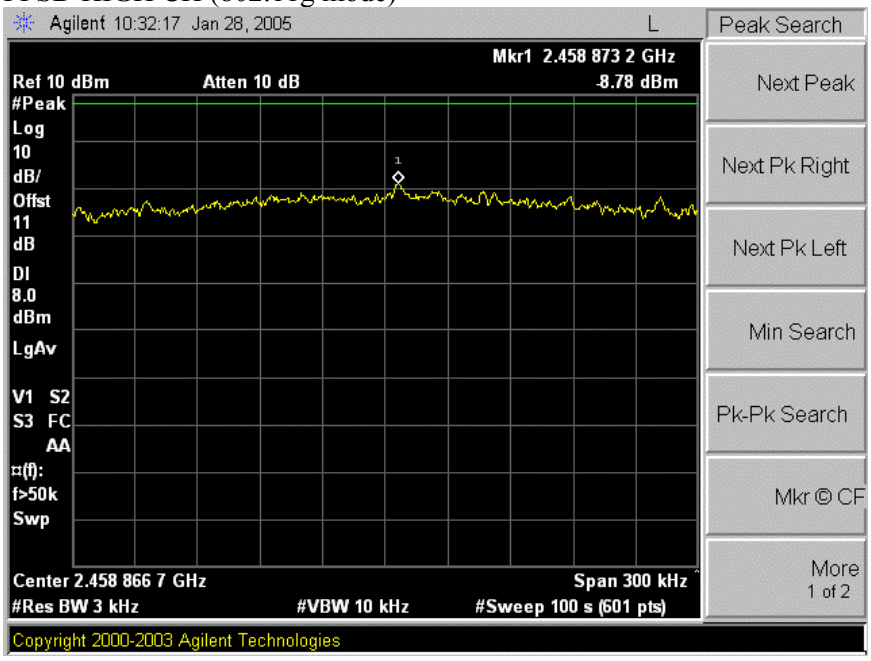
PPSD LOW CH (802.11g mode)



PPSD MID CH (802.11g mode)

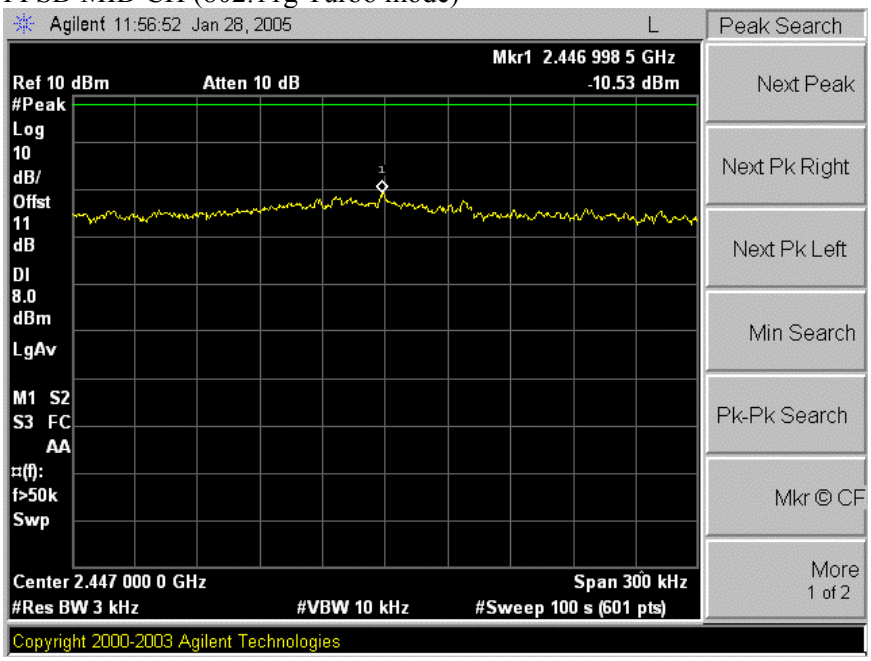


PPSD HIGH CH (802.11g mode)



PEAK POWER SPECTRAL DENSITY (802.11g TURBO MODE)

PPSD MID CH (802.11g Turbo mode)



7.1.6. 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.

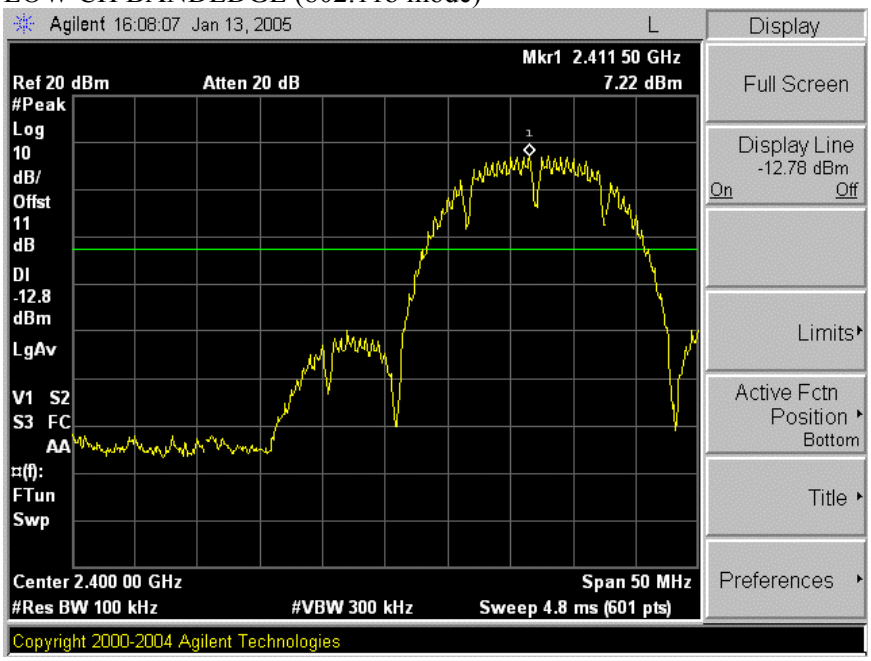
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

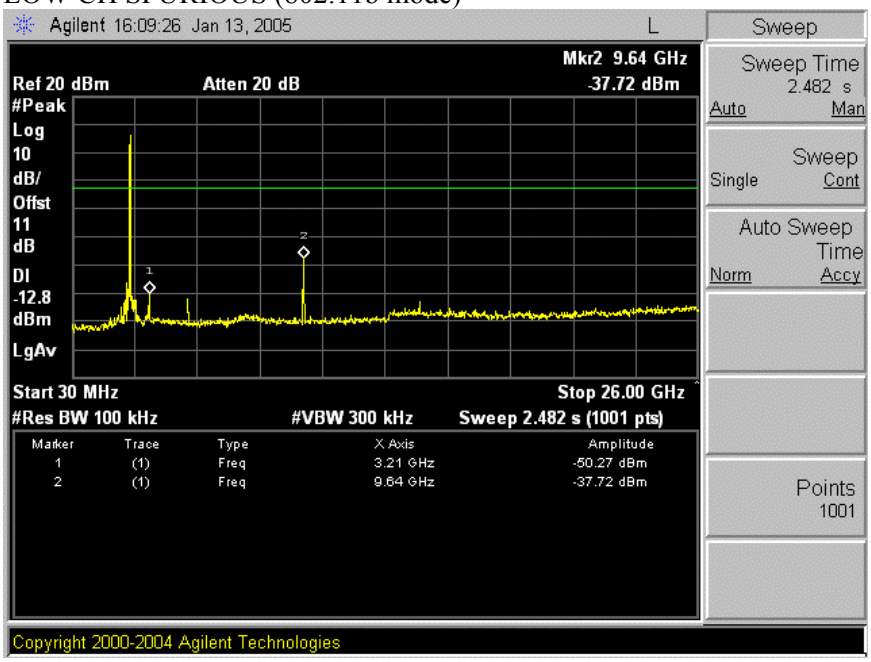
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE)

LOW CH BANDEDGE (802.11b mode)

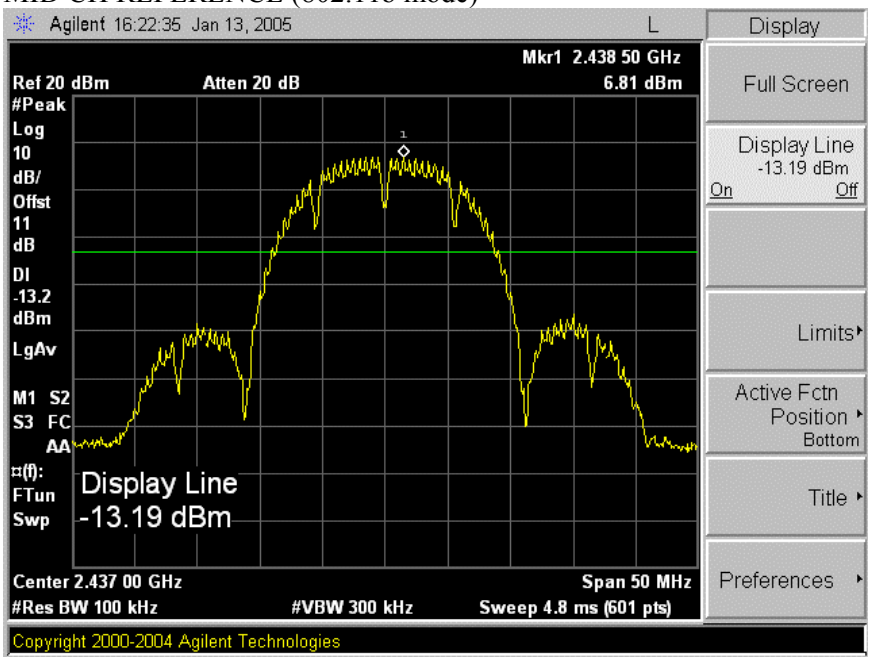


LOW CH SPURIOUS (802.11b mode)

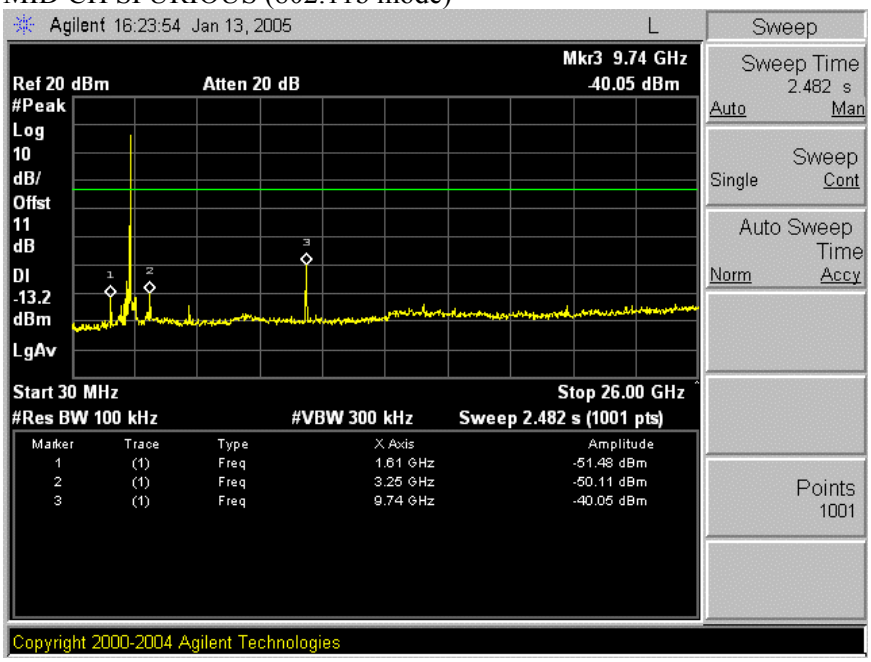


SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE)

MID CH REFERENCE (802.11b mode)

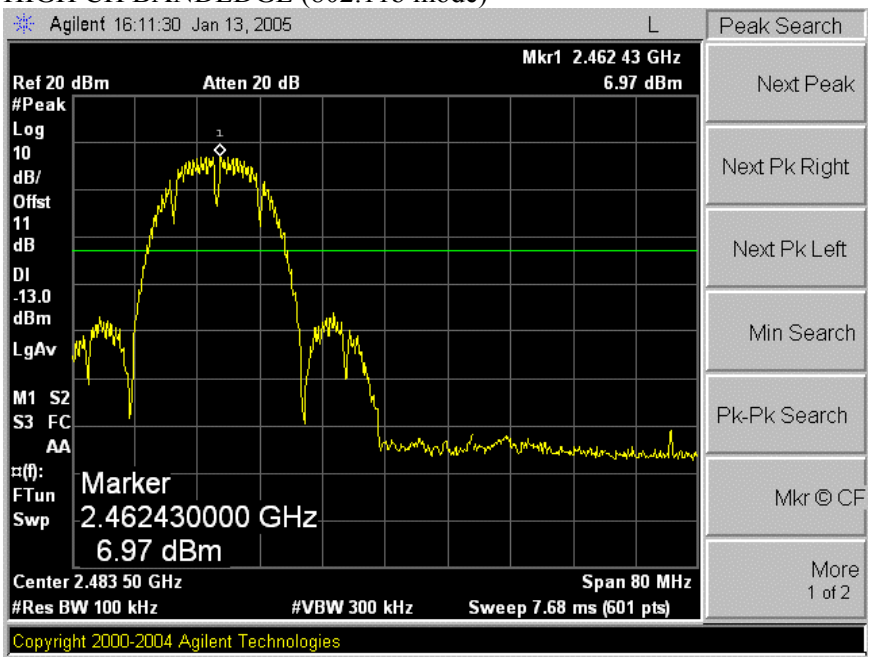


MID CH SPURIOUS (802.11b mode)

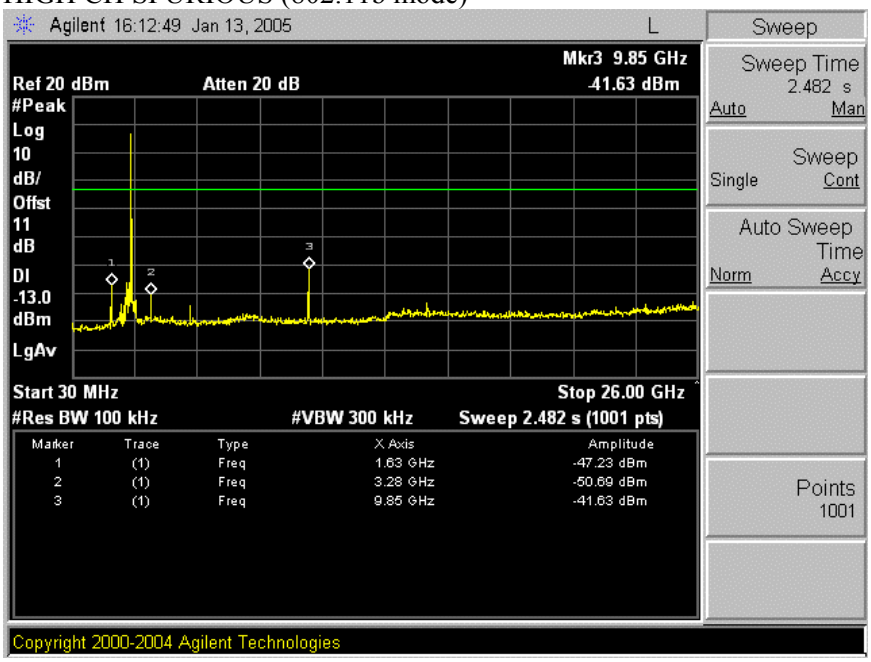


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE)

HIGH CH BANDEDGE (802.11b mode)

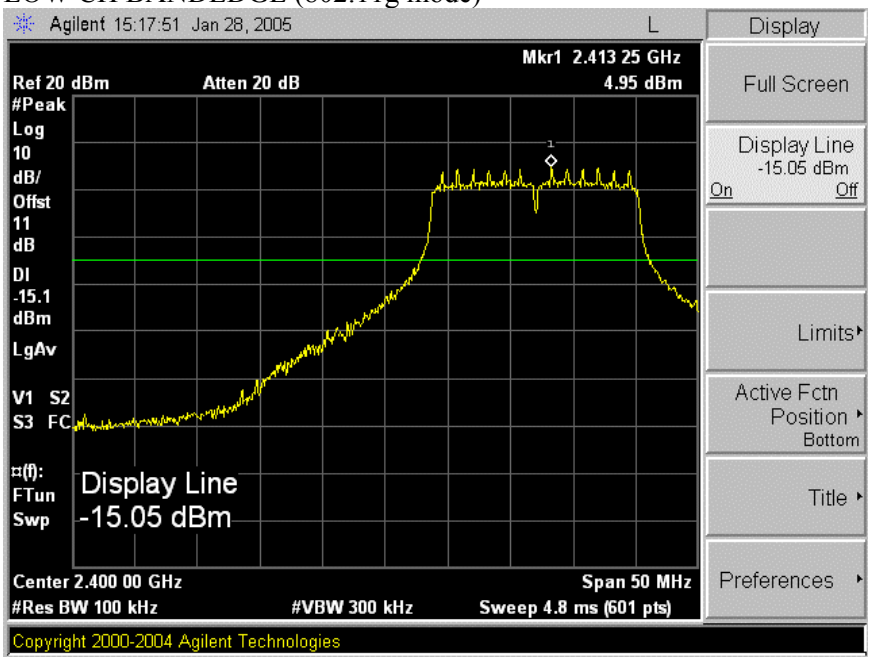


HIGH CH SPURIOUS (802.11b mode)

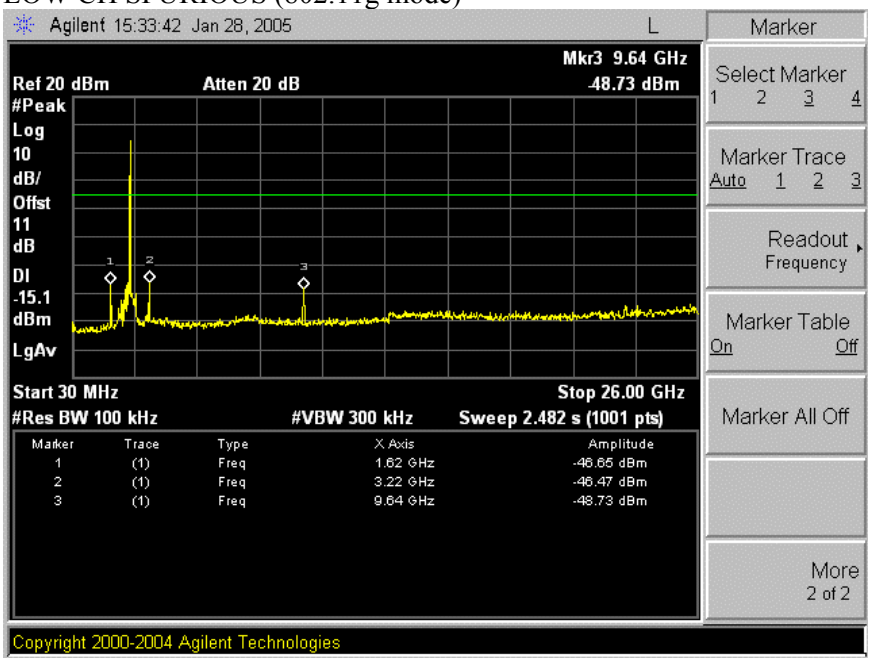


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE)

LOW CH BANDEDGE (802.11g mode)

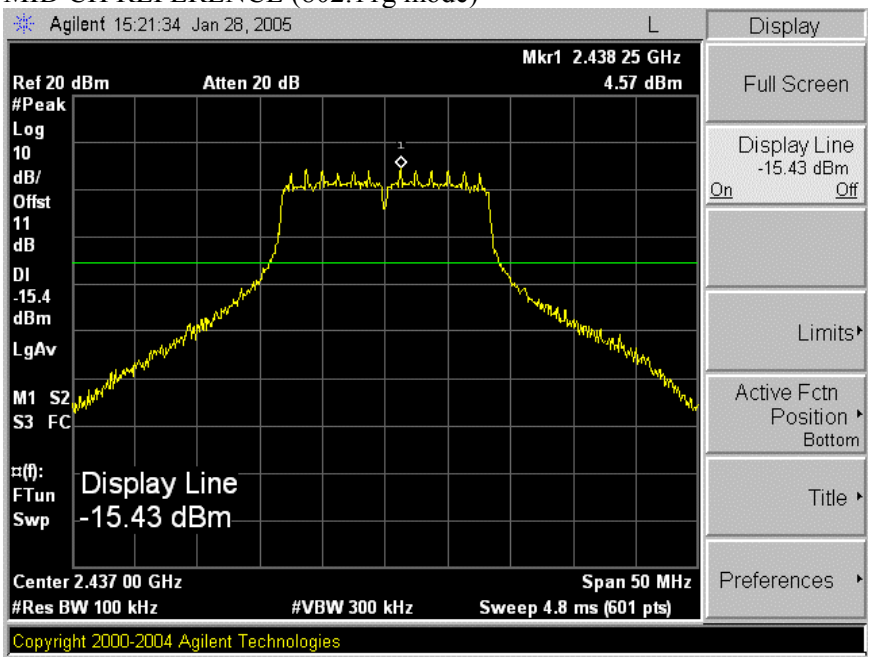


LOW CH SPURIOUS (802.11g mode)

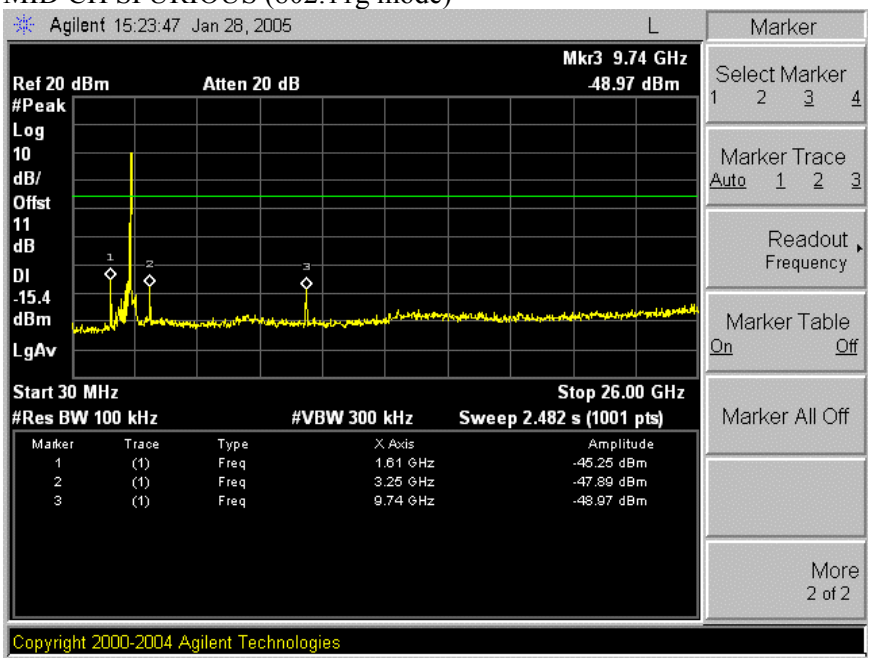


SPURIOUS EMISSIONS, MID CHANNEL (802.11g MODE)

MID CH REFERENCE (802.11g mode)

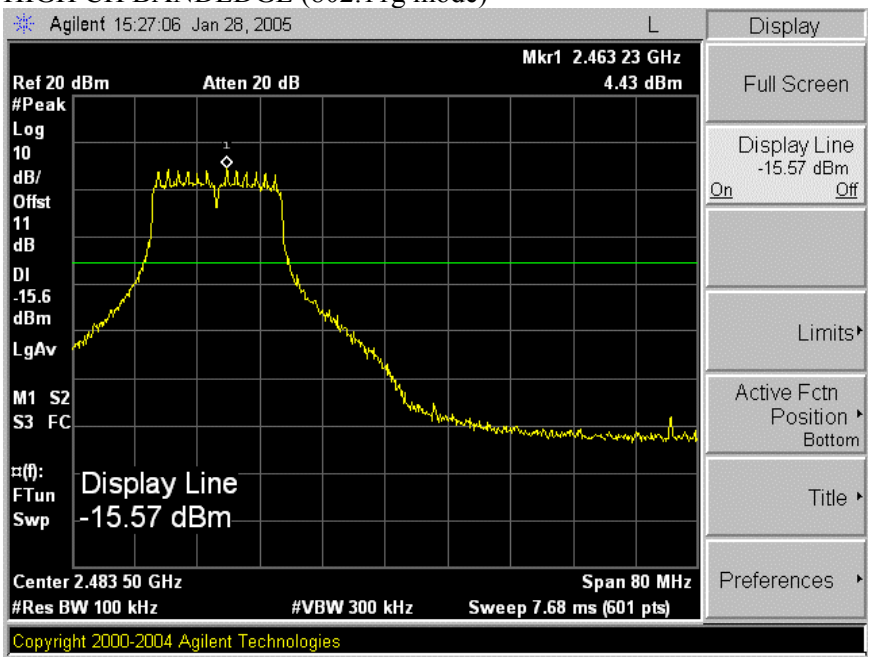


MID CH SPURIOUS (802.11g mode)

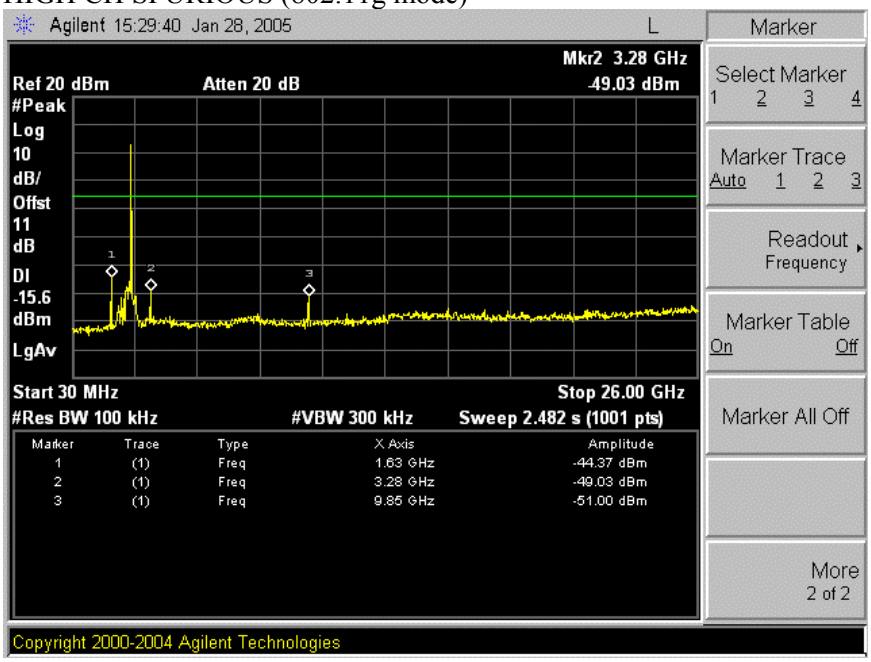


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE)

HIGH CH BANDEDGE (802.11g mode)

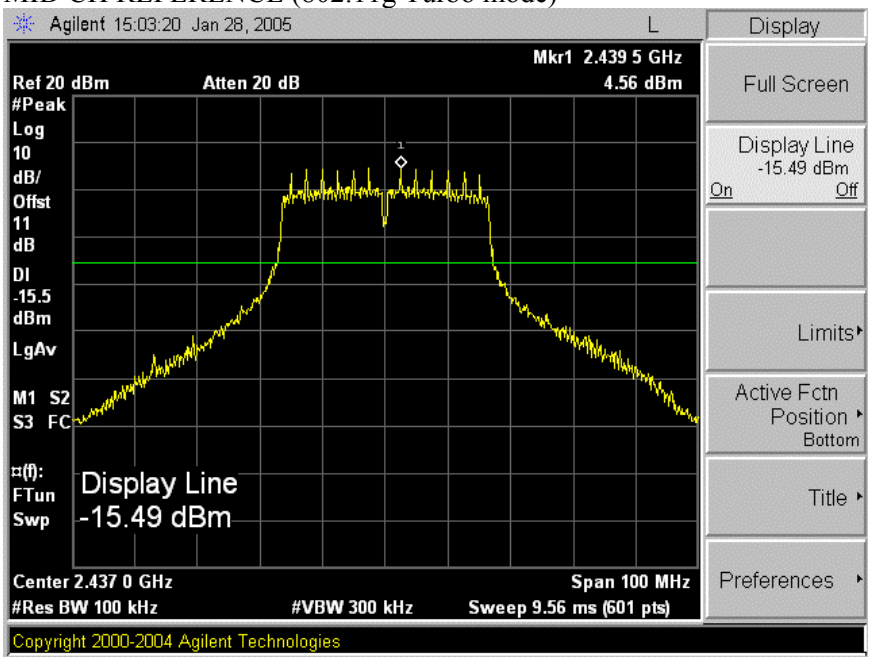


HIGH CH SPURIOUS (802.11g mode)

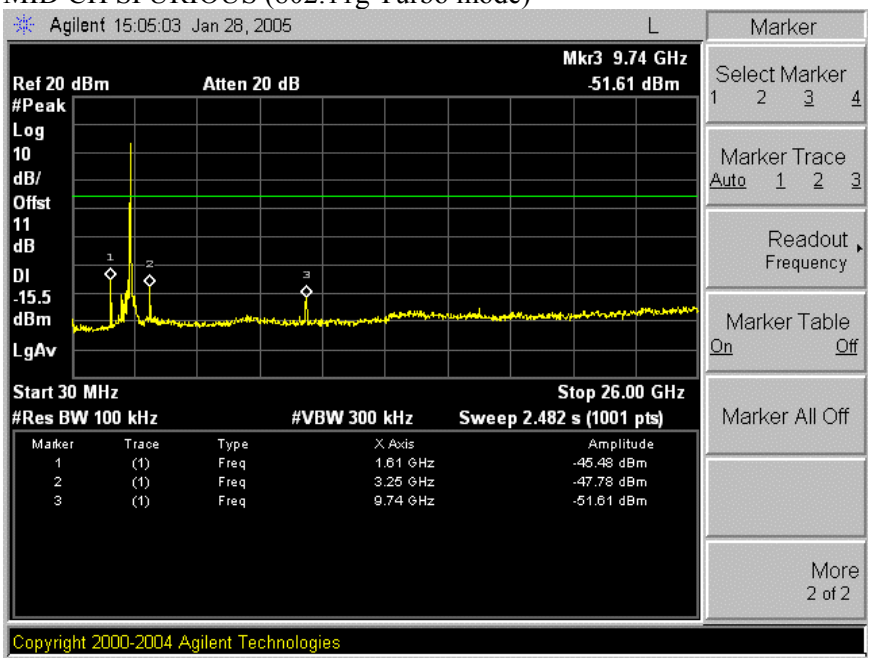


SPURIOUS EMISSIONS, MID CHANNEL (802.11g TURBO MODE)

MID CH REFERENCE (802.11g Turbo mode)



MID CH SPURIOUS (802.11g Turbo mode)



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.

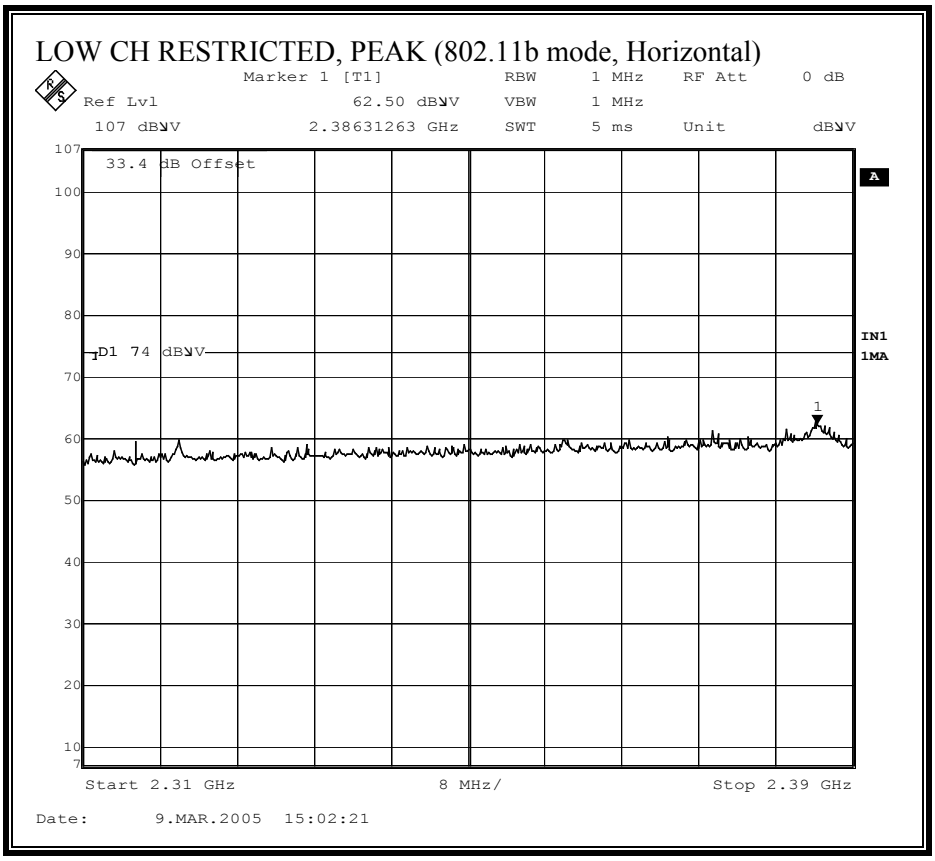
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

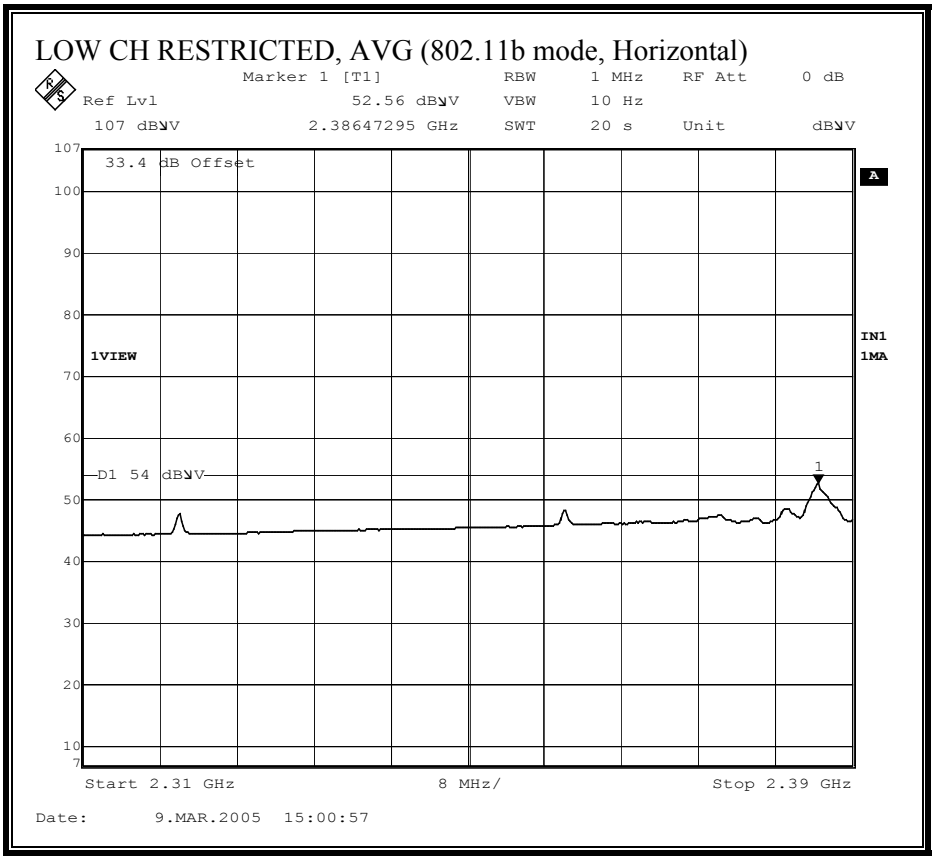
SUPPLEMENTAL TEST PROCEDURE FOR CO-LOCATED TRANSMITTERS

The dominant transmitter is set to the worst case channel. The spurious emissions performance of the dominant transmitter is investigated as the settings of the non-dominant transmitter are varied. The spectrum is searched for intermodulation products. Worst-case results are reported.

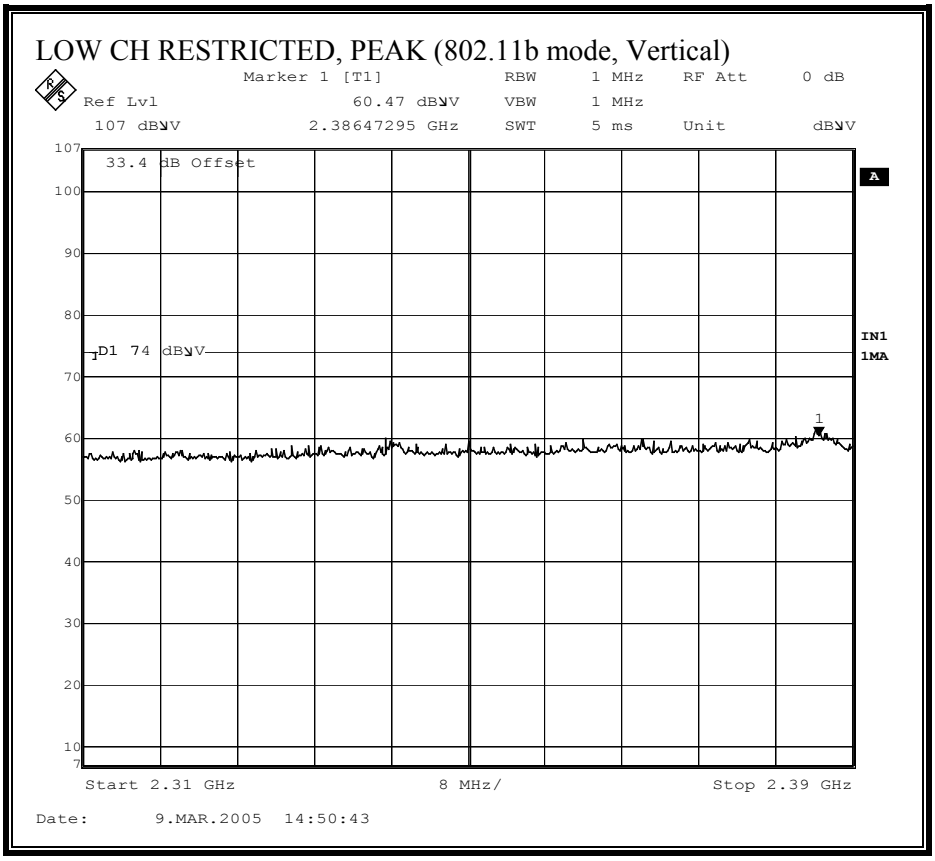
7.2.2. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

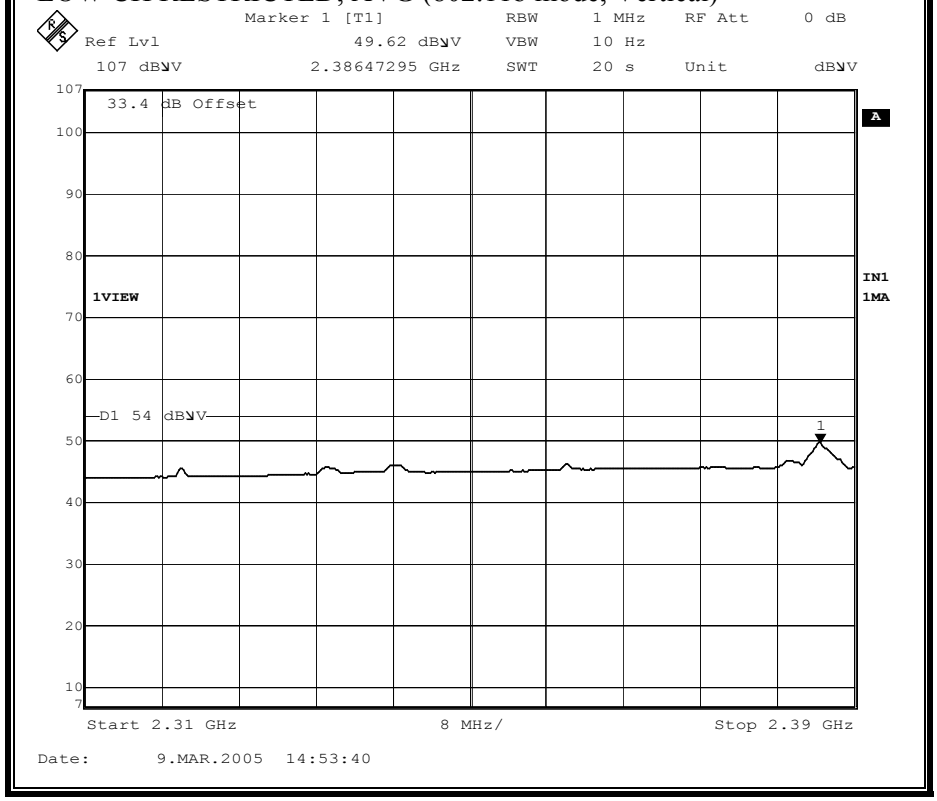




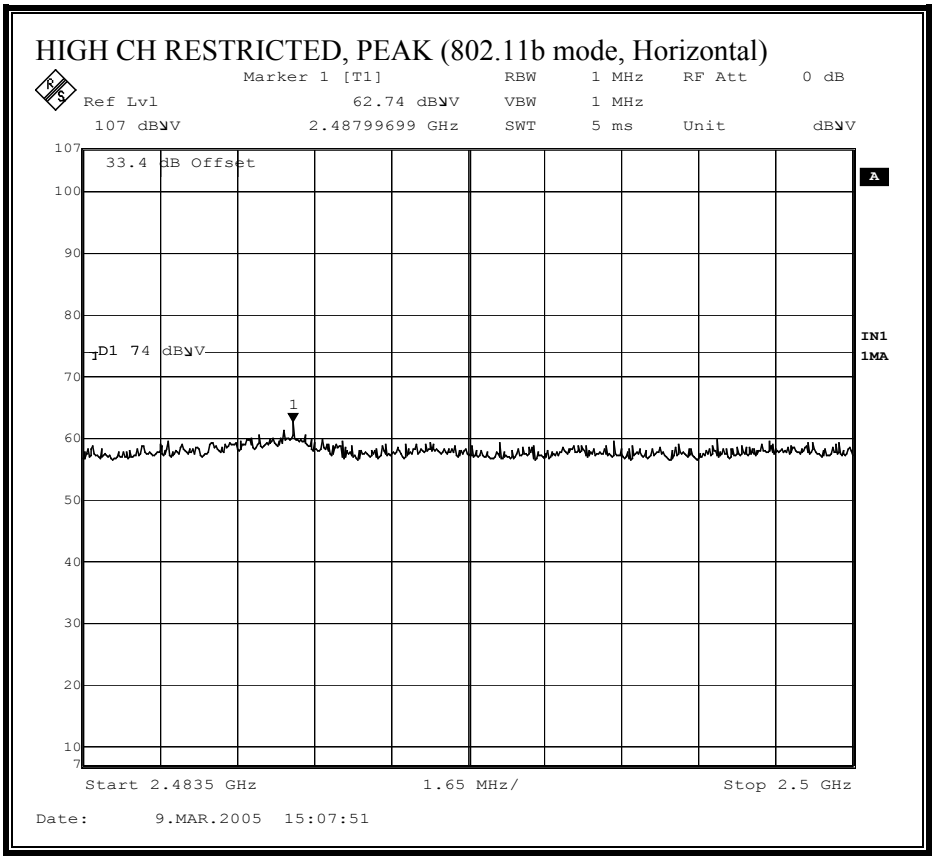
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)



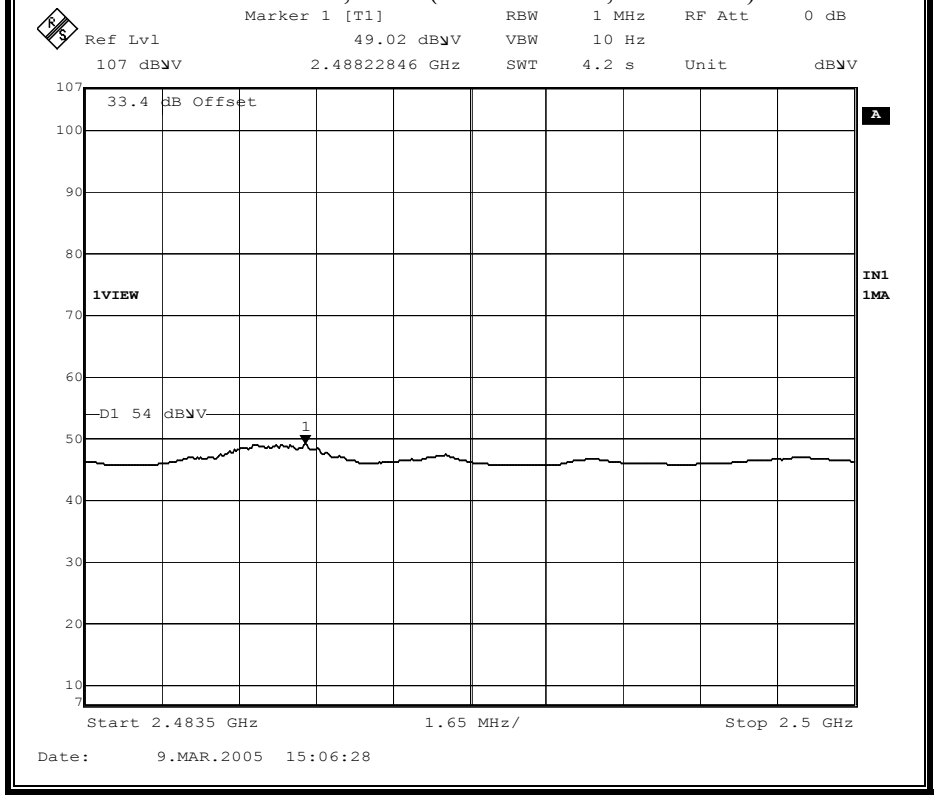
LOW CH RESTRICTED, AVG (802.11b mode, Vertical)



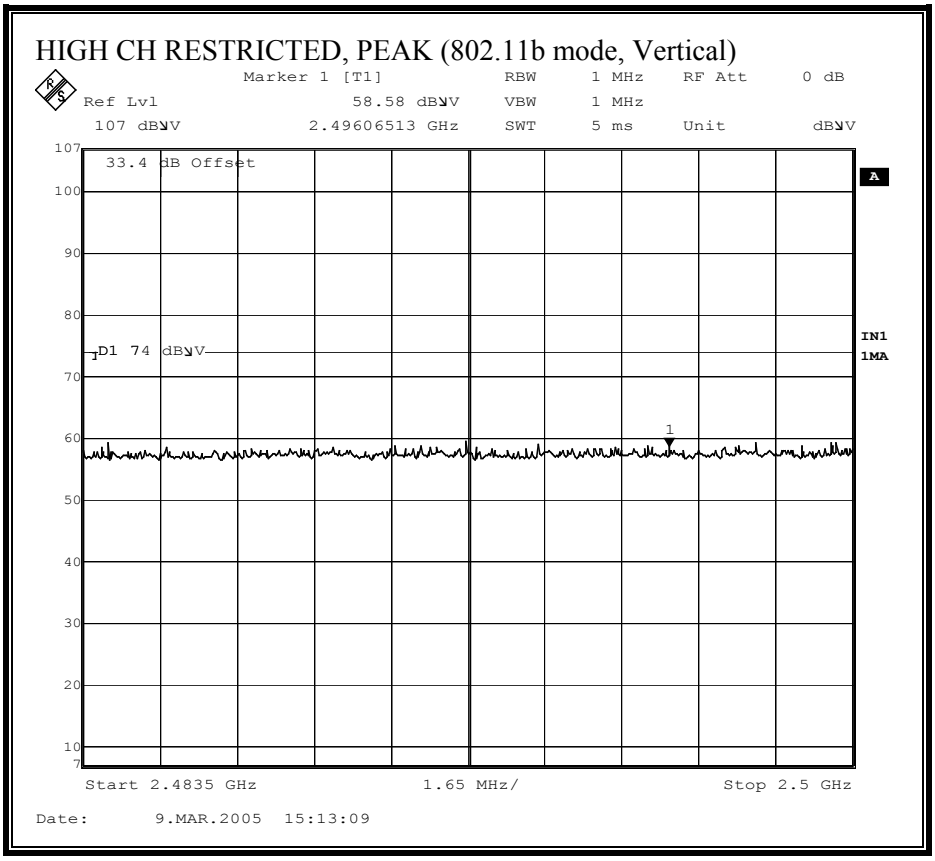
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)



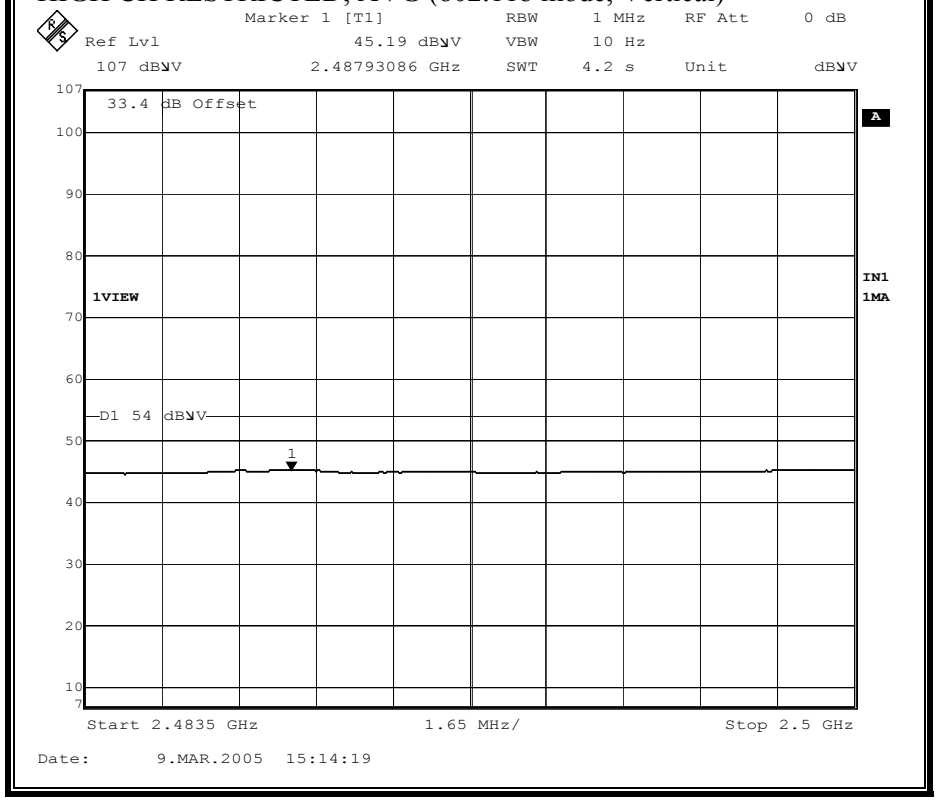
HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)



RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)



HIGH CH RESTRICTED, AVG (802.11b mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

03/09/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 05U3307-1
Company: Toshiba
EUT Descrip.: 802.11b/g Half Size Mini-PCI WLAN Module with Libretto L5 Las Vegas Subnotebook
EUT M/N: MB51H w/HTL017 Ant
Test Target: FCC 15.247
Mode Oper: TX, b mode

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T34 HP 8449B			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_Chin			12_Neelesh		

Peak Measurements
RBW=VBW=1MHz

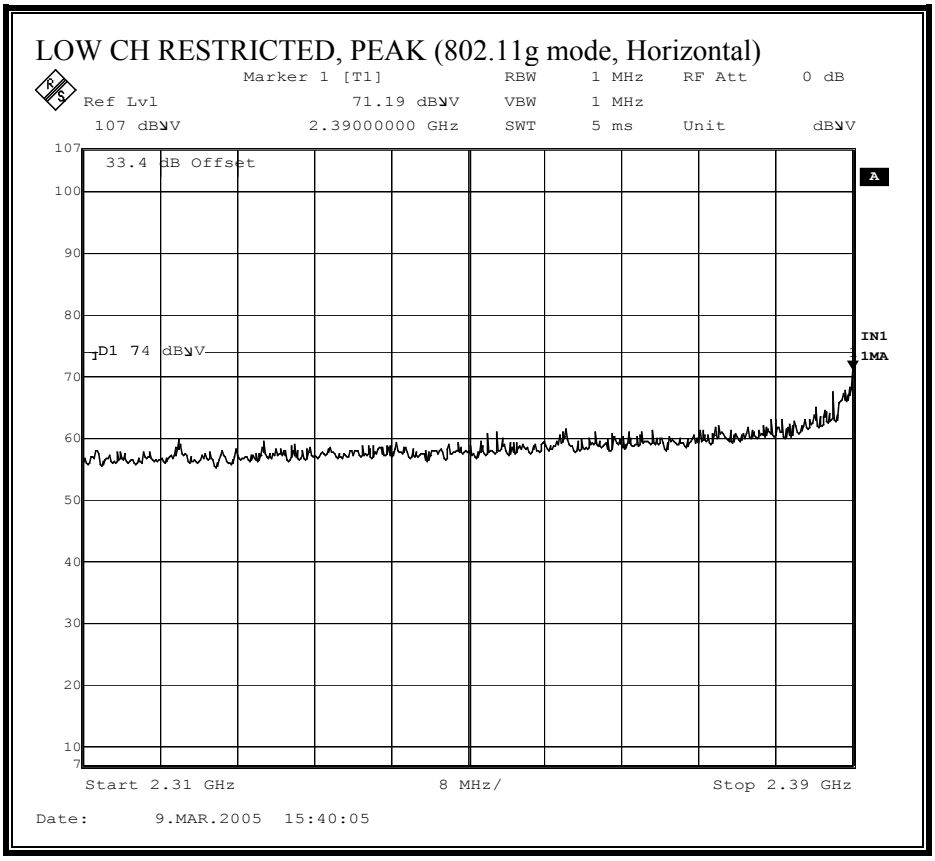
Average Measurements
RBW=1MHz ; VBW=10Hz

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 ch															
4.824	3.0	46.8	39.6	33.7	3.7	-34.2	0.0	0.0	50.0	42.8	74	54	-24.0	-11.2	V
4.824	3.0	45.5	39.0	33.7	3.7	-34.2	0.0	0.0	48.7	42.2	74	54	-25.3	-11.8	H
mid ch															
4.874	3.0	47.0	41.0	33.7	3.7	-34.2	0.0	0.0	50.3	44.3	74	54	-23.7	-9.7	V
7.311	3.0	50.0	43.0	35.7	4.6	-33.7	0.0	0.0	56.6	49.6	74	54	-17.4	-4.4	V
4.874	3.0	45.6	38.5	33.7	3.7	-34.2	0.0	0.0	48.9	41.8	74	54	-25.1	-12.2	H
7.311	3.0	48.0	40.3	35.7	4.6	-33.7	0.0	0.0	54.6	46.9	74	54	-19.4	-7.1	H
high ch															
4.924	3.0	46.6	38.0	33.8	3.8	-34.2	0.0	0.0	49.9	41.3	74	54	-24.1	-12.7	V
7.386	3.0	48.6	39.8	35.7	4.7	-33.7	0.0	0.0	55.3	46.5	74	54	-18.7	-7.5	V
4.924	3.0	46.8	39.0	33.8	3.8	-34.2	0.0	0.0	50.1	42.3	74	54	-23.9	-11.7	H
7.386	3.0	48.2	39.5	35.7	4.7	-33.7	0.0	0.0	54.9	46.2	74	54	-19.1	-7.8	H

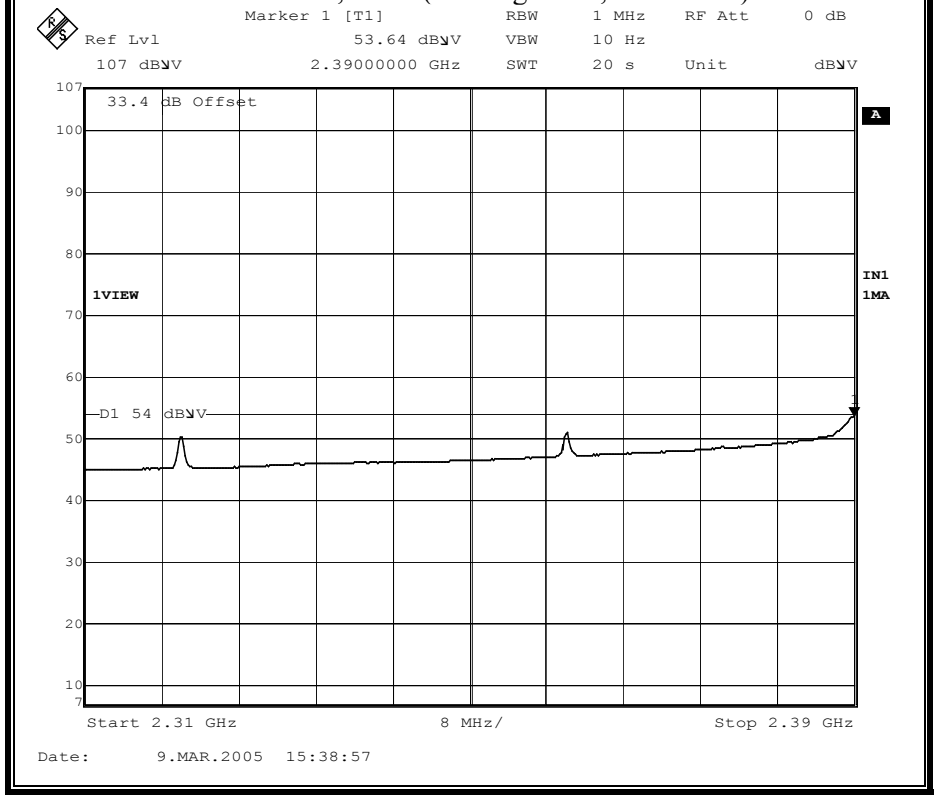
Note: No other emissions were detected above the system noise floor

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		

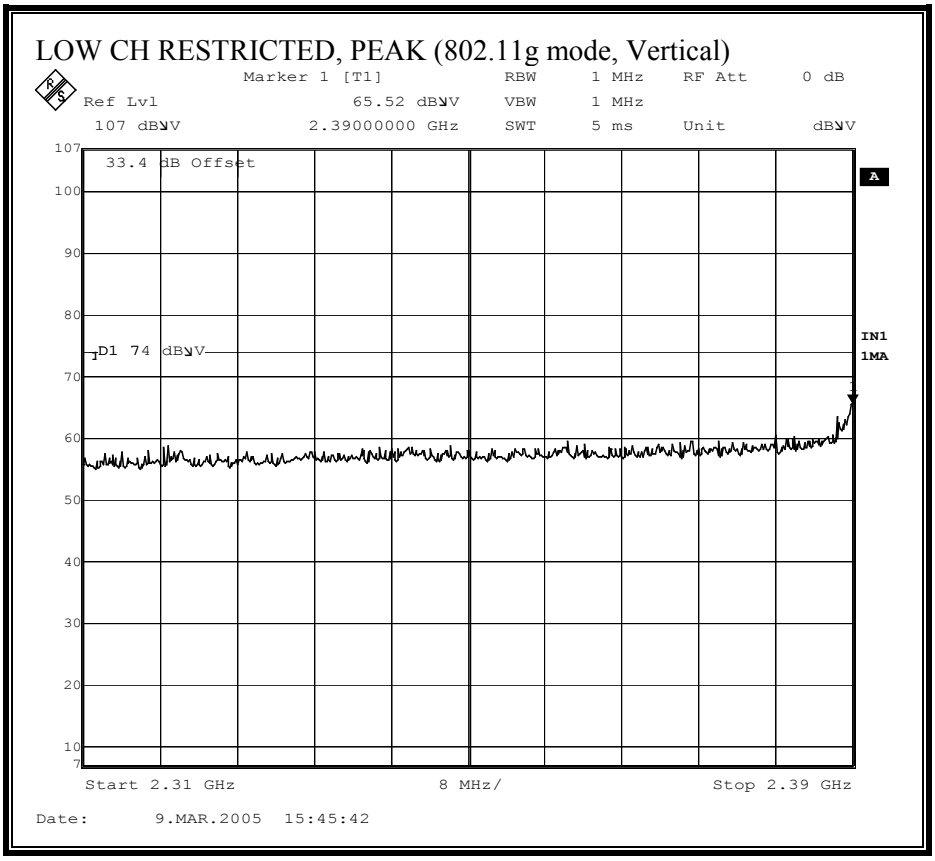
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

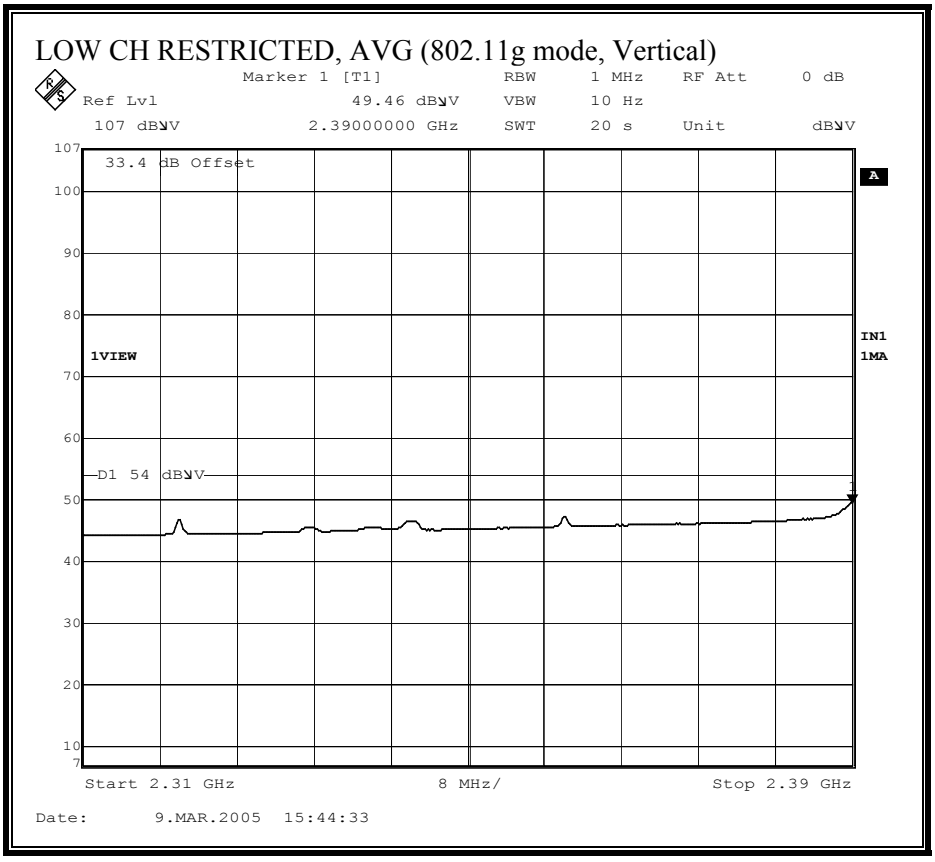


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

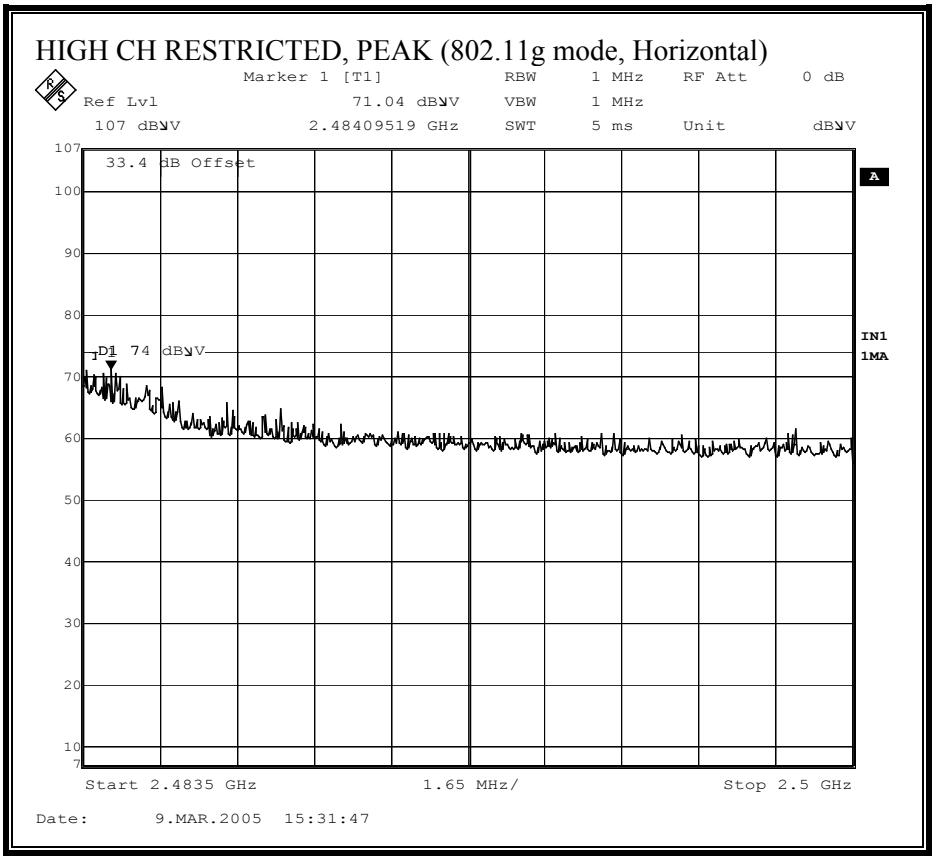


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

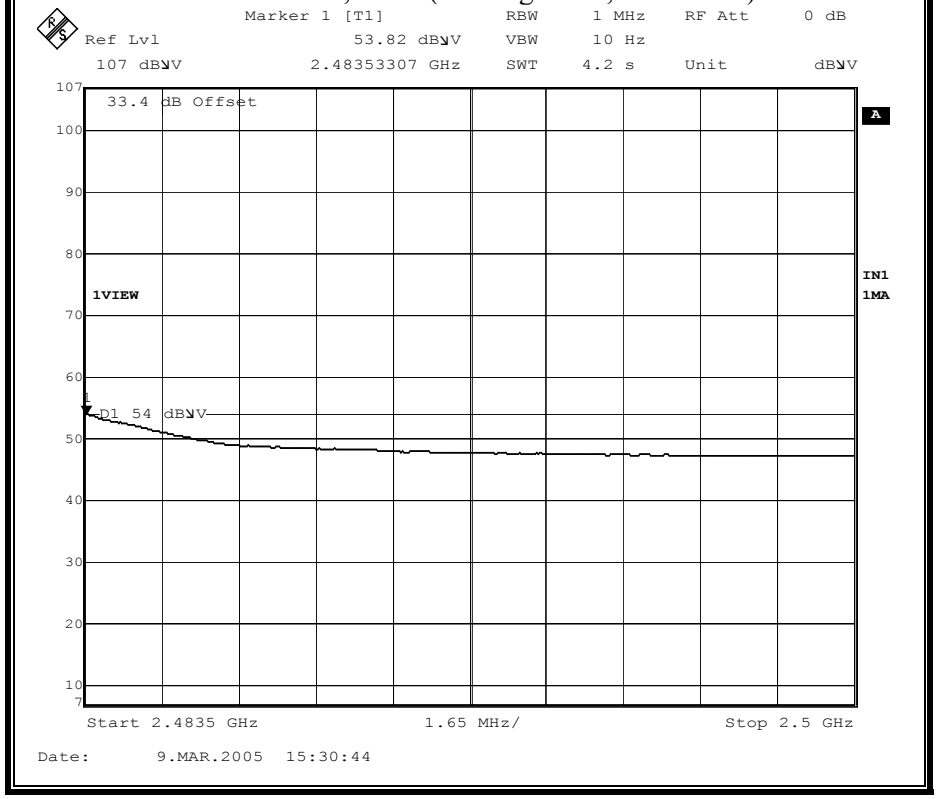




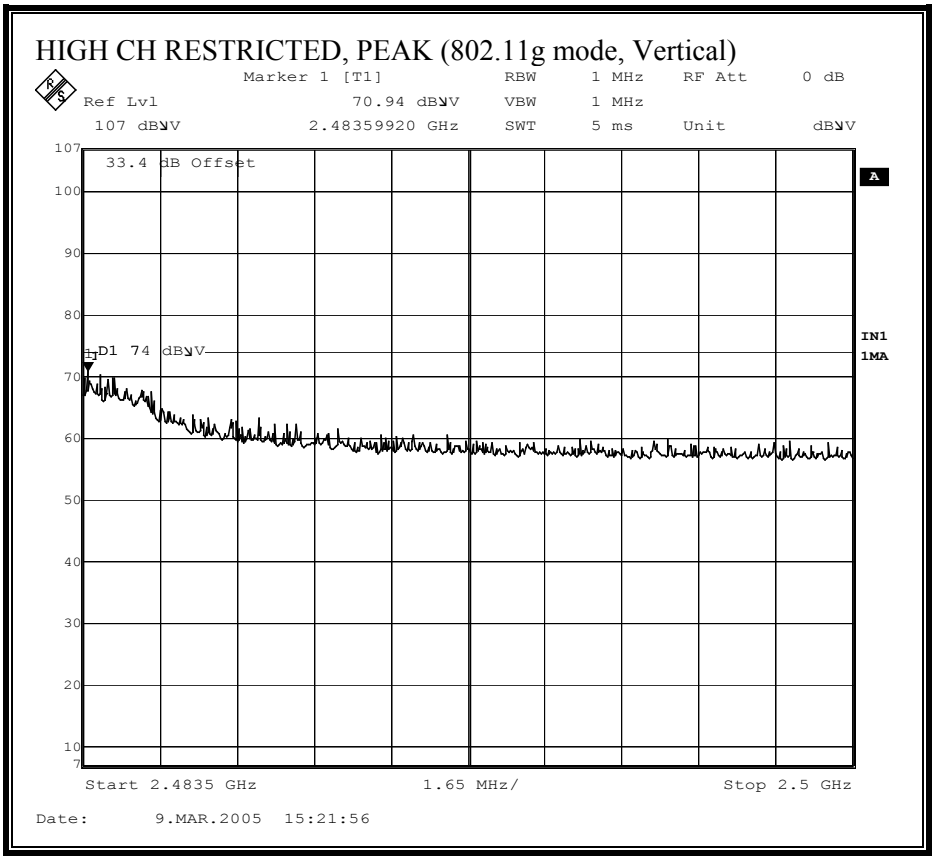
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)



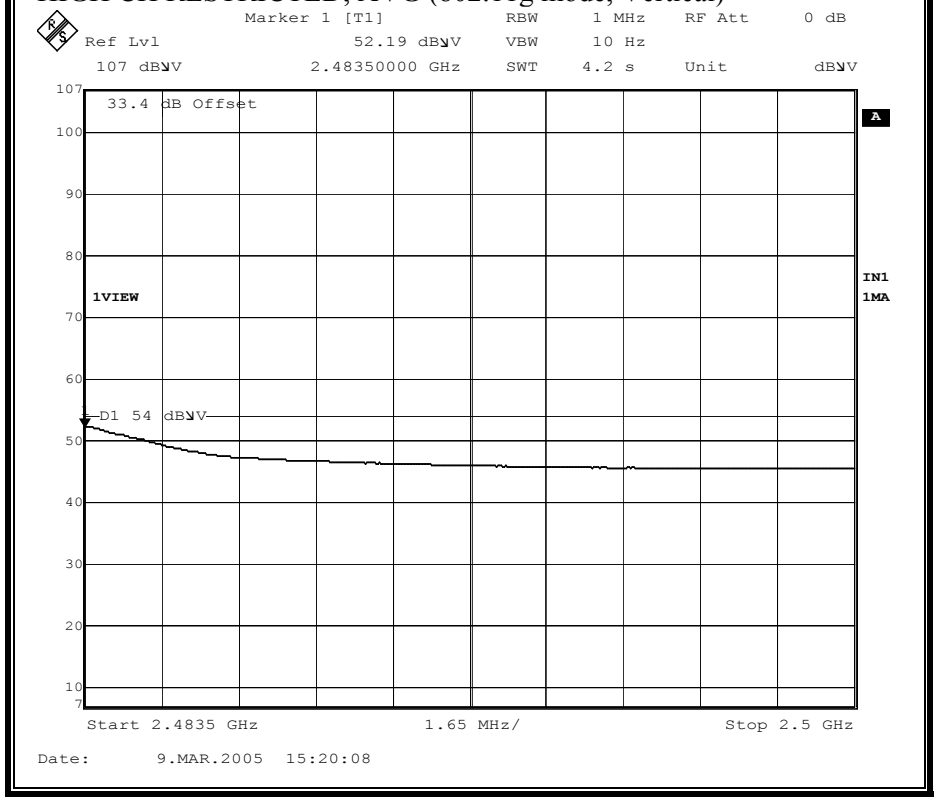
HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)



RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)



HIGH CH RESTRICTED, AVG (802.11g mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (g MODE)

03/09/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 05U3307-1
Company: Toshiba
EUT Descrip.: 802.11b/g Half Size Mini-PCI WLAN Module with Libretto L5 Las Vegas Subnotebook
EUT M/N: MB51H w/HTL017 Ant
Test Target: FCC 15.247
Mode Oper: TX, G mode

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T34 HP 8449B			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_Chin			12_Neelesh		

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 ch															
4.824	3.0	45.0	33.5	33.7	3.7	-34.2	0.0	0.0	48.2	36.7	74	54	-25.8	-17.3	V
4.824	3.0	44.7	33.4	33.7	3.7	-34.2	0.0	0.0	47.9	36.6	74	54	-26.1	-17.4	H
mid ch															
4.874	3.0	46.0	33.8	33.7	3.7	-34.2	0.0	0.0	49.3	37.1	74	54	-24.7	-16.9	V
7.311	3.0	49.5	35.6	35.7	4.6	-33.7	0.0	0.0	56.1	42.2	74	54	-17.9	-11.8	V
4.874	3.0	45.5	33.6	33.7	3.7	-34.2	0.0	0.0	48.8	36.9	74	54	-25.2	-17.1	H
7.311	3.0	48.6	35.0	35.7	4.6	-33.7	0.0	0.0	55.2	41.6	74	54	-18.8	-12.4	H
high ch															
4.924	3.0	46.3	34.5	33.8	3.8	-34.2	0.0	0.0	49.6	37.8	74	54	-24.4	-16.2	V
7.386	3.0	51.6	36.5	35.7	4.7	-33.7	0.0	0.0	58.3	43.2	74	54	-15.7	-10.8	V
4.924	3.0	44.3	33.3	33.8	3.8	-34.2	0.0	0.0	47.6	36.6	74	54	-26.4	-17.4	H
7.386	3.0	49.0	35.0	35.7	4.7	-33.7	0.0	0.0	55.7	41.7	74	54	-18.3	-12.3	H

Note: No other emissions were detected above the system noise floor

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		

HARMONICS AND SPURIOUS EMISSIONS (g TURBO MODE)

03/09/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 05U3307-1
Company: Toshiba
EUT Descrip.: 802.11b/g Half Size Mini-PCI WLAN Module with Libretto L5 Las Vegas Subnotebook
EUT M/N: MB51H w/HTL017 Ant
Test Target: FCC 15.247
Mode Oper: TX, G mode, Turbo

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T34 HP 8449B			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_Chin			12_Neelesh		

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)
mid ch															
4.874	3.0	49.5	35.4	33.7	3.7	-34.2	0.0	0.0	52.8	38.7	74	54	-21.2	-15.3	V
7.311	3.0	51.0	35.8	35.7	4.6	-33.7	0.0	0.0	57.6	42.4	74	54	-16.4	-11.6	V
4.874	3.0	52.0	37.3	33.7	3.7	-34.2	0.0	0.0	55.3	40.6	74	54	-18.7	-13.4	H
7.311	3.0	52.5	36.0	35.7	4.6	-33.7	0.0	0.0	59.1	42.6	74	54	-14.9	-11.4	H

Note: No other emissions were detected above the system noise floor

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		

7.2.3 CO-LOCATED TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHz

Worst-case configurations are determined as:

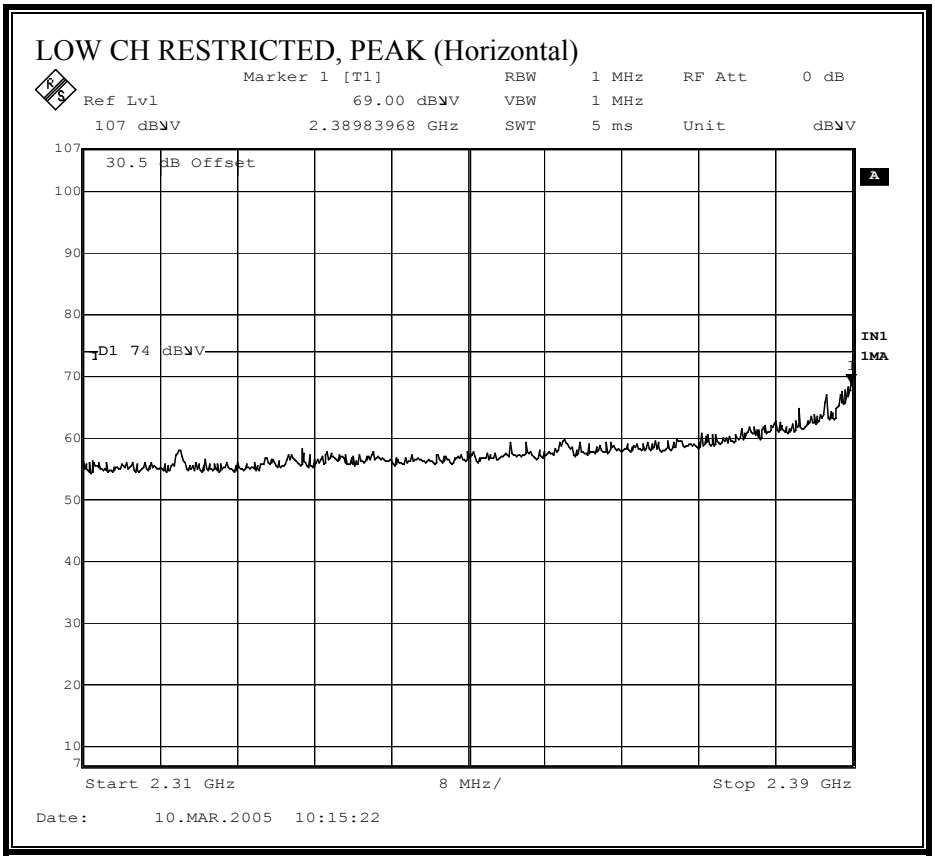
Lower bandedge: WLAN in g mode at low channel and Bluetooth at low channel;
Upper bandedge: WLAN in g mode at high channel and Bluetooth at high channel;
Harmonics and spurious emissions: WLAN in g mode at mid channel and Bluetooth at mid channel.

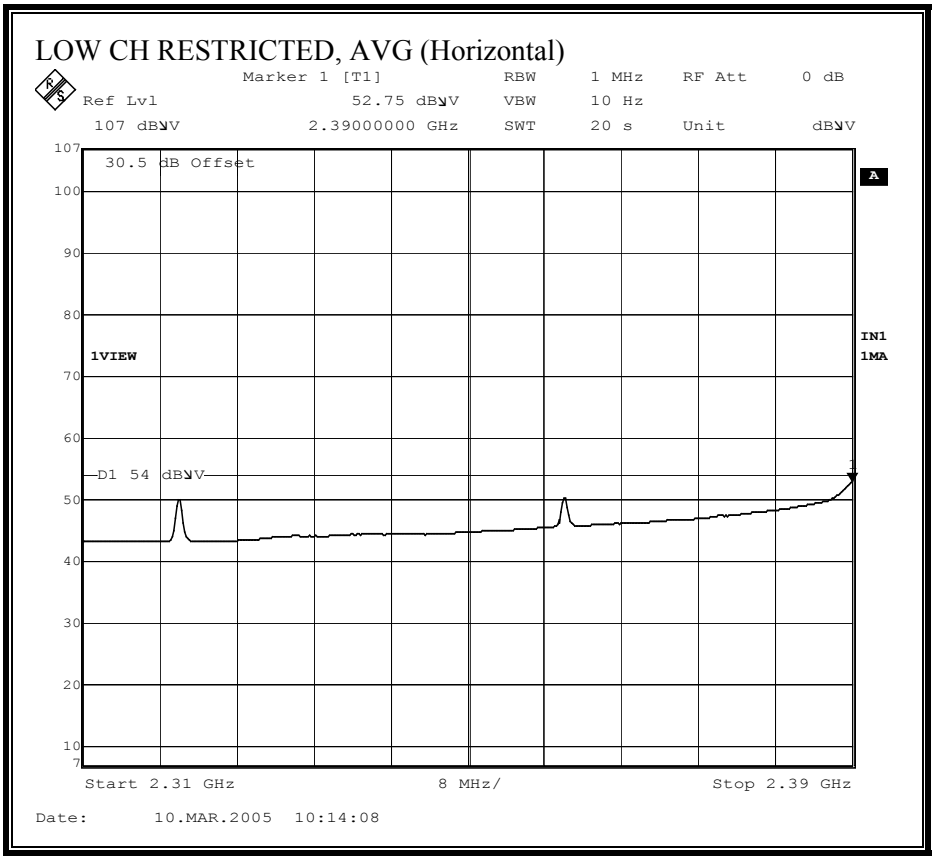
RESULTS

No non-compliance noted:

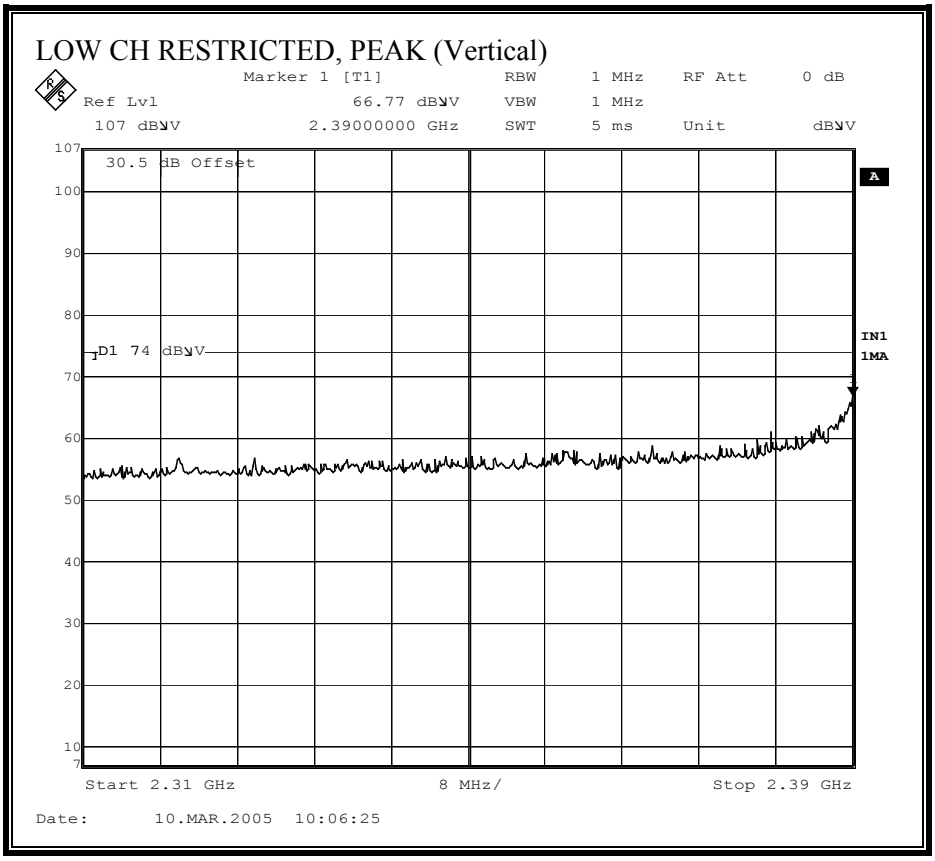
The dominant transmitter is the WLAN.

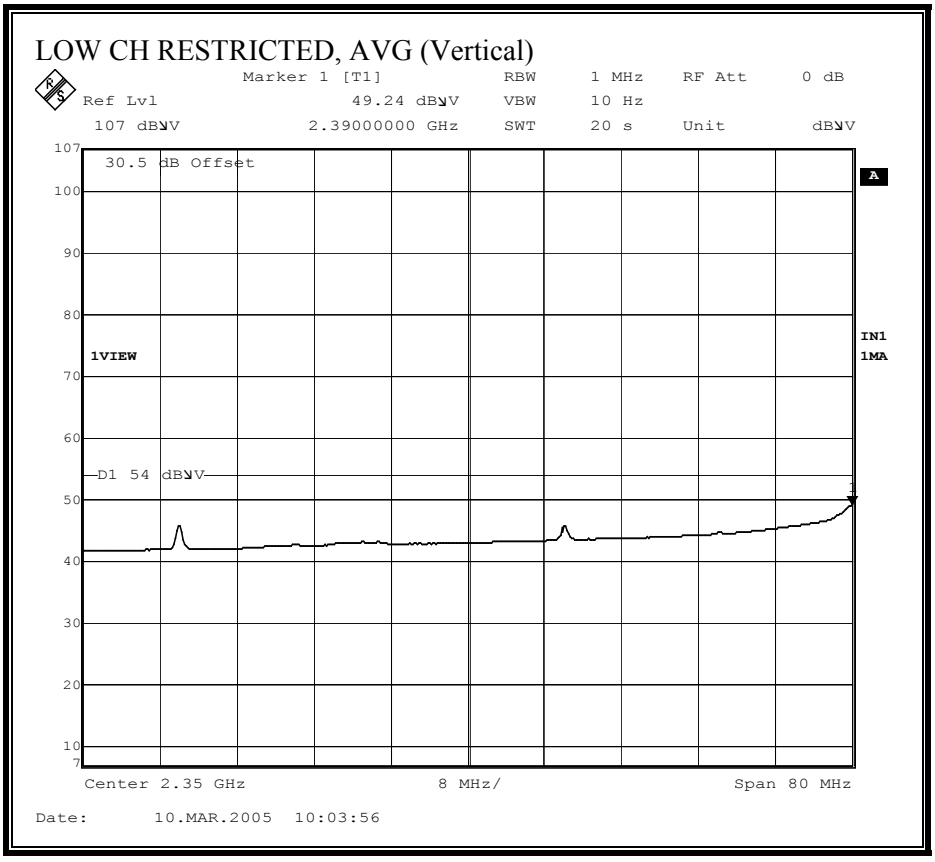
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



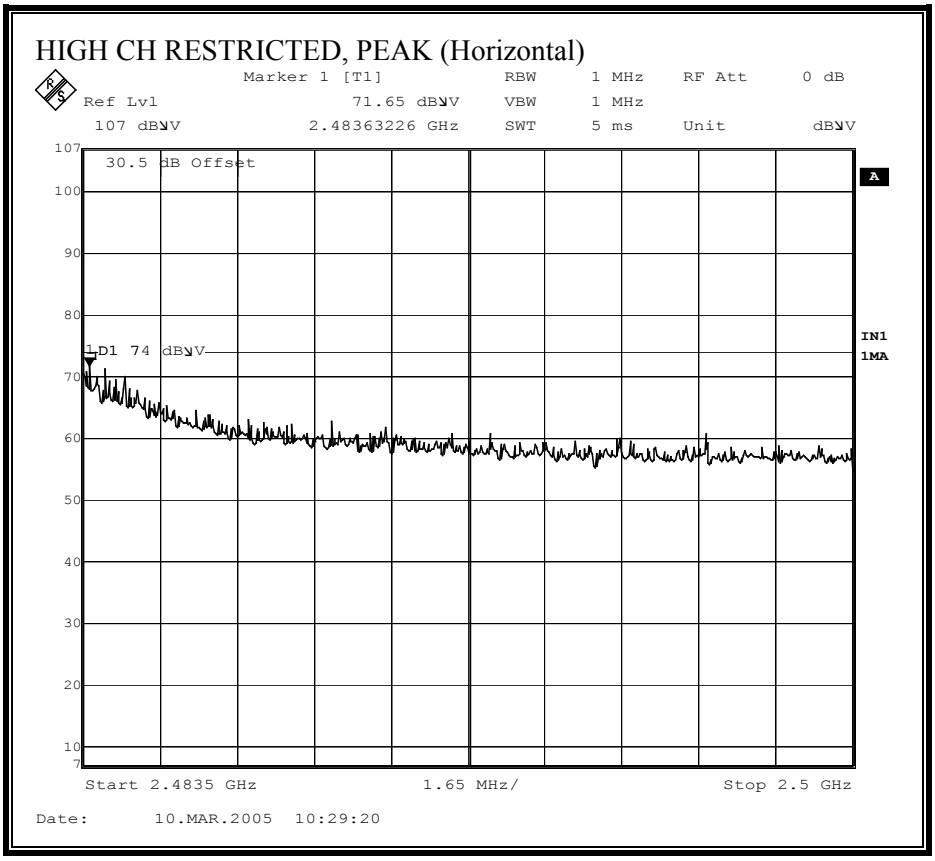


WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

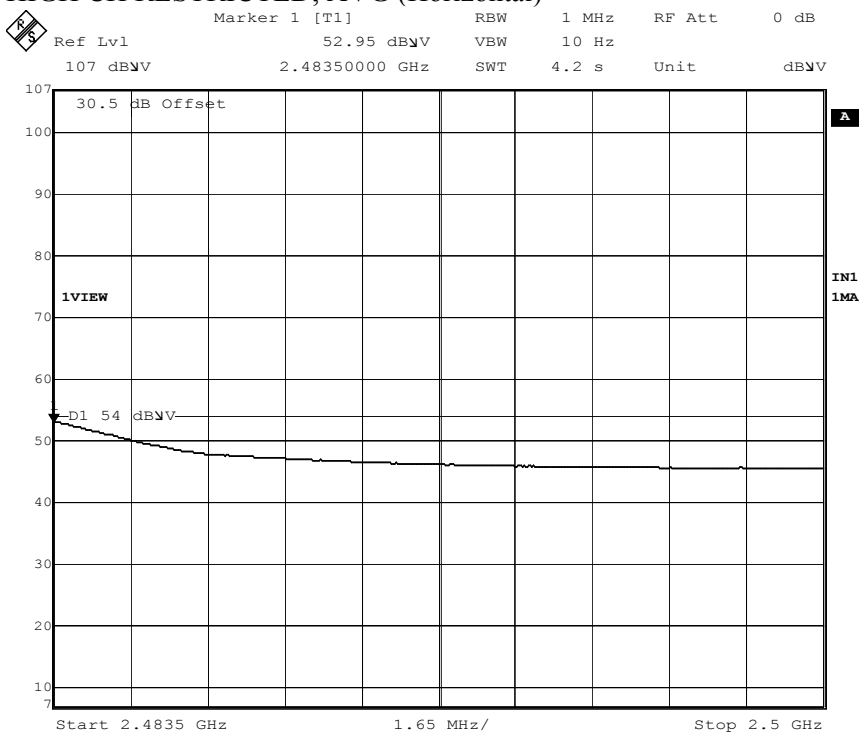




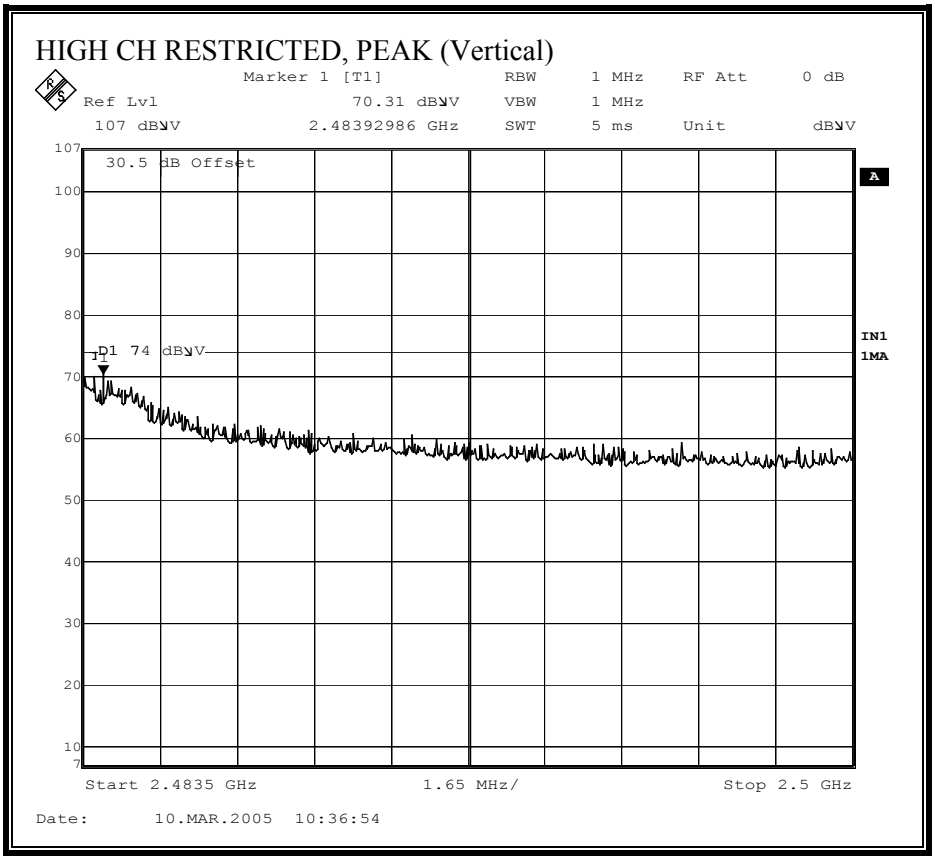
WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

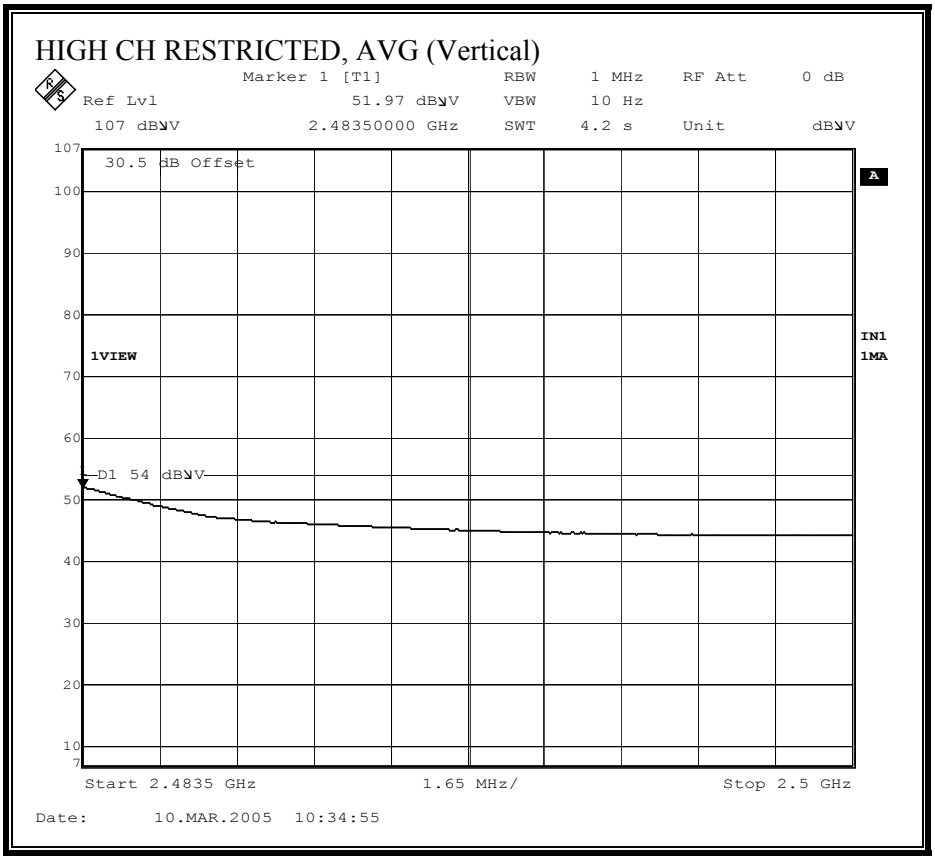


HIGH CH RESTRICTED, AVG (Horizontal)



WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





WORST-CASE HARMONICS AND SPURIOUS EMISSIONS

03/09/05 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 05U3307-1
Company: Toshiba
EUT Descrip.: 802.11b/g Half Size Mini-PCI WLAN Module with Libretto L5 Las Vegas Subnotebook
EUT M/N: MB51H w/HTL017 Ant
Test Target: FCC 15.247
Mode Oper: Colocation Bluetooth and WLAN, TX, G mode, Worst-case Channel
BC04 and WLAN
Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T34 HP 8449B			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_Chin			12_Neelesh		

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)
mid ch															
4.874	3.0	46.0	33.8	33.7	3.7	-34.2	0.0	0.0	49.3	37.1	74	54	-24.7	-16.9	V
4.881	3.0	47.5	37.4	33.7	3.7	-34.2	0.0	0.0	50.8	40.7	74	54	-23.2	-13.3	V
7.311	3.0	51.0	36.0	35.7	4.6	-33.7	0.0	0.0	57.6	42.6	74	54	-16.4	-11.4	V
4.874	3.0	46.7	33.5	33.7	3.7	-34.2	0.0	0.0	50.0	36.8	74	54	-24.0	-17.2	H
4.881	3.0	45.8	34.0	33.7	3.7	-34.2	0.0	0.0	49.1	37.3	74	54	-24.9	-16.7	V
7.311	3.0	50.0	35.4	35.7	4.6	-33.7	0.0	0.0	56.6	42.0	74	54	-17.4	-12.0	H

Note: No other emissions were detected above the system noise floor

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		

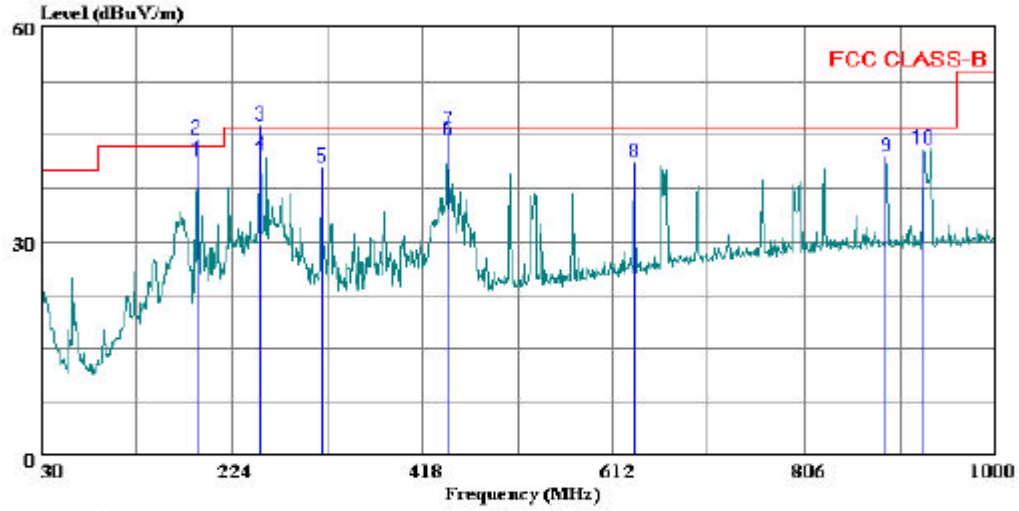
7.2.5 WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

HORIZONTAL PLOT

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

Data#: 4 File#: 3307 rad.EMI Date: 03-11-2005 Time: 09:07:42



(Audix ATC)
Trace: 1 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 05U3307-1
Company: : Toshiba
EUT: : 802.11b/g Half Size Mini-PCI WLAN Module
: with Libretto L5 Las Vegas subnotebook
Model No : TBD
Configuration: : EUT/ Toshiba Laptop
Target of Test: : FCC Class B
Mode of Operation: Tx (Worst Case)

HORIZONTAL DATA

Page: 1

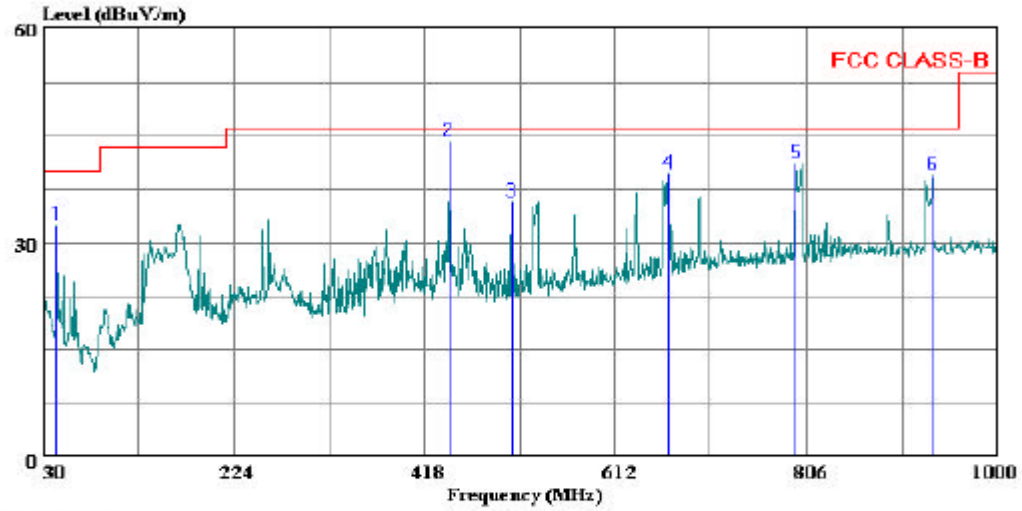
		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		189.080	56.12	-14.72	41.40	43.50	-2.10	QP
2	*	189.080	59.20	-14.72	44.48	43.50	0.98	Peak
3	*	253.100	59.90	-13.58	46.32	46.00	0.32	Peak
4		253.100	55.80	-13.62	42.18	46.00	-3.82	QP
5		316.150	51.90	-11.39	40.51	46.00	-5.49	Peak
6		444.190	52.60	-8.40	44.20	46.00	-1.80	QP
7		444.190	54.10	-8.40	45.70	46.00	-0.30	Peak
8		634.310	45.70	-4.68	41.02	46.00	-4.98	Peak
9		888.450	43.10	-1.16	41.94	46.00	-4.06	Peak
10		926.280	43.60	-0.71	42.89	46.00	-3.11	Peak

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

VERTICAL PLOT

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

Data#: 6 File#: 3307 rad.EMI Date: 03-11-2005 Time: 09:14:56



(Audix ATC)
Trace: 5 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 05U3307-1
Company: : Toshiba
EUT: : 802.11b/g Half Size Mini-PCI WLAN Module
: with Libretto L5 Las Vegas subnotebook
Model No : TBD
Configuration: : EUT/ Toshiba Laptop
Target of Test: : FCC Class B
Mode of Operation: Tx (Worst Case)

VERTICAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	43.580	47.20	-14.89	32.31	40.00	-7.69	Peak
2	443.220	52.60	-8.42	44.18	46.00	-1.82	Peak
3	507.240	42.80	-7.13	35.67	46.00	-10.33	Peak
4	666.320	43.50	-3.83	39.67	46.00	-6.33	Peak
5	794.360	43.00	-1.89	41.11	46.00	-4.89	Peak
6	934.040	40.10	-0.65	39.45	46.00	-6.55	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.

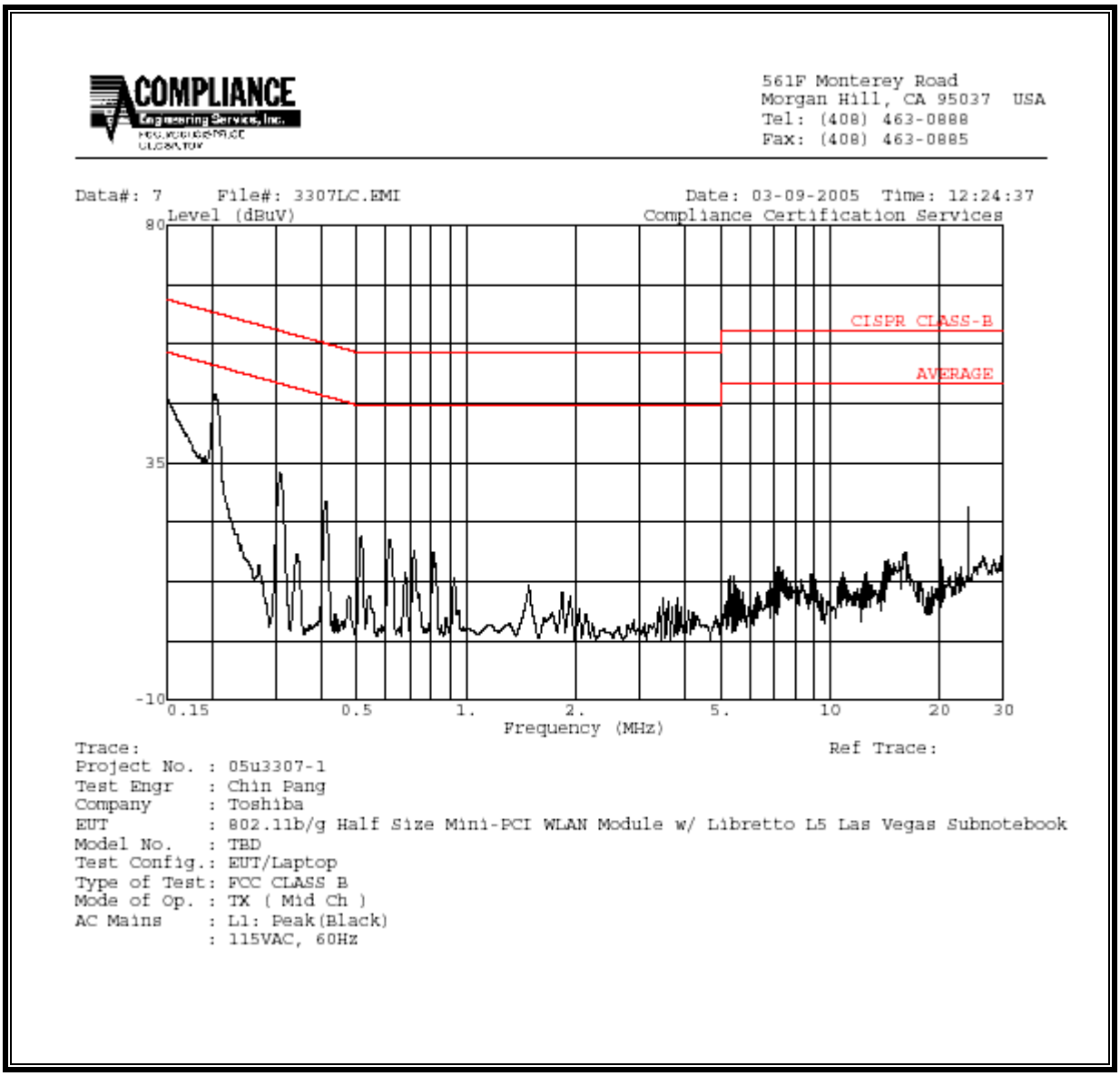
RESULTS

No non-compliance noted:

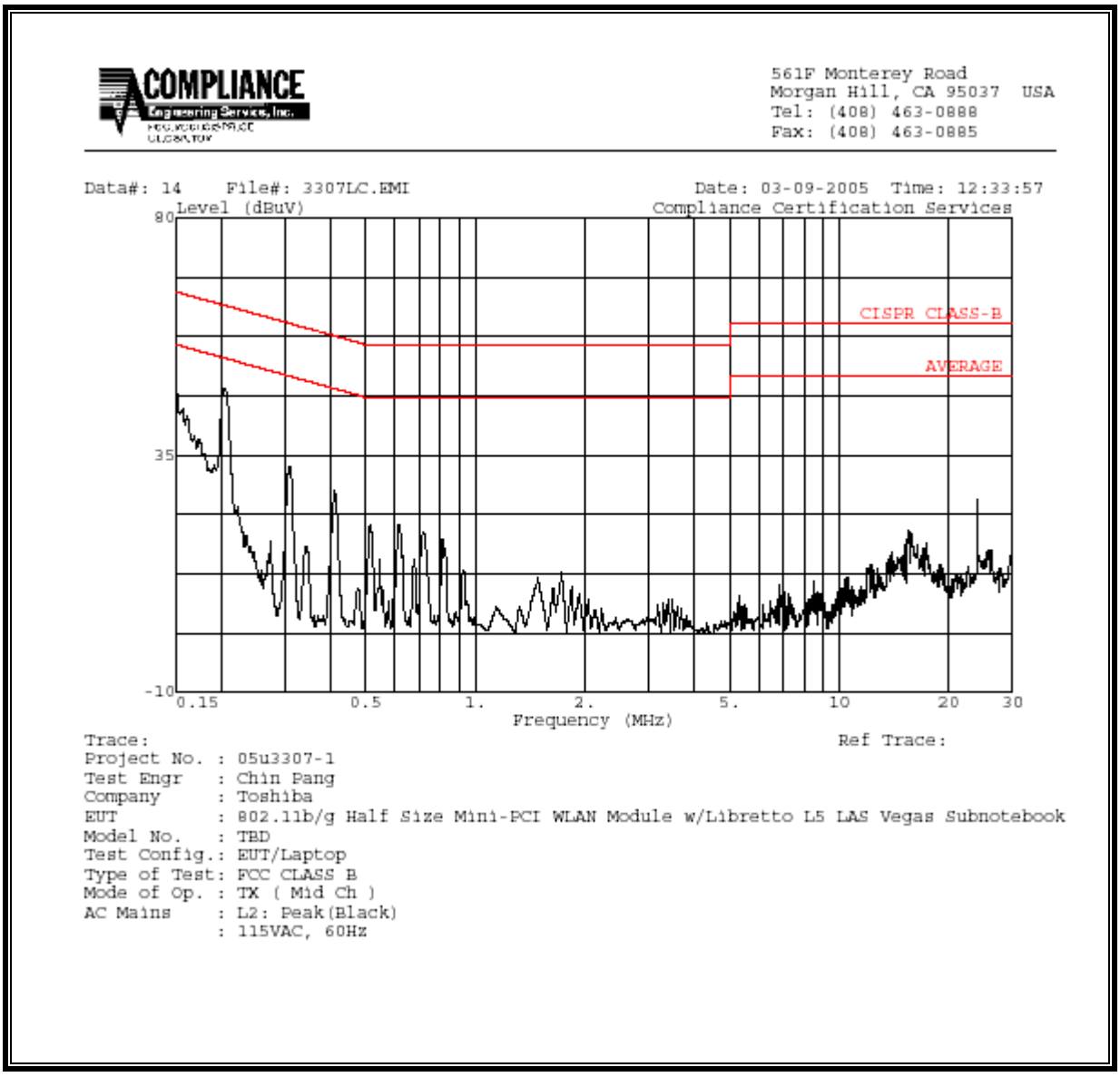
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	47.54	--	--	0.00	66.00	56.00	-18.46	-8.46	L1
0.25	47.72	--	--	0.00	61.92	51.92	-14.20	-4.20	L1
0.31	32.69	--	--	0.00	59.97	49.97	-27.28	-17.28	L1
0.15	46.50	--	--	0.00	65.89	55.89	-19.39	-9.39	L2
0.20	47.48	--	--	0.00	63.45	53.45	-15.97	-5.97	L2
0.31	32.90	--	--	0.00	59.97	49.97	-27.07	-17.07	L2
6 Worst Data									

LINE 1 RESULT



LINE 2 RESULT



8 SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

RADIATED RF MEASUREMENT SETUP FOR BELOW 1 GHz TESTING

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

RADIATED RF MEASUREMENT SETUP FOR ABOVE 1 GHz TESTING

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT