FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

Gen 3 2x3 APX miniPCI Card

MODEL NUMBER: AGN3023MX-01

FCC ID: SA3-AGN3023MX0100

REPORT NUMBER: 05U3625-1, Rev B

ISSUE DATE: OCTOBER 17, 2005

Prepared for
AIRGO NETWORKS, INC.
900 ARASTRADERO ROAD
PALO ALTO, CA, 94304, USA

Prepared by
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LAB CODE:200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
A	9/8/05	Initial Issue	DG
A1	9/27/05	Changed EUT description	DZ
B	10/17/05	Added channel bonding test result under Section 7.2	JC

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: AIRGO NETWORKS, INC.
900 ARASTRADERO ROAD
PALO ALTO, CA 94304, USA

EUT DESCRIPTION: Gen 3 2x3 APX miniPCI Card

MODEL: AGN3023MX-01

SERIAL NUMBER: 280

DATE TESTED: AUGUST 15 – OCTOBER 14, 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:

DAVID GARCIA
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

JOSEPH CHUNG
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 802.11 b/g Gen 3 2x3 MIMO APX transceiver.

The radio module is manufactured by Airgo Networks, Inc.

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)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	21.08	128.23
2412 - 2462	802.11g	23.11	204.64
2412 - 2462	802.11g CB	18.89	77.45
2422 - 2452	802.11g SIMO CB	19.24	83.95

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two dual band monopole antennas for diversity, each with a maximum gain of 2.0 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was PTT debug 2.0.0.233.

The driver used during testing was 2.0.0.233.

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 2437 MHz.

The worst-case data rate for this channel is determined to be 6 Mb/s, based on previous experience with 2.4 GHz WLAN product design architectures.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	SONY	PCG-991L	4-658-376-11	DOC
AC Adapter	SONY	PCGA-AC19V3	0204 A 000156	N/A

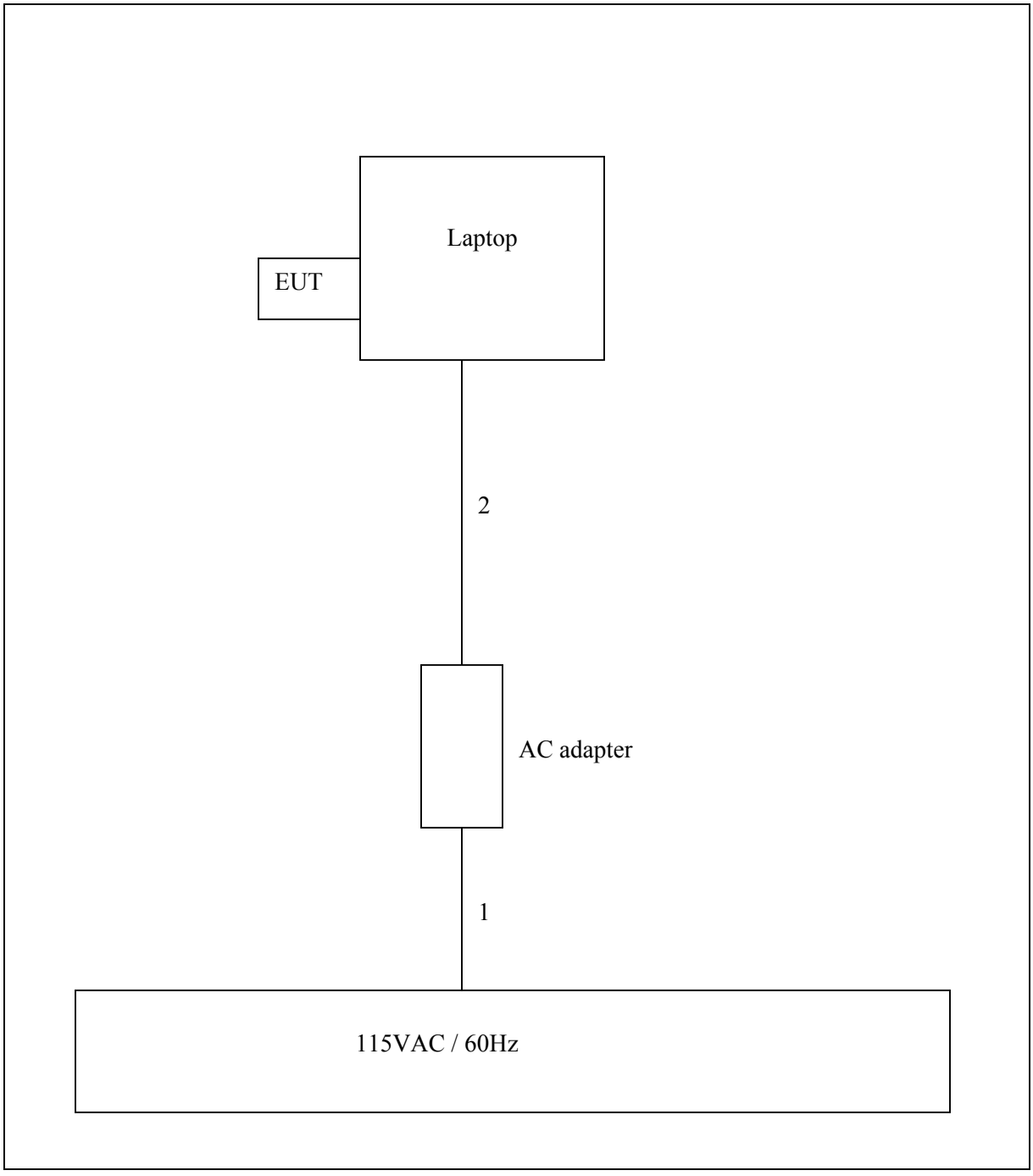
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	Unshielded	0.5 m	
2	DC	1	DC	Unshielded	1.5 m	

TEST SETUP

The EUT is installed in a host laptop computer via a cardbus-to-miniPCI adapter / extension board 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 Receiver, 9 kHz ~ 2.9 GHz	**HP**	**8542E**	**3942A00286**	**3/29/2006**
RF Filter Section	**HP**	**85420E**	**3705A00256**	**3/29/2006**
Antenna, Bilog 30MHz ~ 2Ghz	**Sunol Sciences**	**JB1**	**A121003**	**3/3/2006**
Spectrum Analyzer 3 Hz ~ 44 GHz	**Agilent**	**E4446A**	**MY43360112**	**3/28/2006**
Antenna, Horn 1 ~ 18 GHz	**ETS**	**3117**	**29301**	**4/22/2006**
Preamplifier, 1 ~ 26 GHz	**Miteq**	**NSP2600-SP**	**924341**	**12/23/2005**
Peak / Average Power Sensor	**Agilent**	**E9327A**	**US40440755**	**2/10/2006**
Peak Power Meter	**Agilent**	**E4416A**	**GB41291160**	**2/9/2006**
ESA-E Series Spectrum Analyzer	**Agilent**	**E4407B**	**MY44210488**	**4/20/2006**
LISN, 10 kHz ~ 30 MHz	**FCC**	**LISN-50/250-25-2**	**2023**	**8/30/2006**
LISN, 10 kHz ~ 30 MHz	**Solar**	**8012-50-R-24-BNC**	**8379443**	**8/30/2006**
Site A Line Stabilizer/Conditioner	**Tripplite**	**LC-1800a**	**A005181**	**CNR**
EMI Test Receiver	**R & S**	**ESHS 20**	**827129/006**	**6/3/2006**
4.0 GHz High Pass Filter	**Micro Tronics**	**HPM13351**	**3**	**CNR**
1.5 GHz High Pass Filter	**Micro Tronics**	**HPM13193**	**2**	**CNR**

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, chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	12000	500	11500
Middle	2437	12830	500	12330
High	2462	12330	500	11830

802.11g Mode, chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	16250	500	15750
Middle	2437	16170	500	15670
High	2462	16170	500	15670

802.11b Mode, chain 1

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	12170	500	11670
Middle	2437	12670	500	12170
High	2462	12250	500	11750

802.11g Mode, chain 1

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	15830	500	15330
Middle	2437	16250	500	15750
High	2462	16170	500	15670

802.11g CHANNEL BOND Mode, Chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	14250	500	13750
High	2462	14500	500	14000

802.11g SIMO CHANNEL BOND Mode, Chain 0

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2422	30330	500	29830
High	2452	30220	500	29720

802.11g CHANNEL BOND Mode, Chain 1

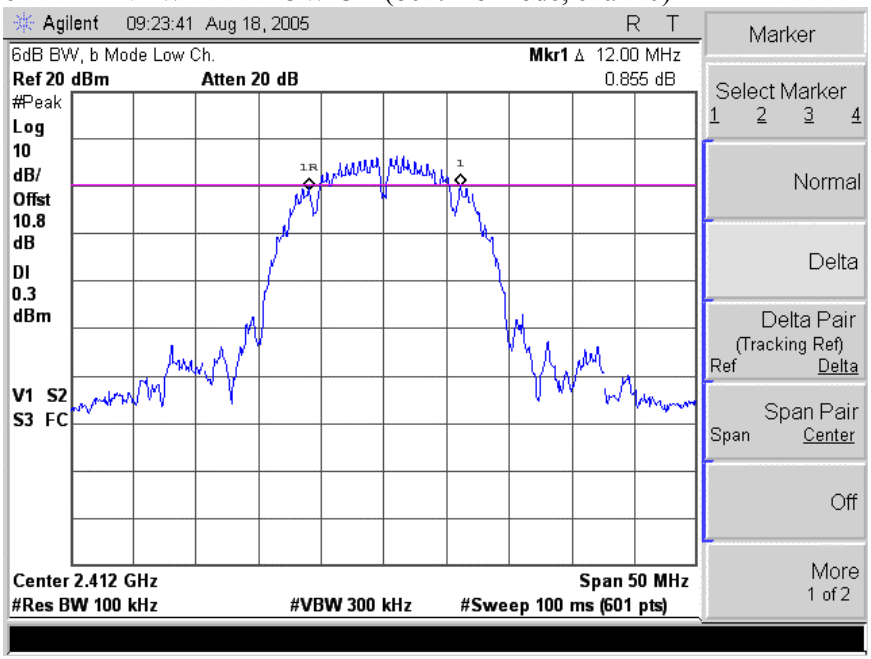
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	14000	500	13500
High	2462	15250	500	14750

802.11g SIMO CHANNEL BOND Mode, Chain 1

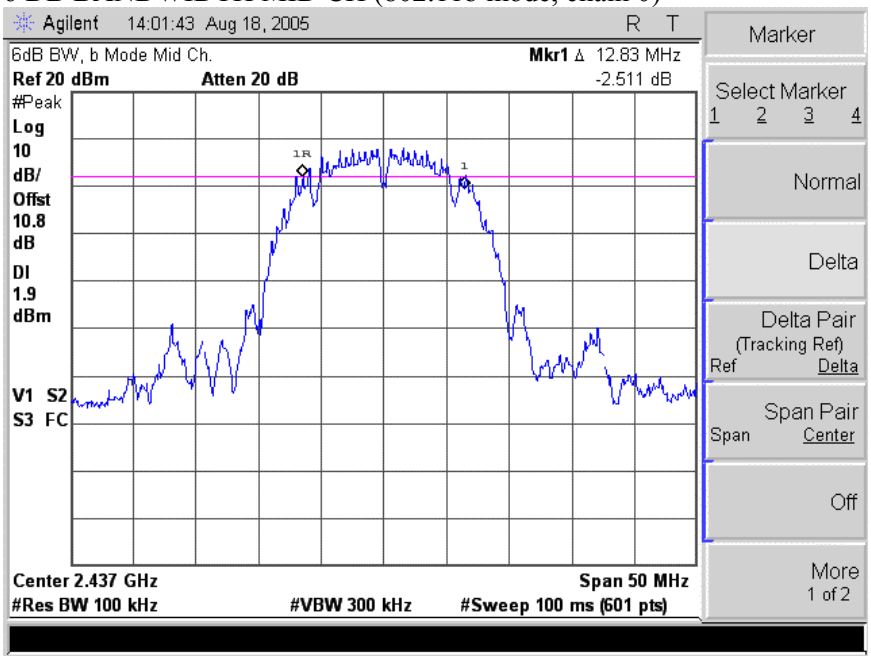
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2422	30570	500	30070
High	2452	28350	500	27850

6 DB BANDWIDTH (802.11b MODE, CHAIN 0)

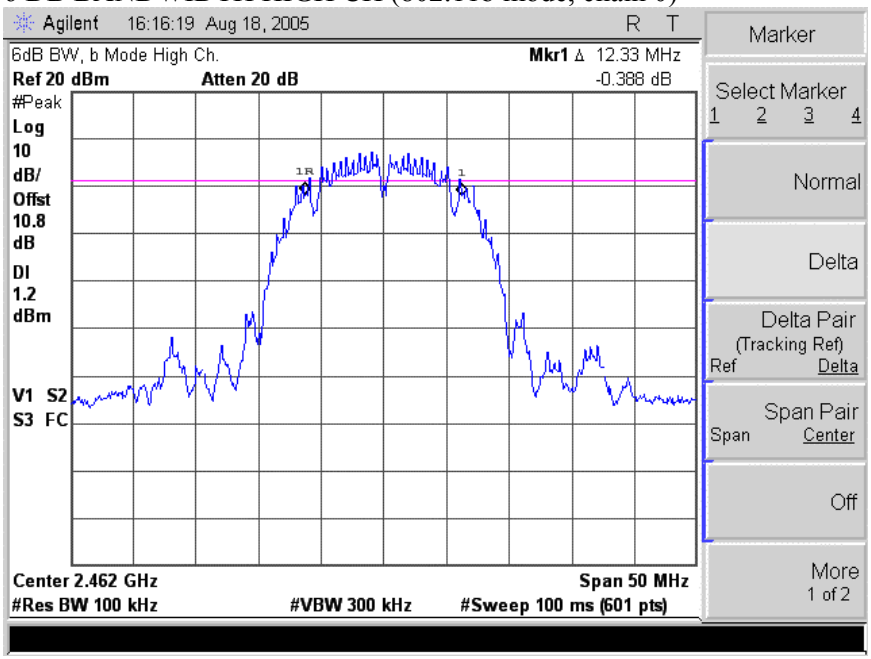
6 DB BANDWIDTH LOW CH (802.11b mode, chain 0)



6 DB BANDWIDTH MID CH (802.11b mode, chain 0)

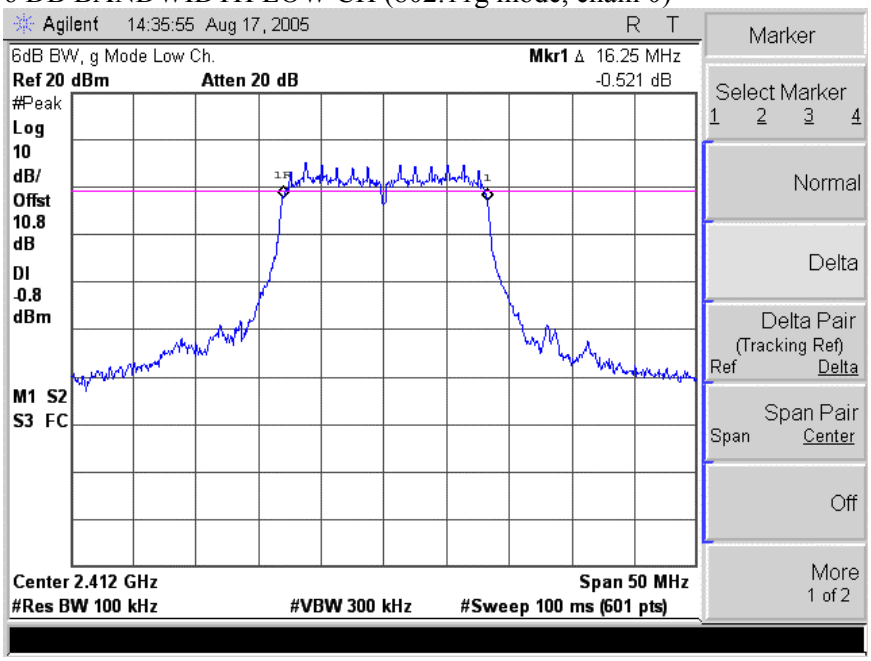


6 DB BANDWIDTH HIGH CH (802.11b mode, chain 0)

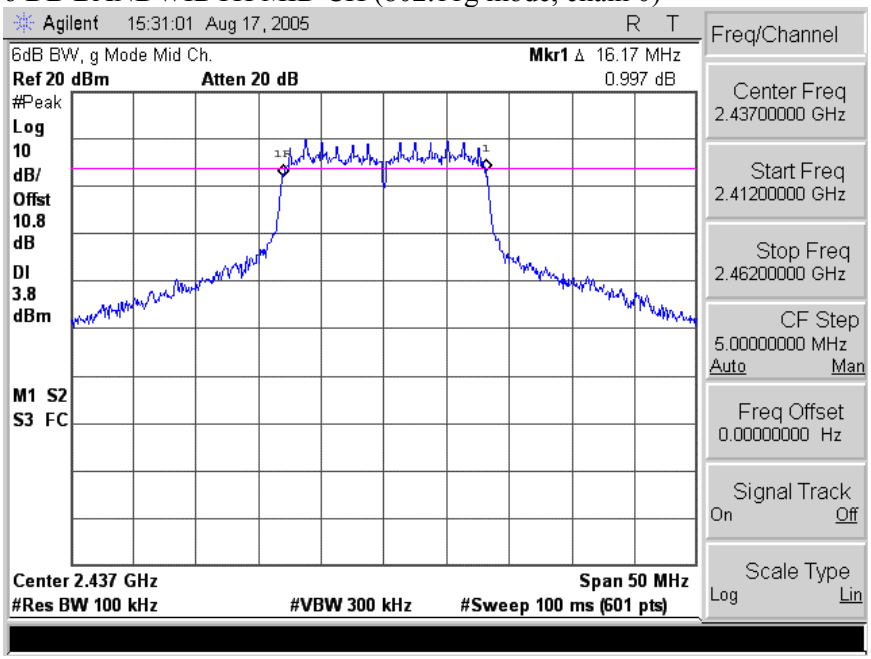


6 DB BANDWIDTH (802.11g MODE, CHAIN 0)

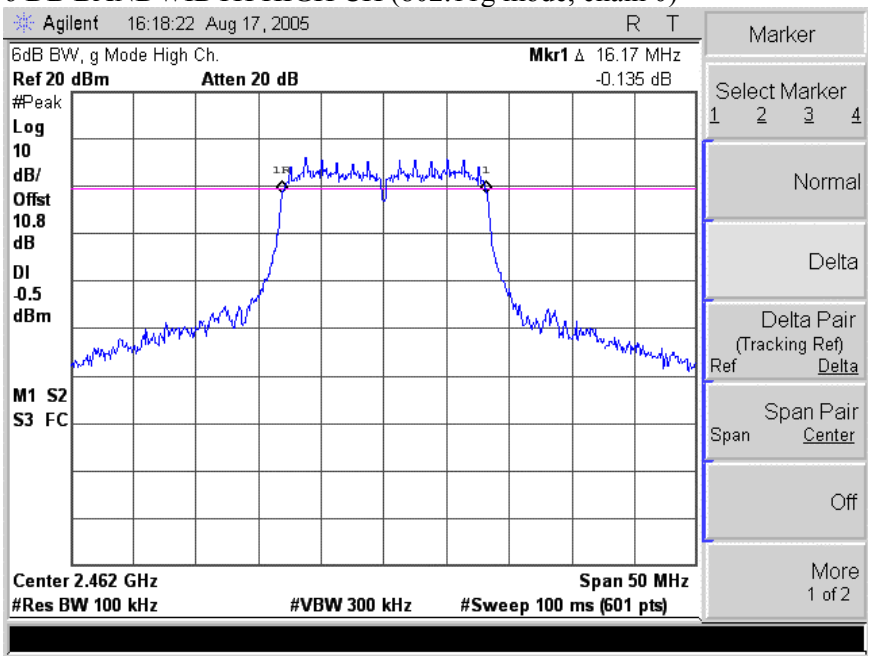
6 DB BANDWIDTH LOW CH (802.11g mode, chain 0)



6 DB BANDWIDTH MID CH (802.11g mode, chain 0)

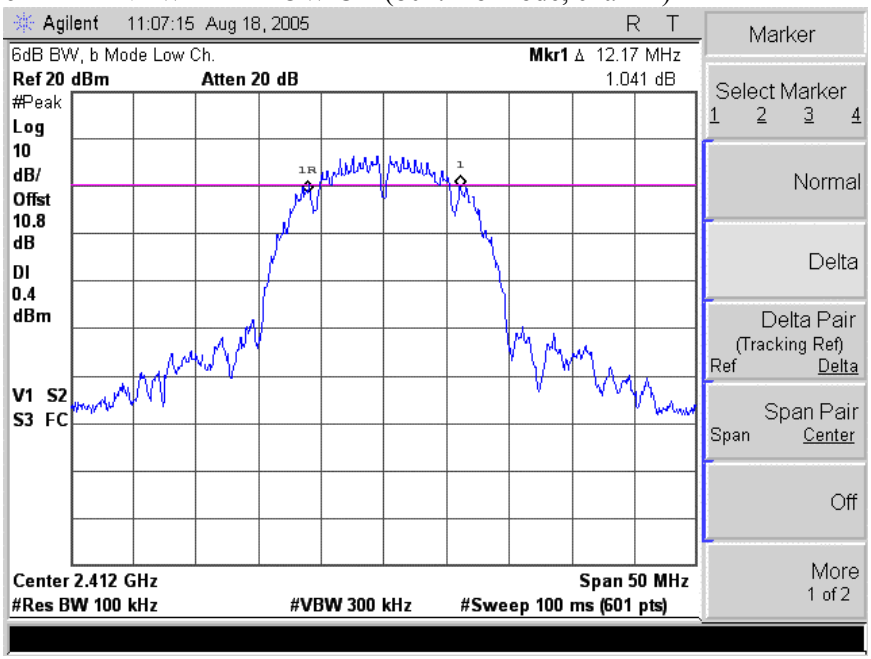


6 DB BANDWIDTH HIGH CH (802.11g mode, chain 0)

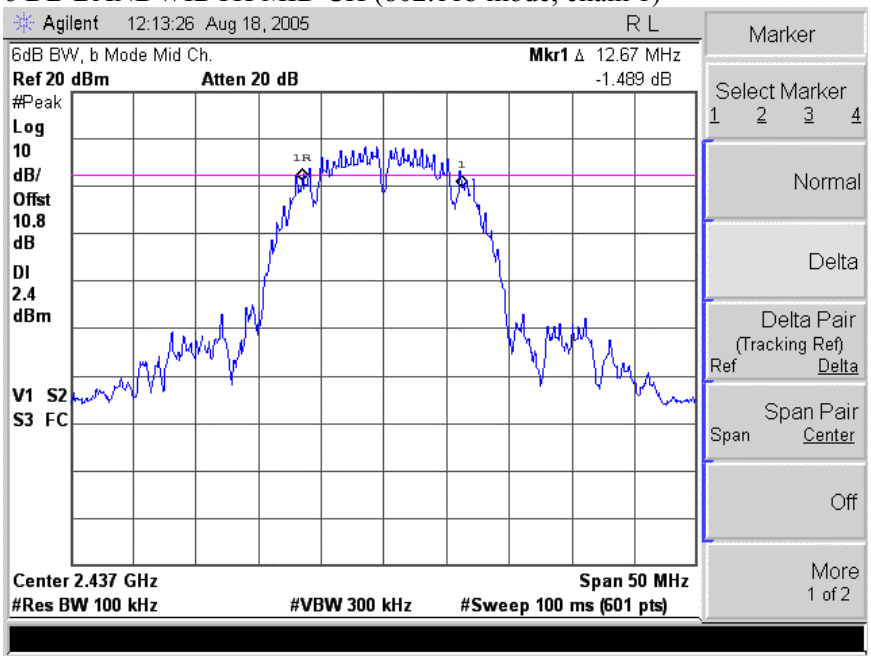


6 DB BANDWIDTH (802.11b MODE, CHAIN 1)

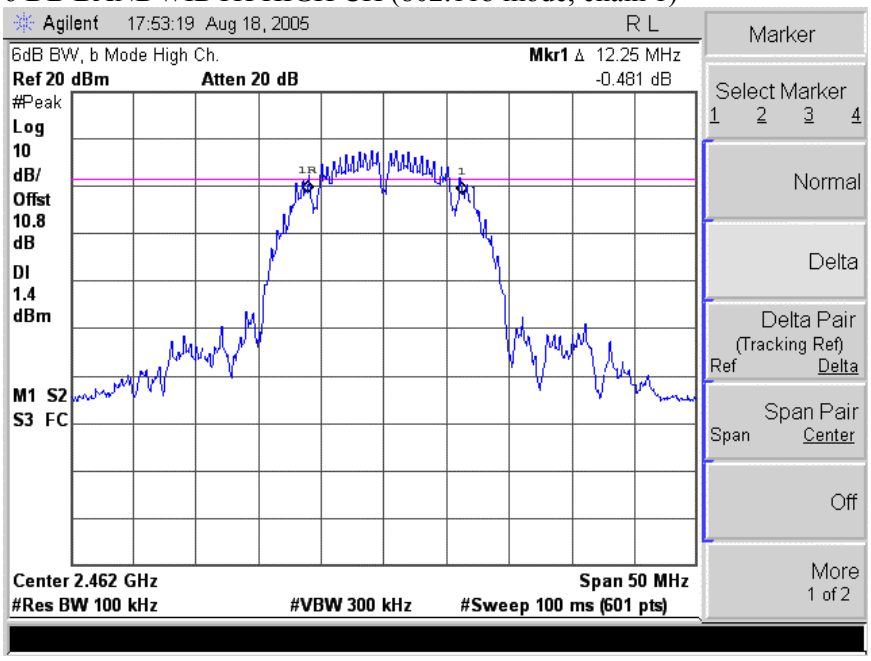
6 DB BANDWIDTH LOW CH (802.11b mode, chain 1)



6 DB BANDWIDTH MID CH (802.11b mode, chain 1)

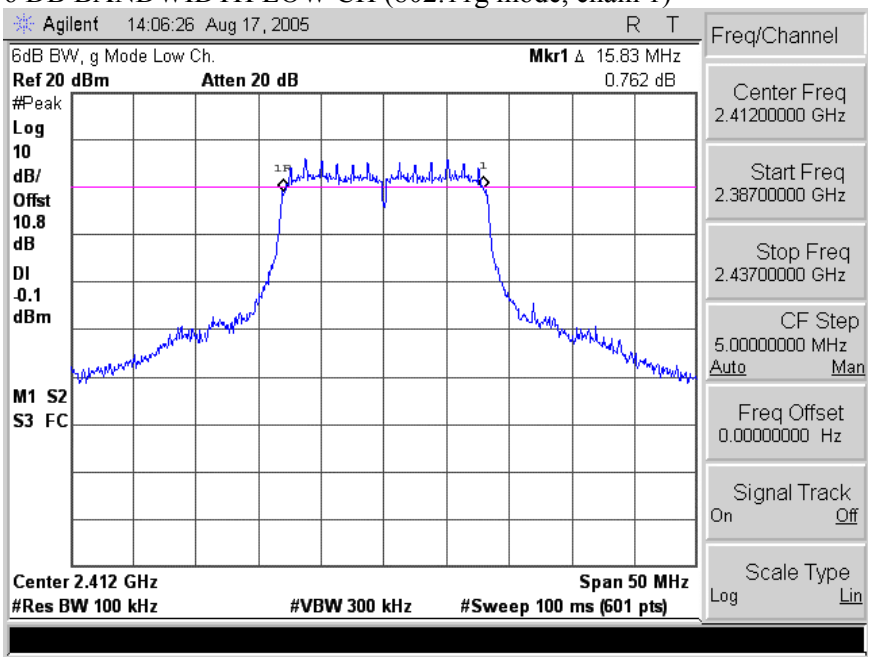


6 DB BANDWIDTH HIGH CH (802.11b mode, chain 1)

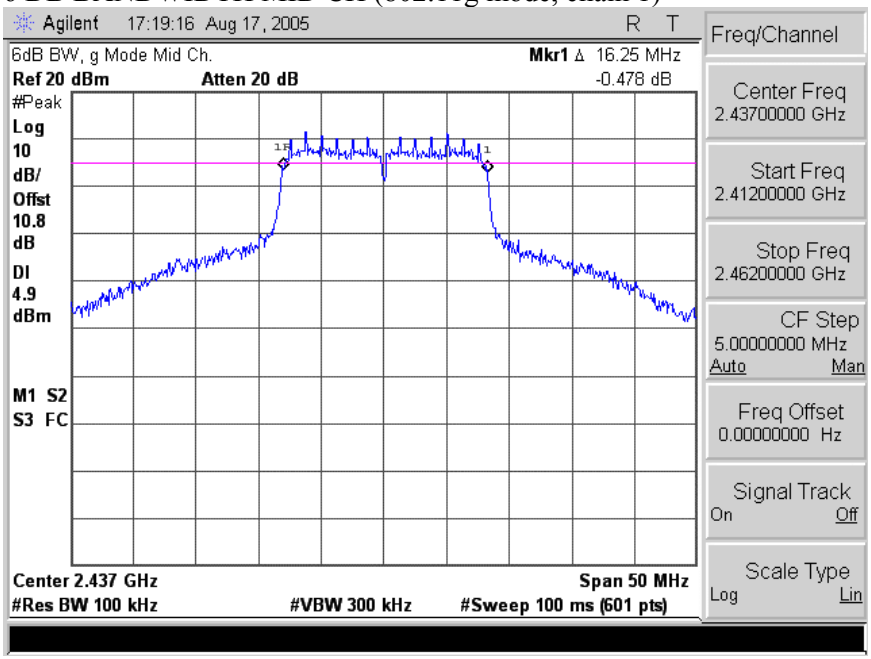


6 DB BANDWIDTH (802.11g MODE, CHAIN 1)

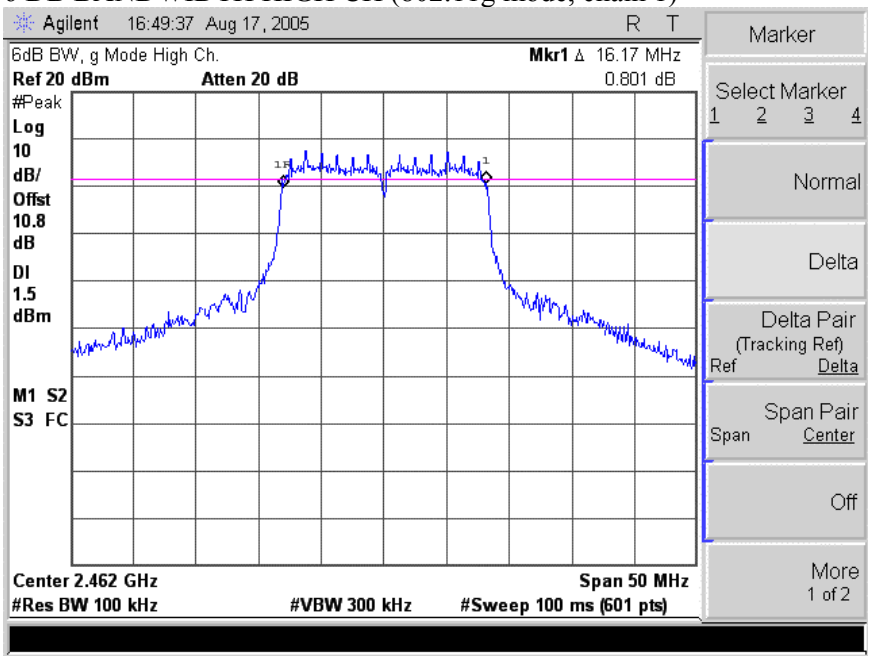
6 DB BANDWIDTH LOW CH (802.11g mode, chain 1)



6 DB BANDWIDTH MID CH (802.11g mode, chain 1)



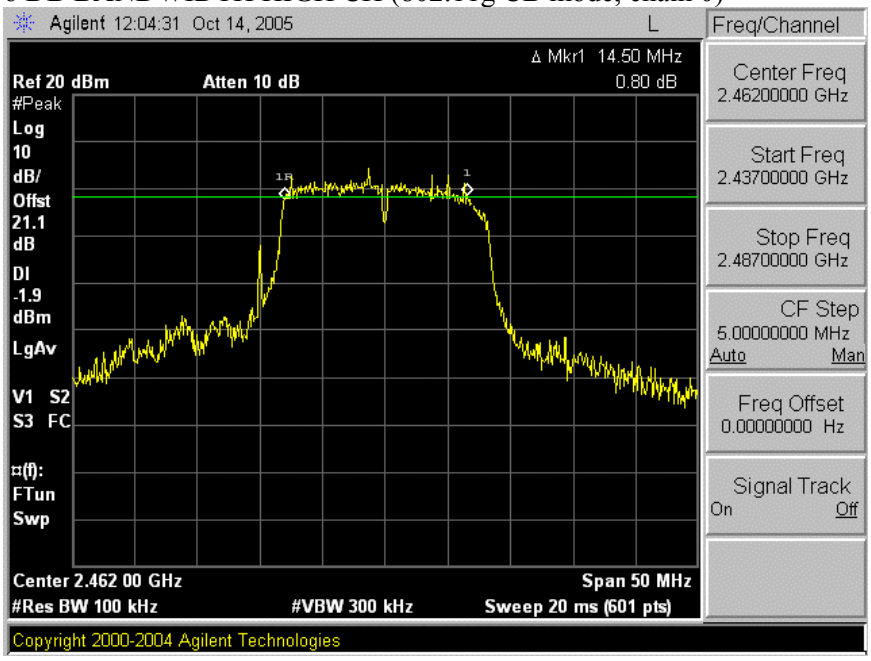
6 DB BANDWIDTH HIGH CH (802.11g mode, chain 1)



6 DB BANDWIDTH (802.11g CHANNEL BONDING MODE, CHAIN 0)

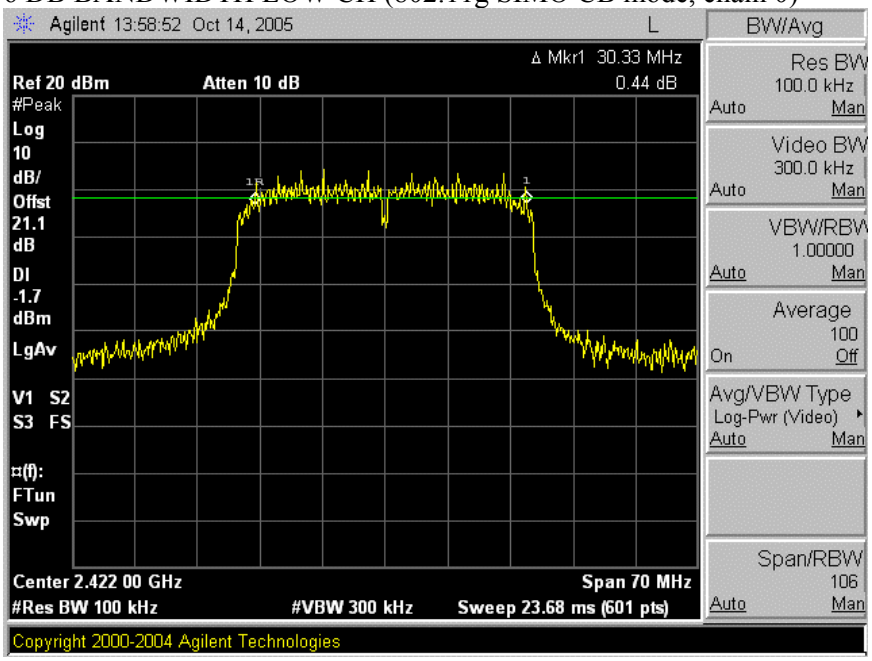
6 DB BANDWIDTH LOW CH (802.11g CB mode, chain 0)

6 DB BANDWIDTH HIGH CH (802.11g CB mode, chain 0)

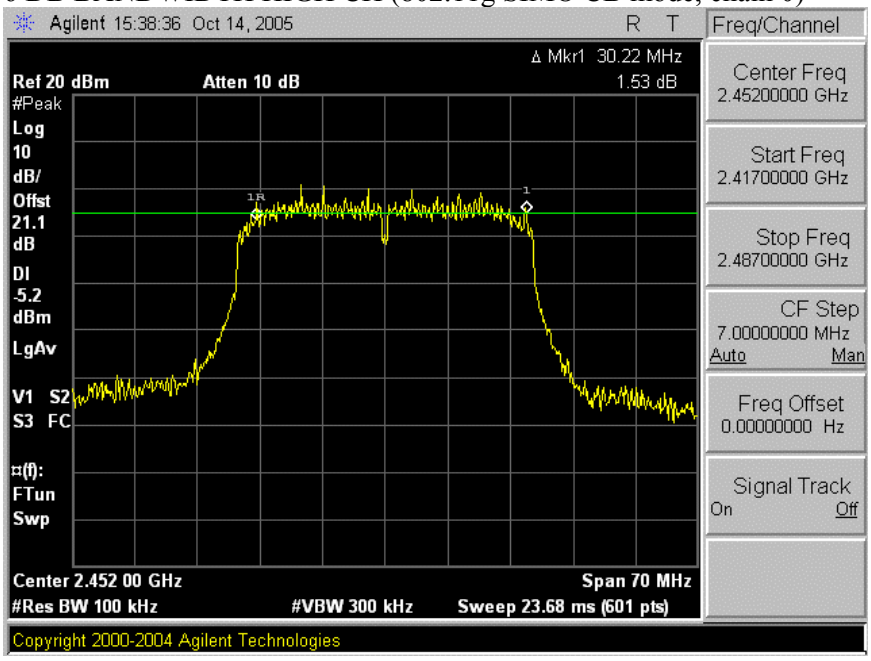


6 DB BANDWIDTH (802.11g SIMO CHANNEL BONDING MODE, CHAIN 0)

6 DB BANDWIDTH LOW CH (802.11g SIMO CB mode, chain 0)



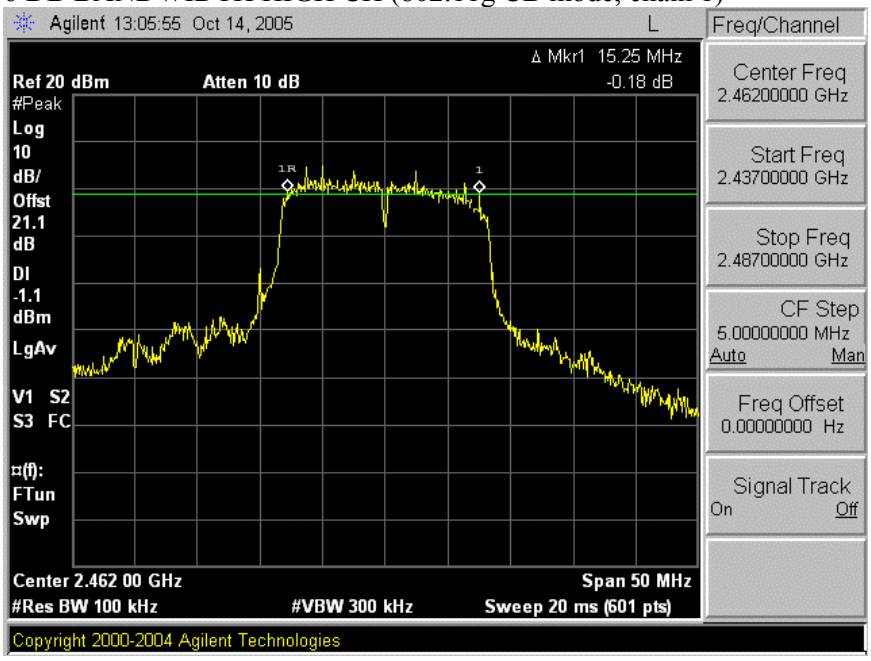
6 DB BANDWIDTH HIGH CH (802.11g SIMO CB mode, chain 0)



6 DB BANDWIDTH (802.11g CHANNEL BONDING MODE, CHAIN 1)

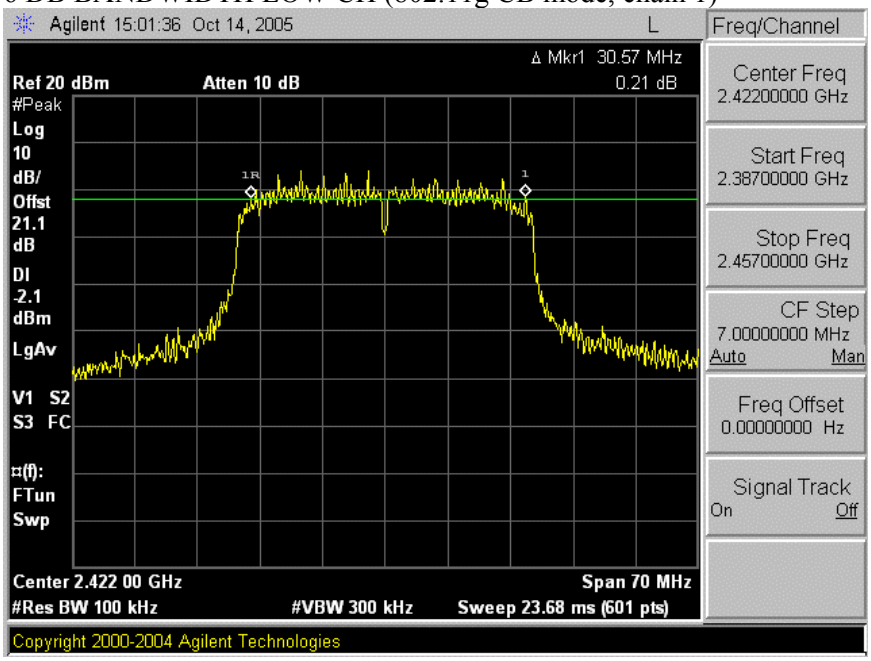
6 DB BANDWIDTH LOW CH (802.11g CB mode, chain 1)

6 DB BANDWIDTH HIGH CH (802.11g CB mode, chain 1)

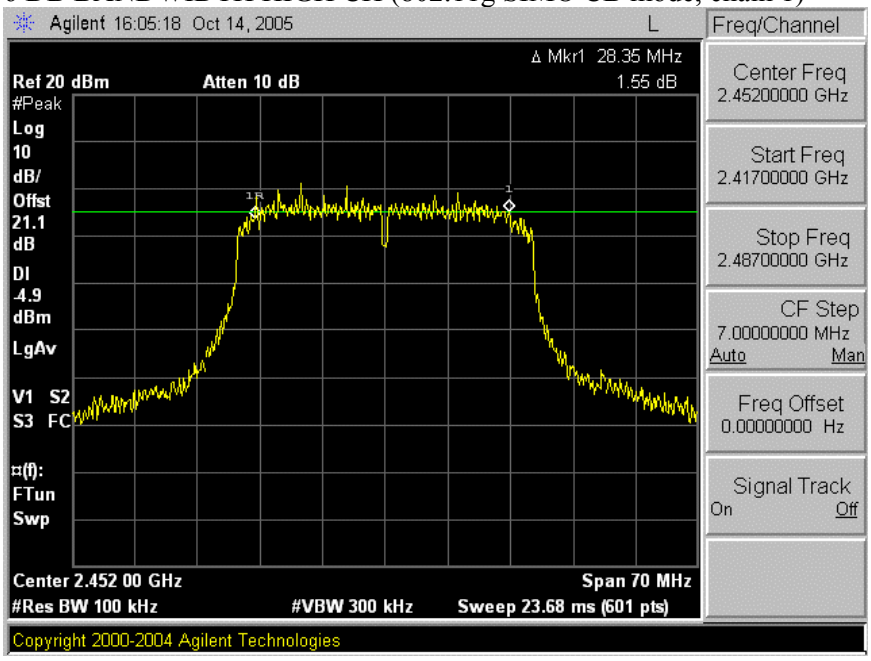


6 DB BANDWIDTH (802.11g SIMO CHANNEL BONDING MODE, CHAIN 1)

6 DB BANDWIDTH LOW CH (802.11g CB mode, chain 1)



6 DB BANDWIDTH HIGH CH (802.11g SIMO CB mode, chain 1)



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, Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.130
Middle	2437	15.127
High	2462	15.040

802.11g Mode, Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.335
Middle	2437	16.429
High	2462	16.329

802.11b Mode, Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.117
Middle	2437	15.122
High	2462	15.100

802.11g Mode, Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.285
Middle	2437	16.638
High	2462	16.326

802.11g CHANNEL BOND Mode, Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.216
High	2462	16.265

802.11g SIMO CHANNEL BOND Mode, Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	32.154
High	2452	32.005

802.11g CHANNEL BOND Mode, Chain 1

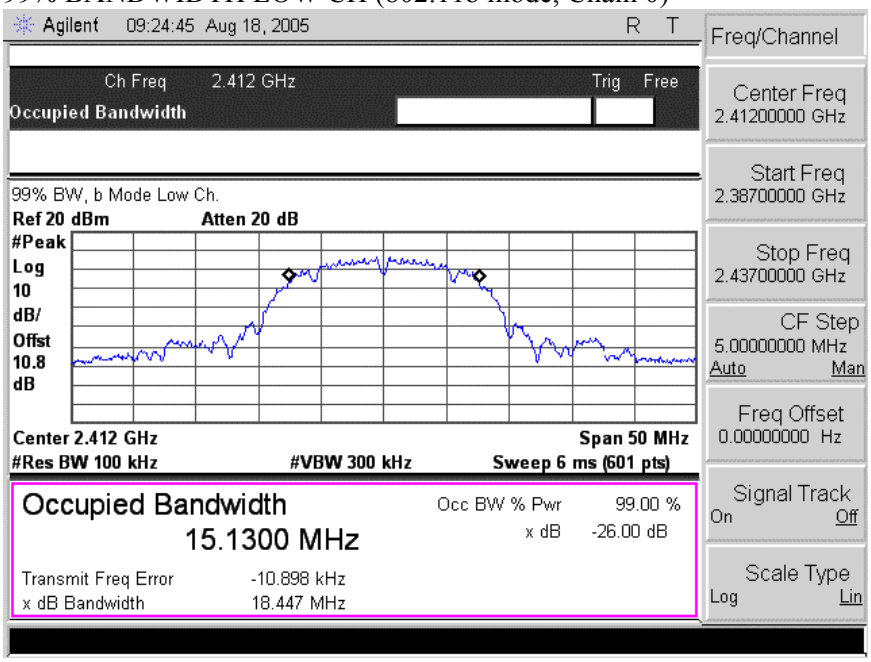
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.154
High	2462	16.160

802.11g SIMO CHANNEL BOND Mode, Chain 1

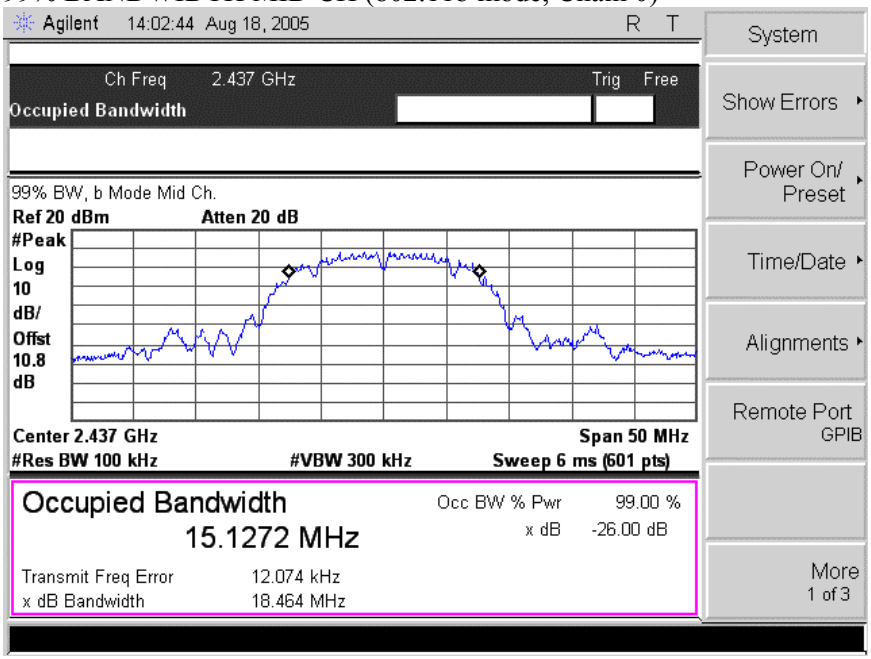
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	32.105
High	2452	32.046

99% BANDWIDTH (802.11b MODE, CHAIN 0)

99% BANDWIDTH LOW CH (802.11b mode, Chain 0)



99% BANDWIDTH MID CH (802.11b mode, Chain 0)



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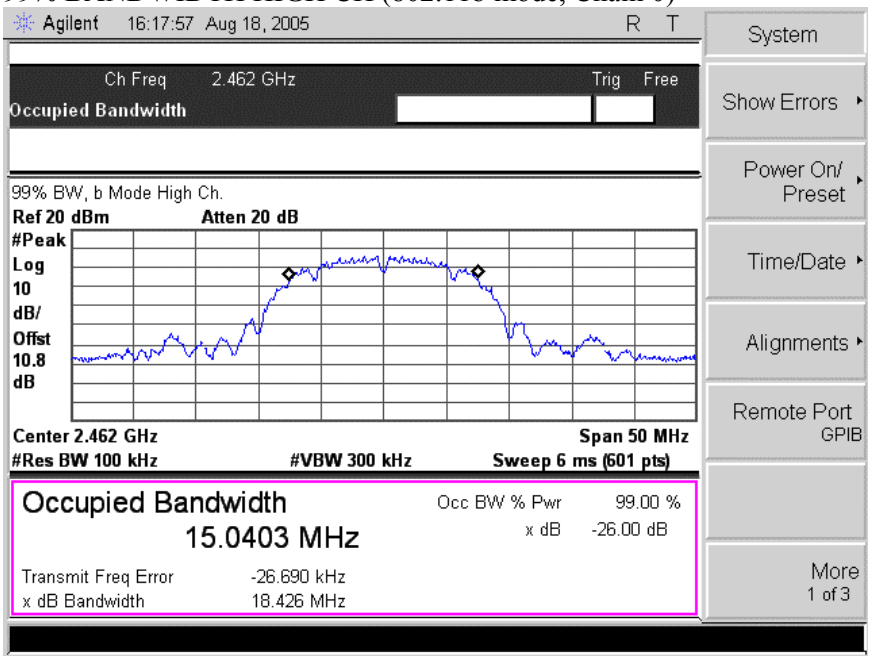
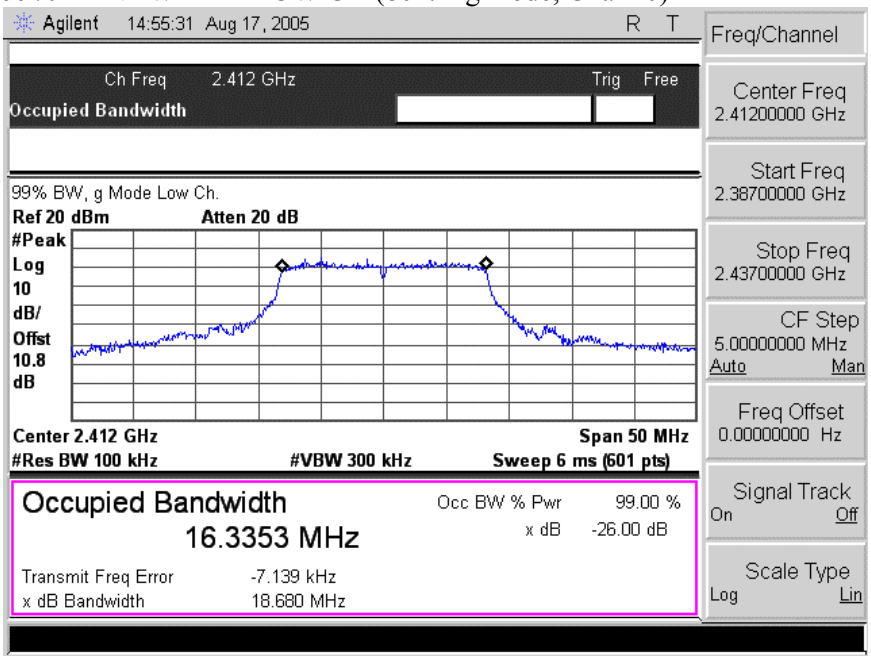
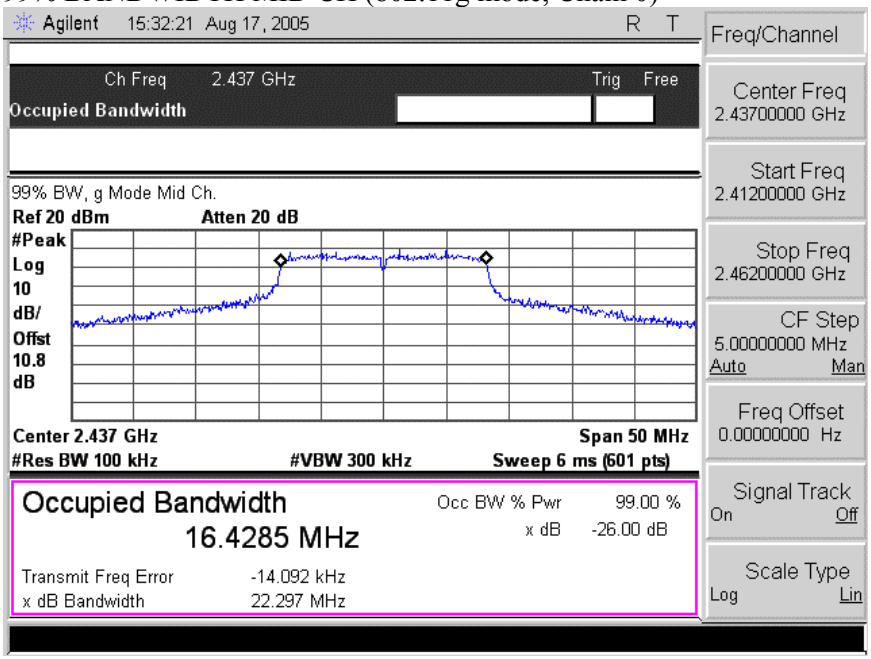


99% BANDWIDTH (802.11g MODE, CHAIN 0)

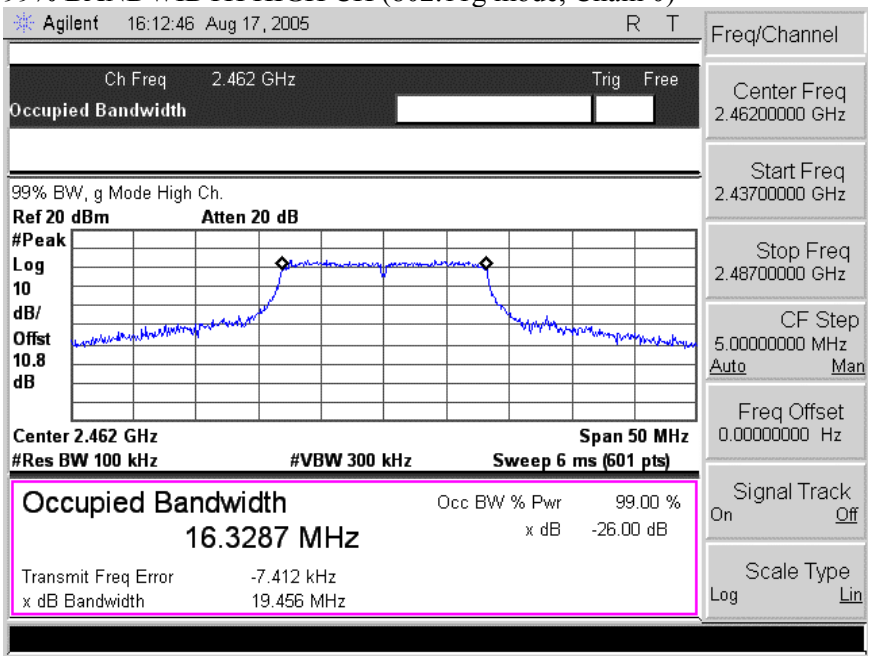
99% BANDWIDTH LOW CH (802.11g mode, Chain 0)



99% BANDWIDTH MID CH (802.11g mode, Chain 0)

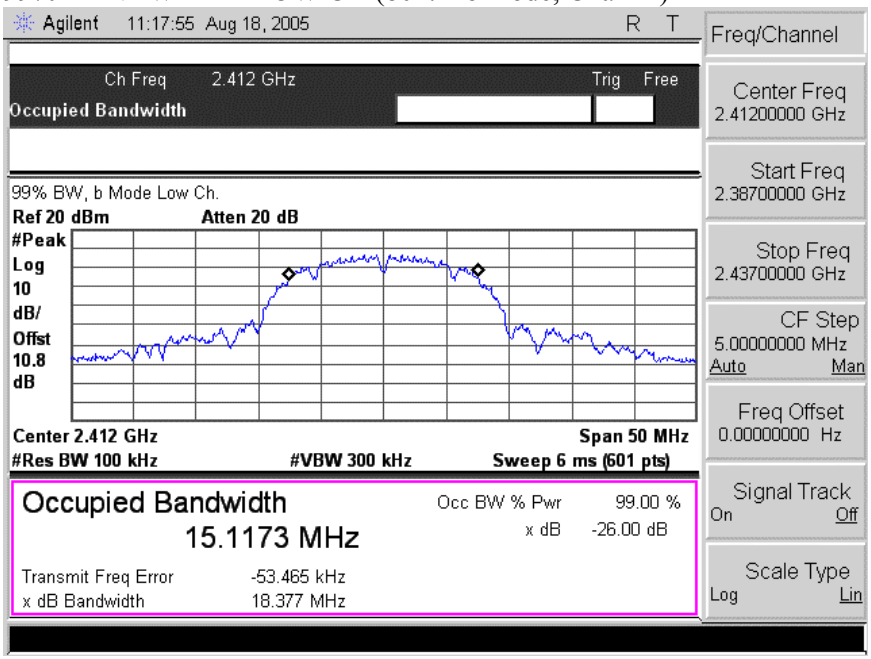


99% BANDWIDTH HIGH CH (802.11g mode, Chain 0)

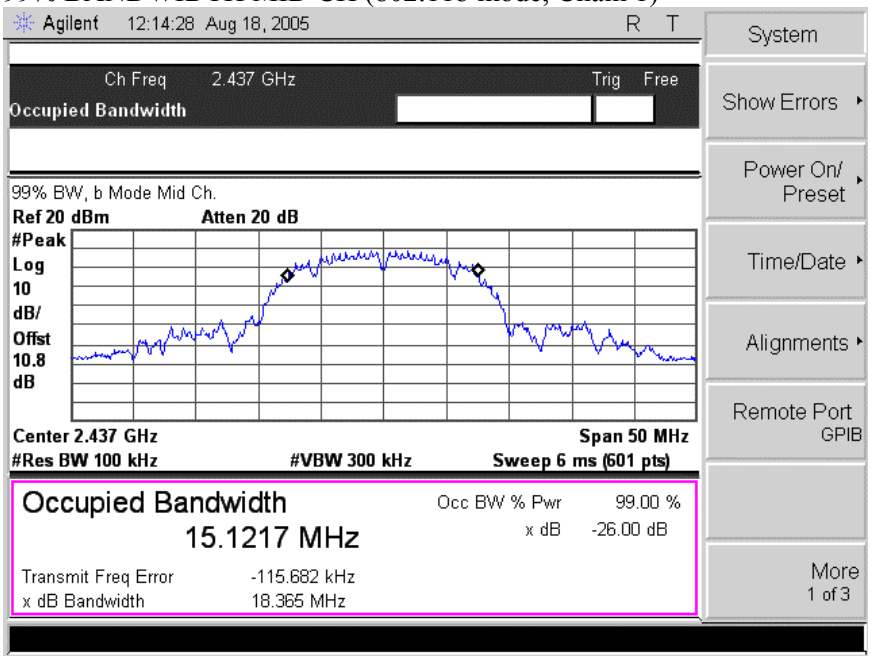


99% BANDWIDTH (802.11b MODE, CHAIN 1)

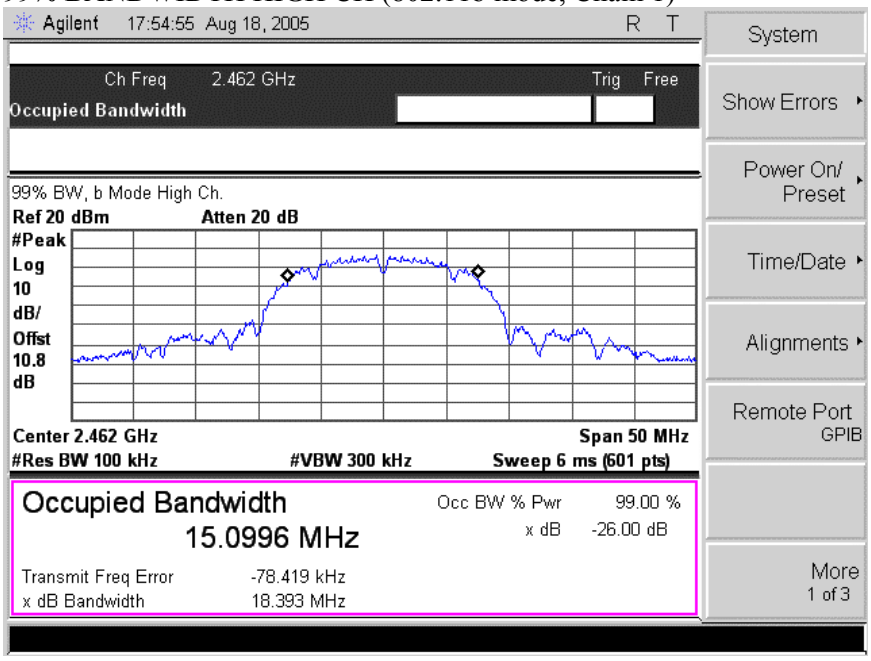
99% BANDWIDTH LOW CH (802.11b mode, Chain 1)



99% BANDWIDTH MID CH (802.11b mode, Chain 1)

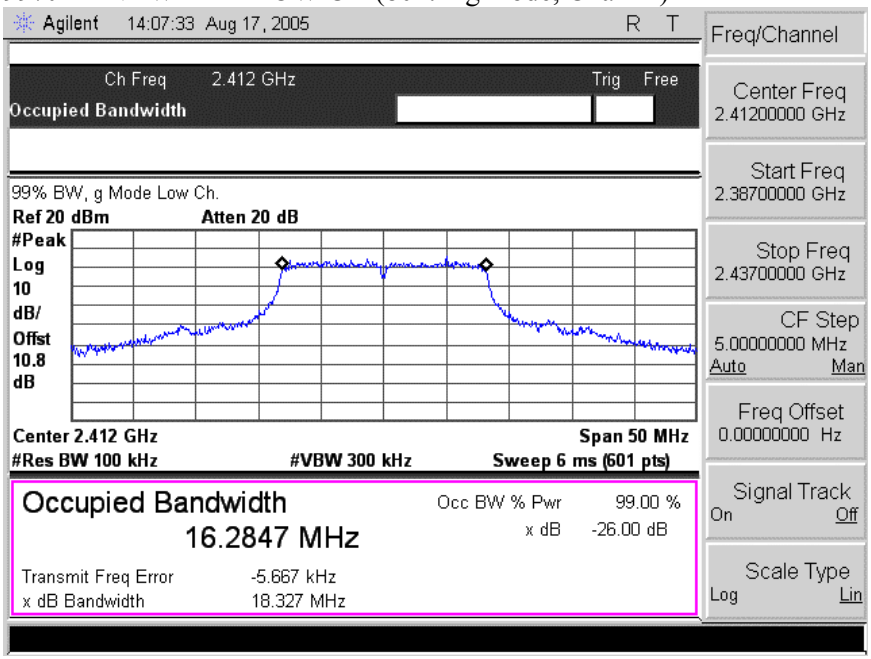


99% BANDWIDTH HIGH CH (802.11b mode, Chain 1)

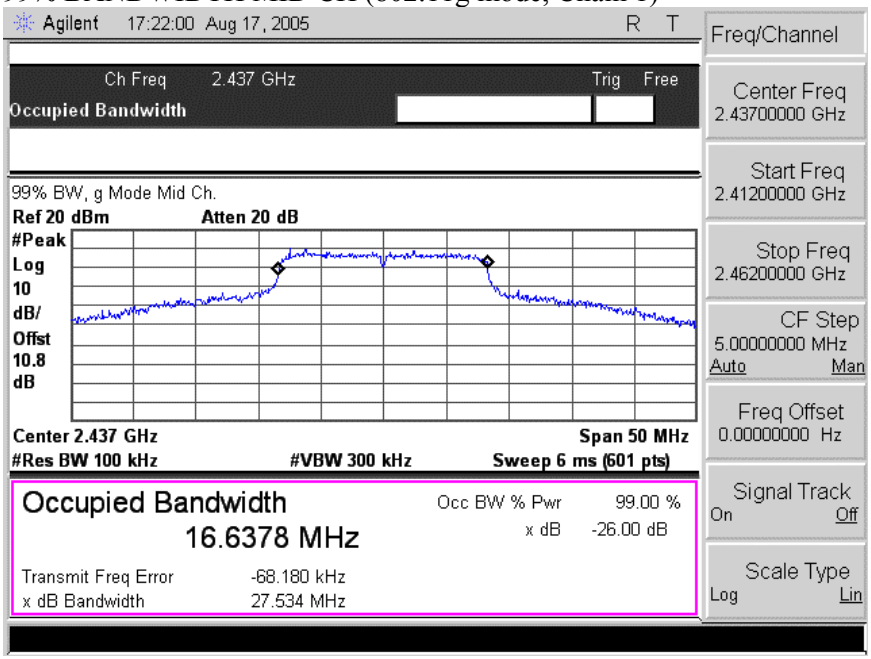


99% BANDWIDTH (802.11g MODE, CHAIN 1)

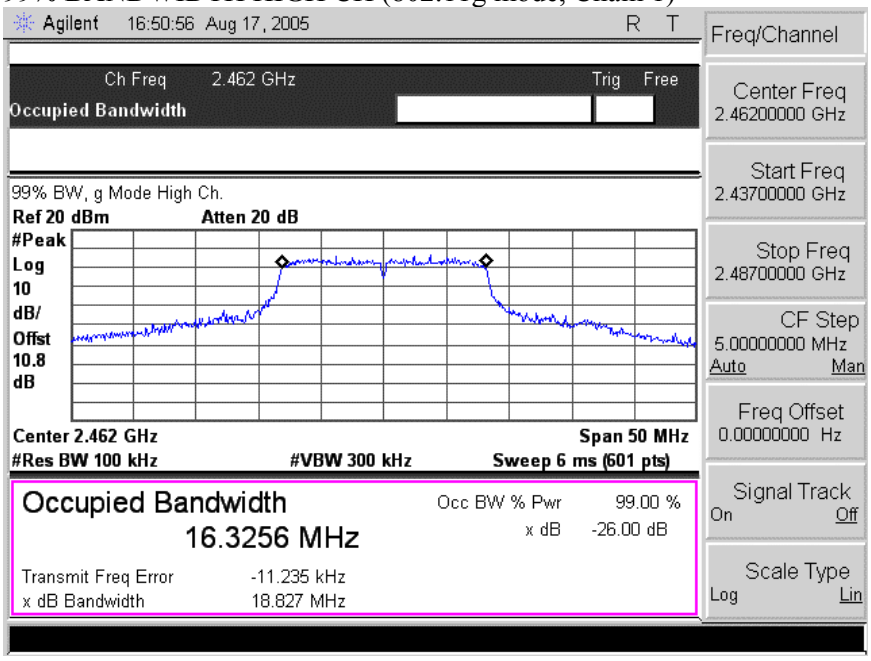
99% BANDWIDTH LOW CH (802.11g mode, Chain 1)



99% BANDWIDTH MID CH (802.11g mode, Chain 1)

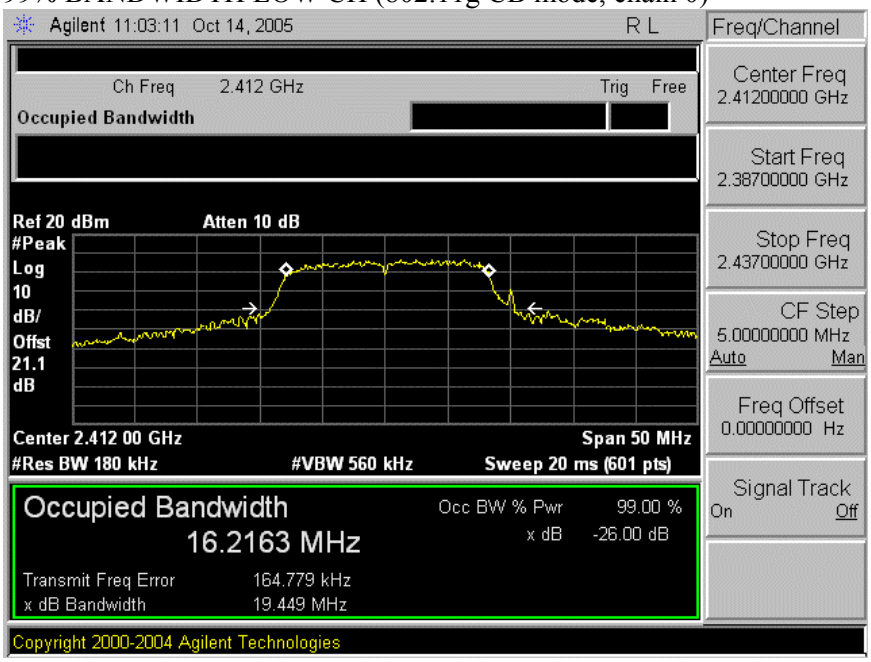


99% BANDWIDTH HIGH CH (802.11g mode, Chain 1)

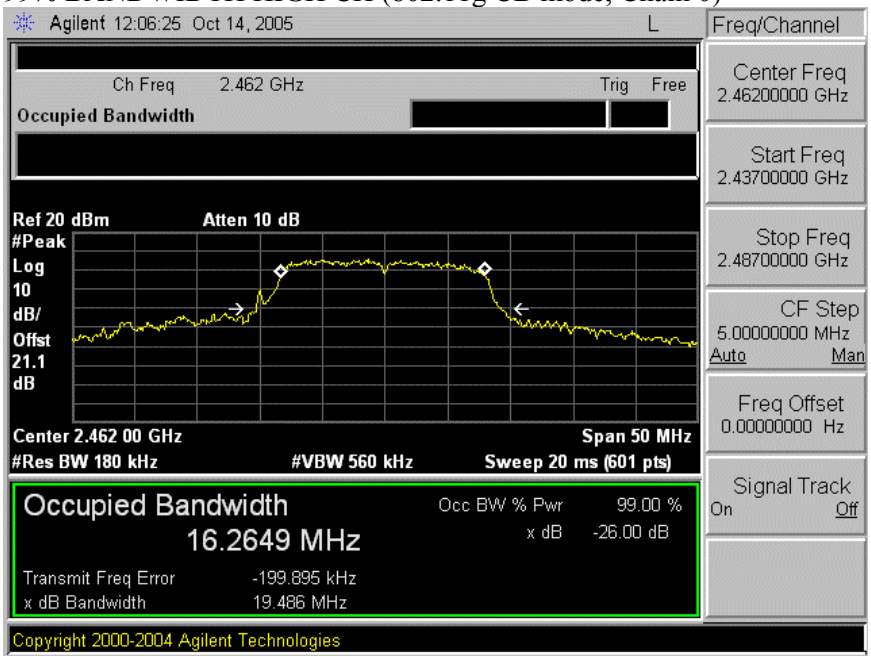


99% BANDWIDTH (802.11g CHANNEL BOND MODE, CHAIN 0)

99% BANDWIDTH LOW CH (802.11g CB mode, chain 0)

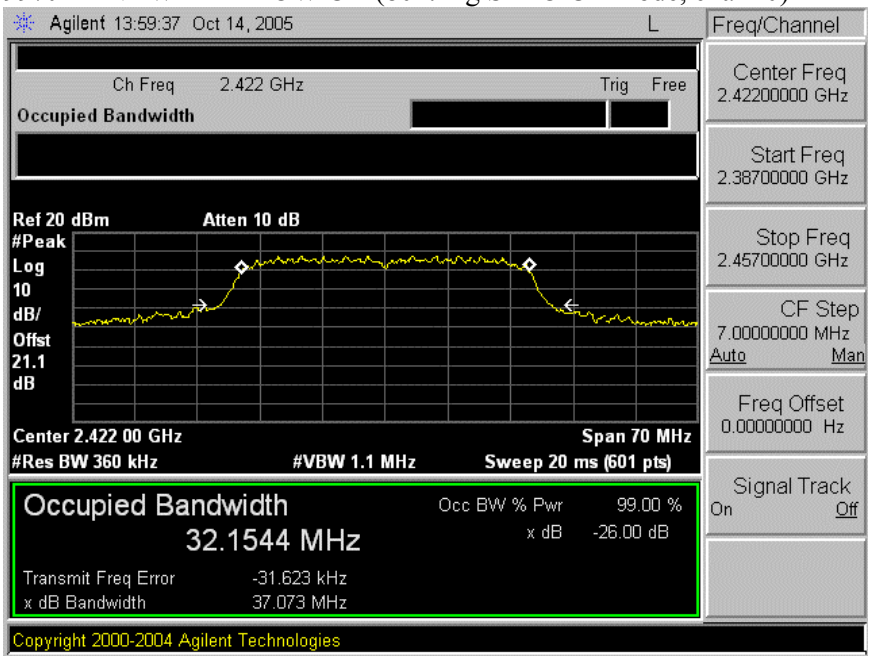


99% BANDWIDTH HIGH CH (802.11g CB mode, Chain 0)

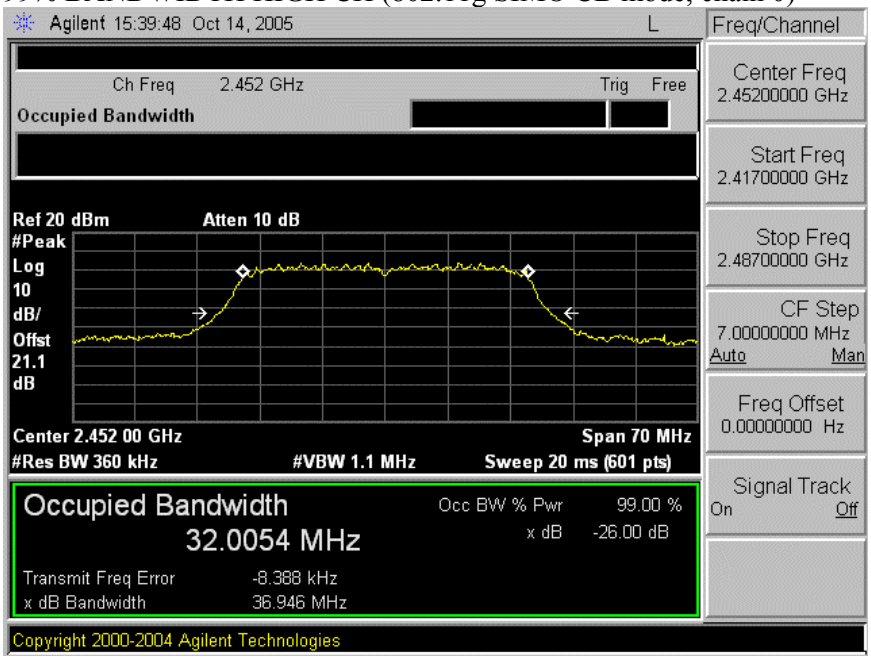


99% BANDWIDTH (802.11g SIMO CHANNEL BOND MODE, CHAIN 0)

99% BANDWIDTH LOW CH (802.11g SIMO CB mode, chain 0)

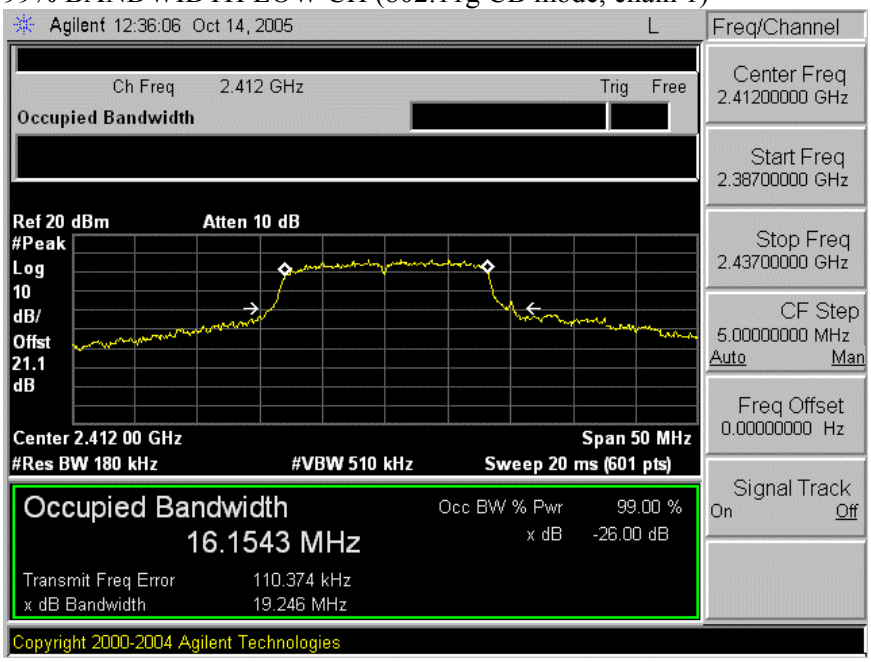


99% BANDWIDTH HIGH CH (802.11g SIMO CB mode, chain 0)

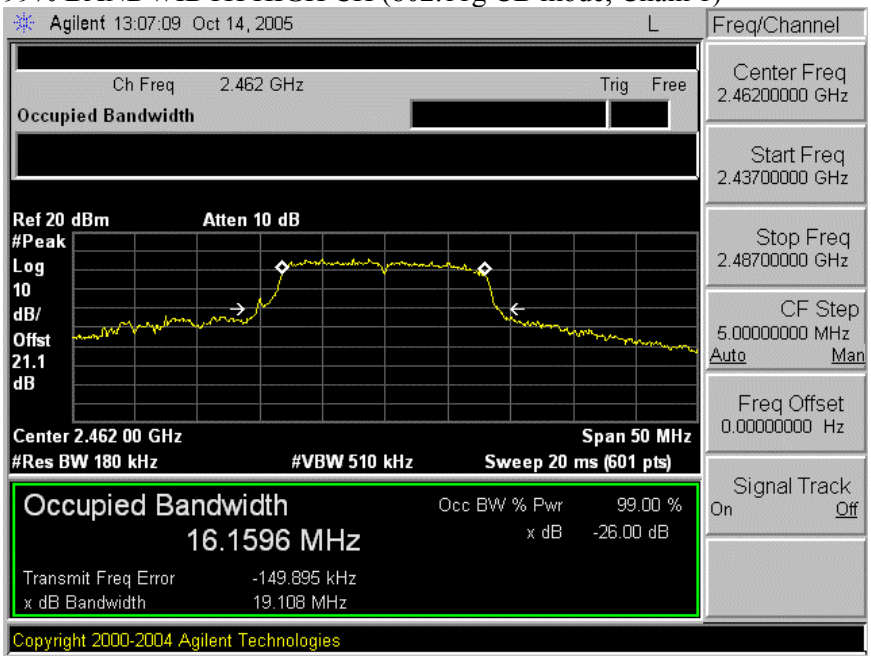


99% BANDWIDTH (802.11g CHANNEL BOND MODE, CHAIN 1)

99% BANDWIDTH LOW CH (802.11g CB mode, chain 1)

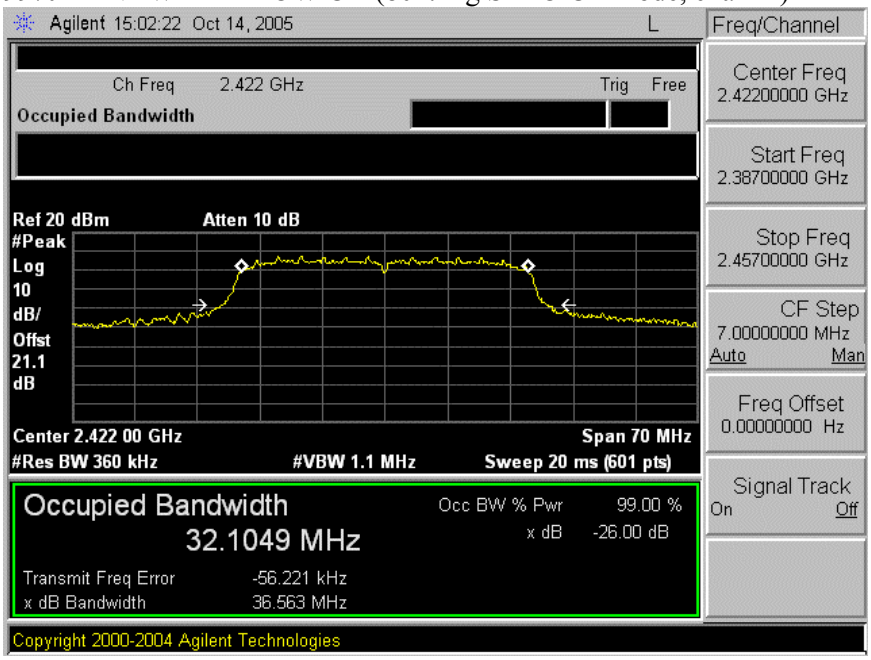


99% BANDWIDTH HIGH CH (802.11g CB mode, Chain 1)

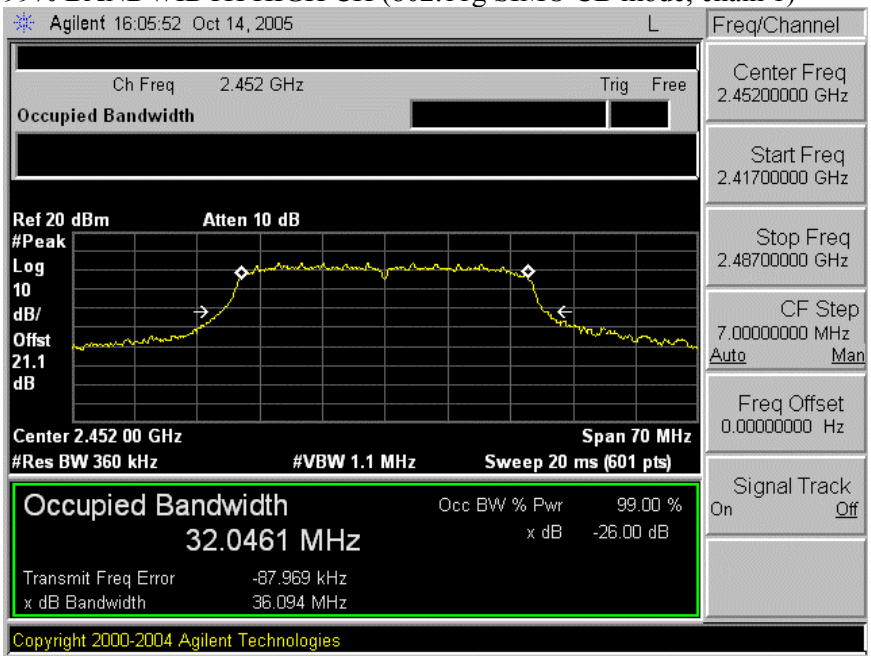


99% BANDWIDTH (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

99% BANDWIDTH LOW CH (802.11g SIMO CB mode, chain 1)



99% BANDWIDTH HIGH CH (802.11g SIMO CB mode, chain 1)



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 2.0 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

No non-compliance noted:

802.11b MODE

Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
2412	16.11	16.25	19.19	30	-10.81
2437	18.05	18.08	21.08	30	-8.92
2462	16.15	16.02	19.10	30	-10.90

802.11g MODE

Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
2412	15.71	15.46	18.60	30	-11.40
2437	20.13	20.06	23.11	30	-6.89
2462	16.01	16.91	19.49	30	-10.51

802.11g CHANNEL BOND MODE

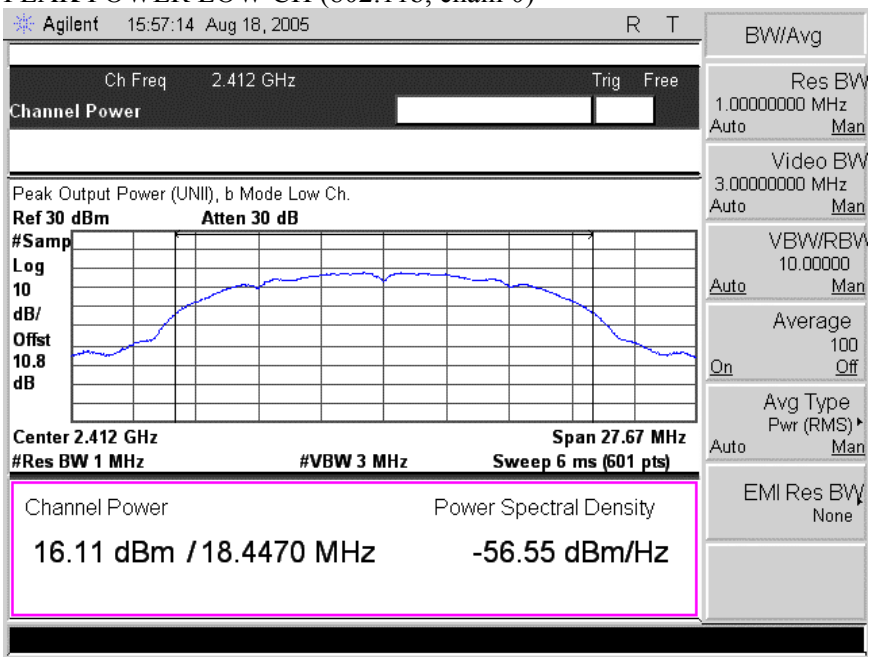
Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
2412	15.74	15.78	18.77	30	-11.23
2462	15.91	15.85	18.89	30	-11.11

802.11g SIMO CHANNEL BOND MODE

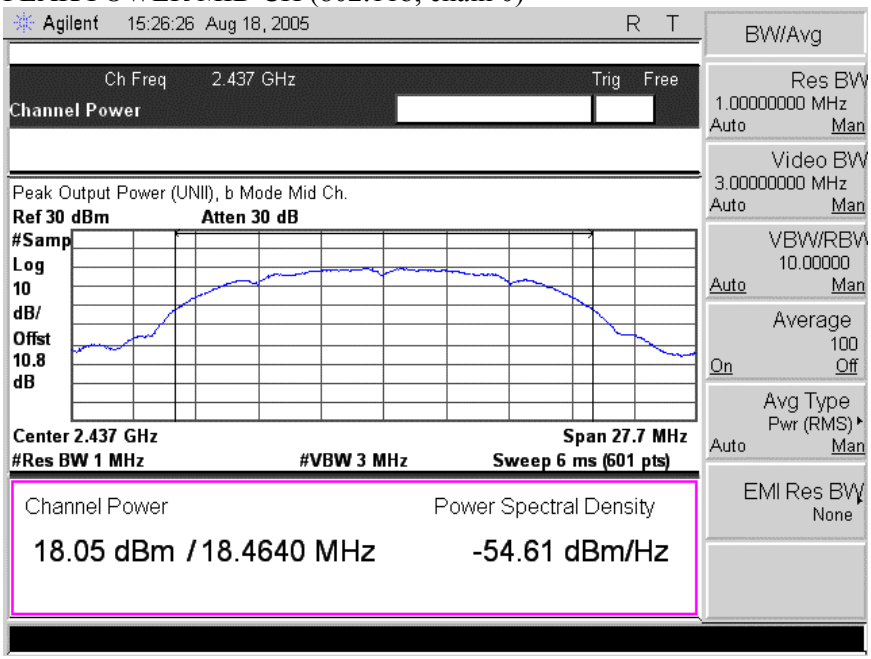
Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
2422	16.18	16.27	19.24	30	-10.76
2452	12.90	12.92	15.92	30	-14.08

OUTPUT POWER (802.11b, CHAIN 0)

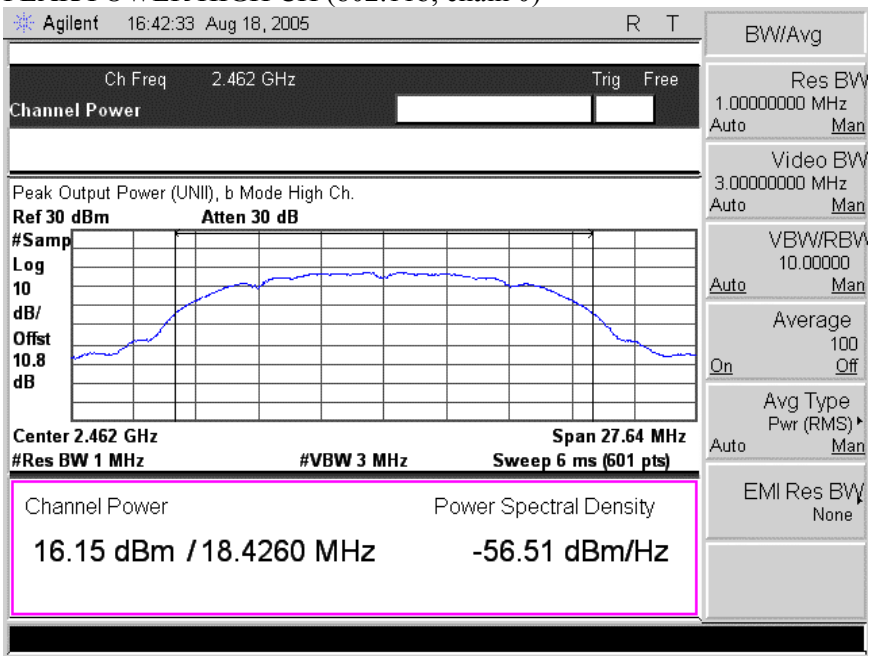
PEAK POWER LOW CH (802.11b, chain 0)



PEAK POWER MID CH (802.11b, chain 0)

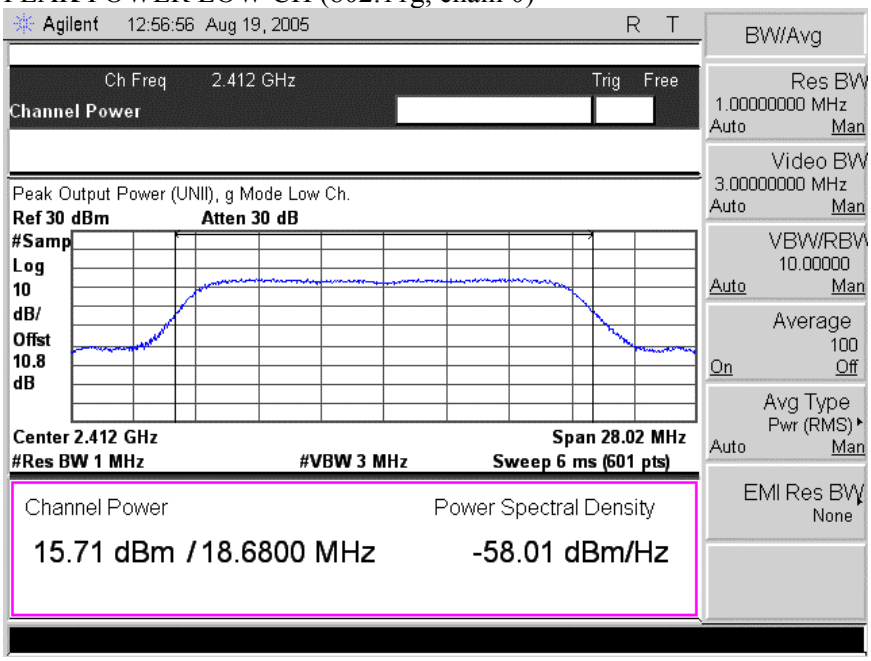


PEAK POWER HIGH CH (802.11b, chain 0)

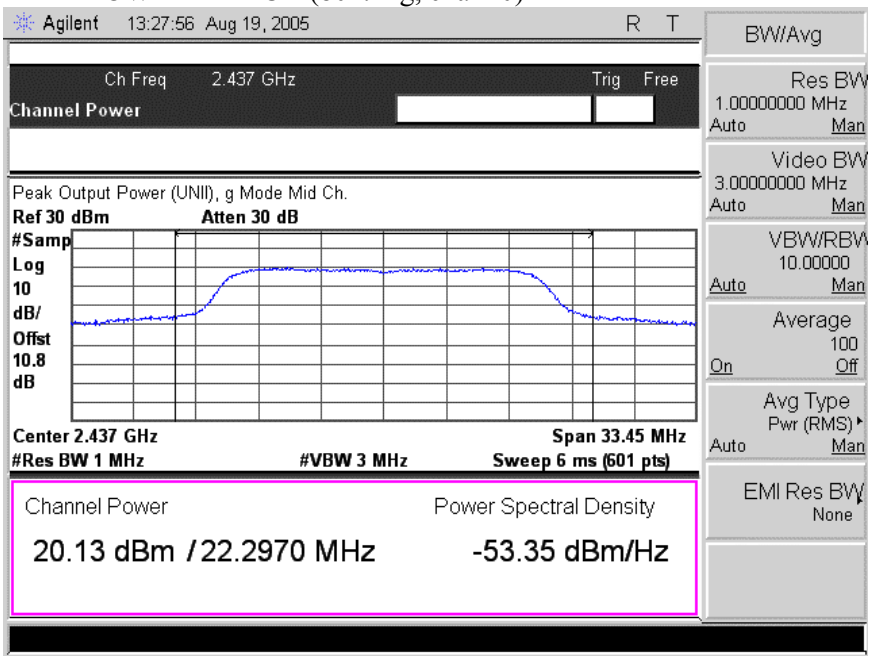


OUTPUT POWER (802.11g, CHAIN 0)

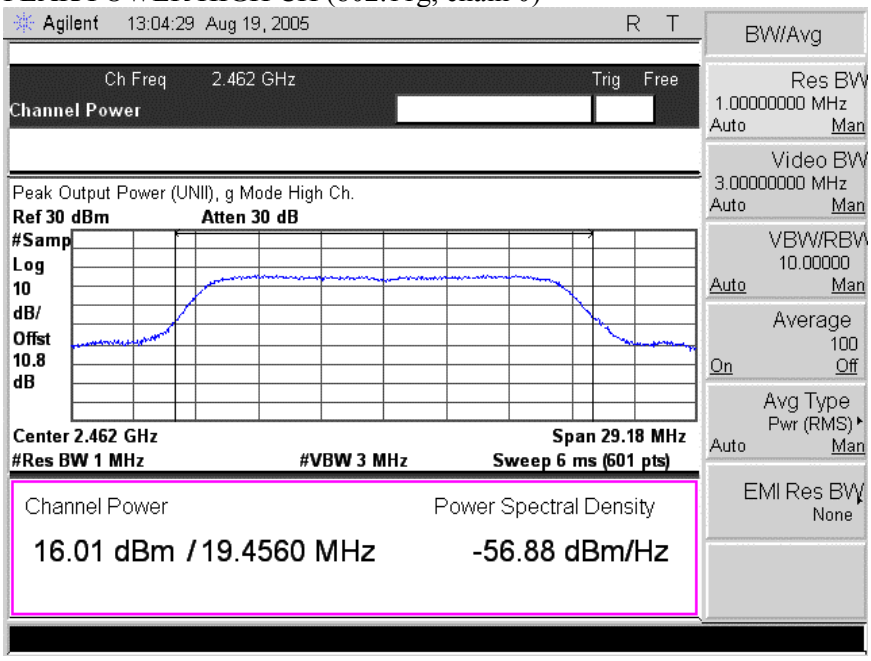
PEAK POWER LOW CH (802.11g, chain 0)



PEAK POWER MID CH (802.11g, chain 0)

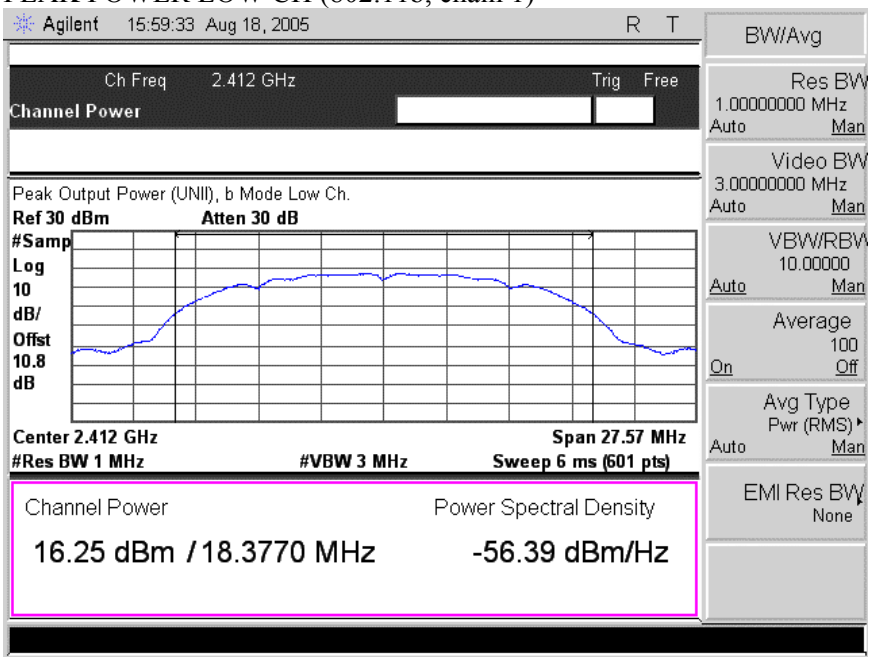


PEAK POWER HIGH CH (802.11g, chain 0)

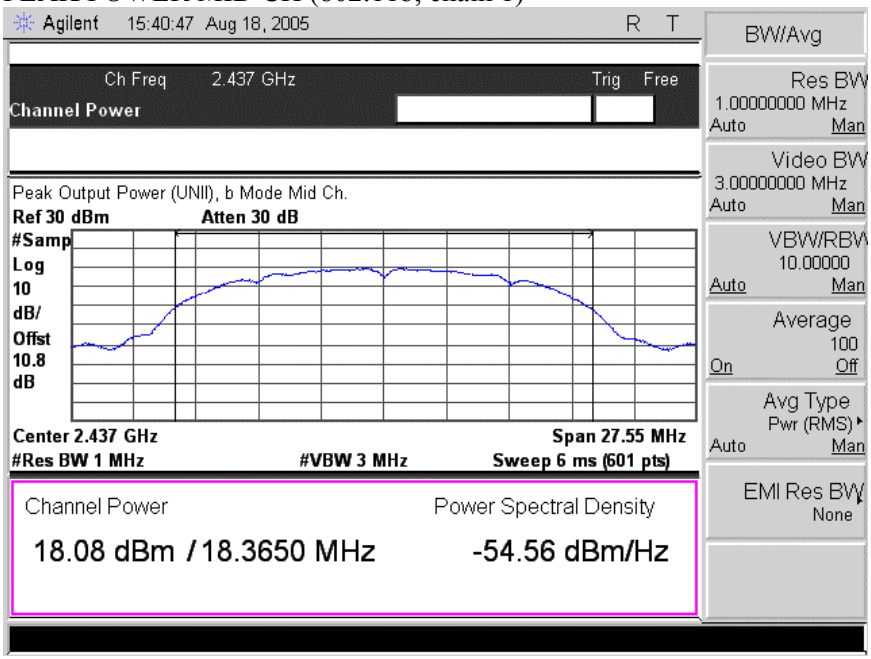


OUTPUT POWER (802.11b, CHAIN 1)

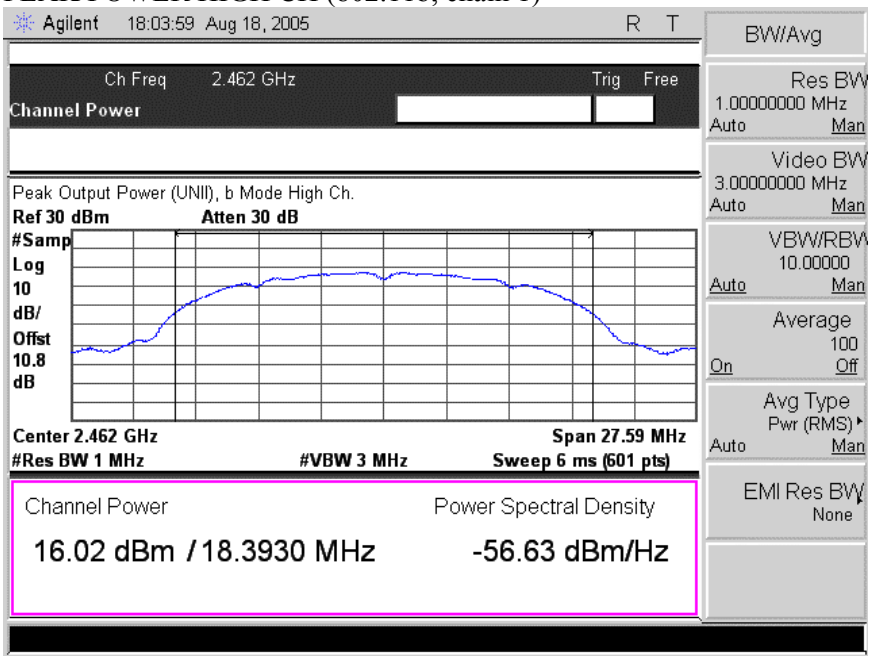
PEAK POWER LOW CH (802.11b, chain 1)



PEAK POWER MID CH (802.11b, chain 1)

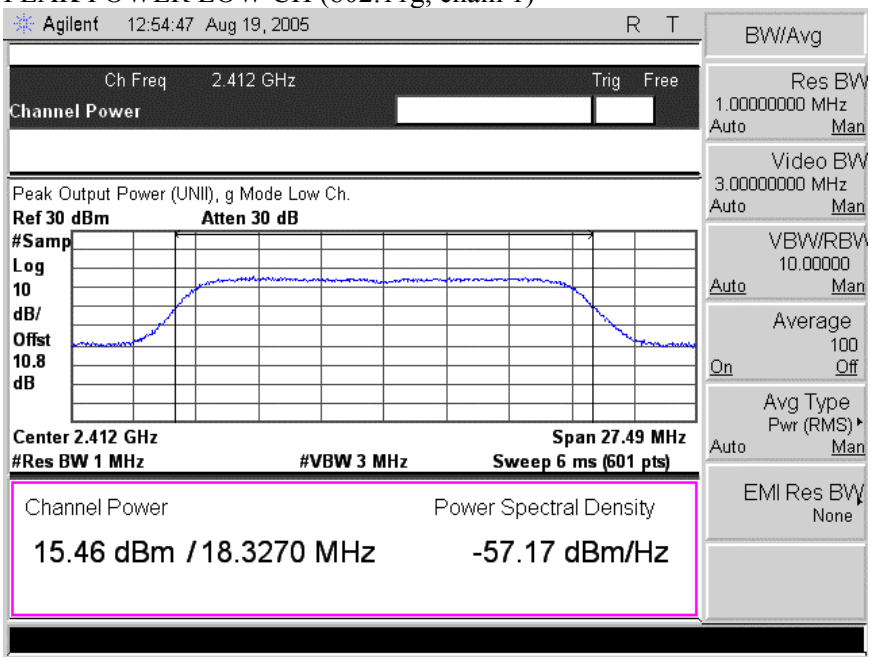


PEAK POWER HIGH CH (802.11b, chain 1)

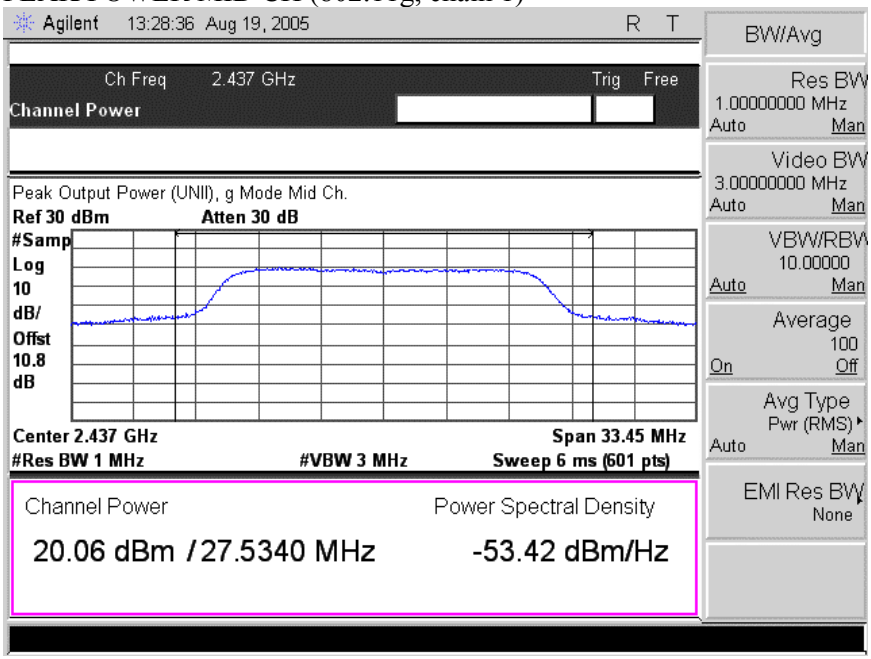


OUTPUT POWER (802.11g, CHAIN 1)

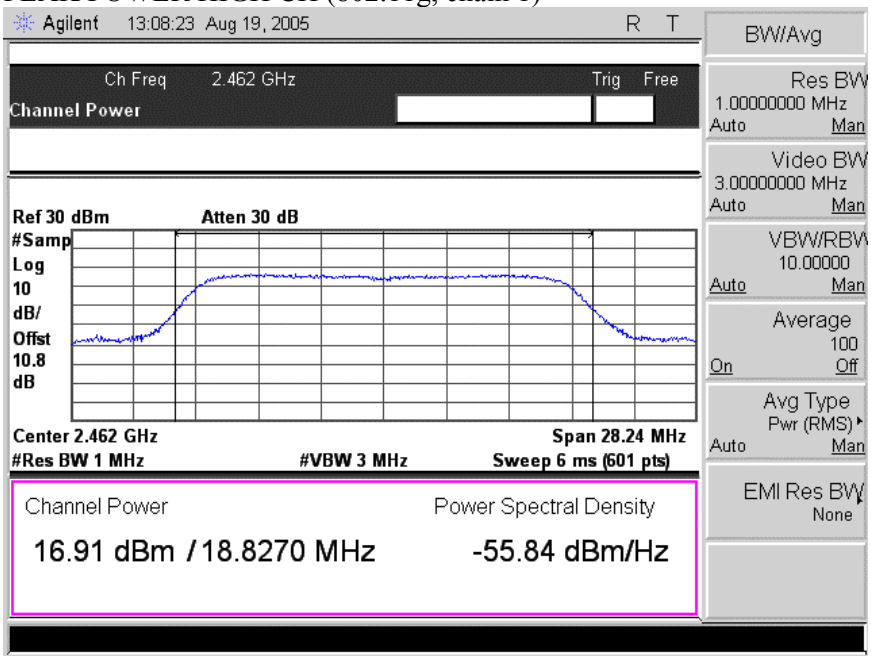
PEAK POWER LOW CH (802.11g, chain 1)



PEAK POWER MID CH (802.11g, chain 1)

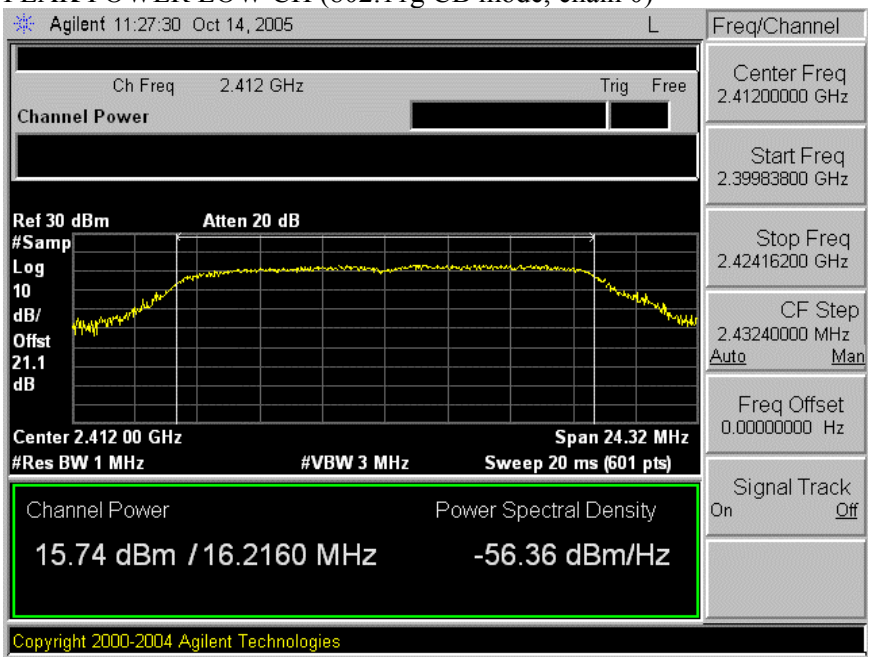


PEAK POWER HIGH CH (802.11g, chain 1)

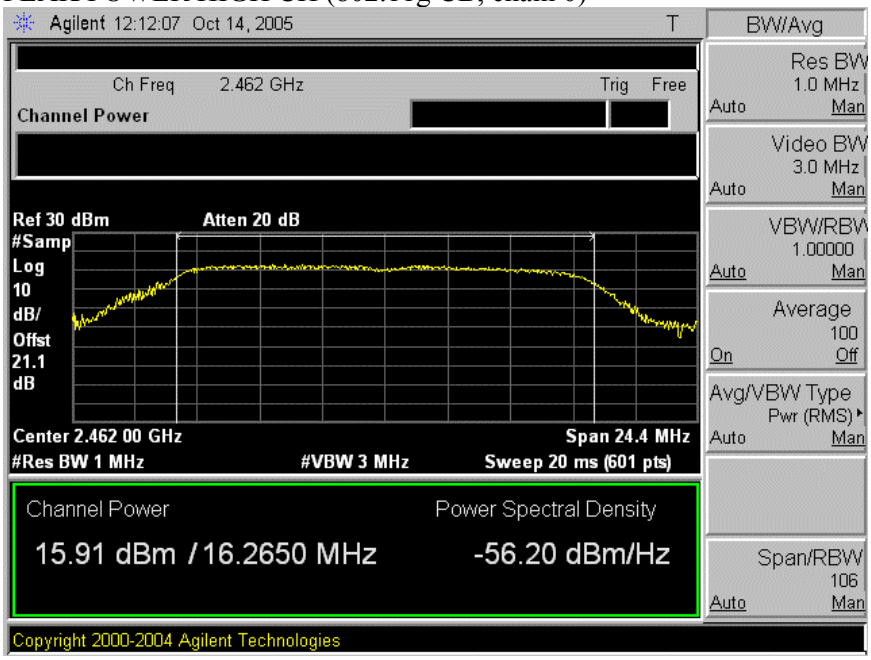


OUTPUT POWER (802.11g CHANNEL BOND MODE, CHAIN 0)

PEAK POWER LOW CH (802.11g CB mode, chain 0)

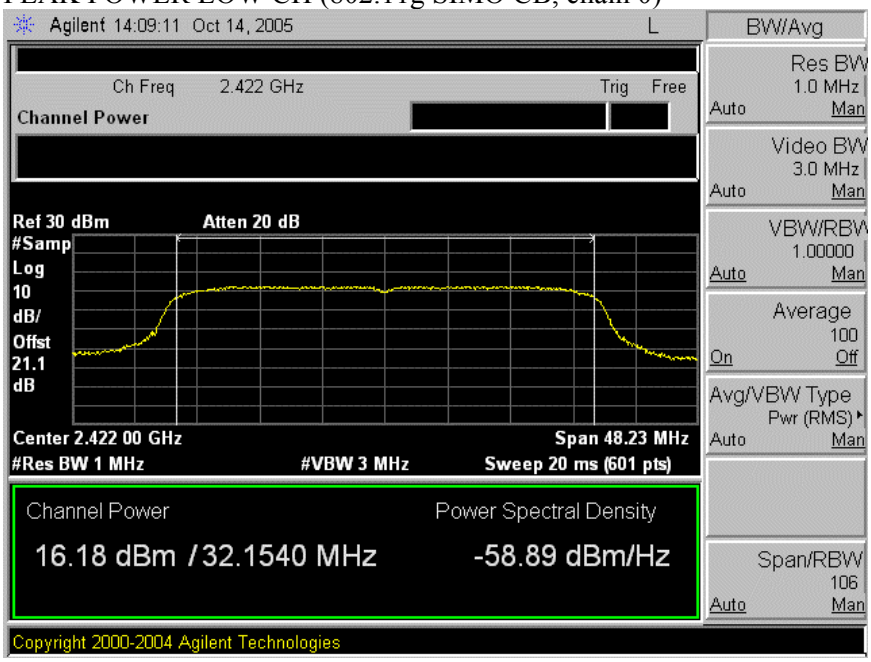


PEAK POWER HIGH CH (802.11g CB, chain 0)

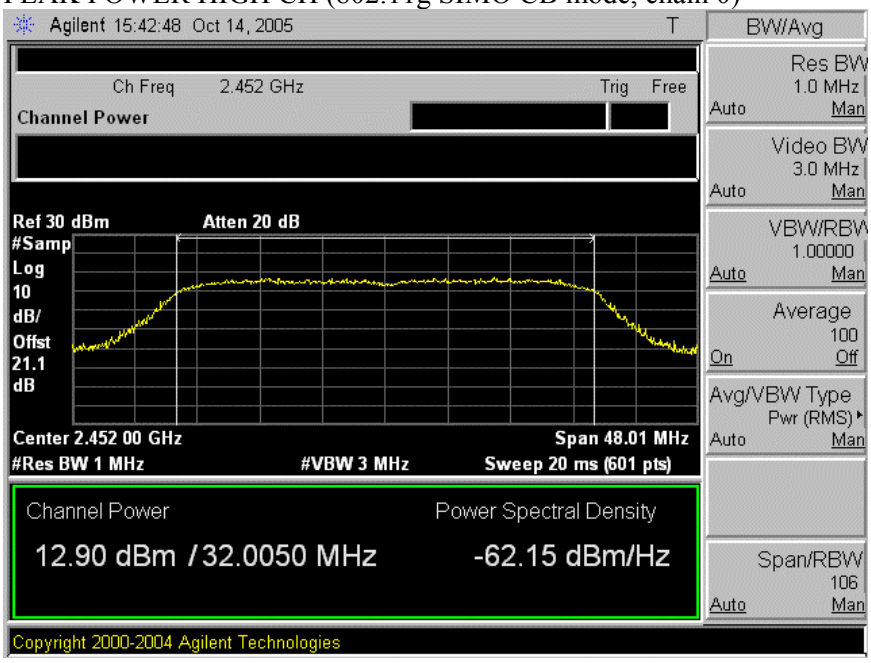


OUTPUT POWER (802.11g SIMO CHANNEL BOND MODE, CHAIN 0)

PEAK POWER LOW CH (802.11g SIMO CB, chain 0)

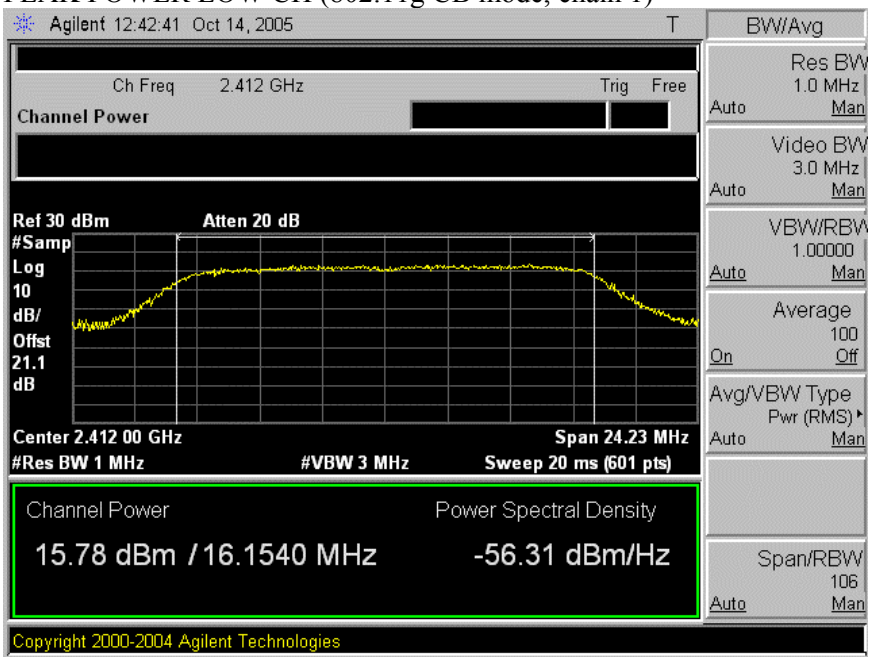


PEAK POWER HIGH CH (802.11g SIMO CB mode, chain 0)

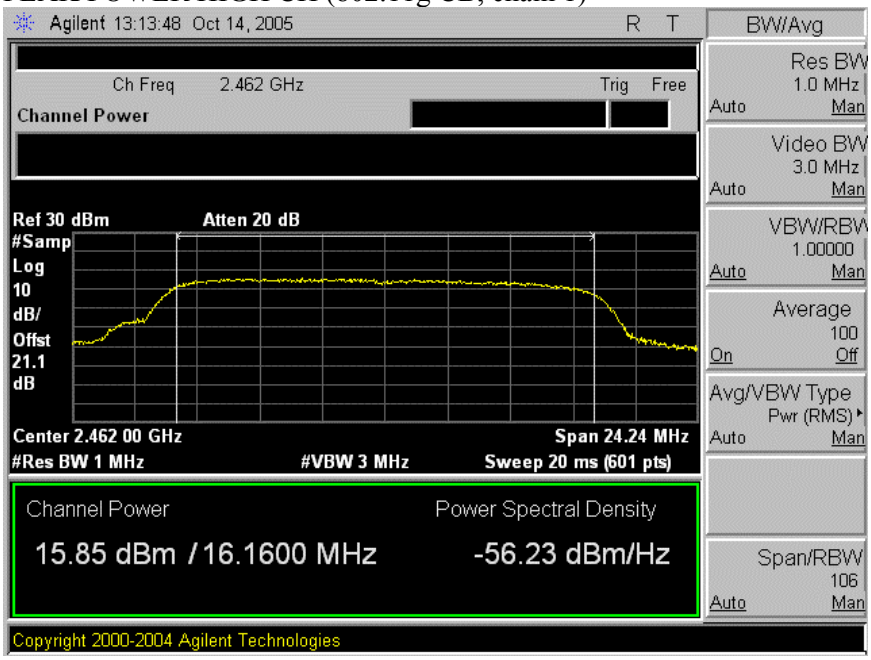


OUTPUT POWER (802.11g CHANNEL BOND MODE, CHAIN 1)

PEAK POWER LOW CH (802.11g CB mode, chain 1)

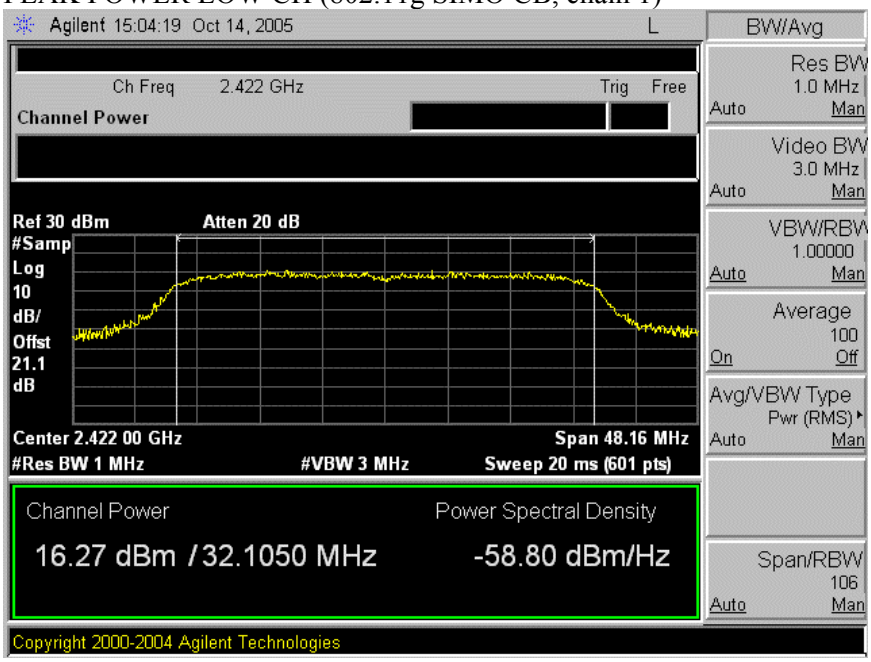


PEAK POWER HIGH CH (802.11g CB, chain 1)

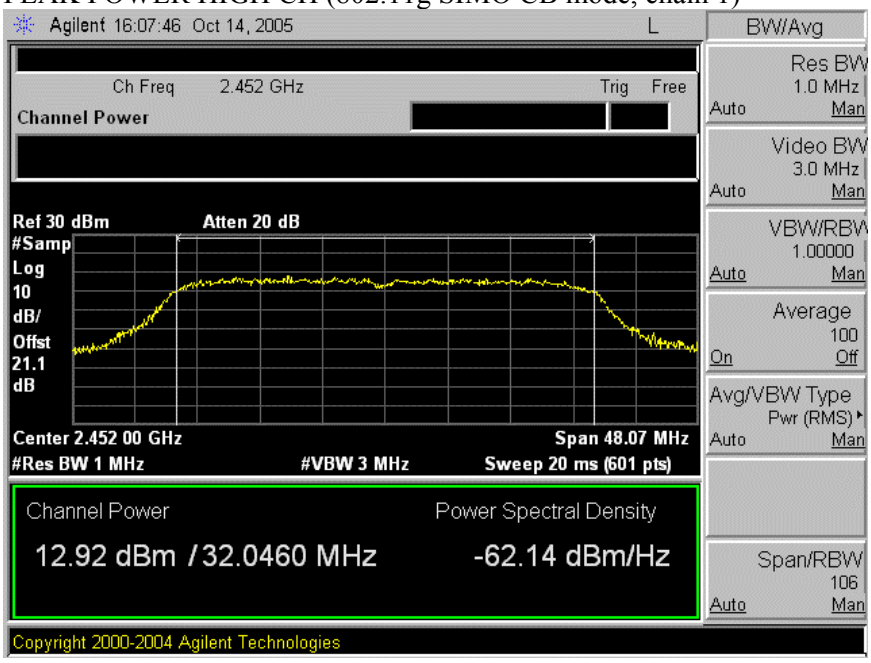


OUTPUT POWER (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

PEAK POWER LOW CH (802.11g SIMO CB, chain 1)



PEAK POWER HIGH CH (802.11g SIMO CB mode, chain 1)



7.1.4. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E \wedge 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 \wedge ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 \wedge ((P + G) / 10) / (d^2)$

LIMITS

From §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
802.11b	20.0	21.08	2.00	0.04
802.11g	20.0	23.11	2.00	0.06
802.11g CB	20.0	18.89	2.00	0.02
802.11g SIMO CB	20.0	19.24	2.00	0.03

7.1.5. 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 10.8 dB (including 10 dB pad and 0.8 dB 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 Chain 0 (dBm)	Average Power Chain 1 (dBm)	Average Total (dBm)
Low	2412	16.72	16.80	19.77
Middle	2437	18.70	18.60	21.66
High	2462	16.70	16.90	19.81

802.1g Mode

Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 1 (dBm)	Average Power Total (dBm)
Low	2412	16.05	16.10	19.09
Middle	2437	20.60	20.98	23.80
High	2462	17.08	17.80	20.47

802.11g CHANNEL BOND Mode

Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 1 (dBm)	Average Total (dBm)
Low	2412	16.19	16.22	19.22
High	2462	16.30	16.30	19.31

802.11g SIMO CHANNEL BOND Mode

Channel	Frequency (MHz)	Average Power Chain 0 (dBm)	Average Power Chain 1 (dBm)	Average Power Total (dBm)
Low	2422	16.50	16.52	19.52
High	2452	13.02	13.05	16.05

7.1.6. 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

Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
2412	4.19	-7.60	4.47	8	-3.53
2437	-6.76	-5.28	-2.95	8	-10.95
2462	-7.85	-8.36	-5.09	8	-13.09

802.11g Mode

Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
2412	-9.90	-8.64	-6.21	8	-14.21
2437	-4.29	-2.84	-0.49	8	-8.49
2462	-7.18	-7.54	-4.35	8	-12.35

802.11g CHANNEL BOND Mode

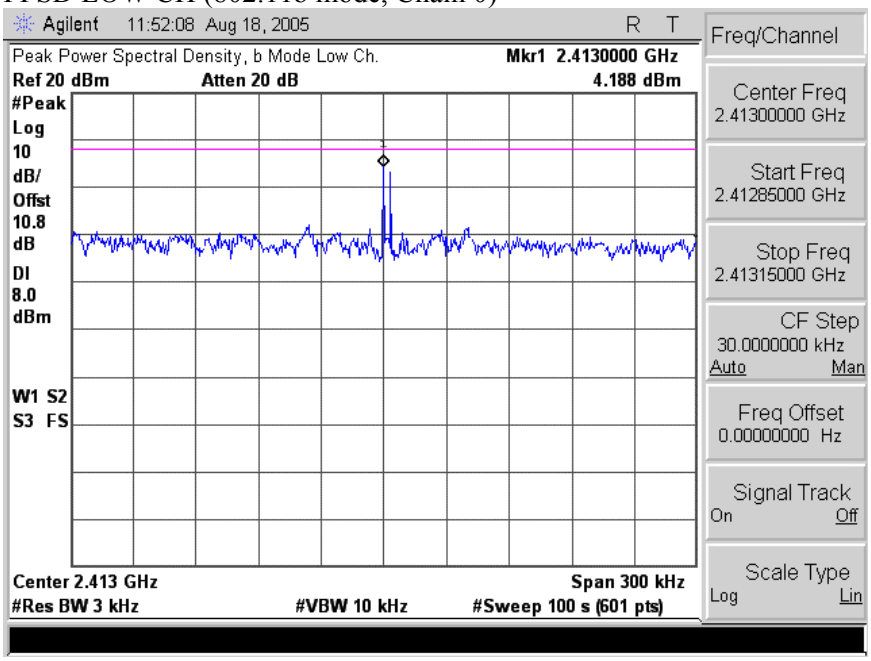
Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
2412	-10.85	-9.65	-7.20	8	-15.20
2462	-9.69	-11.15	-7.35	8	-15.35

802.11g SIMO CHANNEL BOND Mode

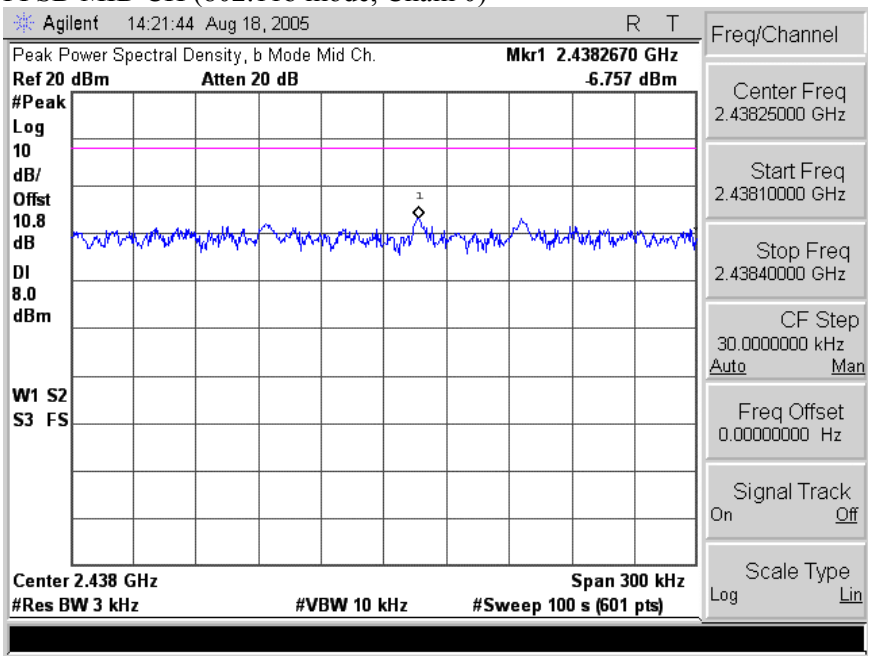
Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
2422	-11.24	-11.38	-8.30	8	-16.30
2452	-14.50	-14.59	-11.53	8	-19.53

PEAK POWER SPECTRAL DENSITY (802.11b MODE, CHAIN 0)

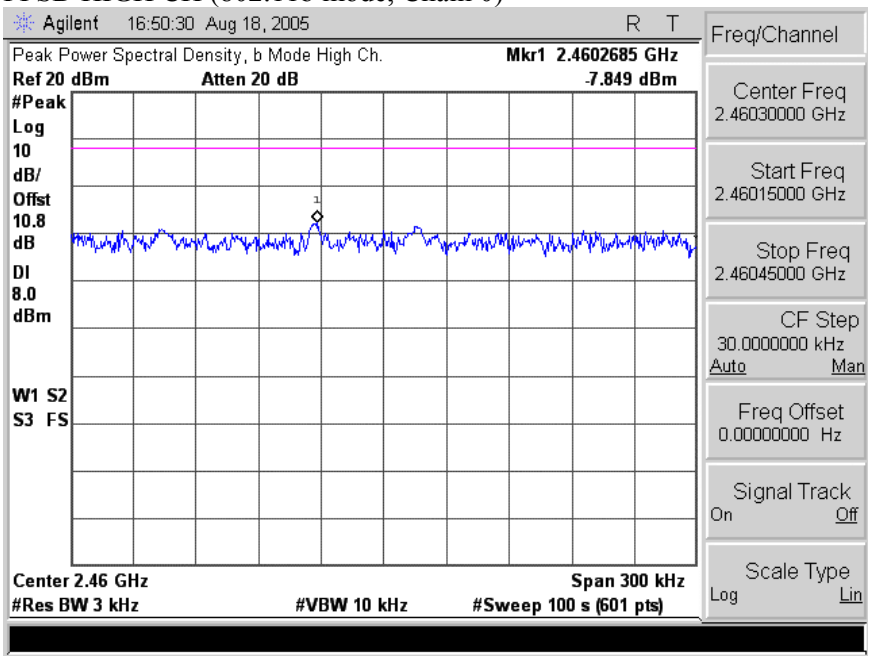
PPSD LOW CH (802.11b mode, Chain 0)



PPSD MID CH (802.11b mode, Chain 0)

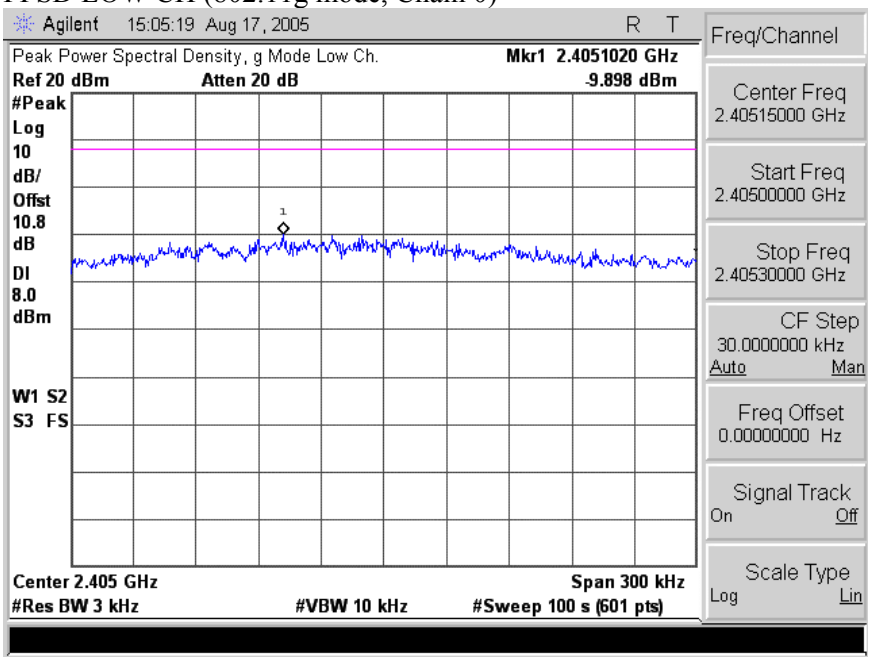


PPSD HIGH CH (802.11b mode, Chain 0)

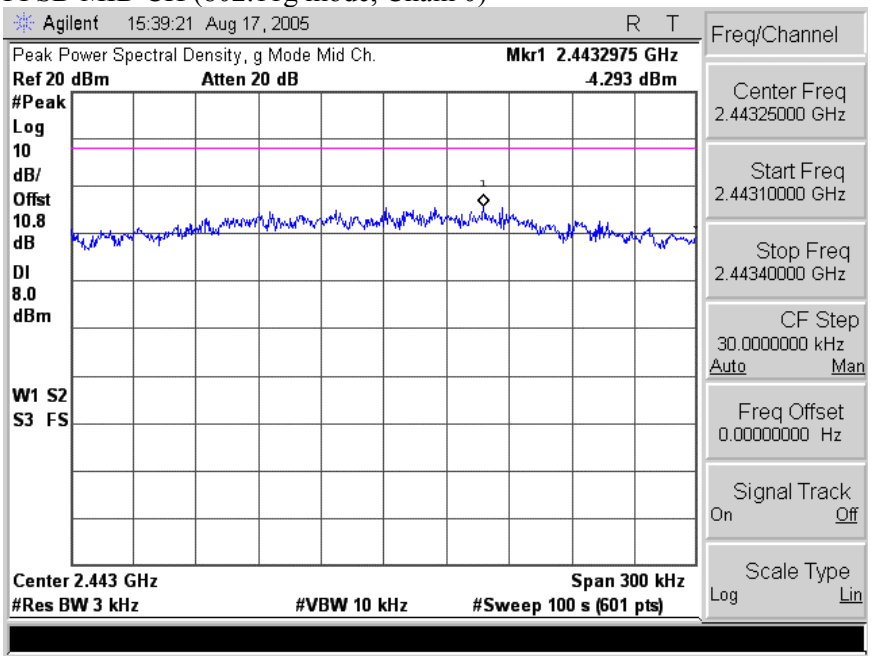


PEAK POWER SPECTRAL DENSITY (802.11g MODE, CHAIN 0)

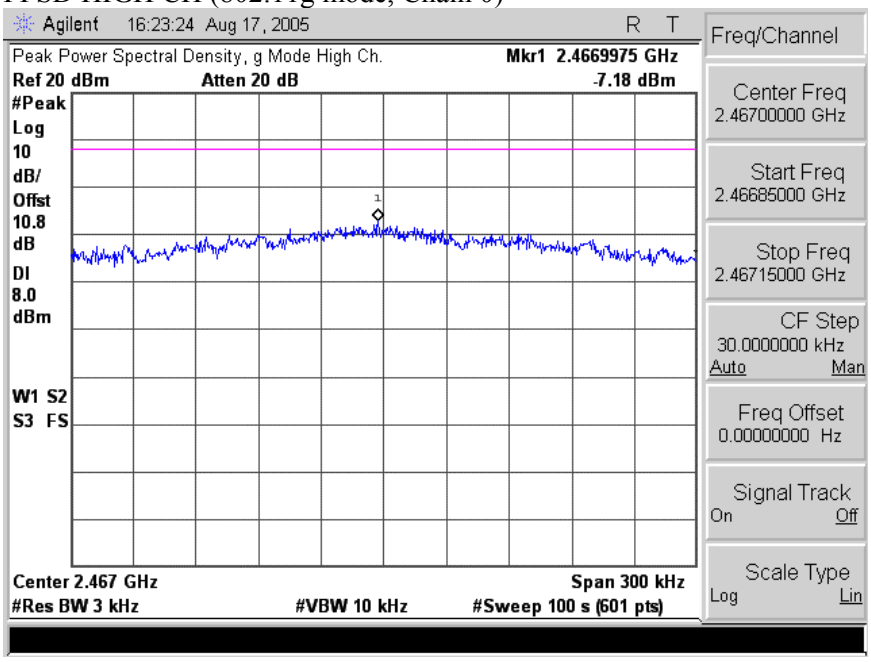
PPSD LOW CH (802.11g mode, Chain 0)



PPSD MID CH (802.11g mode, Chain 0)

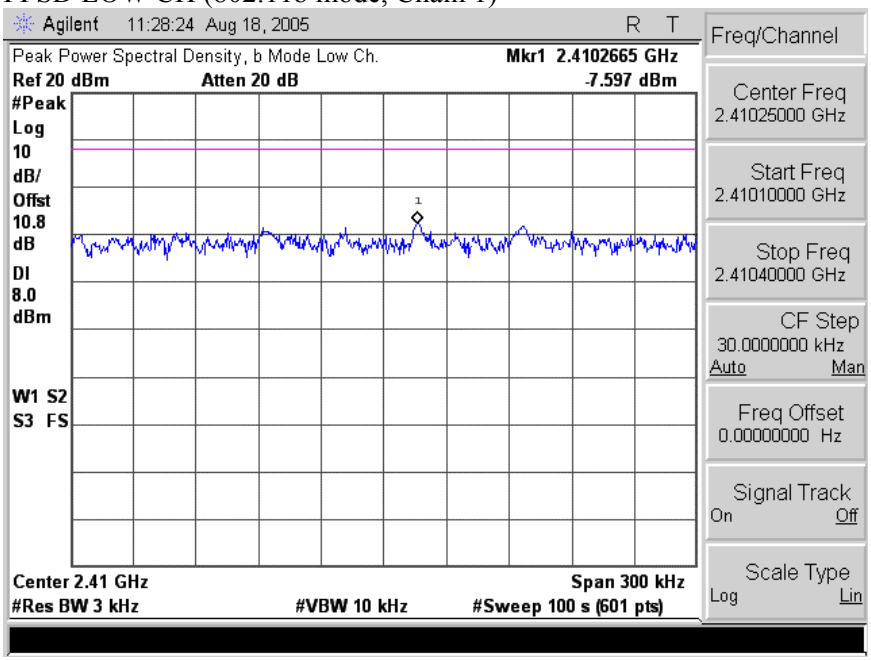


PPSD HIGH CH (802.11g mode, Chain 0)

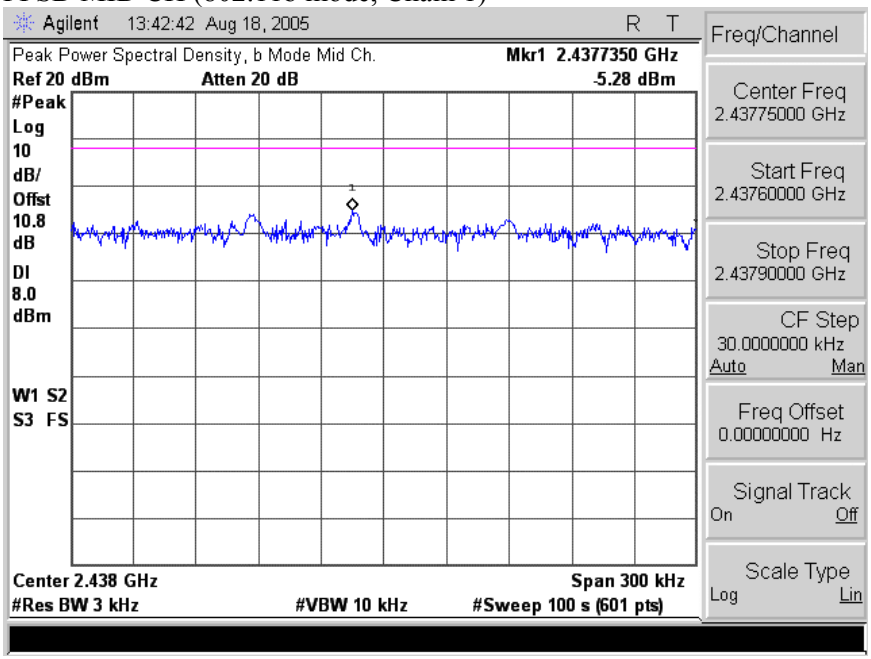


PEAK POWER SPECTRAL DENSITY (802.11b MODE, CHAIN 1)

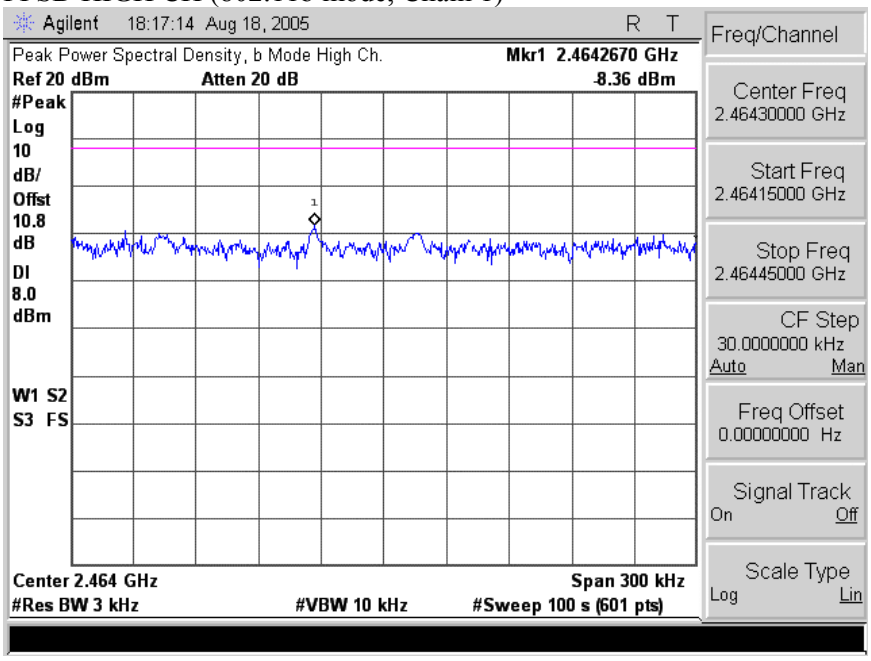
PPSD LOW CH (802.11b mode, Chain 1)



PPSD MID CH (802.11b mode, Chain 1)

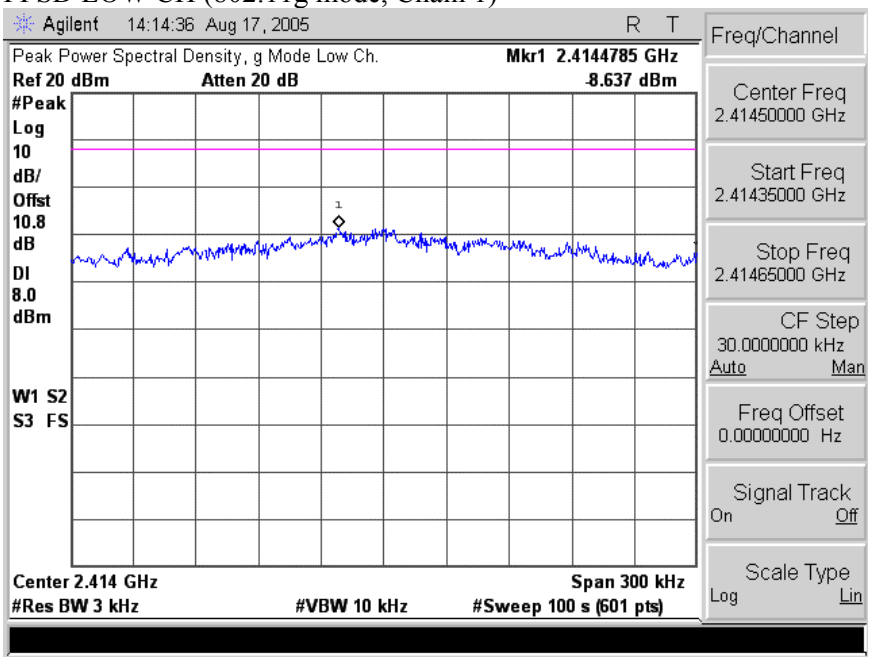


PPSD HIGH CH (802.11b mode, Chain 1)

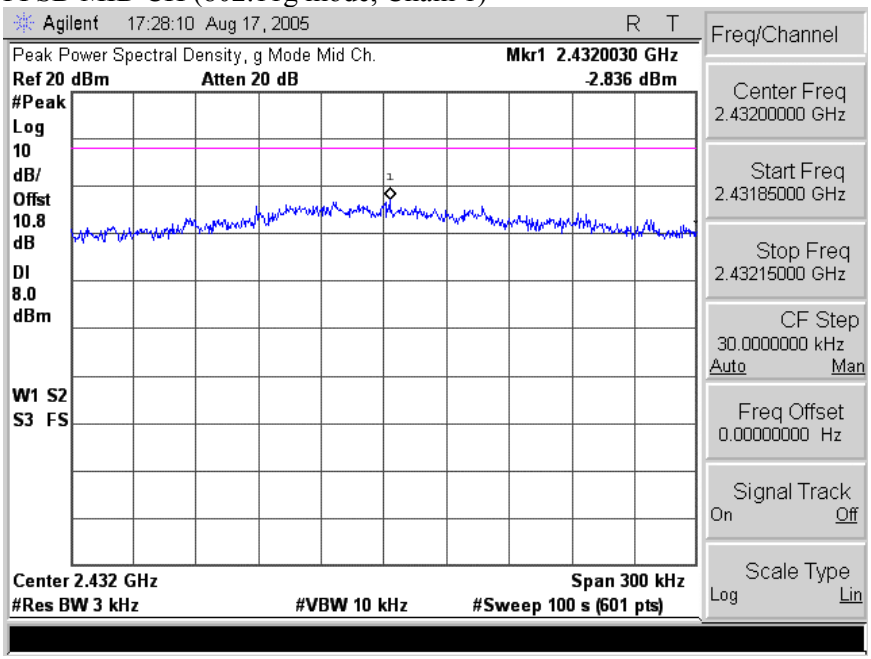


PEAK POWER SPECTRAL DENSITY (802.11g MODE, CHAIN 1)

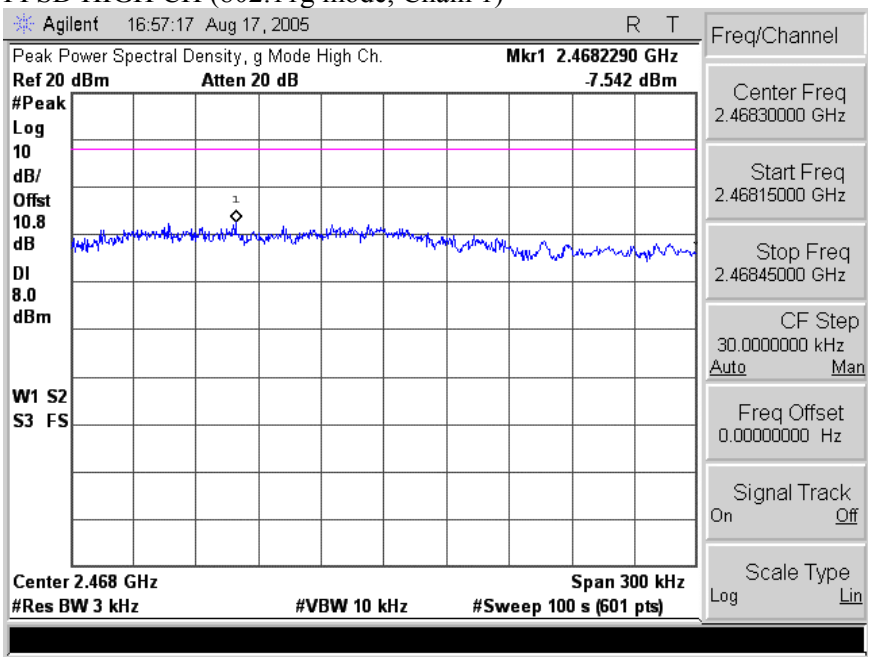
PPSD LOW CH (802.11g mode, Chain 1)



PPSD MID CH (802.11g mode, Chain 1)

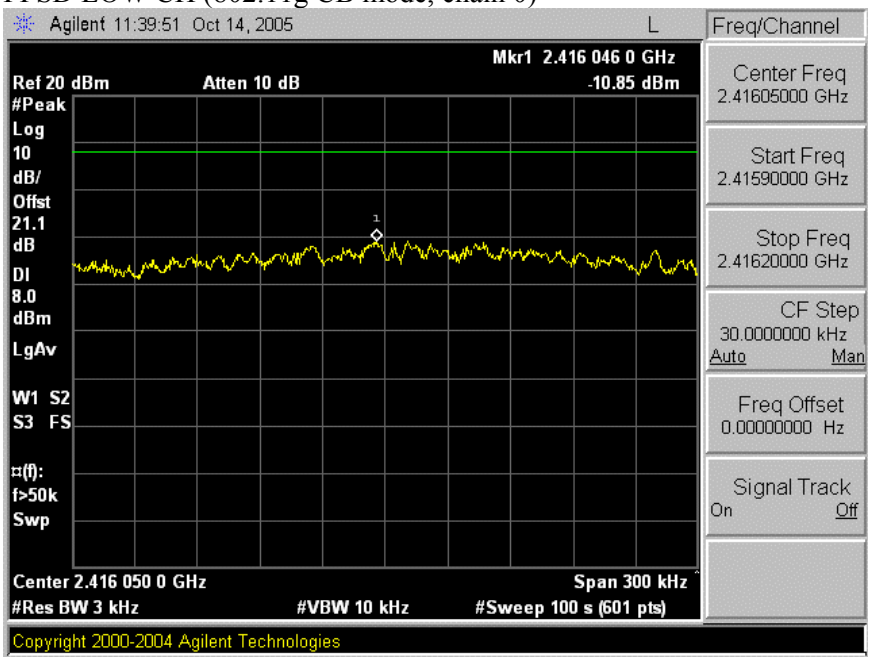


PPSD HIGH CH (802.11g mode, Chain 1)

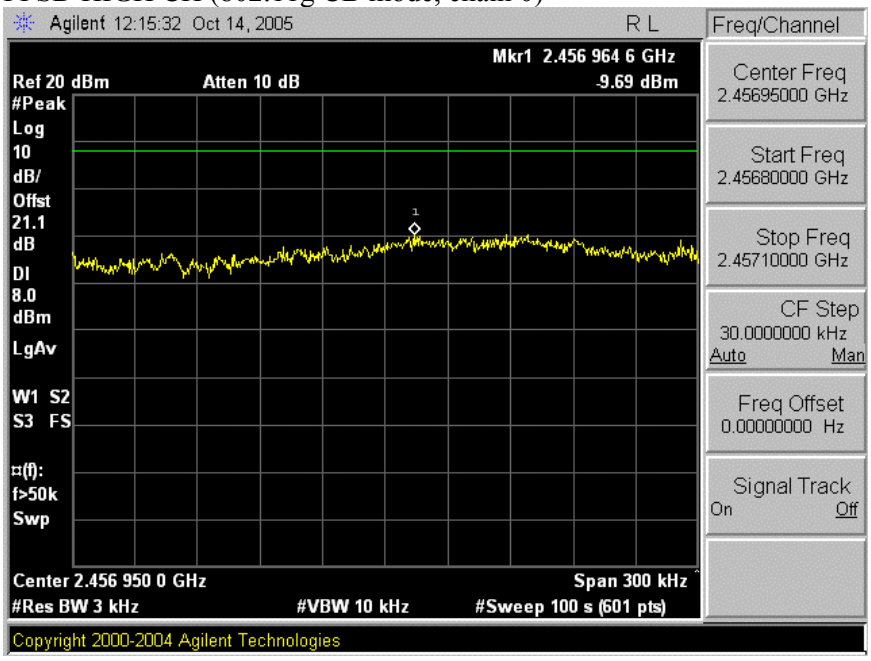


PEAK POWER SPECTRAL DENSITY (802.11g CHANNEL BOND MODE, CHAIN 0)

PPSD LOW CH (802.11g CB mode, chain 0)

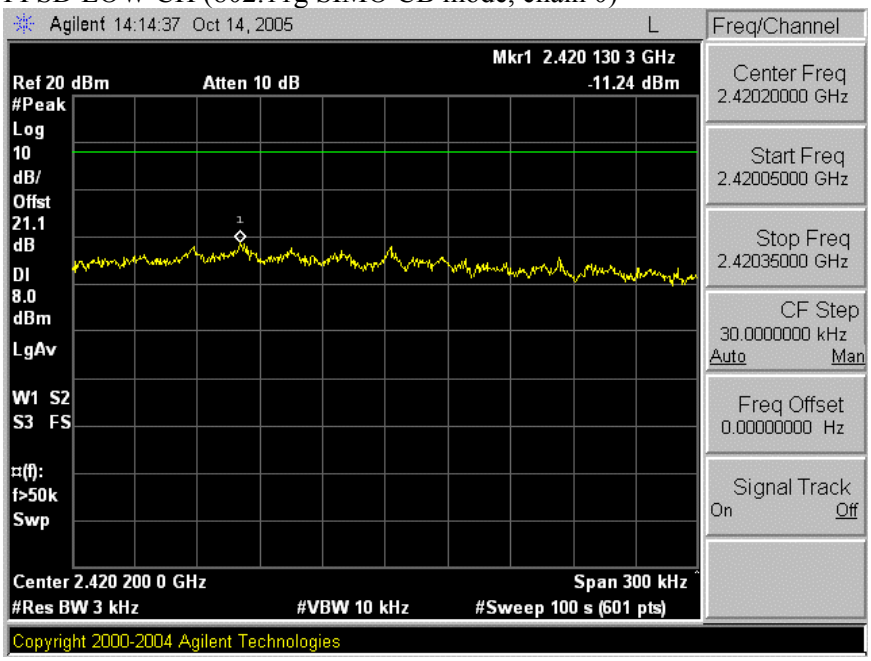


PPSD HIGH CH (802.11g CB mode, chain 0)

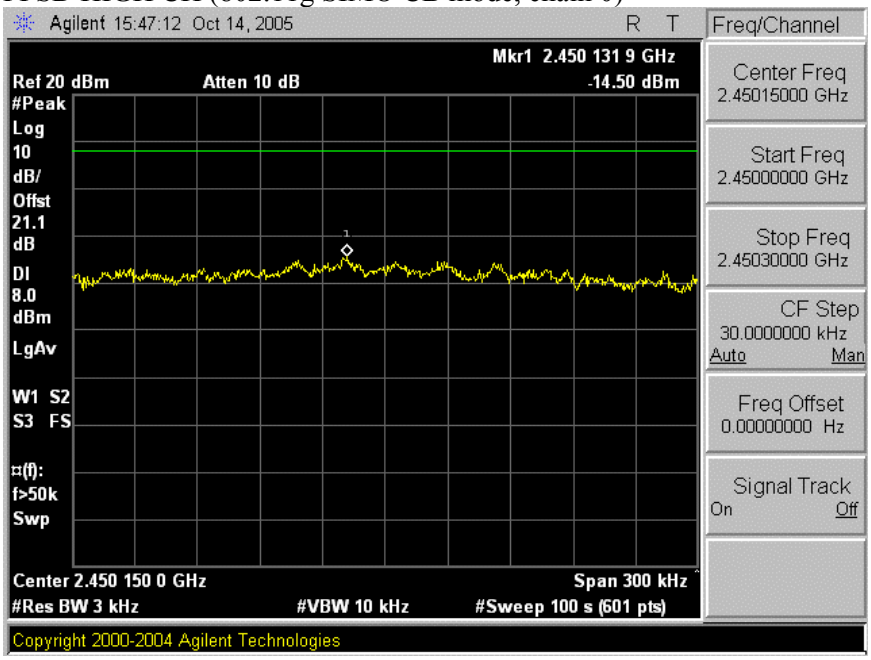


PEAK POWER SPECTRAL DENSITY (802.11g SIMO CHANNEL BOND MODE, CHAIN 0)

PPSD LOW CH (802.11g SIMO CB mode, chain 0)

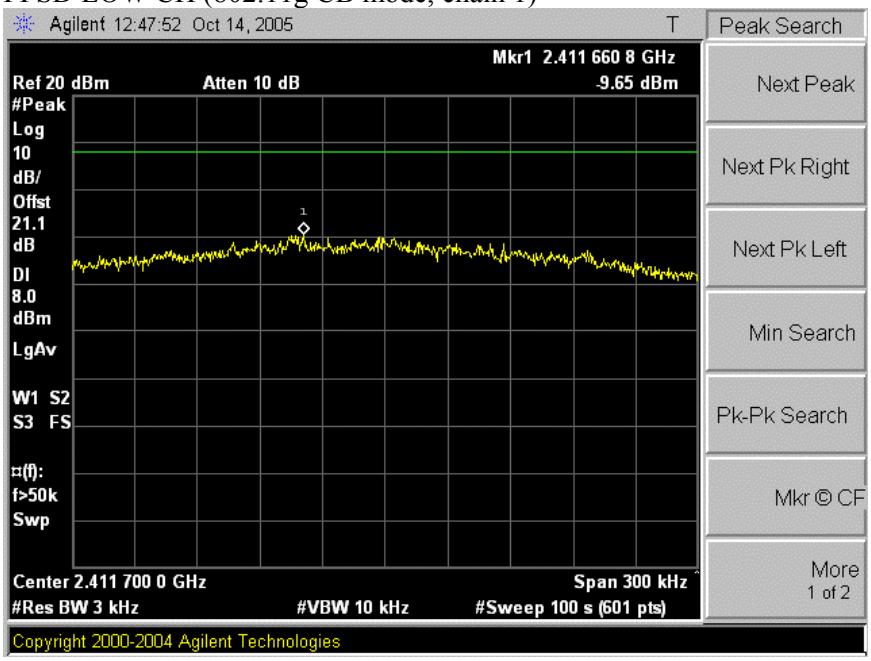


PPSD HIGH CH (802.11g SIMO CB mode, chain 0)

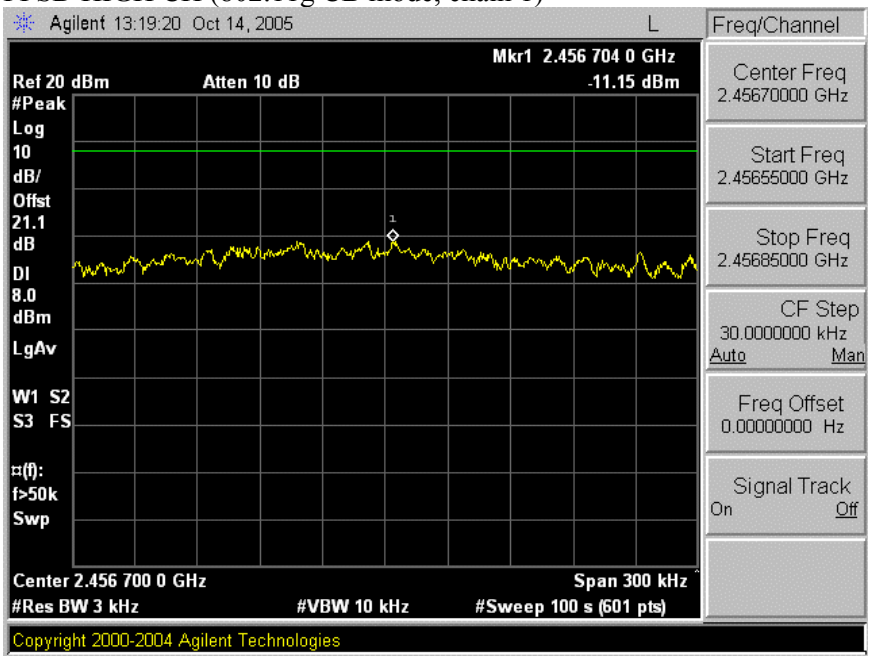


PEAK POWER SPECTRAL DENSITY (802.11g CHANNEL BOND MODE, CHAIN 1)

PPSD LOW CH (802.11g CB mode, chain 1)

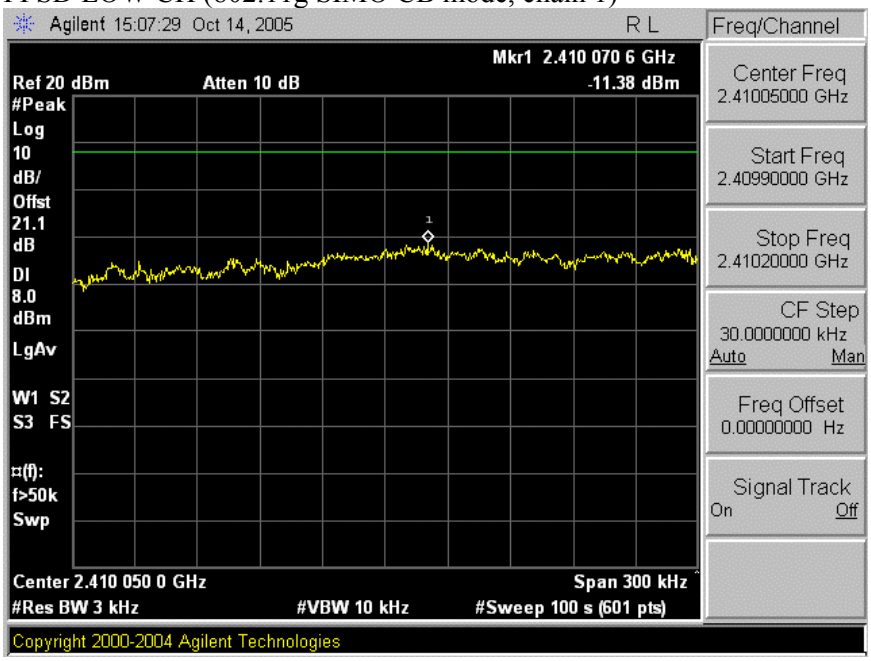


PPSD HIGH CH (802.11g CB mode, chain 1)

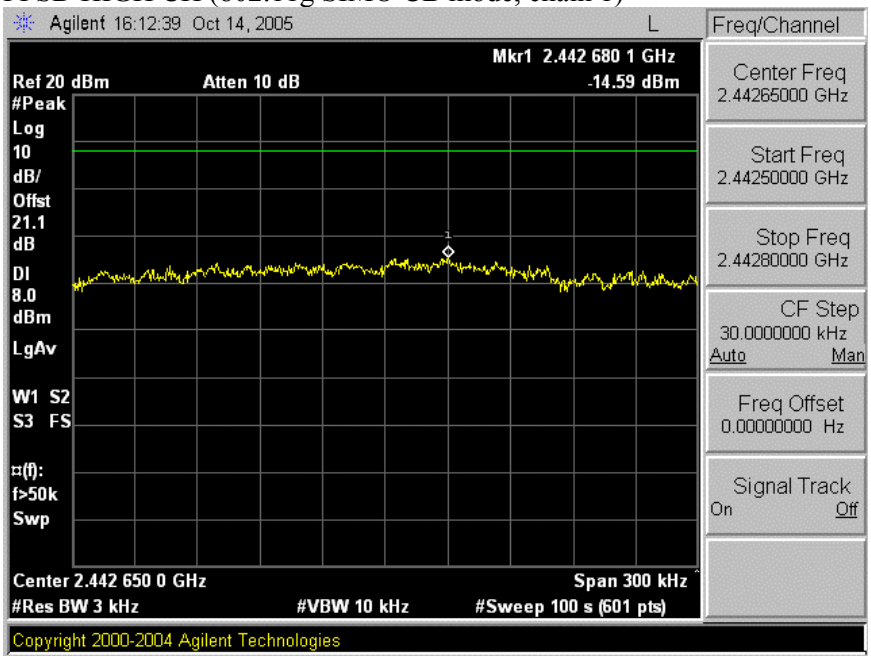


PEAK POWER SPECTRAL DENSITY (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

PPSD LOW CH (802.11g SIMO CB mode, chain 1)



PPSD HIGH CH (802.11g SIMO CB mode, chain 1)



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.

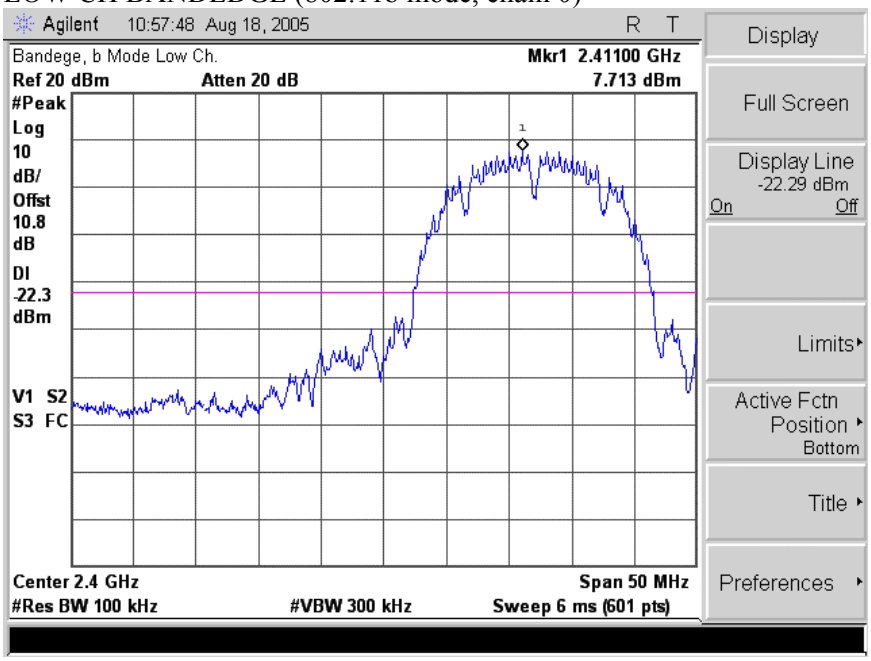
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

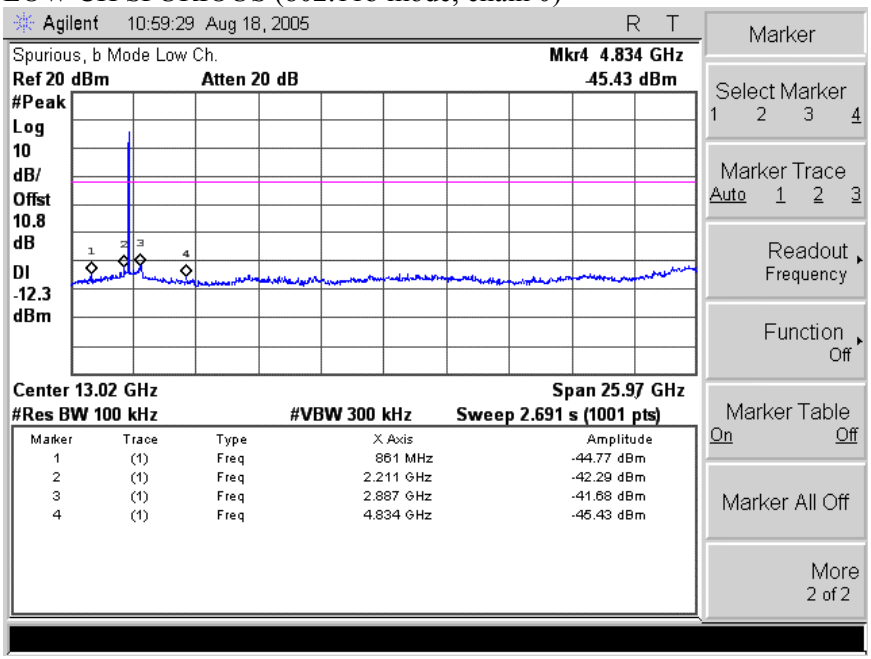
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE), CHAIN 0

LOW CH BANDEDGE (802.11b mode, chain 0)

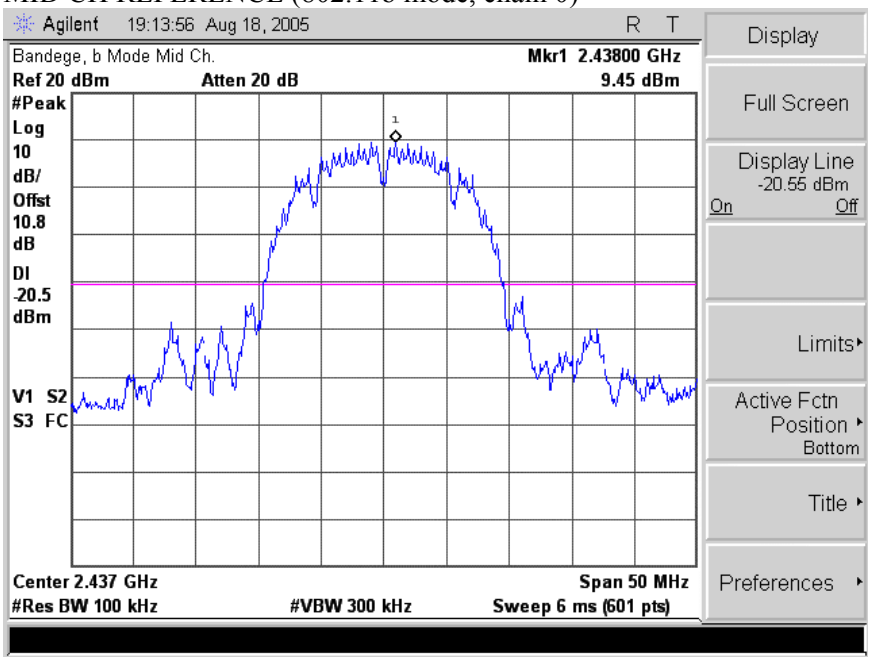


LOW CH SPURIOUS (802.11b mode, chain 0)

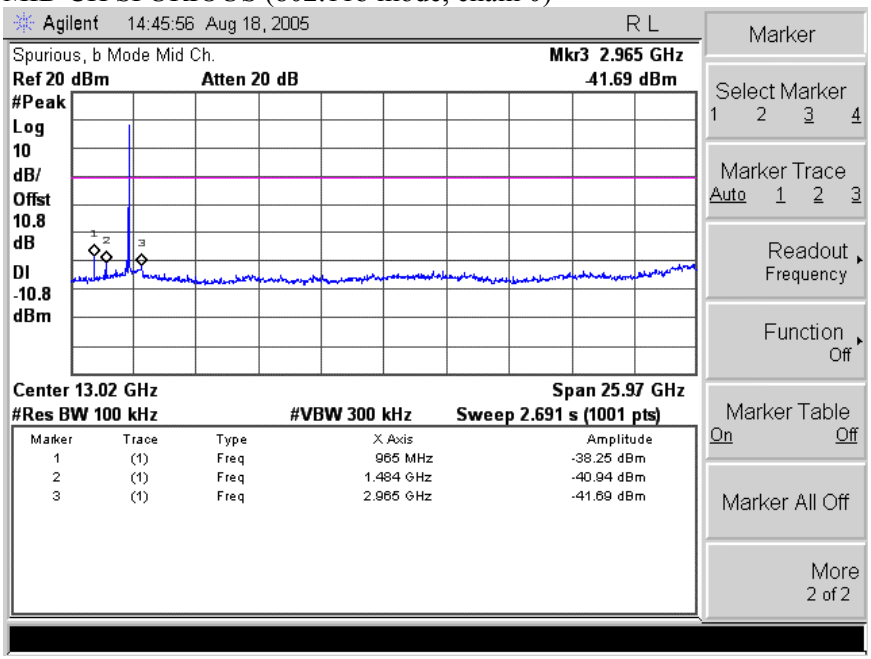


SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE, CHAIN 0)

MID CH REFERENCE (802.11b mode, chain 0)

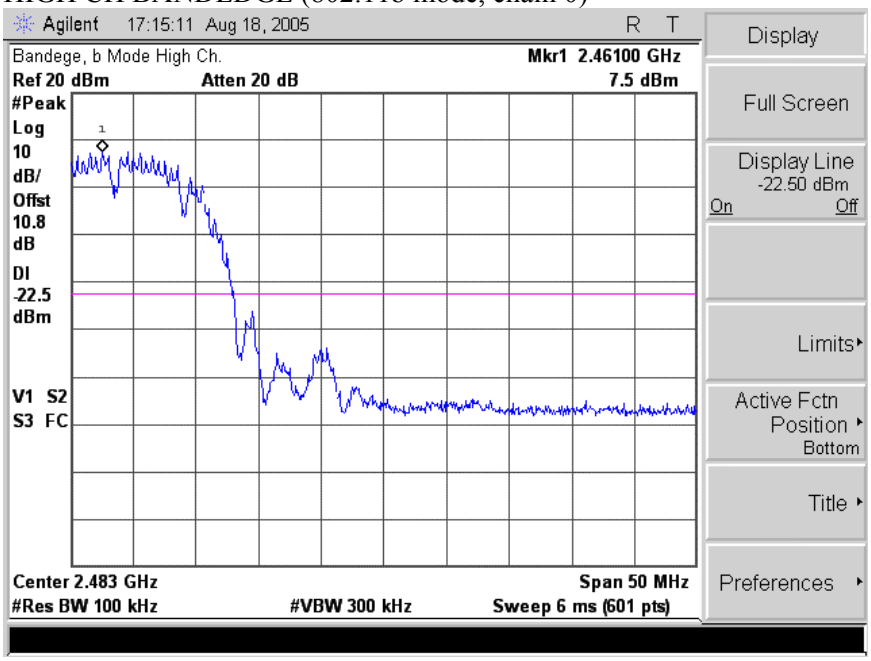


MID CH SPURIOUS (802.11b mode, chain 0)

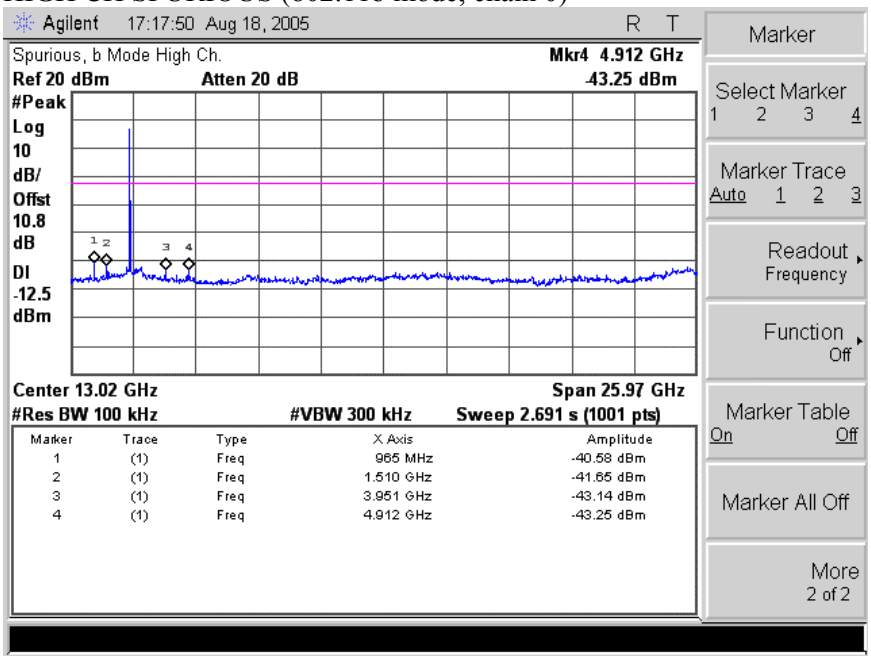


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE, CHAIN 0)

HIGH CH BANDEDGE (802.11b mode, chain 0)

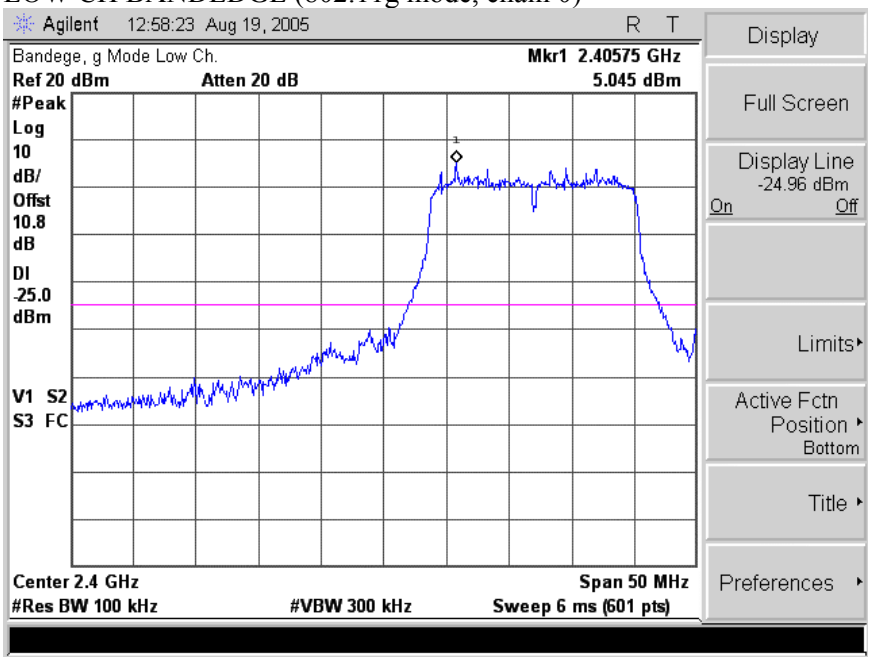


HIGH CH SPURIOUS (802.11b mode, chain 0)

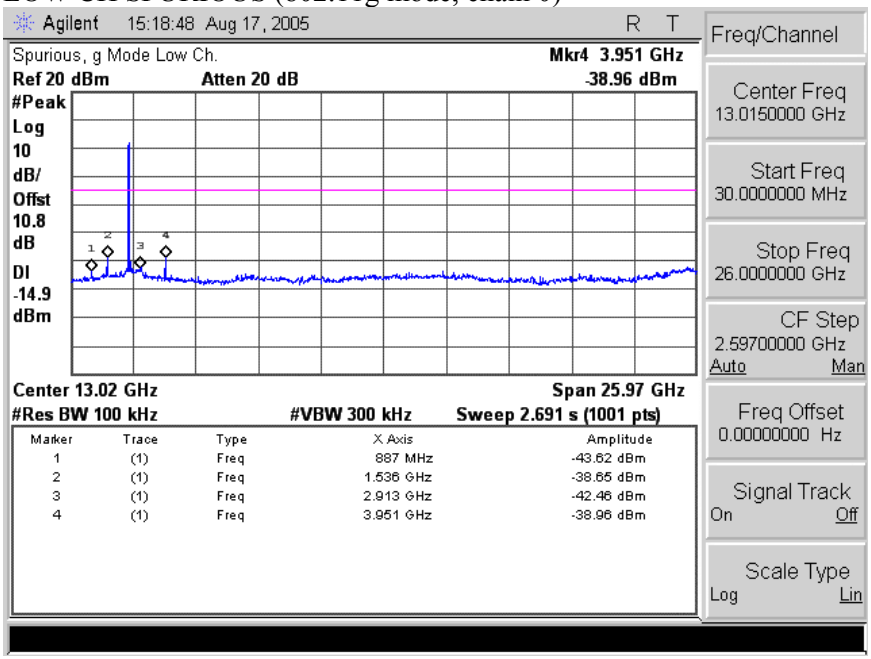


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE, CHAIN 0)

LOW CH BANDEDGE (802.11g mode, chain 0)

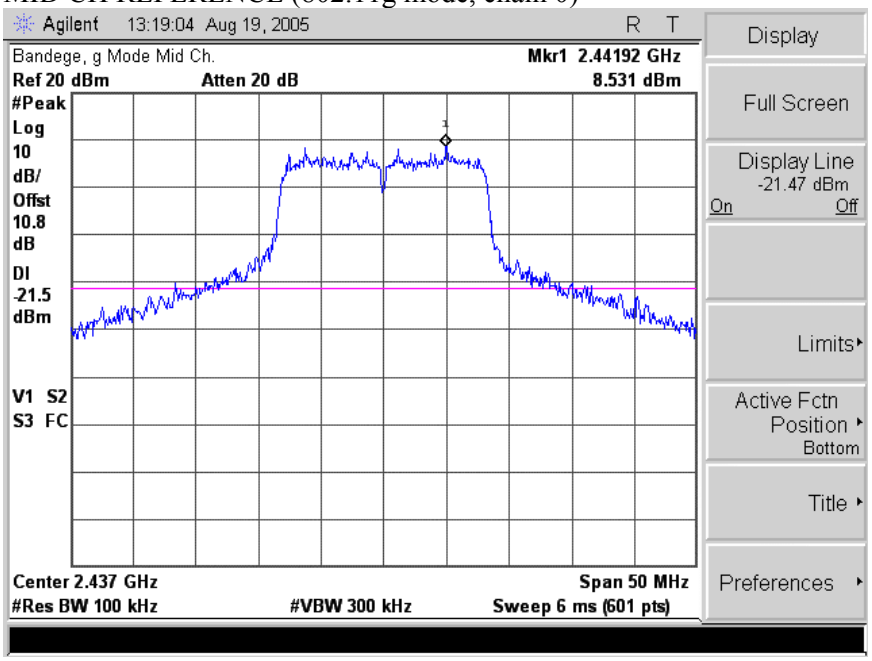


LOW CH SPURIOUS (802.11g mode, chain 0)

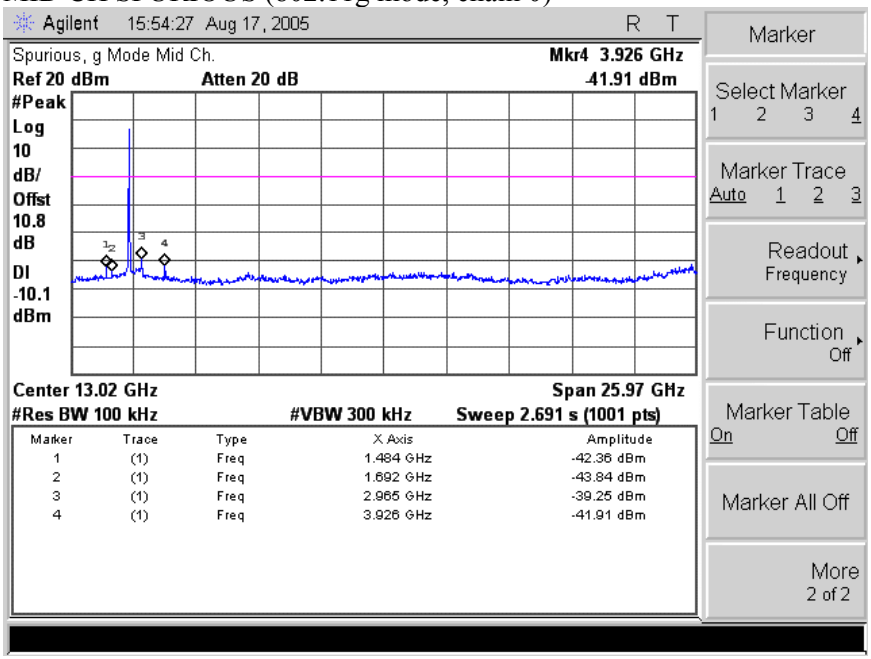


SPURIOUS EMISSIONS, MID CHANNEL (802.11g MODE, CHAIN 0)

MID CH REFERENCE (802.11g mode, chain 0)

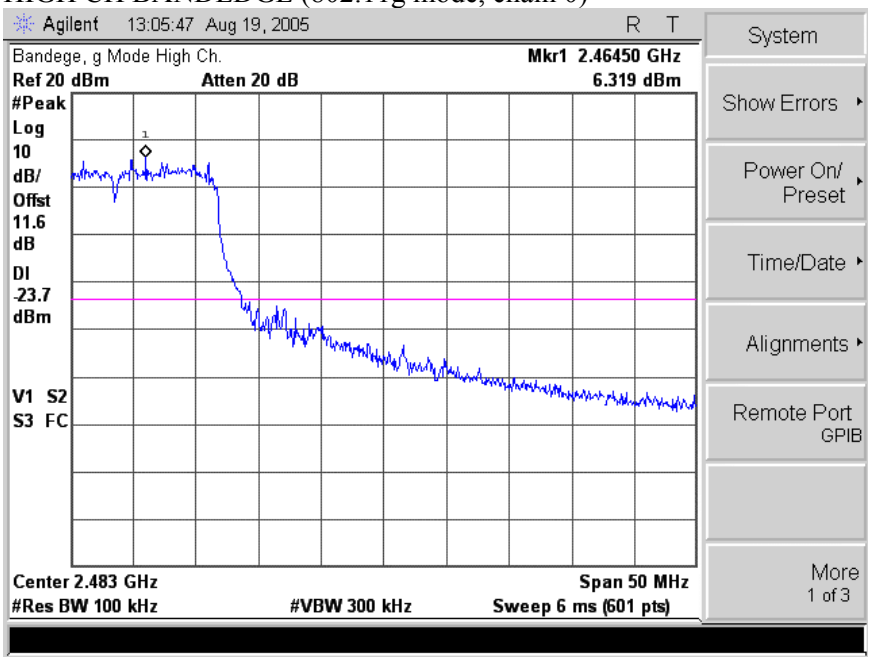


MID CH SPURIOUS (802.11g mode, chain 0)

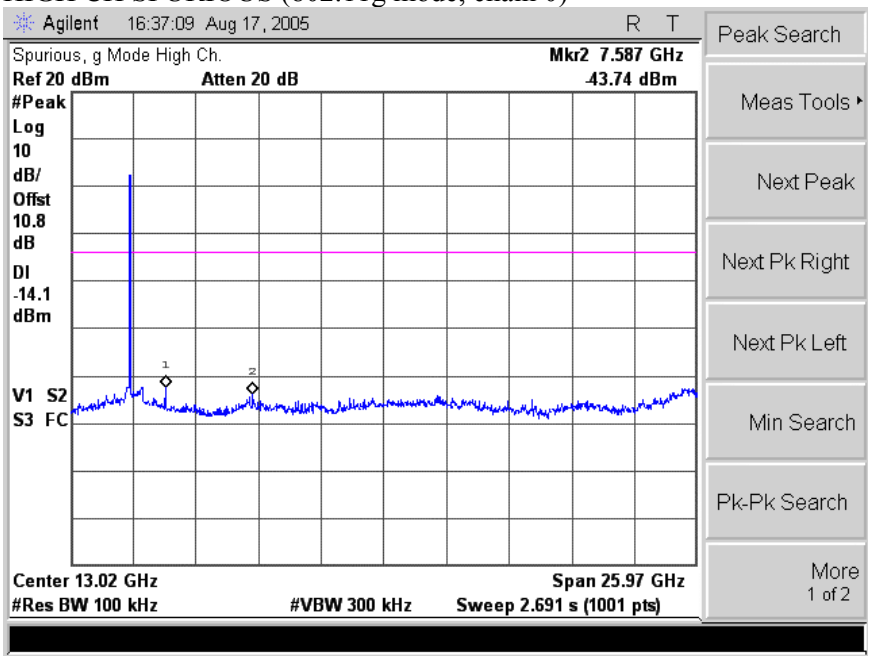


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE, CHAIN 0)

HIGH CH BANDEDGE (802.11g mode, chain 0)

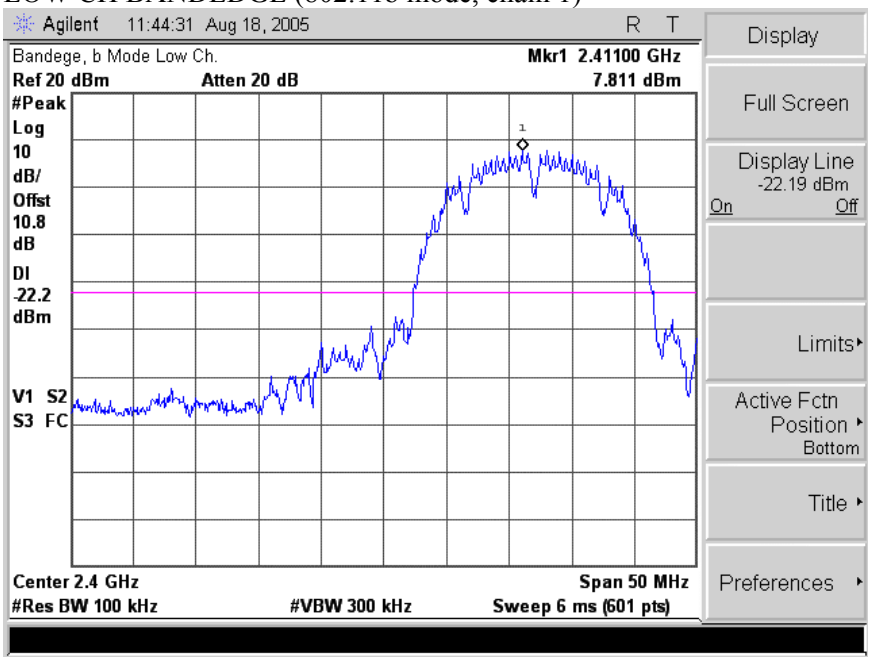


HIGH CH SPURIOUS (802.11g mode, chain 0)

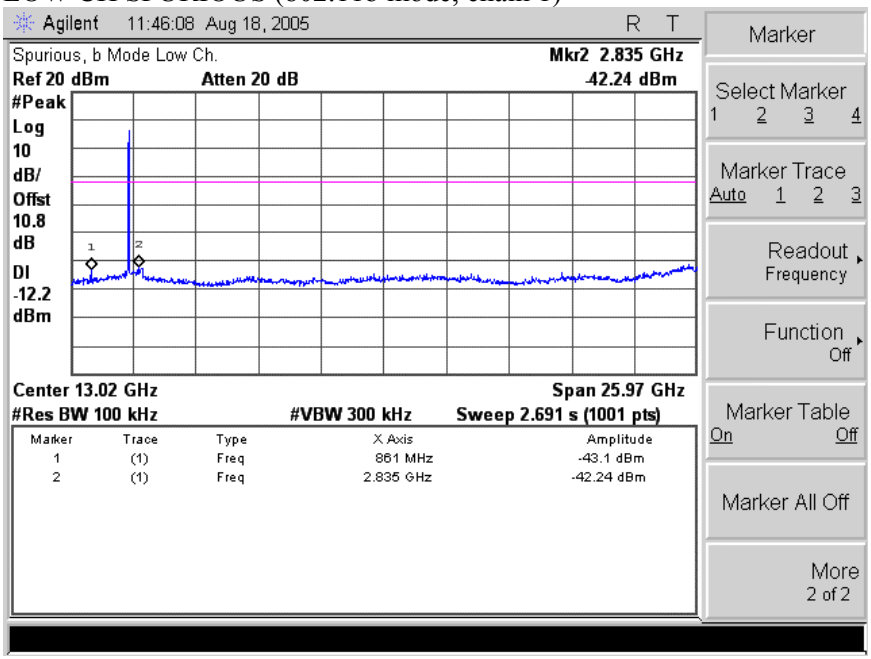


SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE, CHAIN 1

LOW CH BANDEDGE (802.11b mode, chain 1)

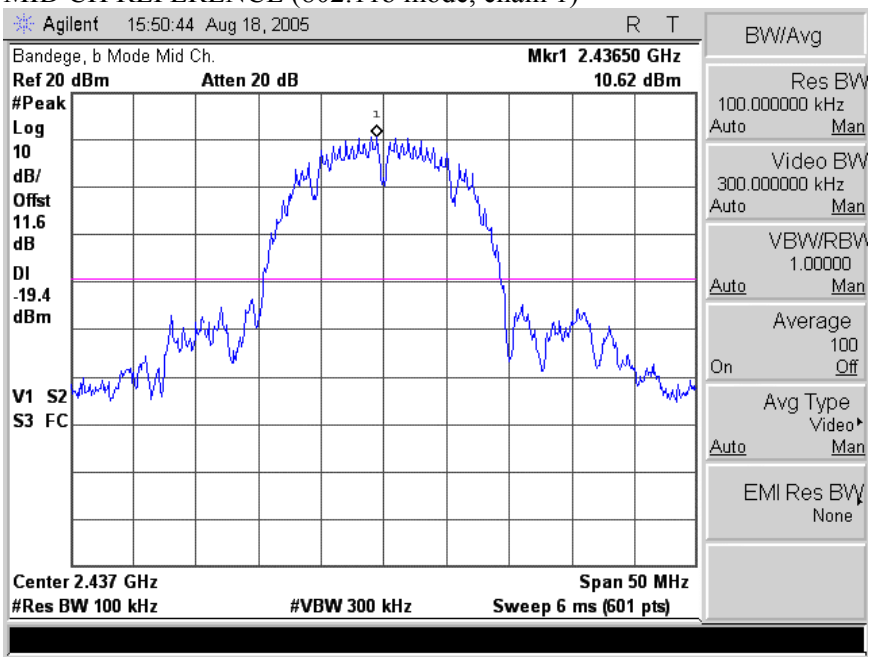


LOW CH SPURIOUS (802.11b mode, chain 1)

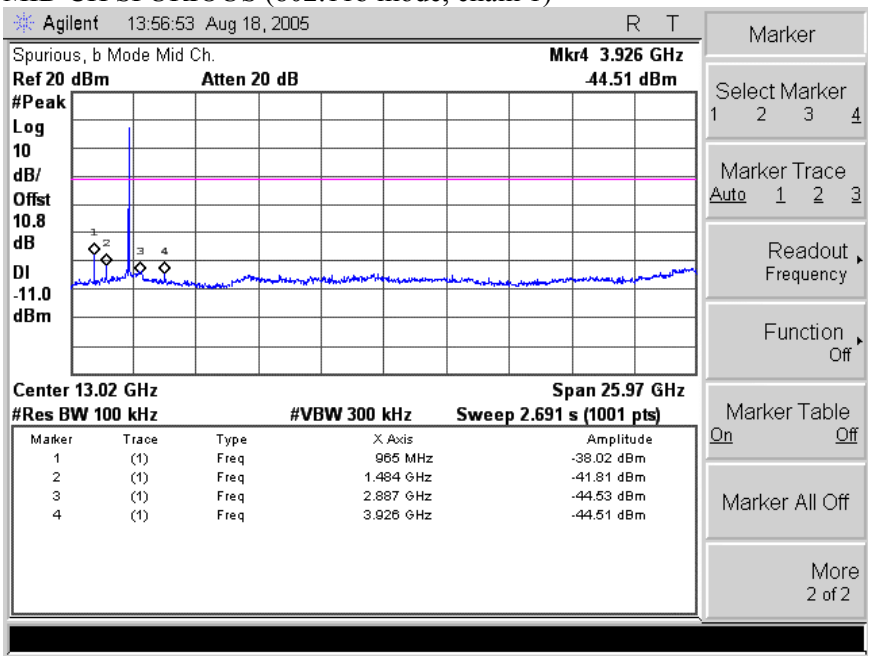


SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE, CHAIN 1)

MID CH REFERENCE (802.11b mode, chain 1)

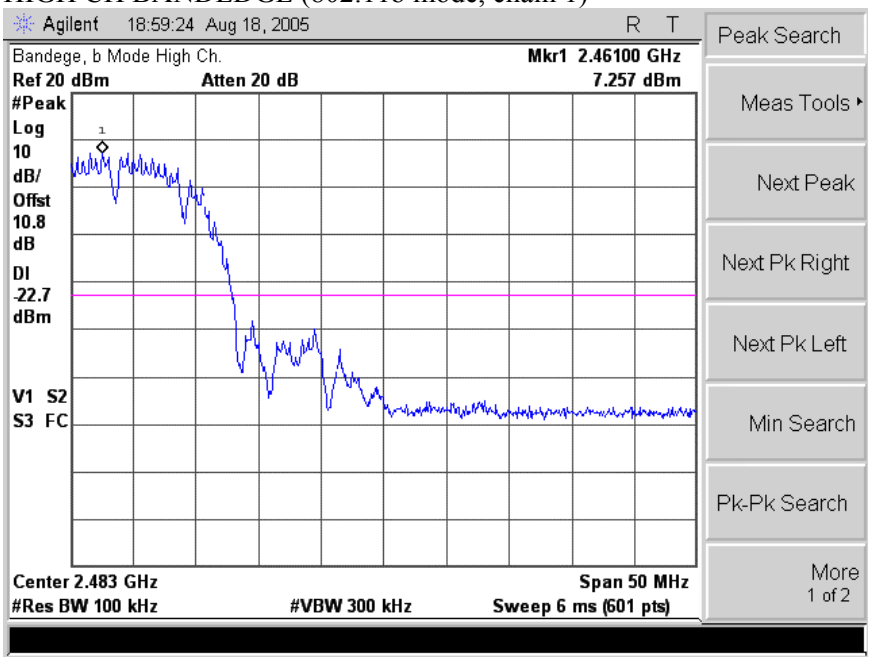


MID CH SPURIOUS (802.11b mode, chain 1)

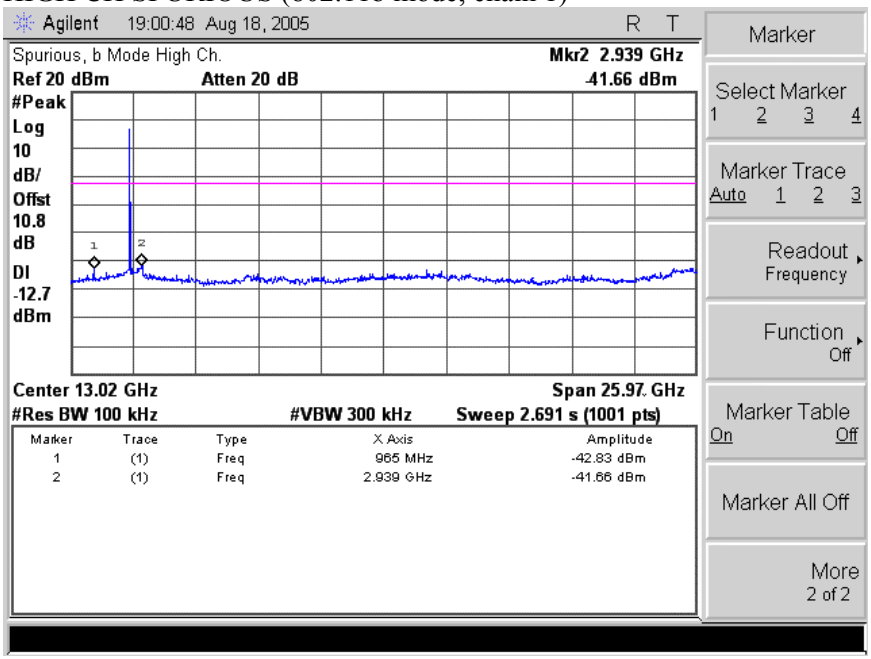


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE, CHAIN 1)

HIGH CH BANDEDGE (802.11b mode, chain 1)

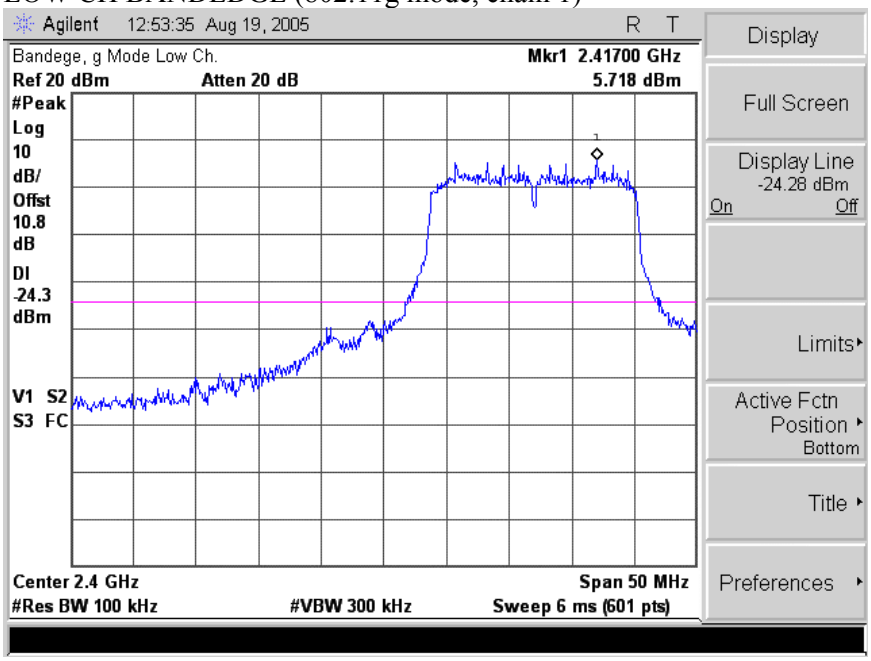


HIGH CH SPURIOUS (802.11b mode, chain 1)

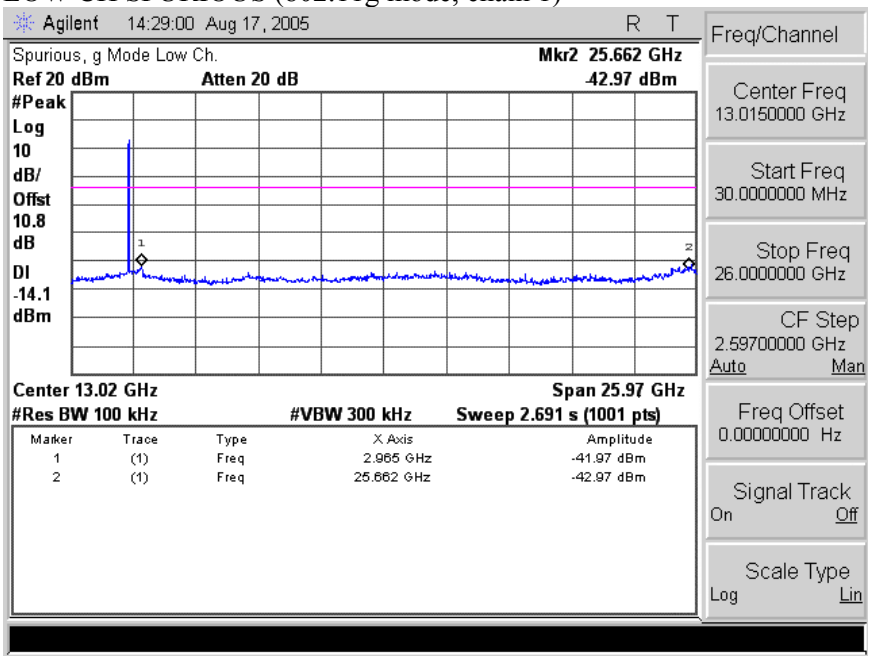


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE, CHAIN 1)

LOW CH BANDEDGE (802.11g mode, chain 1)

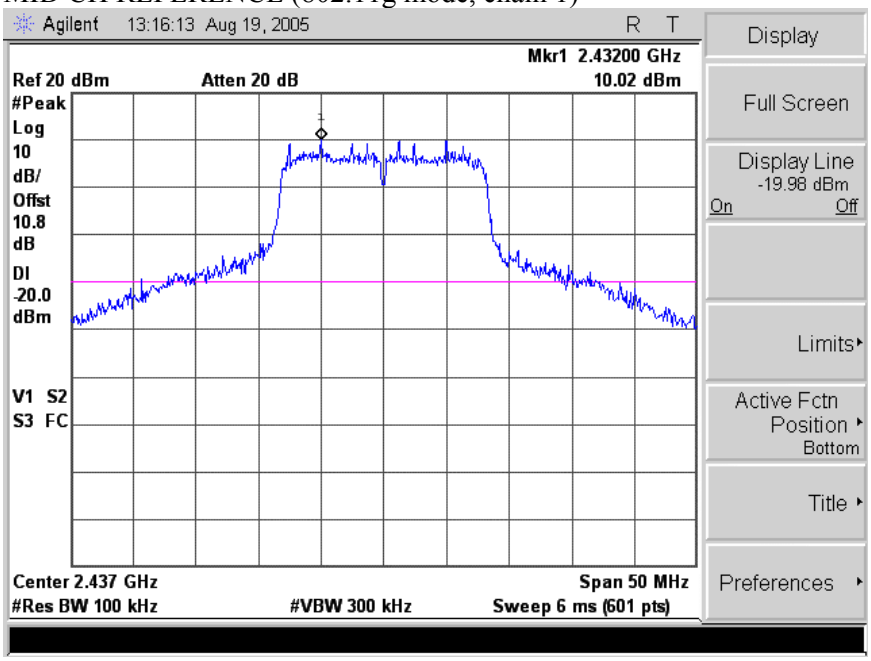


LOW CH SPURIOUS (802.11g mode, chain 1)

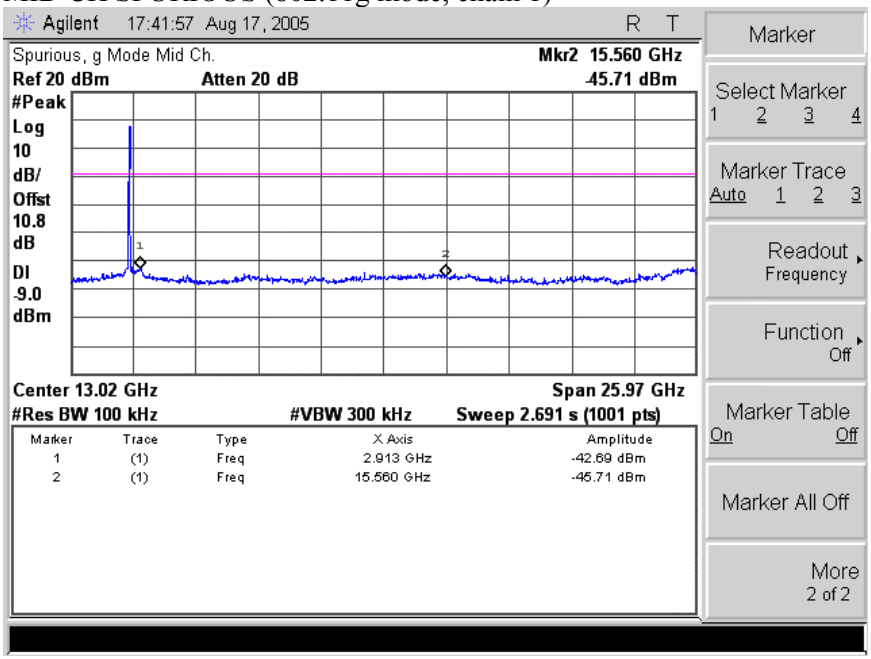


SPURIOUS EMISSIONS, MID CHANNEL (802.11g MODE, CHAIN 1)

MID CH REFERENCE (802.11g mode, chain 1)

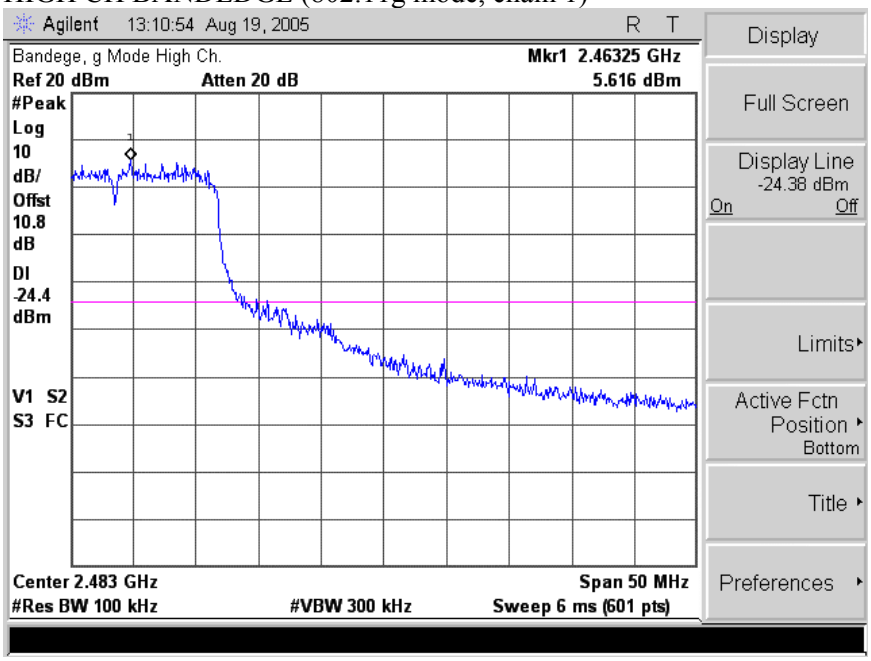


MID CH SPURIOUS (802.11g mode, chain 1)

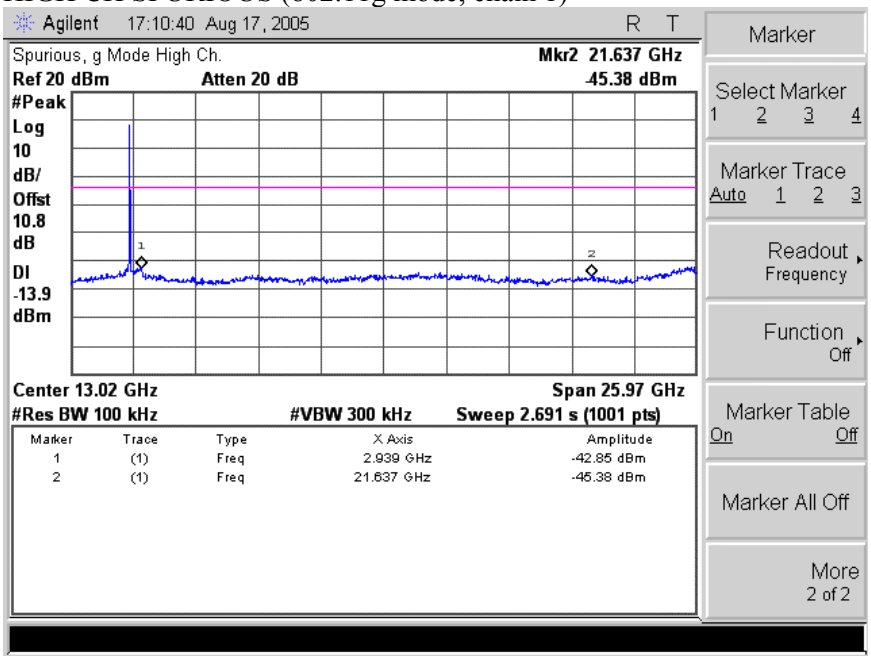


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE, CHAIN 1)

HIGH CH BANDEDGE (802.11g mode, chain 1)

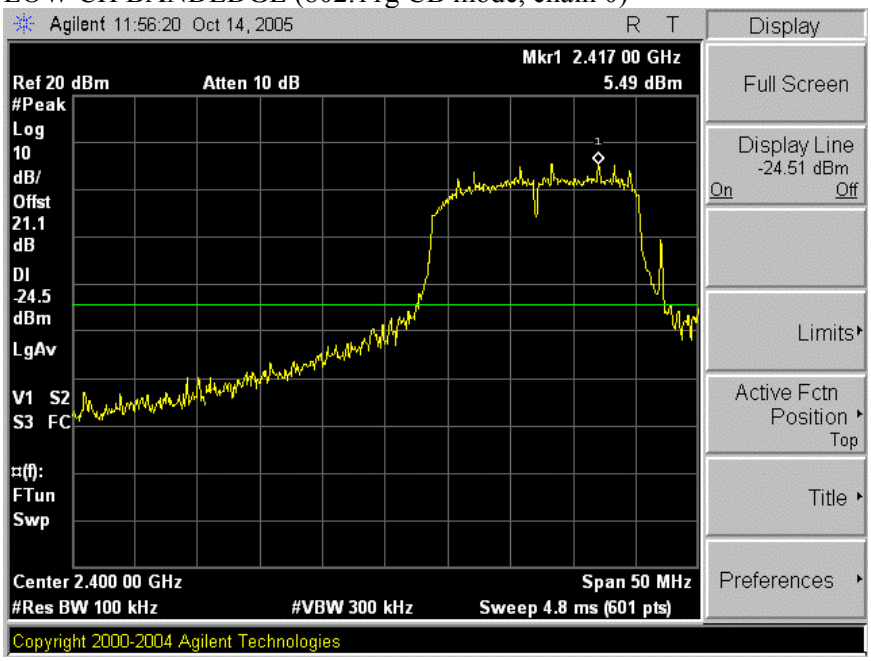


HIGH CH SPURIOUS (802.11g mode, chain 1)

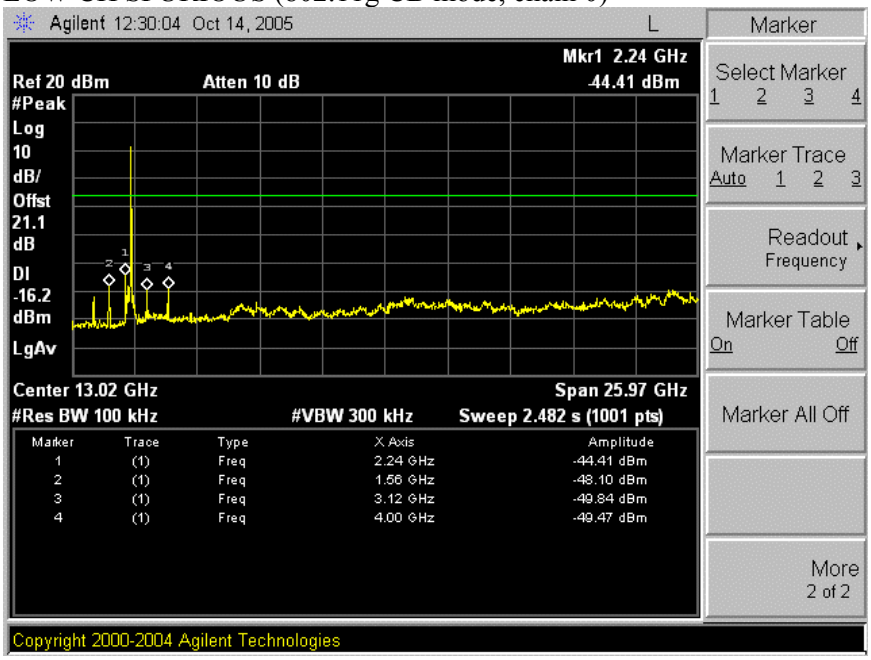


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g CHANNEL BOND MODE, CHAIN 0)

LOW CH BANDEDGE (802.11g CB mode, chain 0)

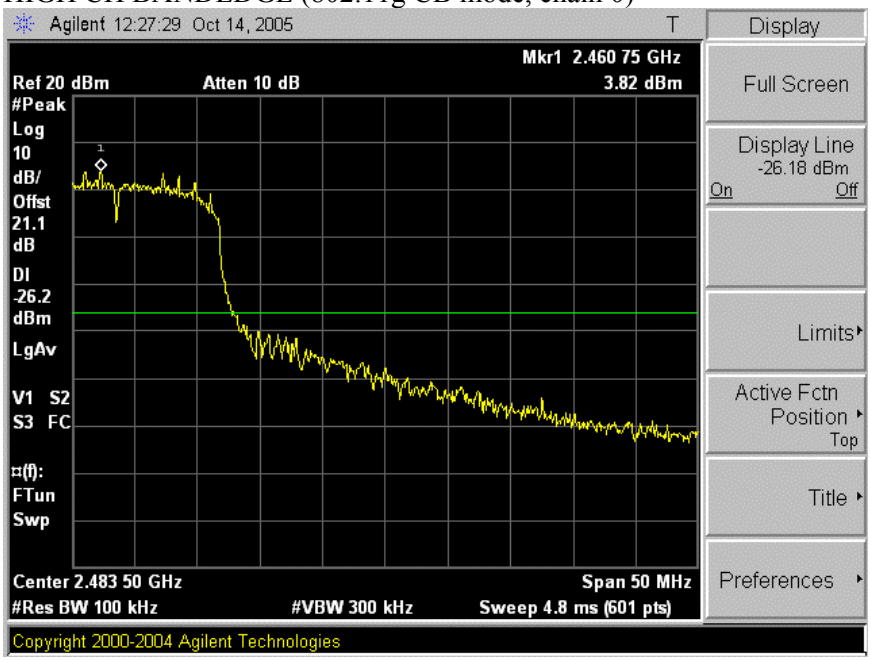


LOW CH SPURIOUS (802.11g CB mode, chain 0)

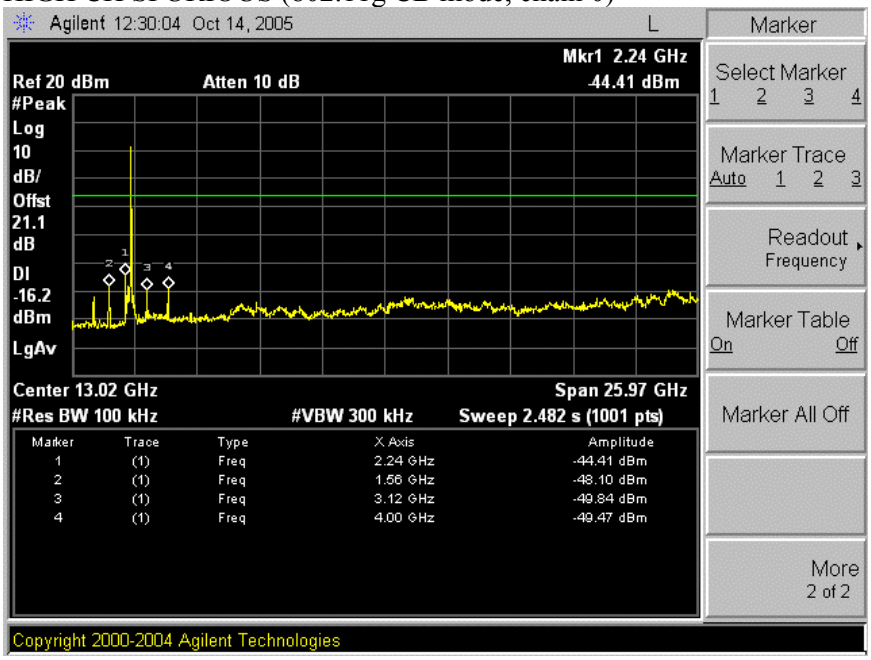


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g CHANNEL BOND MODE, CHAIN 0)

HIGH CH BANDEDGE (802.11g CB mode, chain 0)

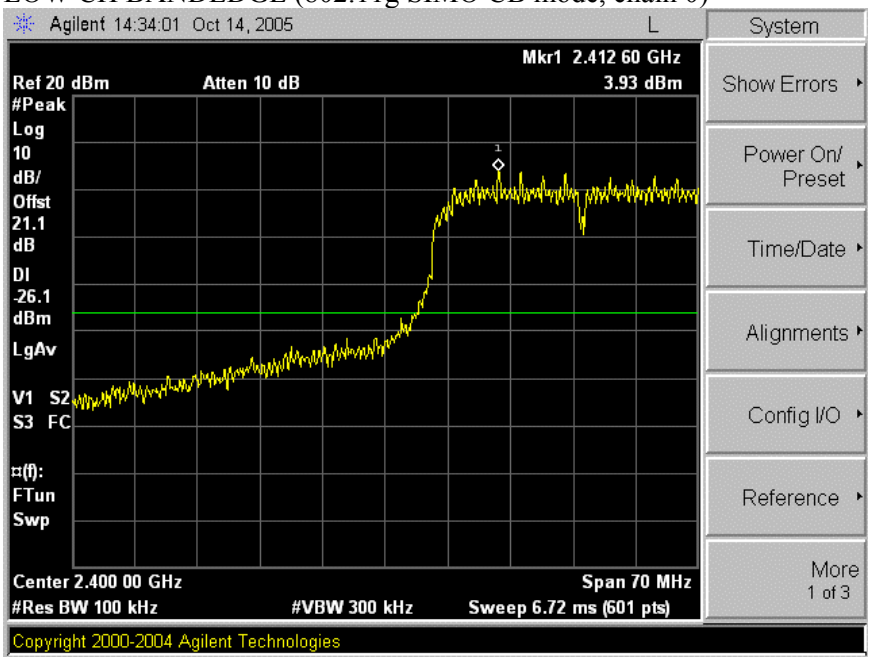


HIGH CH SPURIOUS (802.11g CB mode, chain 0)

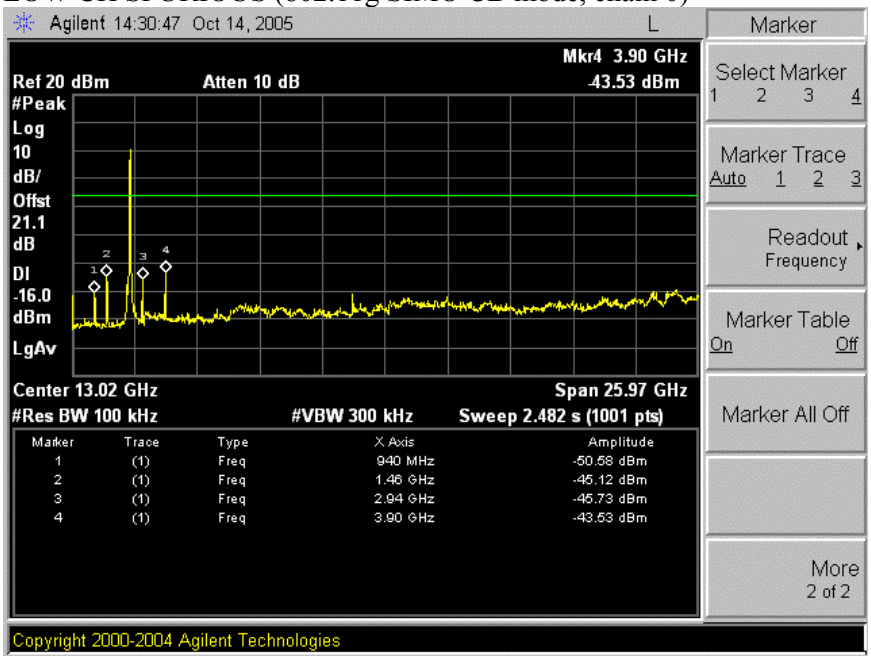


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g SIMO CB MODE, CHAIN 0)

LOW CH BANDEDGE (802.11g SIMO CB mode, chain 0)

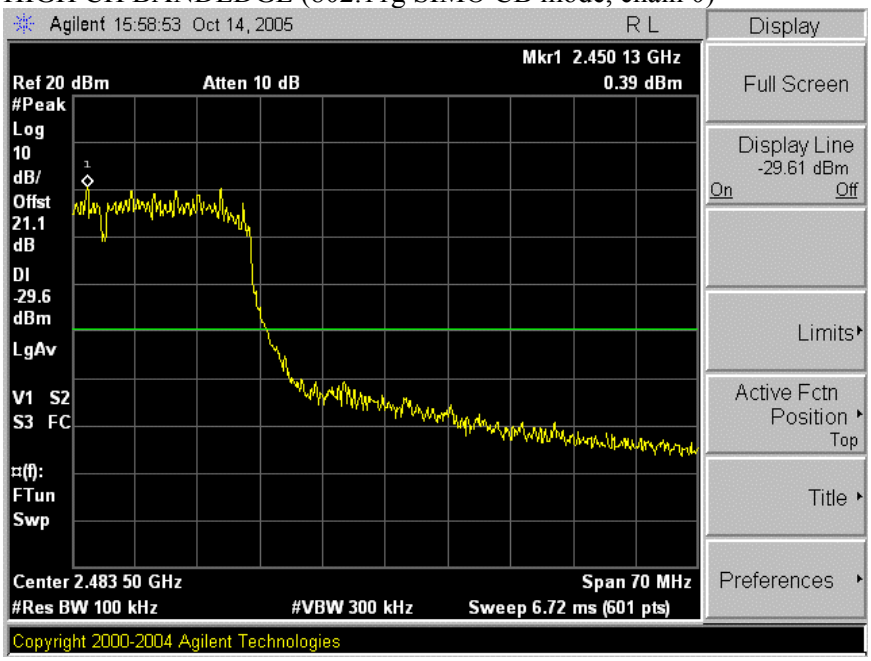


LOW CH SPURIOUS (802.11g SIMO CB mode, chain 0)

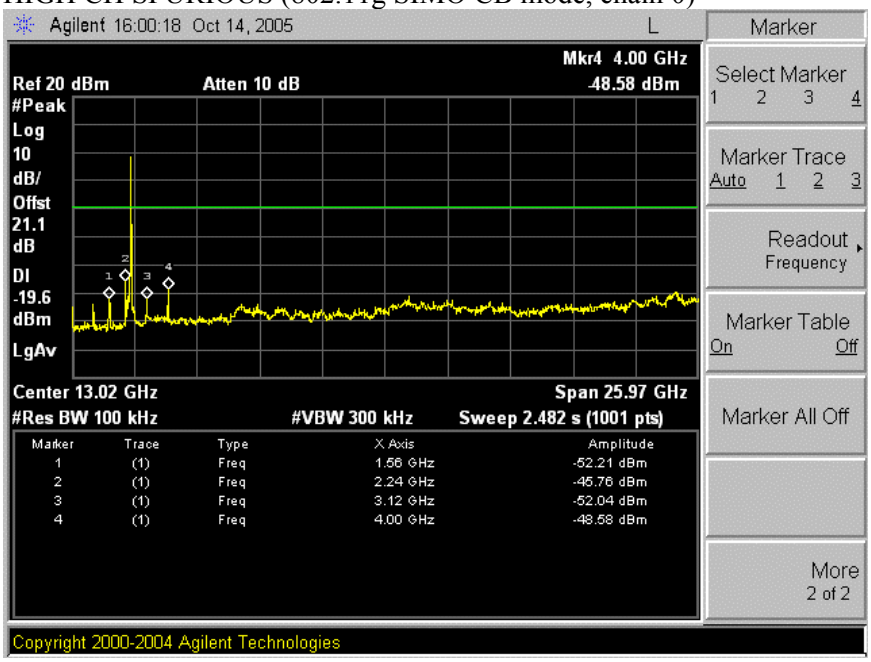


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g SIMO CHANNEL BOND MODE, CHAIN 0)

HIGH CH BANDEDGE (802.11g SIMO CB mode, chain 0)

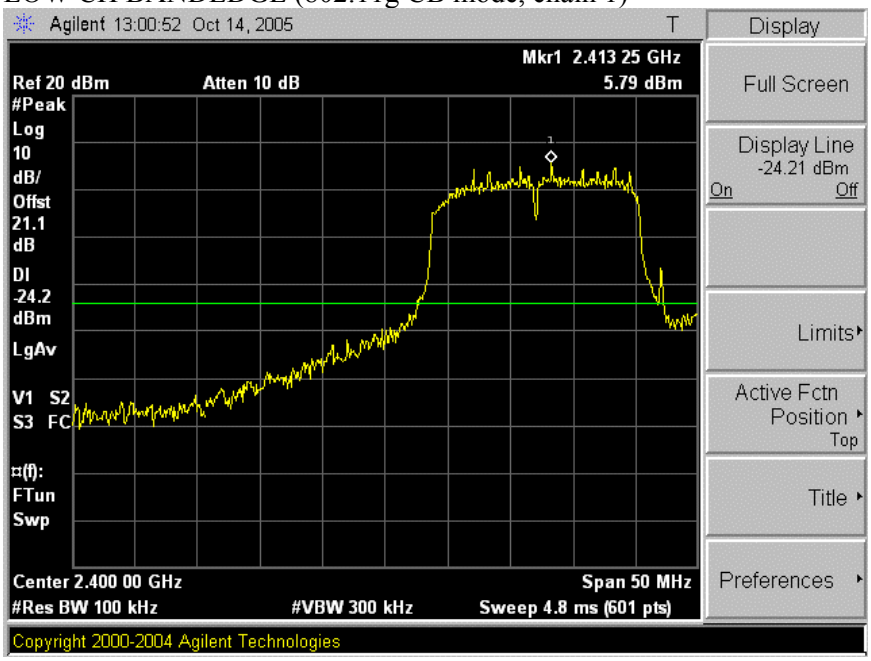


HIGH CH SPURIOUS (802.11g SIMO CB mode, chain 0)

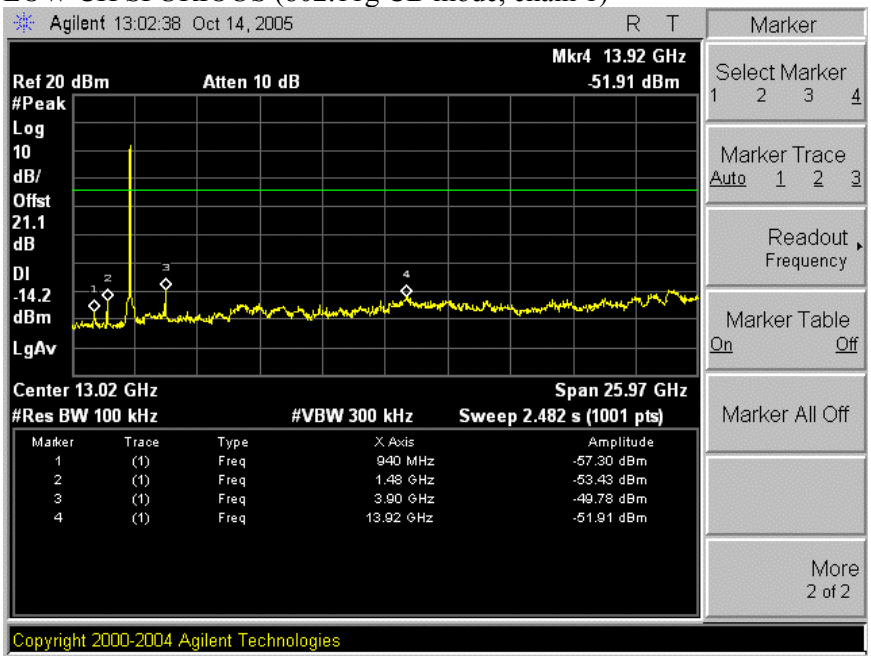


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g CHANNEL BOND MODE, CHAIN 1)

LOW CH BANDEDGE (802.11g CB mode, chain 1)

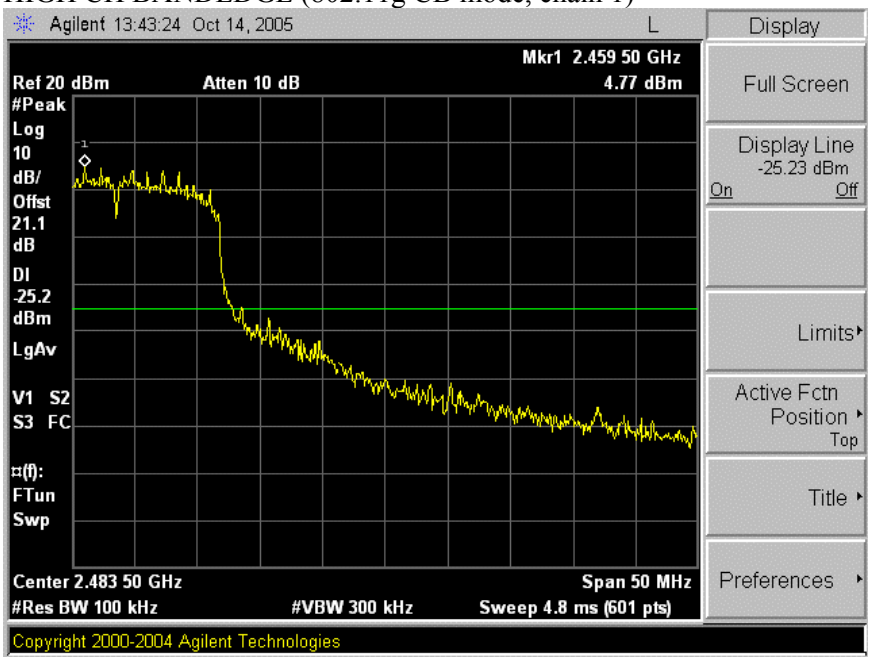


LOW CH SPURIOUS (802.11g CB mode, chain 1)

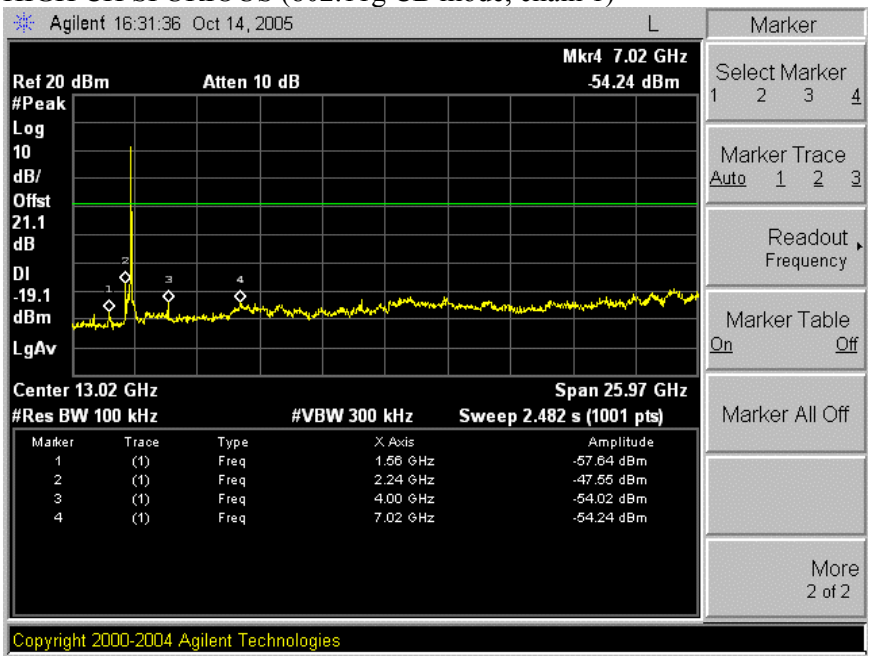


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g CHANNEL BOND MODE, CHAIN 1)

HIGH CH BANDEDGE (802.11g CB mode, chain 1)

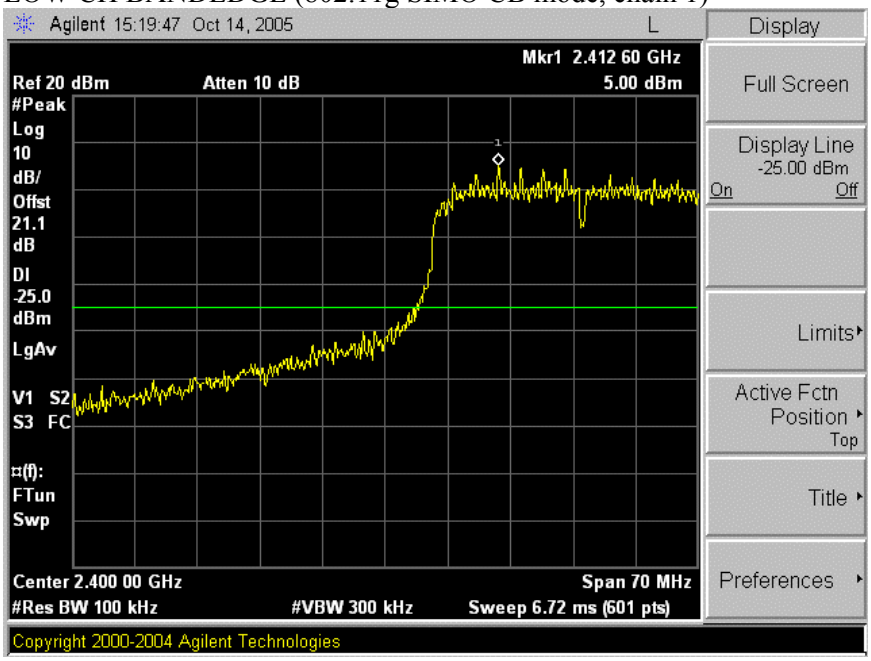


HIGH CH SPURIOUS (802.11g CB mode, chain 1)

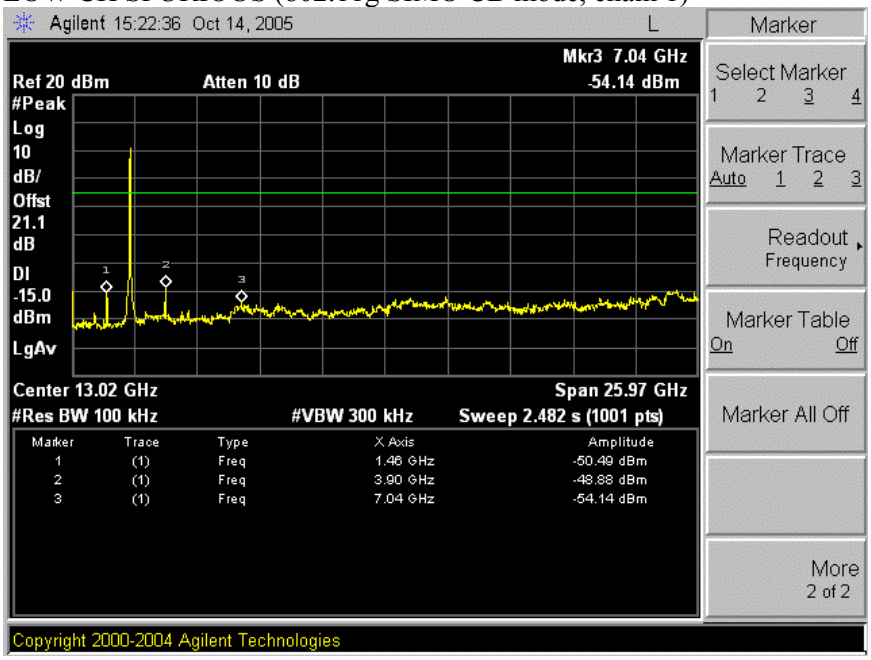


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

LOW CH BANDEDGE (802.11g SIMO CB mode, chain 1)

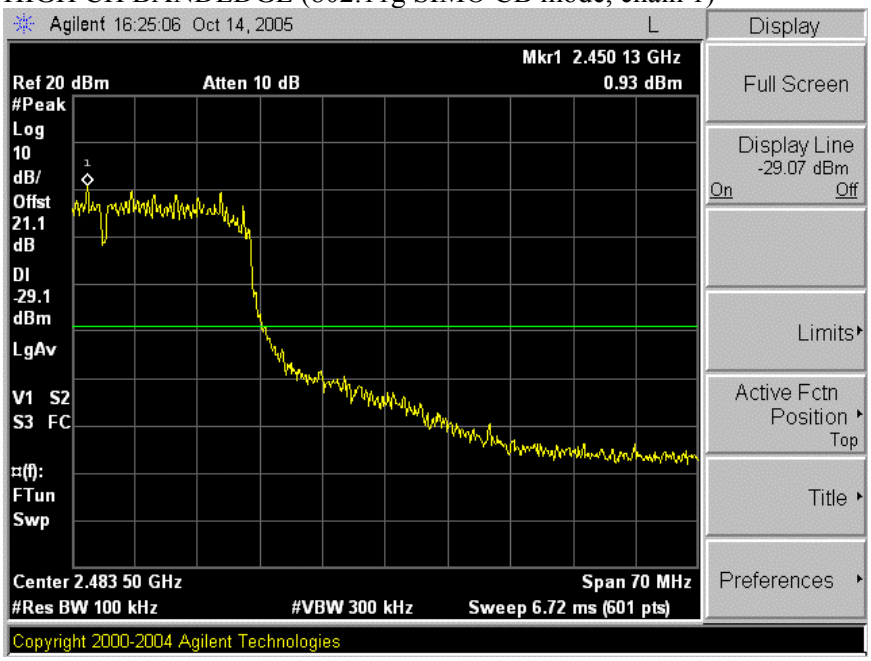


LOW CH SPURIOUS (802.11g SIMO CB mode, chain 1)

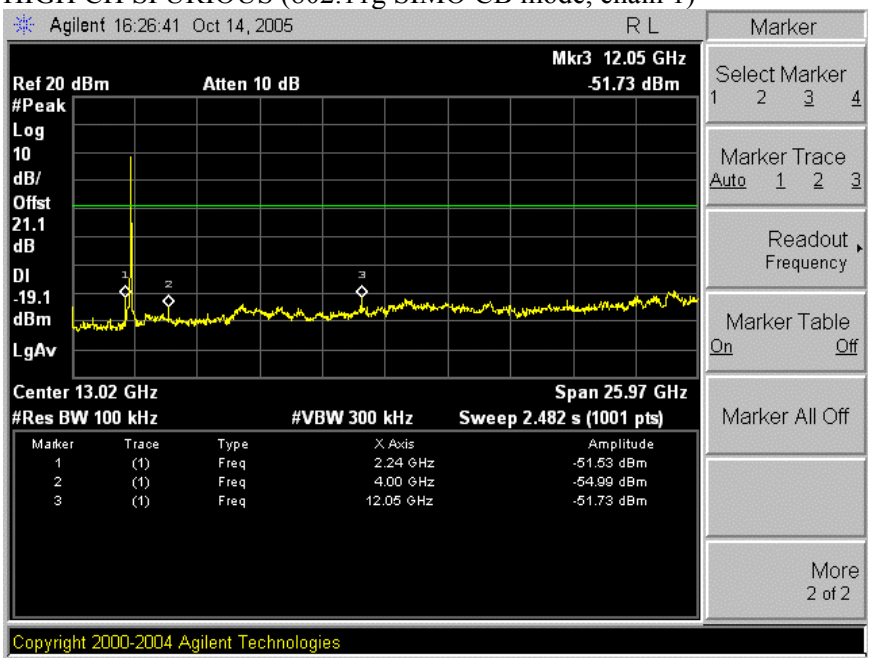


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

HIGH CH BANDEDGE (802.11g SIMO CB mode, chain 1)



HIGH CH SPURIOUS (802.11g SIMO CB mode, chain 1)



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.

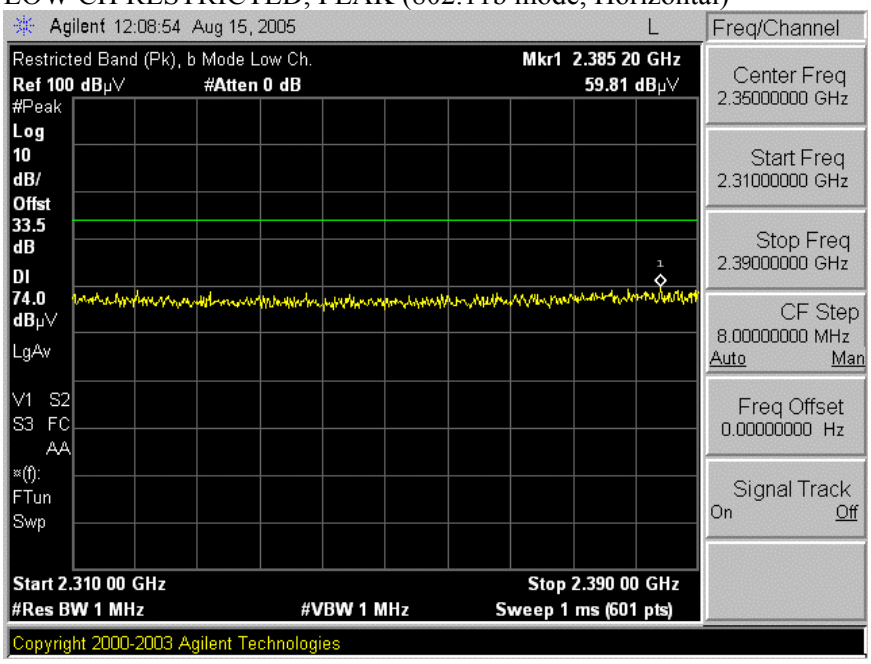
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

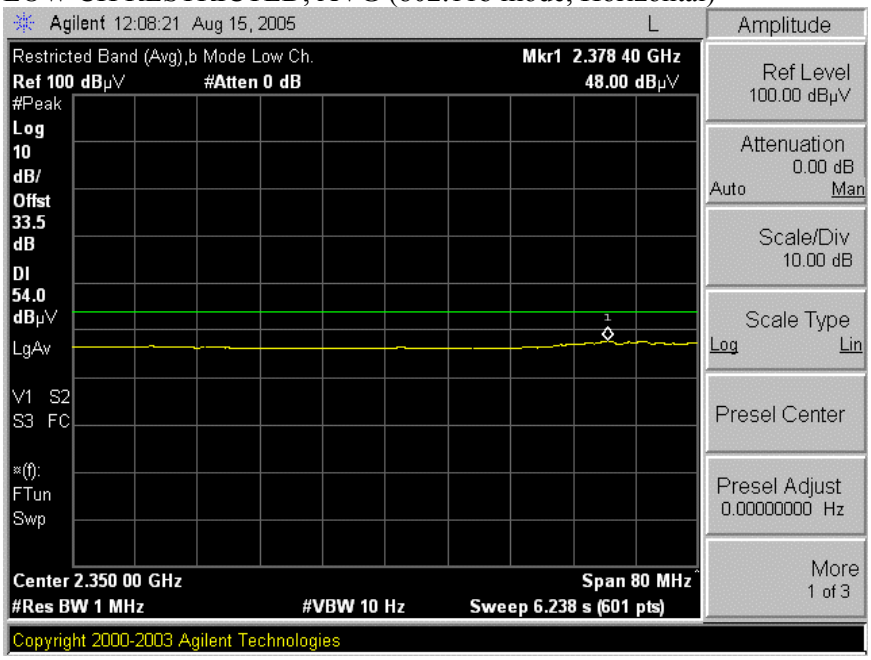
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11b mode, Horizontal)

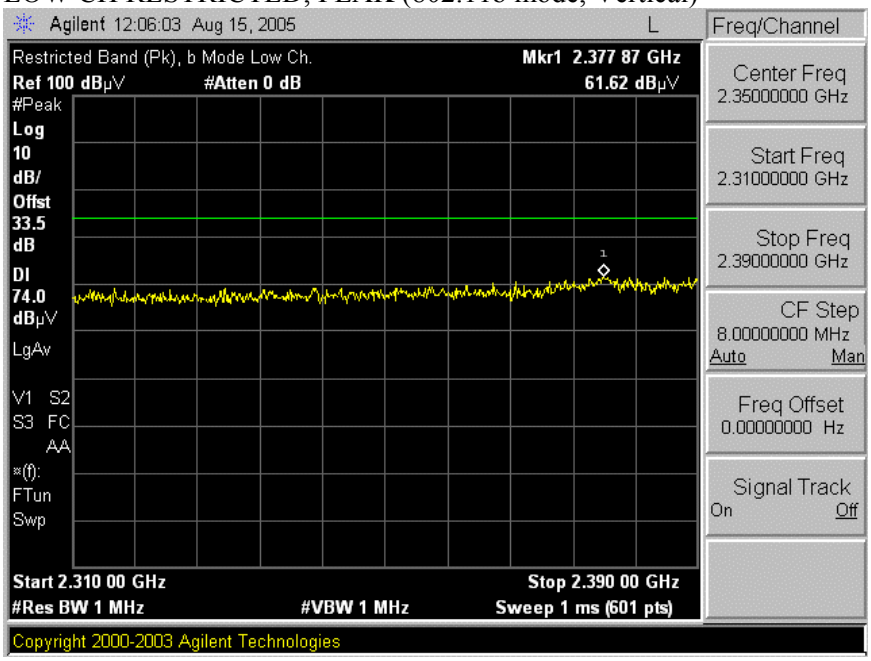


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

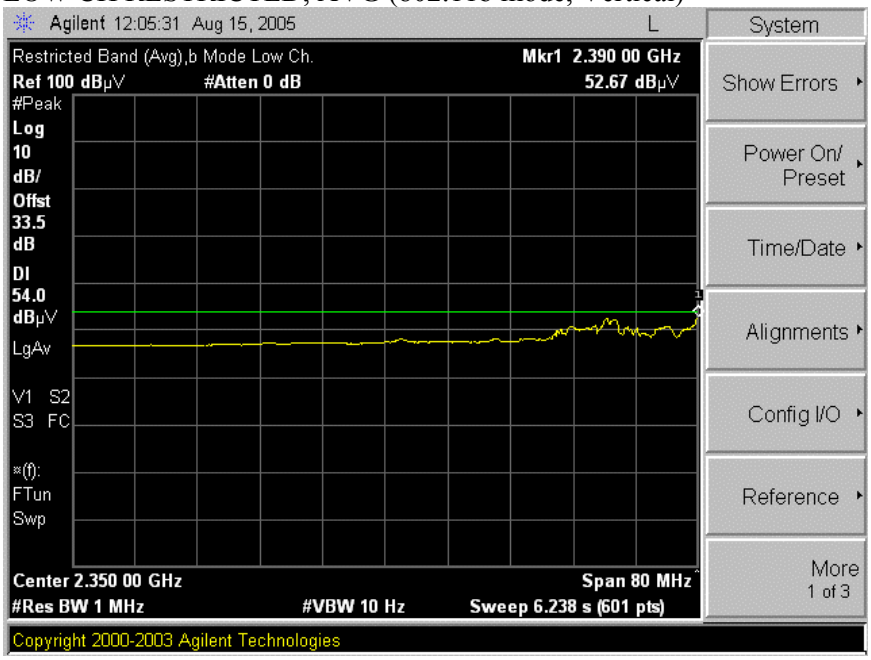


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

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

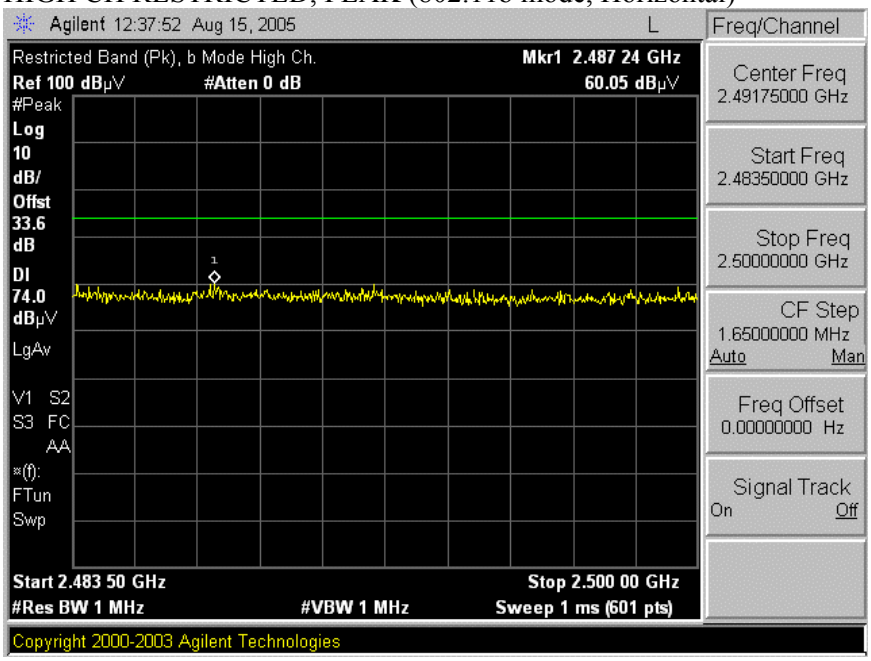


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

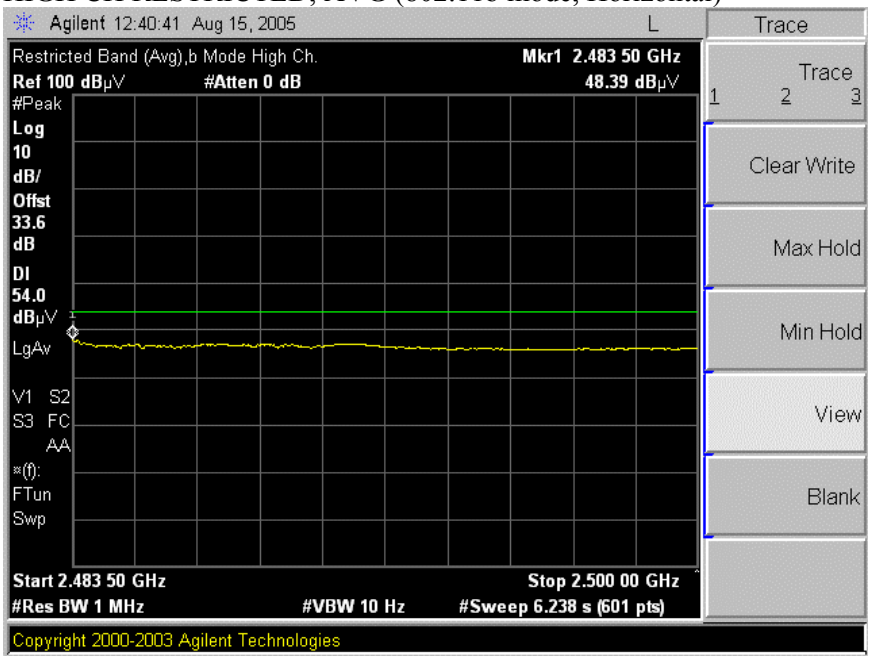


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

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

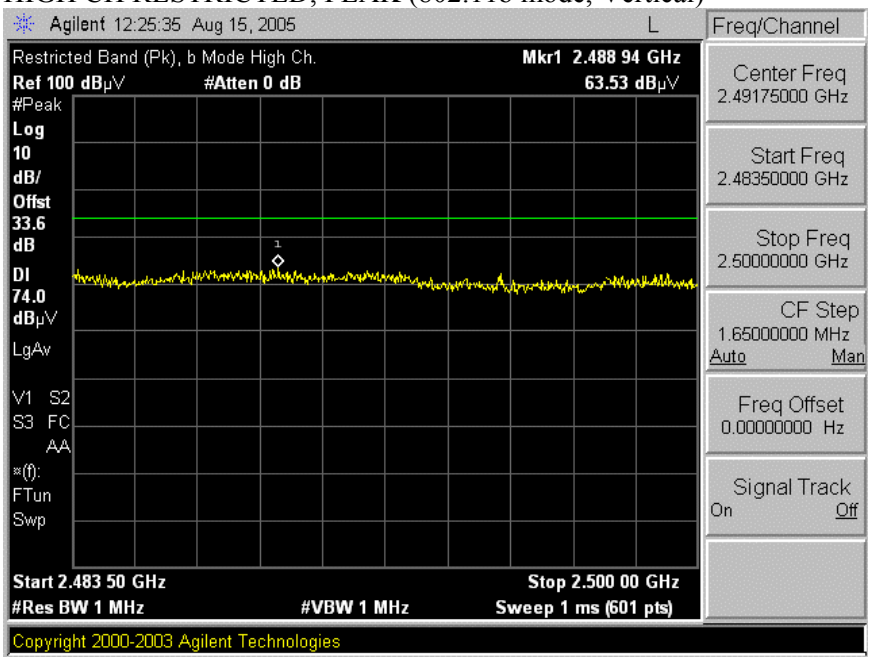


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

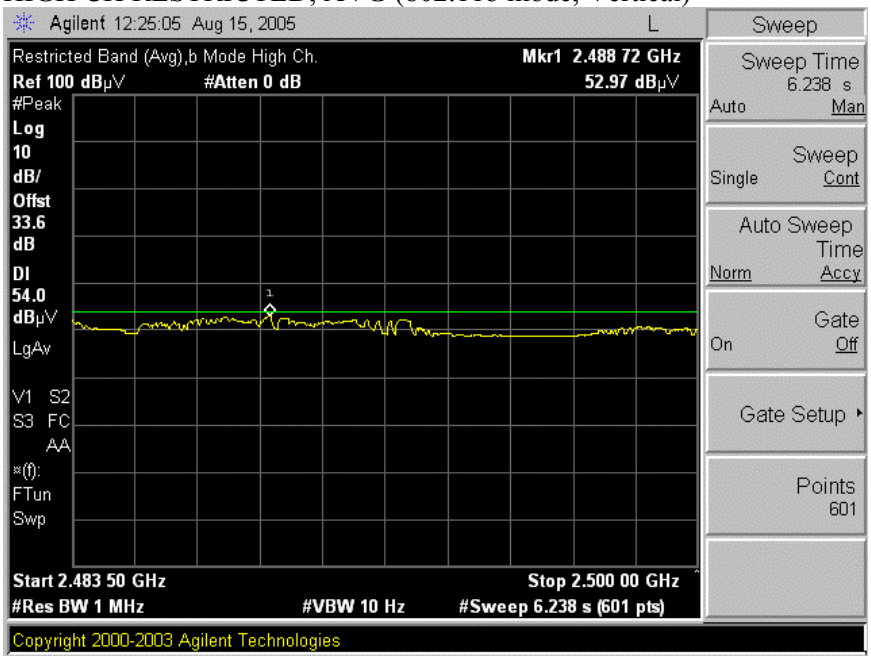


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

08/15/05 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Joseph Chung
Project #:05U3625
Company: Airgo
EUT Descrip.: MIMO APX
EUT M/N: AGN3023MX-01
Test Target: FCC 15.205
Mode Oper: TX
Average Power Meter: Low = 17 dBm, Mid = 19 dBm, High = 19 dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T86 Miteq 924341			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_David	3_David		12_Vien	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

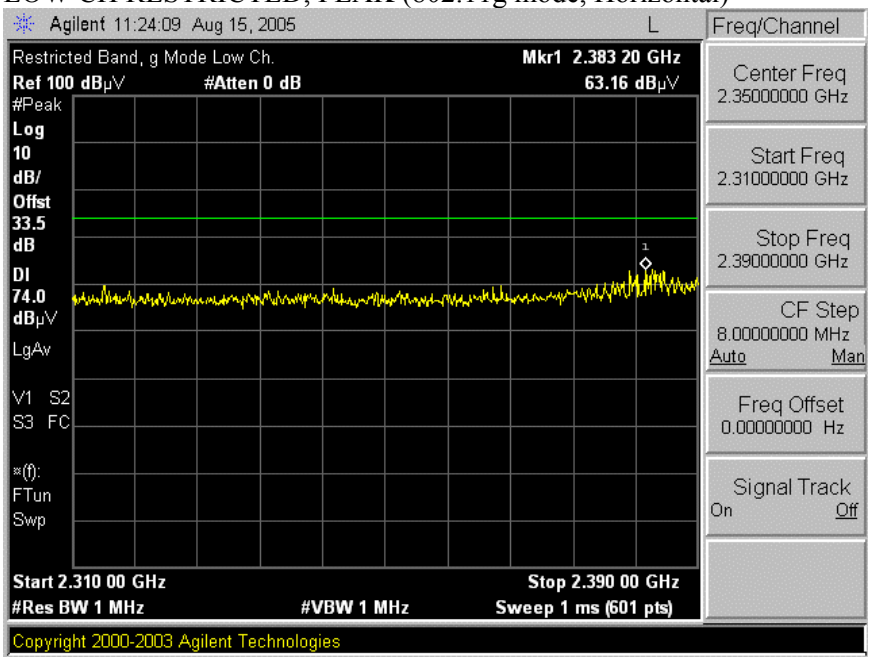
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Ch low, b mode															
4.824	3.0	50.7	48.0	34.0	3.7	-33.6	0.0	0.6	55.5	52.8	74.0	54.0	-18.5	-1.2	V
12.060	3.0	39.8	28.8	38.4	6.5	-33.5	0.0	0.9	52.2	41.2	74.0	54.0	-21.8	-12.8	V
14.472	3.0	40.8	28.8	39.4	6.4	-32.8	0.0	0.9	54.8	42.8	74.0	54.0	-19.2	-11.2	V
4.824	3.0	45.8	40.5	34.0	3.7	-33.6	0.0	0.6	50.6	45.3	74.0	54.0	-23.4	-8.7	H
12.060	3.0	39.6	28.0	38.4	6.5	-33.5	0.0	0.9	52.0	40.4	74.0	54.0	-22.0	-13.6	H
Mid Ch, b mode															
4.874	3.0	44.5	39.1	34.1	3.8	-33.5	0.0	0.6	49.4	44.0	74.0	54.0	-24.6	-10.0	H
7.311	3.0	41.0	30.1	35.6	4.3	-33.3	0.0	0.6	48.3	37.4	74.0	54.0	-25.7	-16.6	H
12.185	3.0	40.9	28.9	38.5	6.5	-33.4	0.0	0.9	53.4	41.3	74.0	54.0	-20.6	-12.7	H
4.874	3.0	51.2	49.0	34.1	3.8	-33.5	0.0	0.6	56.1	53.9	74.0	54.0	-17.9	-0.1	V
7.311	3.0	46.0	40.5	35.6	4.3	-33.3	0.0	0.6	53.2	47.8	74.0	54.0	-20.8	-6.3	V
High Ch, b mode															
4.924	3.0	50.4	47.6	34.1	3.8	-33.5	0.0	0.6	55.3	52.6	74.0	54.0	-18.7	-1.4	V
7.386	3.0	49.4	43.9	35.7	4.3	-33.3	0.0	0.6	56.7	51.2	74.0	54.0	-17.3	-2.8	V
12.310	3.0	41.1	29.2	38.5	6.5	-33.4	0.0	0.9	53.6	41.7	74.0	54.0	-20.4	-12.3	V
4.924	3.0	44.5	39.3	34.1	3.8	-33.5	0.0	0.6	49.5	44.3	74.0	54.0	-24.5	-9.7	H
7.386	3.0	45.5	38.5	35.7	4.3	-33.3	0.0	0.6	52.8	45.9	74.0	54.0	-21.2	-8.1	H

Note: No other emissions detected above noise floor.

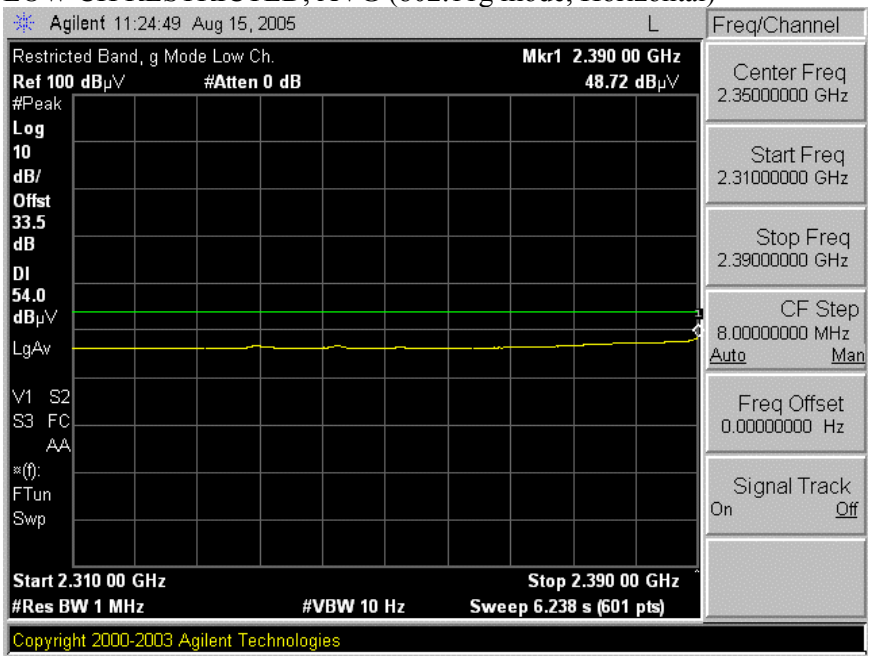
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

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

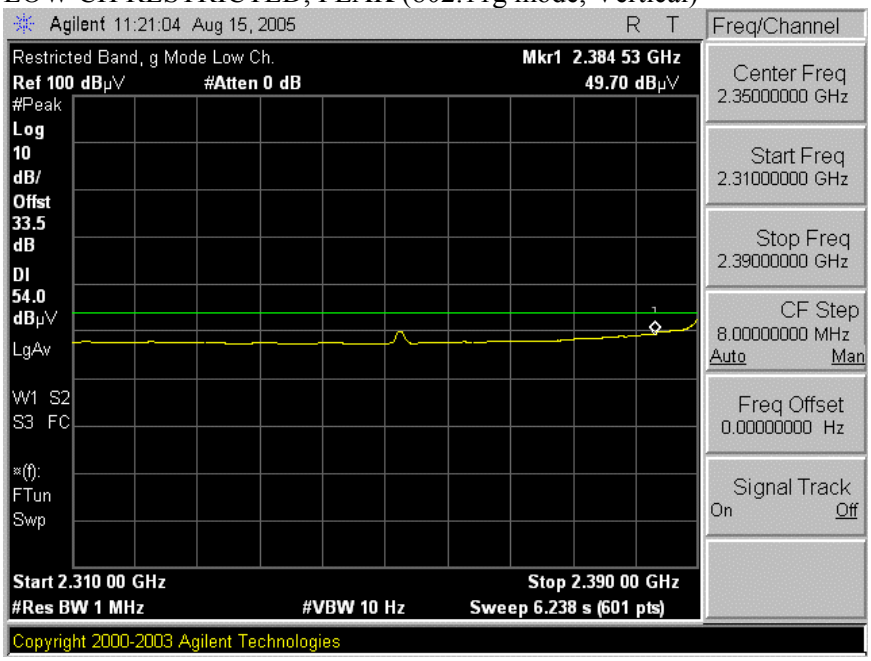


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

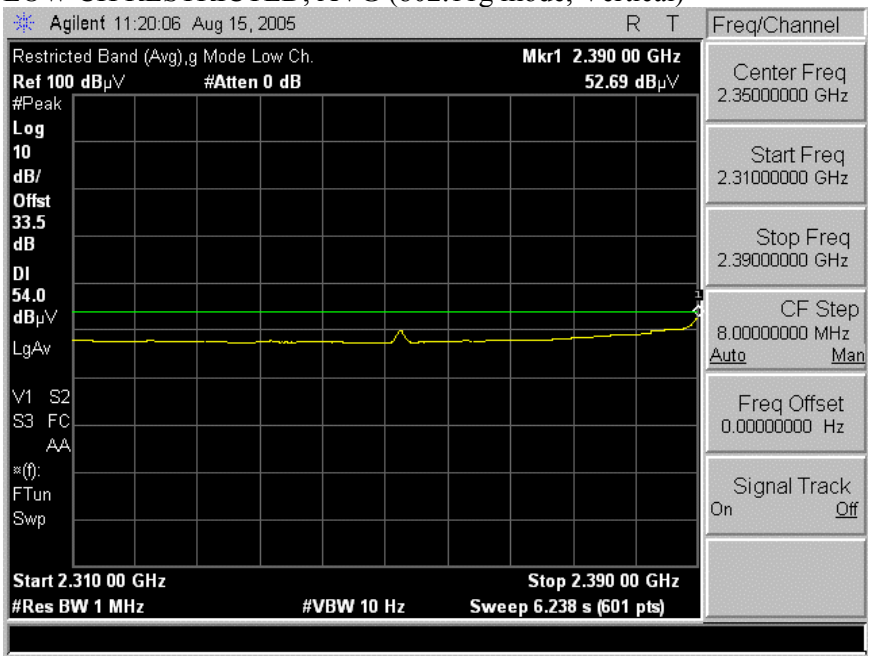


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Vertical)

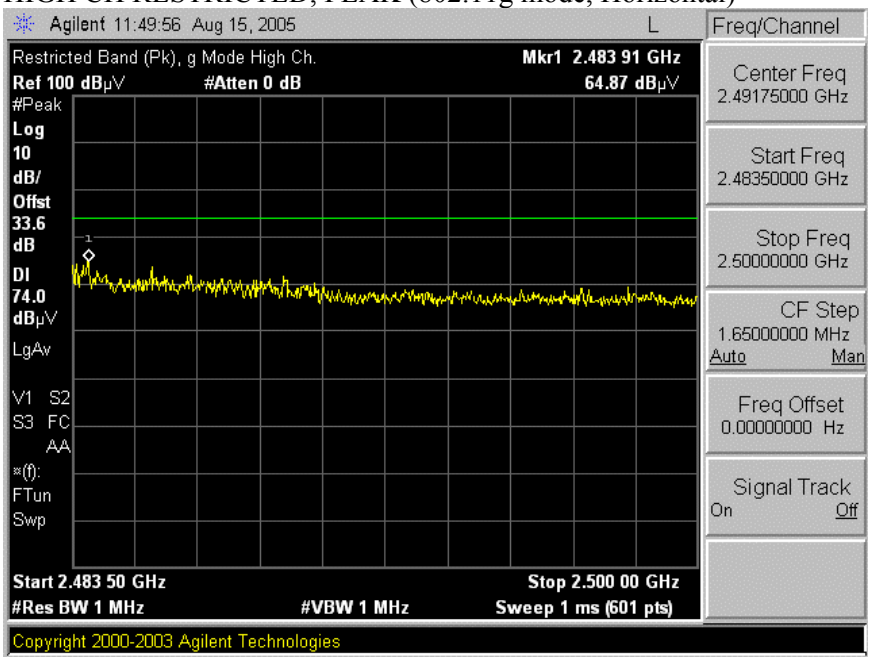


LOW CH RESTRICTED, AVG (802.11g mode, Vertical)

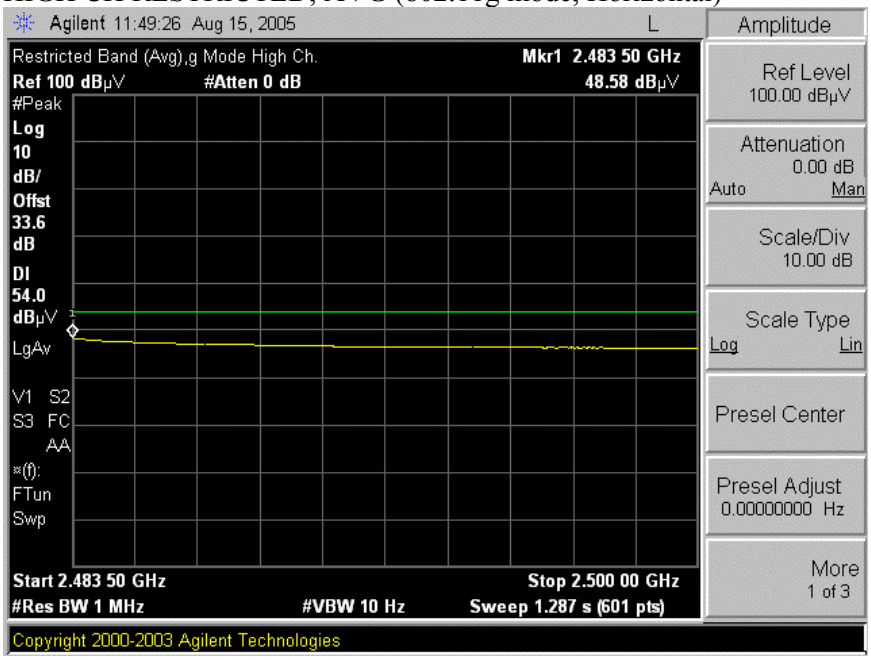


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

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

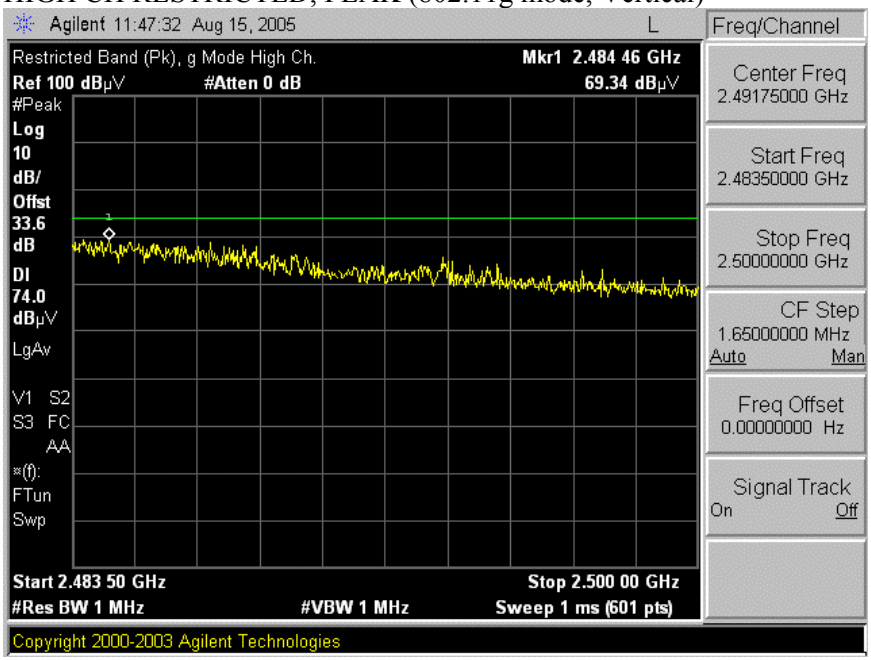


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

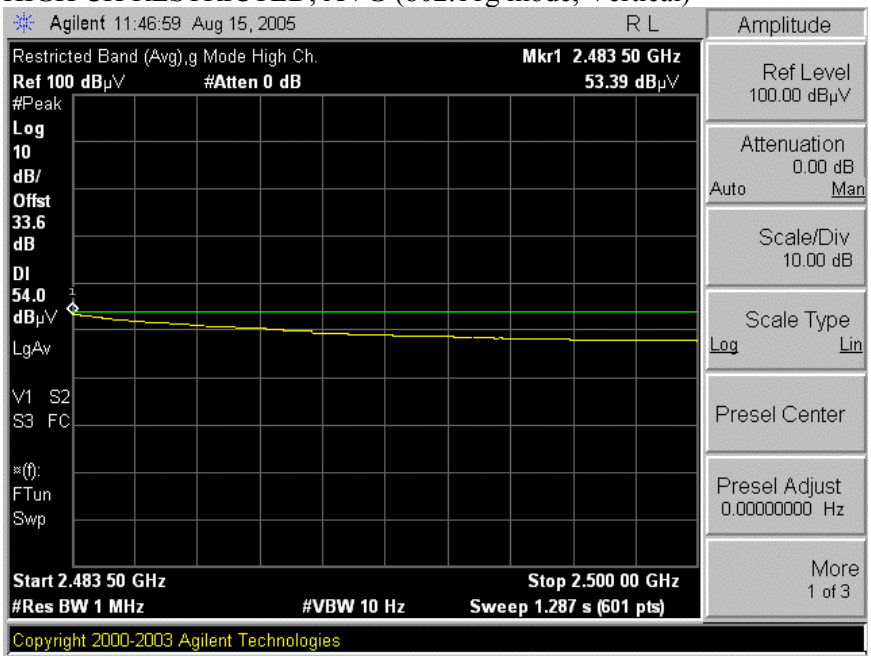


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (g MODE)

08/15/05 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Joseph Chung
Project #:05U3625
Company: Airgo
EUT Descrip.: MIMO APX
EUT M/N: AGN3023MX-01
Test Target: FCC 15.205
Mode Oper: TX
Average Power Meter: Low = 21 dBm, Mid = 21 dBm, High = 21 dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T86 Miteq 924341			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_David	3_David		12_Vien	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

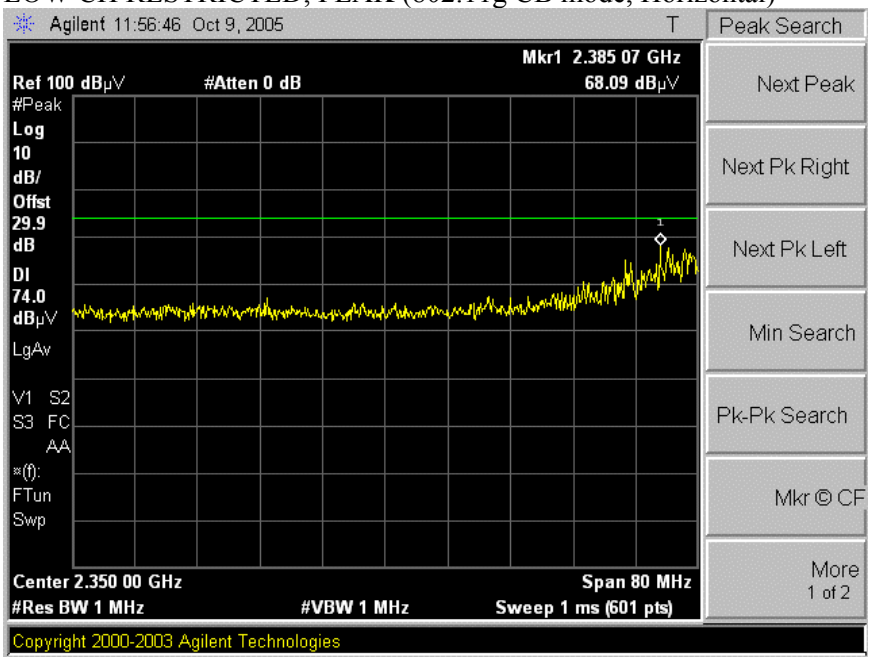
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, g mode															
4.824	3.0	62.8	48.9	34.0	3.7	-33.6	0.0	0.6	67.6	53.7	74.0	54.0	-6.4	-0.3	V
12.060	3.0	40.0	28.8	38.4	6.5	-33.5	0.0	0.9	52.4	41.2	74.0	54.0	-21.6	-12.8	V
4.824	3.0	52.0	40.1	34.0	3.7	-33.6	0.0	0.6	56.8	44.9	74.0	54.0	-17.2	-9.1	H
12.060	3.0	40.9	28.6	38.4	6.5	-33.5	0.0	0.9	53.4	41.0	74.0	54.0	-20.6	-13.0	H
Mid, g mode															
4.874	3.0	64.2	49.5	34.1	1.3	-33.5	0.0	0.6	66.6	51.9	74.0	54.0	-7.4	-2.1	V
7.311	3.0	50.9	38.3	35.6	4.3	-33.3	0.0	0.6	58.2	45.6	74.0	54.0	-15.8	-8.4	V
12.185	3.0	40.8	29.7	38.5	6.5	-33.4	0.0	0.9	53.3	42.2	74.0	54.0	-20.7	-11.8	V
4.874	3.0	52.9	41.4	34.1	3.8	-33.5	0.0	0.6	57.8	46.3	74.0	54.0	-16.2	-7.7	H
7.311	3.0	47.7	36.6	35.6	4.3	-33.3	0.0	0.6	55.0	43.9	74.0	54.0	-19.0	-10.1	H
12.185	3.0	41.2	29.5	38.5	6.5	-33.4	0.0	0.9	53.7	42.0	74.0	54.0	-20.3	-12.0	H
High Ch, g mode															
4.924	3.0	53.2	39.9	34.1	3.8	-33.5	0.0	0.6	58.2	44.9	74.0	54.0	-15.8	-9.1	H
7.386	3.0	42.2	30.5	35.7	4.3	-33.3	0.0	0.6	49.6	37.9	74.0	54.0	-24.4	-16.1	H
12.310	3.0	40.3	28.9	38.5	6.5	-33.4	0.0	0.9	52.8	41.5	74.0	54.0	-21.2	-12.5	H
7.386	3.0	50.7	39.4	35.7	4.3	-33.3	0.0	0.6	58.1	46.7	74.0	54.0	-15.9	-7.3	V
4.924	3.0	60.1	47.5	34.1	3.8	-33.5	0.0	0.6	65.1	52.4	74.0	54.0	-8.9	-1.6	V
12.310	3.0	41.7	28.9	38.5	6.5	-33.4	0.0	0.9	54.2	41.5	74.0	54.0	-19.8	-12.5	V

Note: No other emissions found above noise floor.

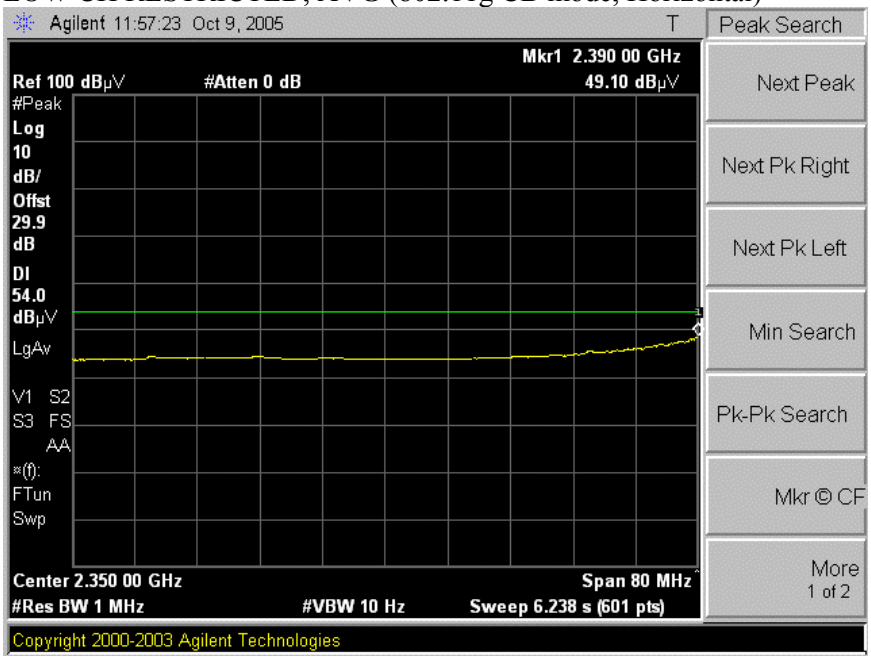
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

RESTRICTED BANDEDGE (g CHANNEL BONDING MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11g CB mode, Horizontal)

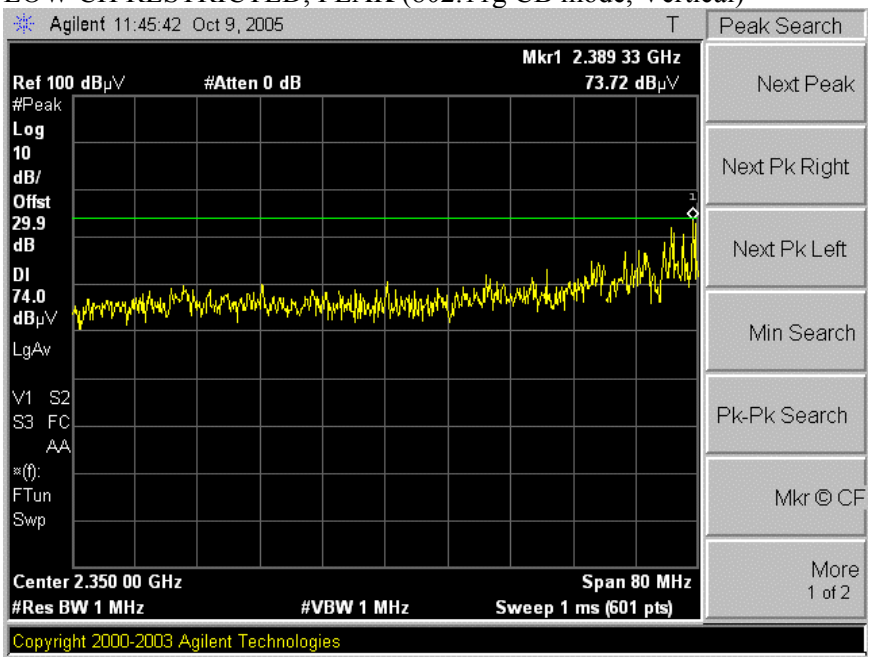


LOW CH RESTRICTED, AVG (802.11g CB mode, Horizontal)

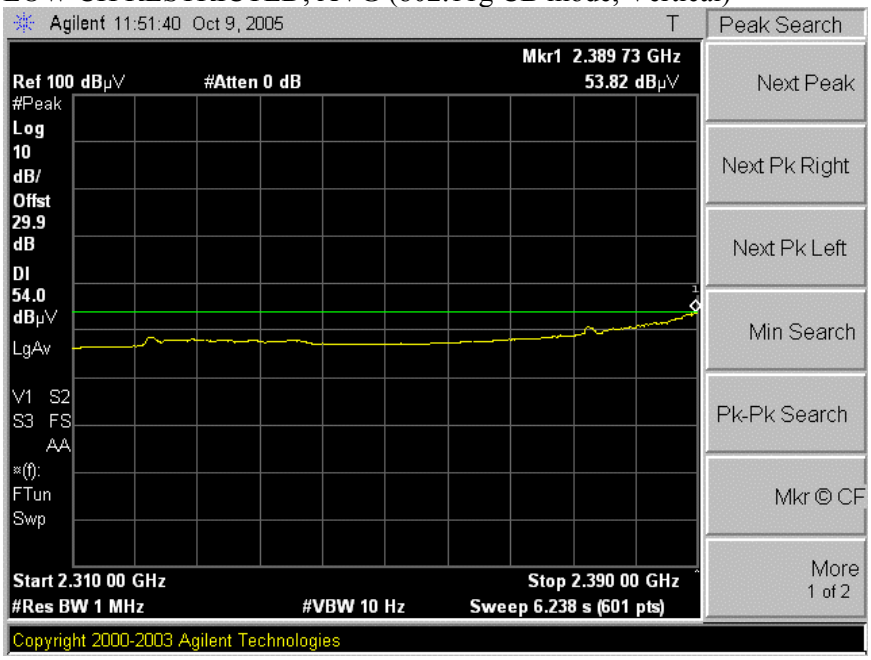


RESTRICTED BANDEDGE (g CHANNEL BONDING MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11g CB mode, Vertical)

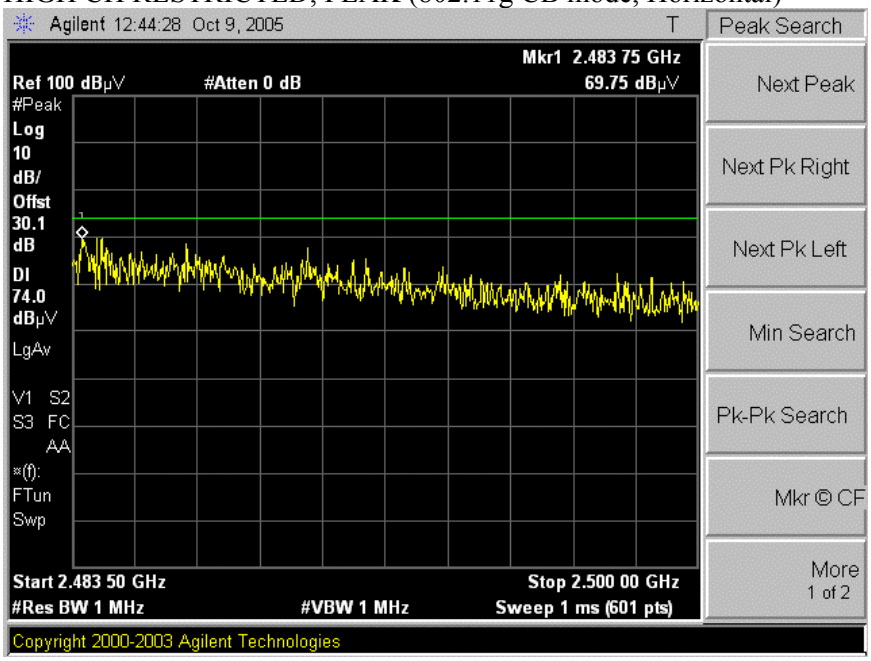


LOW CH RESTRICTED, AVG (802.11g CB mode, Vertical)

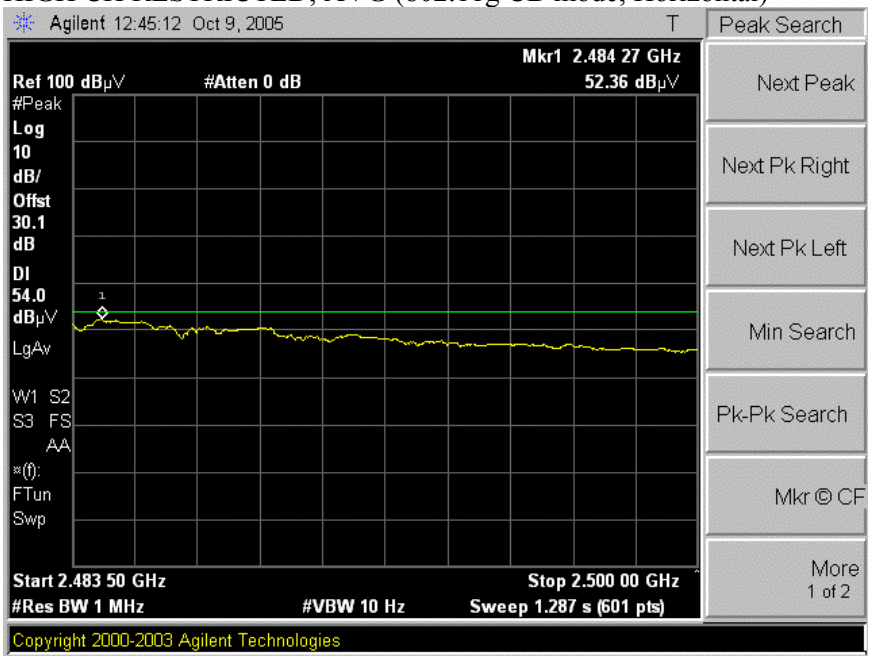


RESTRICTED BANDEDGE (g CHANNEL BOND MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g CB mode, Horizontal)

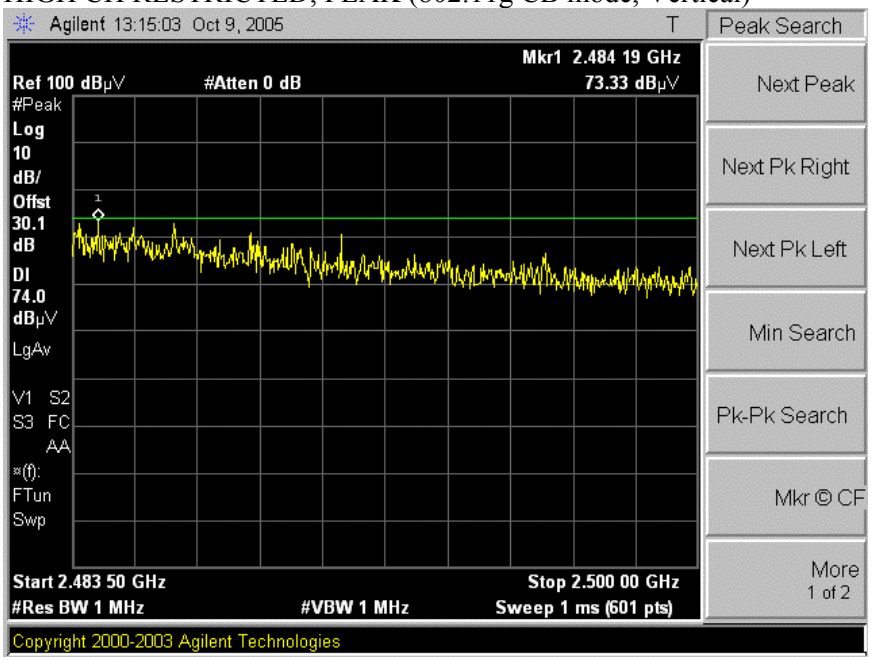


HIGH CH RESTRICTED, AVG (802.11g CB mode, Horizontal)

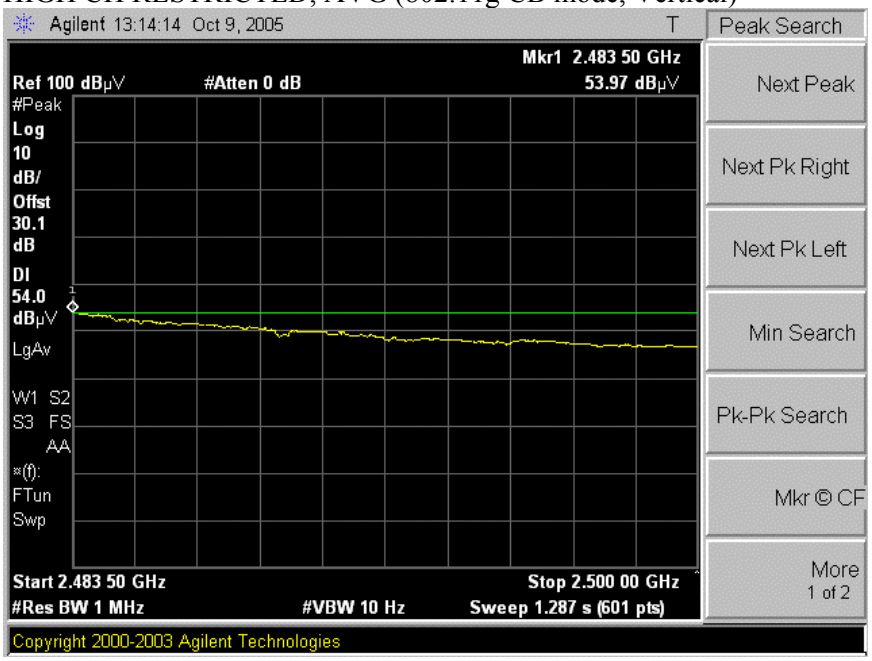


RESTRICTED BANDEDGE (g CHANNEL BOND MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11g CB mode, Vertical)



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



HARMONICS AND SPURIOUS EMISSIONS (g CHANNEL BOND MODE)

10/30/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Joseph Chung
Project #: 05U3625
Company: Airgo
EUT Descrip.: 2x3 MIMO APX
EUT M/N: AGN3023MX-01
Test Target: FCC 15.209
Mode Oper: TX Channel Bonding G mode
Average Power Meter: Low = 16.2, High = 16.3 dBm

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Joseph 187215001	Joseph 208946001	HPF_4.0GHz	

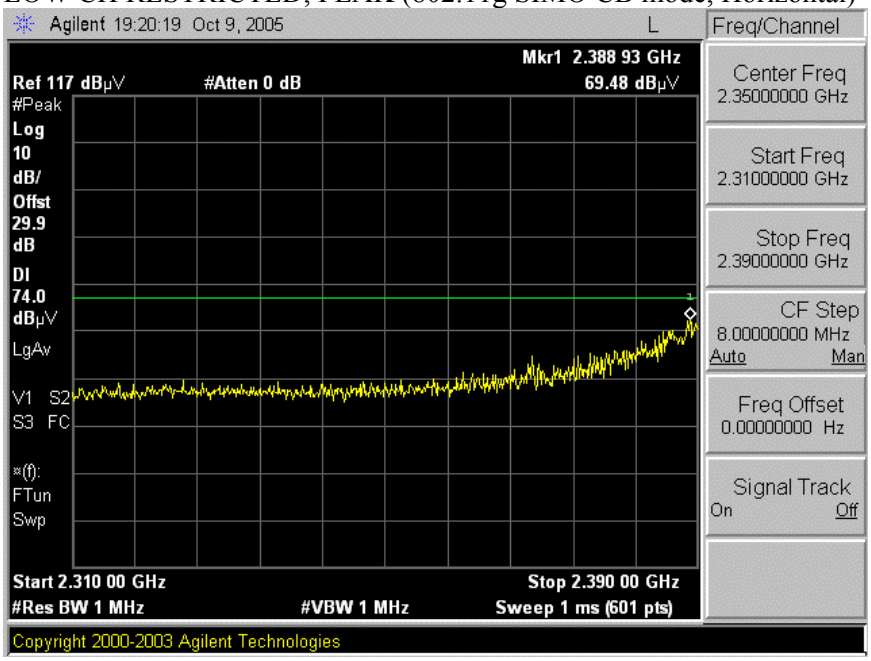
Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

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 2412 MHz, G mode CB															
4.824	3.0	51.7	38.0	33.7	3.4	-36.5	0.0	0.6	52.9	39.2	74	54	-21.1	-14.8	V
7.236	3.0	51.1	38.6	35.4	3.5	-36.2	0.0	0.6	54.4	41.9	74	54	-19.6	-12.1	V
9.648	3.0	45.0	33.0	37.5	4.0	-37.0	0.0	0.8	50.3	38.3	74	54	-23.7	-15.7	V
4.824	3.0	45.5	33.6	33.7	3.4	-36.5	0.0	0.6	46.7	34.8	74	54	-27.3	-19.2	H
7.236	3.0	49.6	36.0	35.4	3.5	-36.2	0.0	0.6	52.9	39.3	74	54	-21.1	-14.7	H
9.648	3.0	44.0	32.0	37.5	4.0	-37.0	0.0	0.8	49.3	37.3	74	54	-24.7	-16.7	H
HI CH 2462 MHz, G mode CB															
4.924	3.0	55.0	41.3	33.8	3.4	-36.5	0.0	0.6	56.3	42.6	74	54	-17.7	-11.4	V
7.386	3.0	51.5	36.5	35.6	3.5	-36.2	0.0	0.6	55.1	40.1	74	54	-18.9	-13.9	V
9.484	3.0	45.5	33.5	37.3	3.9	-36.9	0.0	0.8	50.7	38.7	74	54	-23.3	-15.3	V
4.924	3.0	46.2	33.2	33.8	3.4	-36.5	0.0	0.6	47.5	34.5	74	54	-26.5	-19.5	H
7.386	3.0	47.0	34.5	35.6	3.5	-36.2	0.0	0.6	50.6	38.1	74	54	-23.4	-15.9	H
9.484	3.0	44.5	32.4	37.3	3.9	-36.9	0.0	0.8	49.7	37.6	74	54	-24.3	-16.4	H
		No other emissions were detected above system noise floor.													

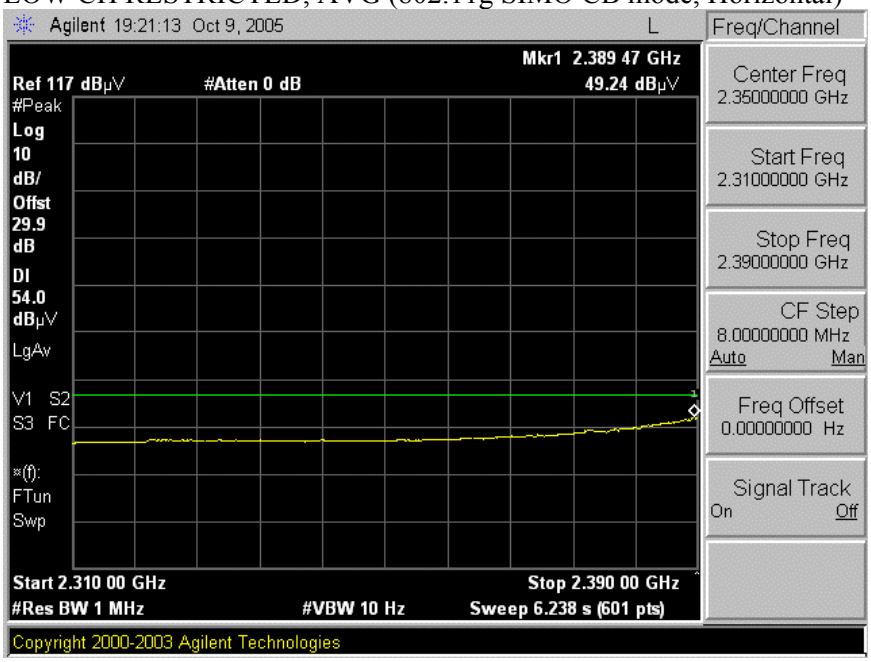
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

RESTRICTED BANDEDGE (SIMO CHANNEL BOND MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11g SIMO CB mode, Horizontal)

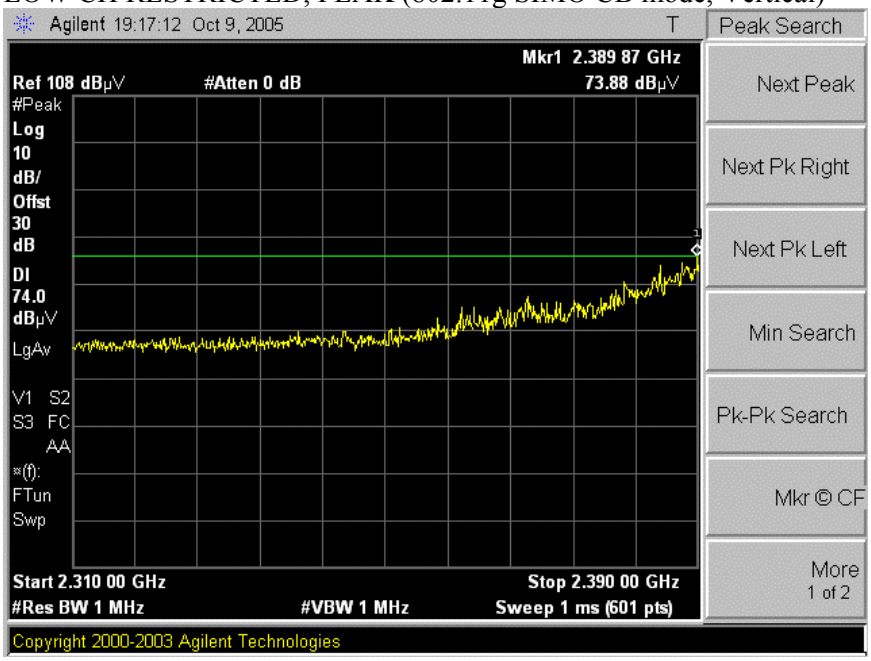


LOW CH RESTRICTED, AVG (802.11g SIMO CB mode, Horizontal)

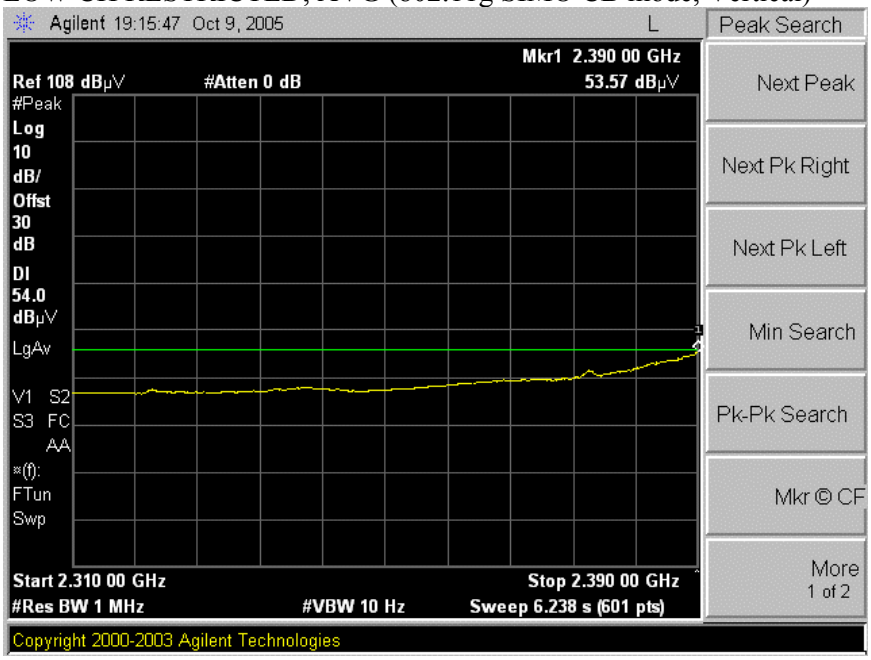


RESTRICTED BANDEDGE (SIMO CHANNEL BOND MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11g SIMO CB mode, Vertical)

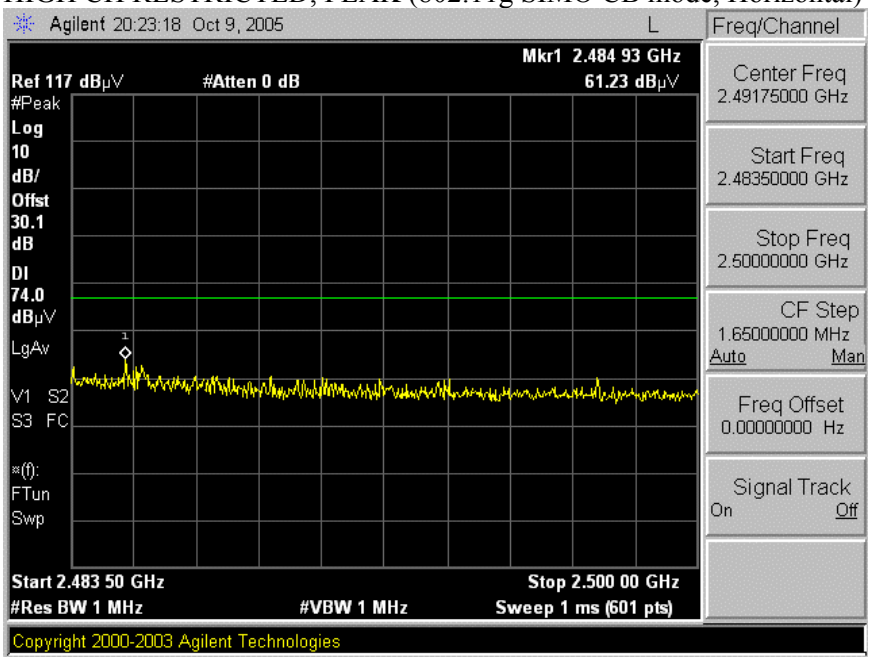


LOW CH RESTRICTED, AVG (802.11g SIMO CB mode, Vertical)

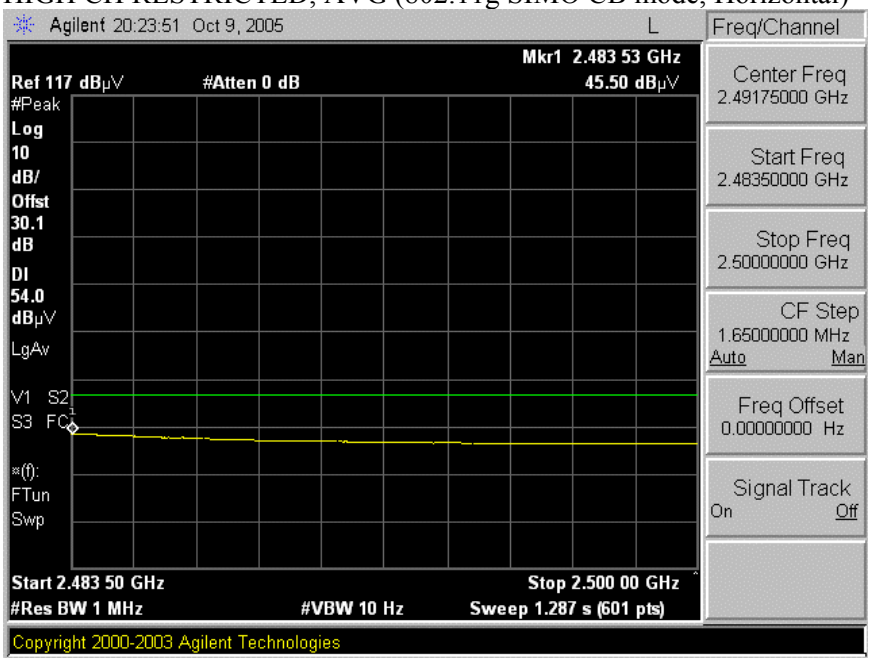


RESTRICTED BANDEDGE (SIMO CHANNEL BOND MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g SIMO CB mode, Horizontal)

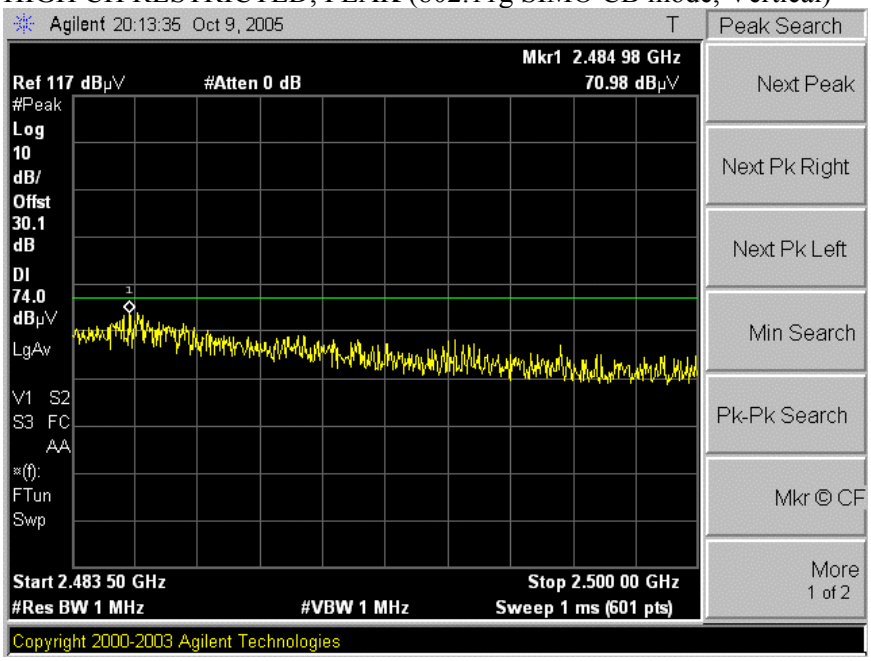


HIGH CH RESTRICTED, AVG (802.11g SIMO CB mode, Horizontal)

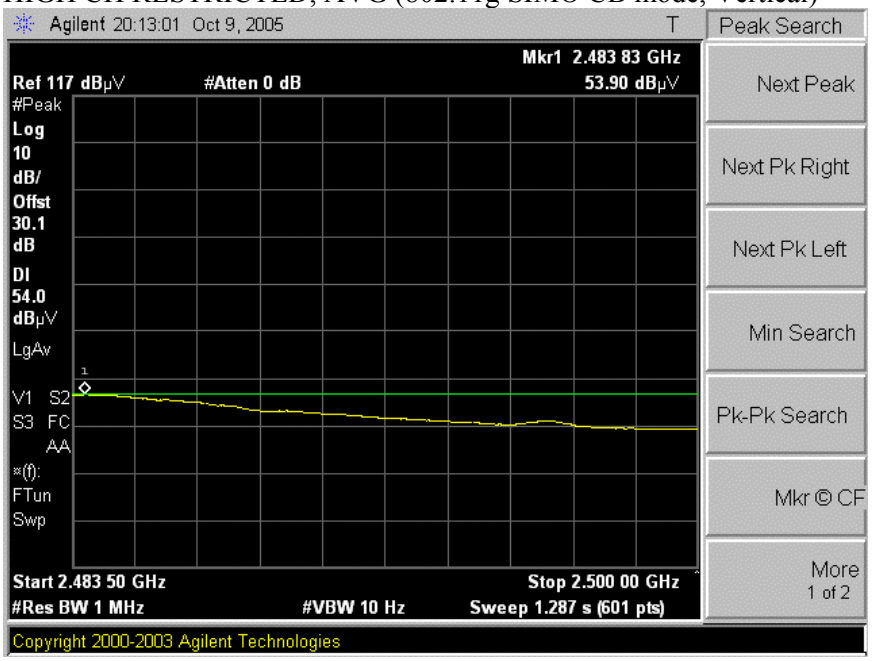


RESTRICTED BANDEDGE (SIMO CHANNEL BOND MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11g SIMO CB mode, Vertical)



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



HARMONICS AND SPURIOUS EMISSIONS (CHANNEL BONDING SIMO MODE)

10/13/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Joseph Chung
Project #: 05U3625
Company: Airgo
EUT Descrip.: 2x3 MIMO APX
EUT M/N: AGN3023MX-01
Test Target: FCC 15.209
Mode Oper: TX Channel Bonding G mode
Average Power Meter: Low = 16.5 dBm, High = 13.0 dBm

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Joseph 187215001	Joseph 208946001	HPF_4.0GHz	

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 2412 MHz_Output Power = 16.5dBm															
4.824	3.0	51.9	36.5	33.7	3.4	-36.5	0.0	0.6	53.1	37.7	74	54	-20.9	-16.3	V
7.236	3.0	50.4	35.6	35.4	3.5	-36.2	0.0	0.6	53.7	38.9	74	54	-20.3	-15.1	V
4.824	3.0	47.7	34.7	33.7	3.4	-36.5	0.0	0.6	48.9	35.9	74	54	-25.1	-18.1	H
7.236	3.0	48.5	35.7	35.4	3.5	-36.2	0.0	0.6	51.8	39.0	74	54	-22.2	-15.0	H
HI CH 2462 MHz_Output Power = 13dBm															
4.924	3.0	47.9	32.9	33.8	3.4	-36.5	0.0	0.6	49.2	34.2	74	54	-24.8	-19.8	V
7.386	3.0	46.8	31.5	35.6	3.5	-36.2	0.0	0.6	50.4	35.1	74	54	-23.6	-18.9	V
4.924	3.0	43.8	30.8	33.8	3.4	-36.5	0.0	0.6	45.1	32.1	74	54	-28.9	-21.9	H
7.386	3.0	44.4	31.9	35.6	3.5	-36.2	0.0	0.6	48.0	35.5	74	54	-26.0	-18.5	H
		No other emissions were detected above 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. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

HORIZONTAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Cable Loss	Probe Factor
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		dB	dB
1	329.730	29.17	16.44	45.61	46.00	-0.39	Peak	1.60	14.84
2	463.590	15.96	19.50	35.46	46.00	-10.54	Peak	1.92	17.58
3	609.090	17.98	21.66	39.64	46.00	-6.36	Peak	2.22	19.44
4	788.540	14.55	24.40	38.95	46.00	-7.05	Peak	2.62	21.78
5	904.940	18.58	25.99	44.57	46.00	-1.43	Peak	2.99	23.00
6	963.140	29.61	26.61	56.22	*96.00	-39.78	Peak	3.15	23.46

Note: *-20dBc from fundamental

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

VERTICAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Cable Loss	Probe Factor
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		dB	dB
1	56.190	25.82	8.47	34.29	40.00	-5.71	Peak	0.60	7.87
2	237.580	23.30	13.39	36.69	46.00	-9.31	Peak	1.33	12.06
3	371.440	18.46	17.44	35.90	46.00	-10.10	Peak	1.70	15.74
4	436.430	14.45	18.89	33.34	46.00	-12.66	Peak	1.83	17.06
5	963.140	29.04	26.61	55.65	*96.00	-40.45	Peak	3.15	23.46
6	974.780	14.10	26.67	40.77	54.00	-13.23	Peak	3.12	23.55

Note: *-20dBc from fundamental

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.

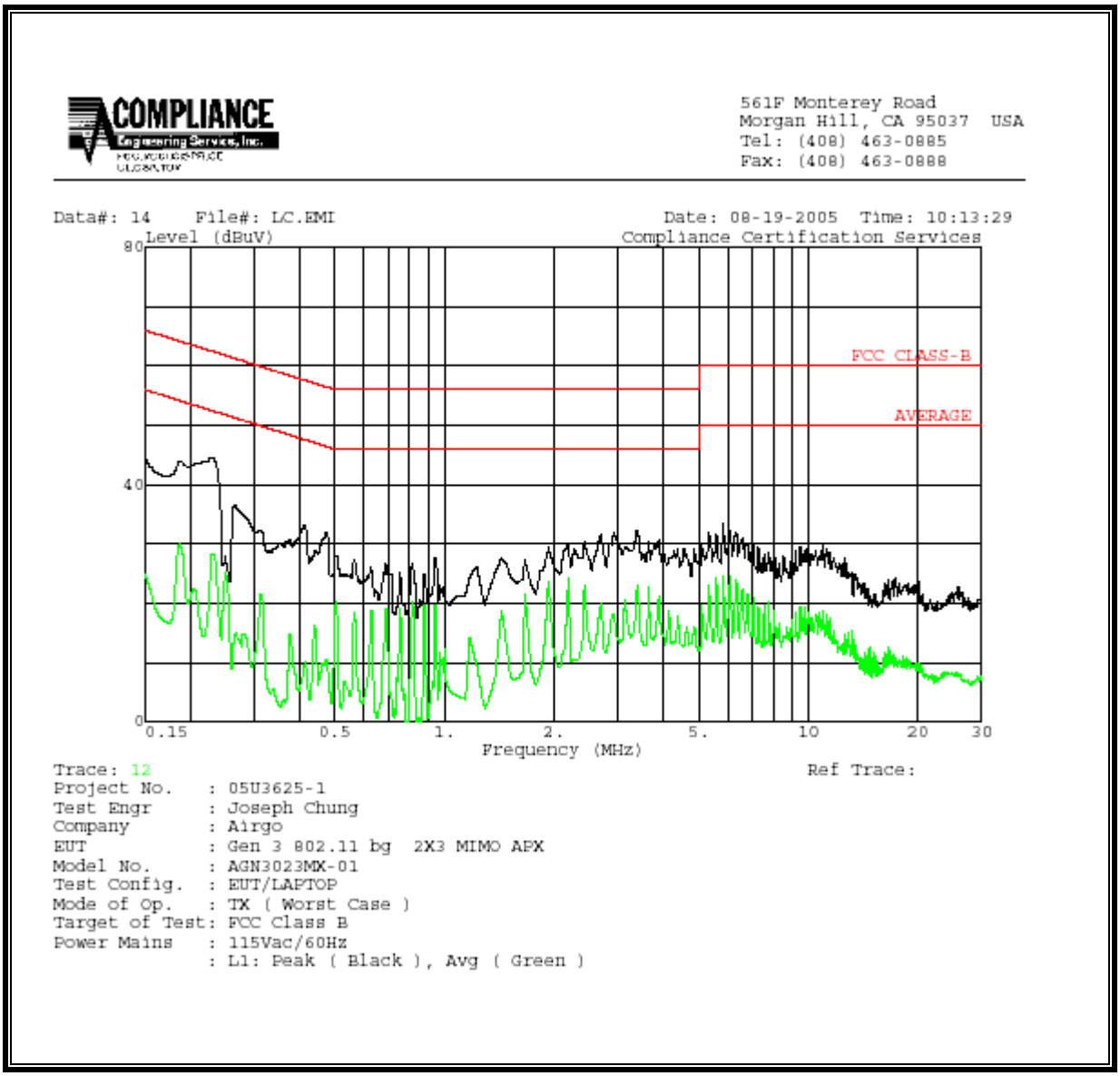
RESULTS

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
0.23	44.60	--	28.37	0.00	62.49	52.49	-17.89	-24.12	L1
0.41	33.06	--	16.33	0.00	57.59	47.59	-24.53	-31.26	L1
5.84	33.46	--	24.48	0.00	60.00	50.00	-26.54	-25.52	L1
0.19	43.50	--	31.20	0.00	64.17	54.17	-20.67	-22.97	L2
0.44	32.10	--	26.61	0.00	57.06	47.06	-24.96	-20.45	L2
6.02	33.36	--	20.81	0.00	60.00	50.00	-26.64	-29.19	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS