FCC CFR47 PART 15 SUBPART C

CLASS 2 PERMISSIVE CHANGE

TEST REPORT

FOR

Gen 3 2x3 APX miniPCI Card

MODEL NUMBER: AGN3023MX-01

FCC ID: SA3-AGN3023MX0100

REPORT NUMBER: TNCGEN3APxCL2

ISSUE DATE: 15 November 2005

Prepared for
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900 ARASTRADERO ROAD
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Revision History

Rev.	Issue Date	Revisions	Revised By
A	11/15/05	Initial Issue	TNC

TABLE OF CONTENTS

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: 1087

DATE TESTED: 1-15 NOVEMBER 2005

The test data below supports an application for a class 2 permissive change for the referenced product under the provisions of section 2.1043 of FCC Rules.

Changes were made to the original product to improve band- edge filtering and transmitter performance at lowest and highest operating channels. The changes are described in a confidential document presented as part of the class 2 permissive change application submission. Tests were performed at highest and lowest channel for each operating mode. Maximum measured power levels were within 0.25 dB of power listed on the original grant of certification.

THOMAS N COKENIAS
Agent for Airgo Networks Inc.

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	23.27	212.32
2412 - 2462	802.11g	23.33	215.28
2412 - 2462	802.11g CB	22.86	193.20
2422 - 2452	802.11g SIMO CB	23.36	216.77

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 data rate for this channel is determined to be 6 Mb/s, based on previous experience with 2.4 GHz WLAN product design architectures, confirmed by average power meter measurements taken at different data rates.

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

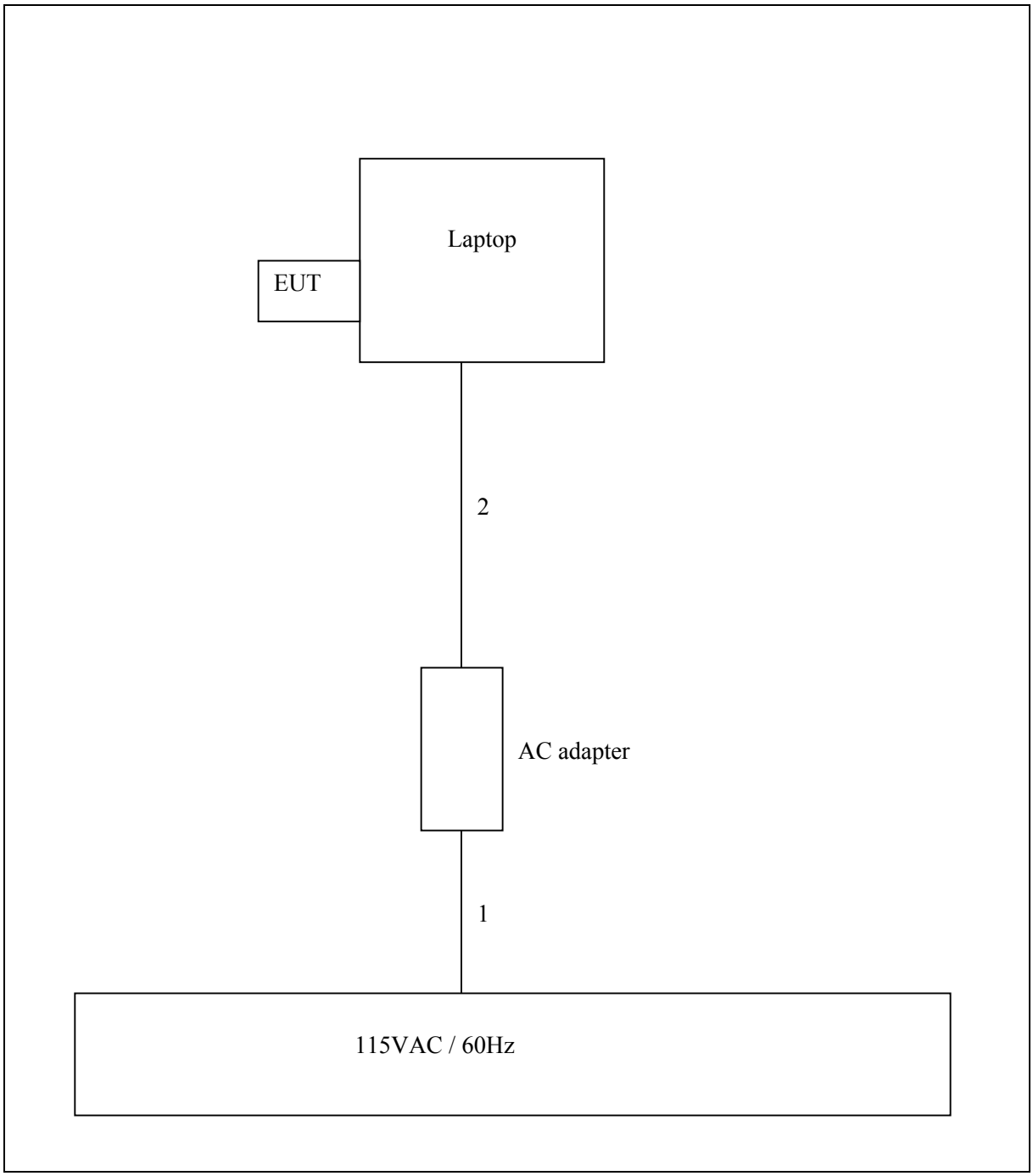
I/O CABLES

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**	**3/29/06**
RF Filter Section	**HP**	**85420E**	**3705A00256**	**3/29/06**
Antenna, Bilog 30MHz ~ 2Ghz	**Sunol Sciences**	**JB1**	**A121003**	**3/3/06**
Spectrum Analyzer 3 Hz ~ 44 GHz	**Agilent**	**E4446A**	**MY43360112**	**3/28/06**
Antenna, Horn 1 ~ 18 GHz	**ETS**	**3117**	**29301**	**4/22/06**
Preamplifier, 1 ~ 26 GHz	**Miteq**	**NSP2600-SP**	**924341**	**12/23/05**
Peak / Average Power Sensor	**Agilent**	**E9327A**	**US40440755**	**2/10/06**
Peak Power Meter	**Agilent**	**E4416A**	**GB41291160**	**2/9/06**
ESA-E Series Spectrum Analyzer	**Agilent**	**E4407B**	**MY44210488**	**4/20/06**
LISN, 10 kHz ~ 30 MHz	**FCC**	**LISN-50/250-25-2**	**2023**	**8/30/06**
LISN, 10 kHz ~ 30 MHz	**Solar**	**8012-50-R-24-BNC**	**8379443**	**8/30/06**
Site A Line Stabilizer/Conditioner	**Tripplite**	**LC-1800a**	**A005181**	**CNR**
EMI Test Receiver	**R & S**	**ESHS 20**	**827129/006**	**6/3/06**
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. 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	20.20	20.32	23.27	30	-6.73
2462	20.37	20.05	23.22	30	-6.78

802.11g MODE

Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
2412	20.57	20.05	23.33	30	-6.67
2437*	20.13	20.06	23.11	30	-6.89
2462	20.13	20.47	23.31	30	-6.69

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	19.50	20.08	22.81	30	-7.19
2462	19.63	20.06	22.86	30	-7.14

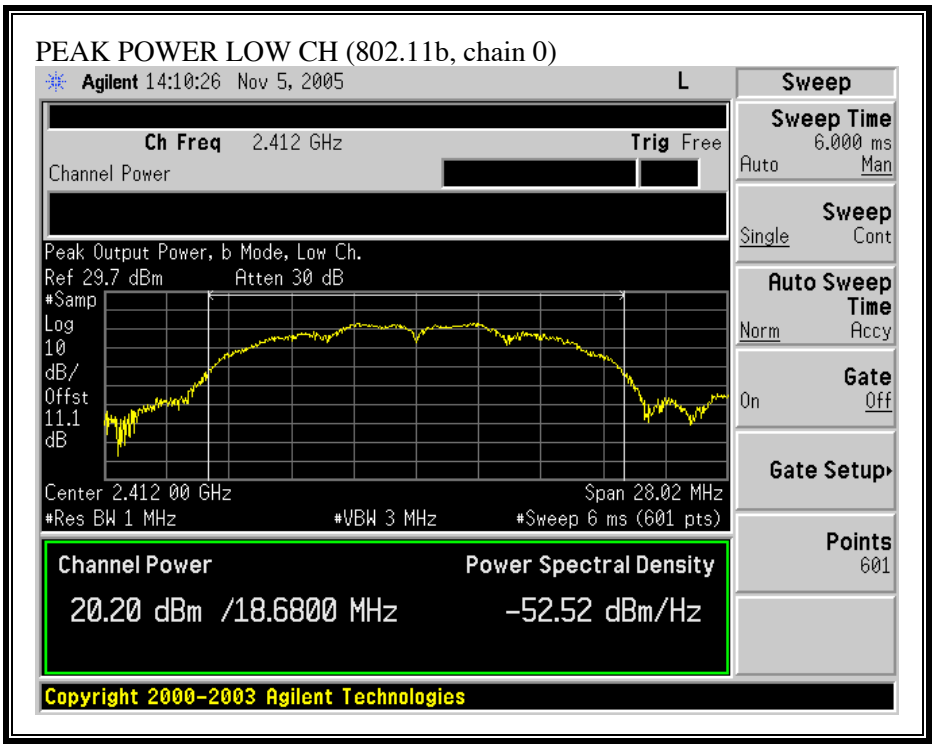
802.11g SIMO CHANNEL BOND MODE

Frequency (MHz)	Peak Power Chain 0 (dBm)	Peak Power Chain 1 (dBm)	Peak Power Total (dBm)	Limit (dBm)	Margin (dB)
2422	20.12	20.18	23.16	30	-6.84
2452	20.28	20.42	23.36	30	-6.64

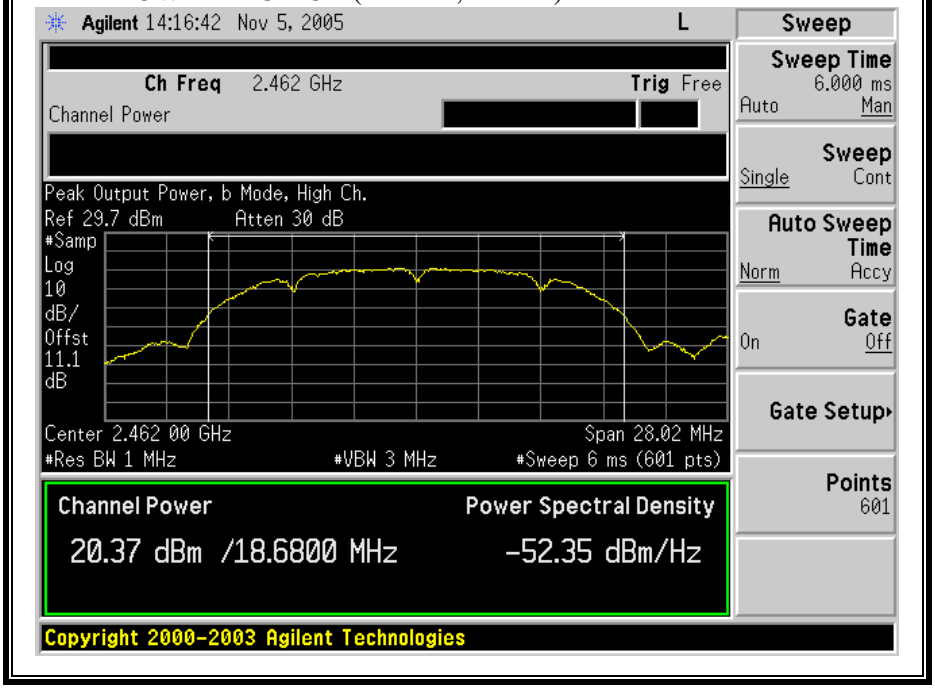
* Maximum power, mid channel, original product. Maximum output power for updated product shows 0.25 dBm variation or less from original product.

OUTPUT POWER (802.11b, CHAIN 0)

PEAK POWER LOW CH (802.11b, chain 0)



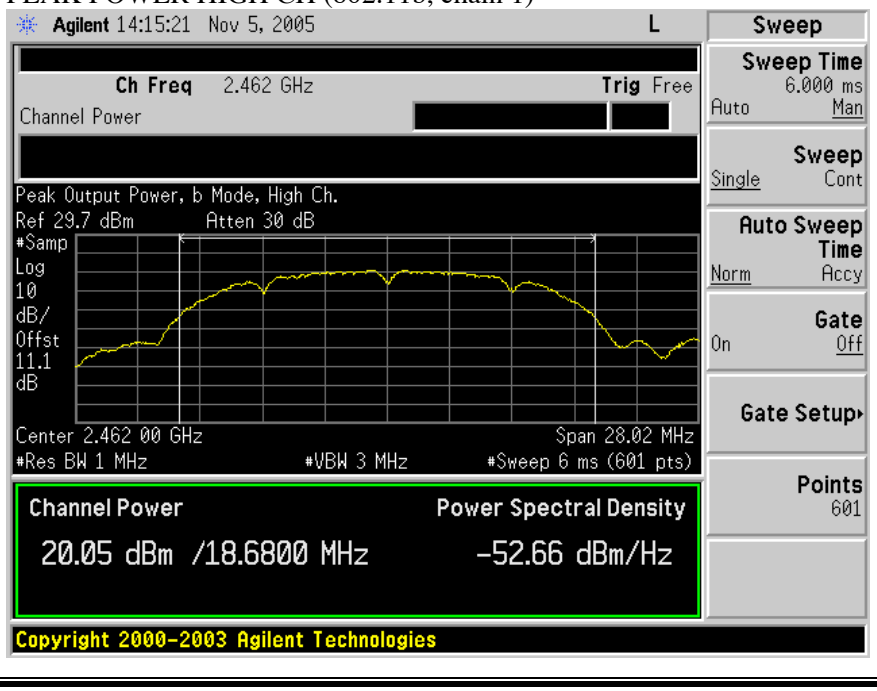
PEAK POWER HIGH CH (802.11b, chain 0)



OUTPUT POWER (802.11b, CHAIN 1)

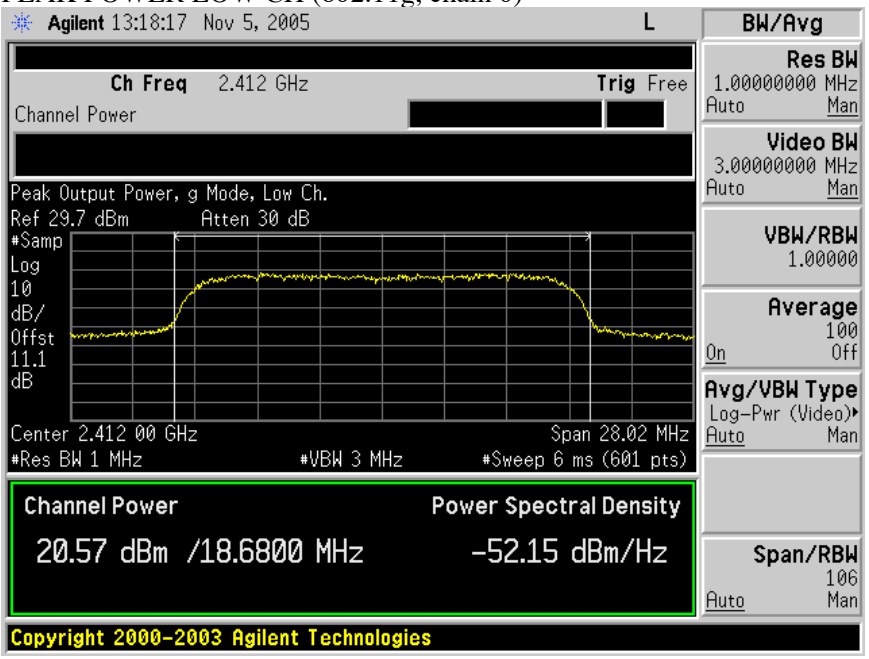
PEAK POWER LOW CH (802.11b, chain 1)

PEAK POWER HIGH CH (802.11b, chain 1)

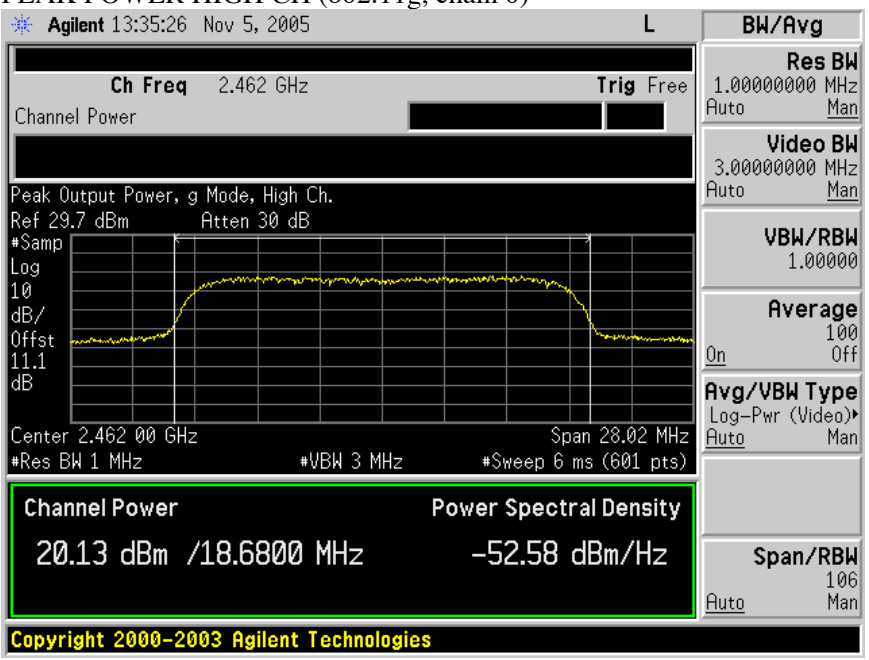


OUTPUT POWER (802.11g, CHAIN 0)

PEAK POWER LOW CH (802.11g, chain 0)

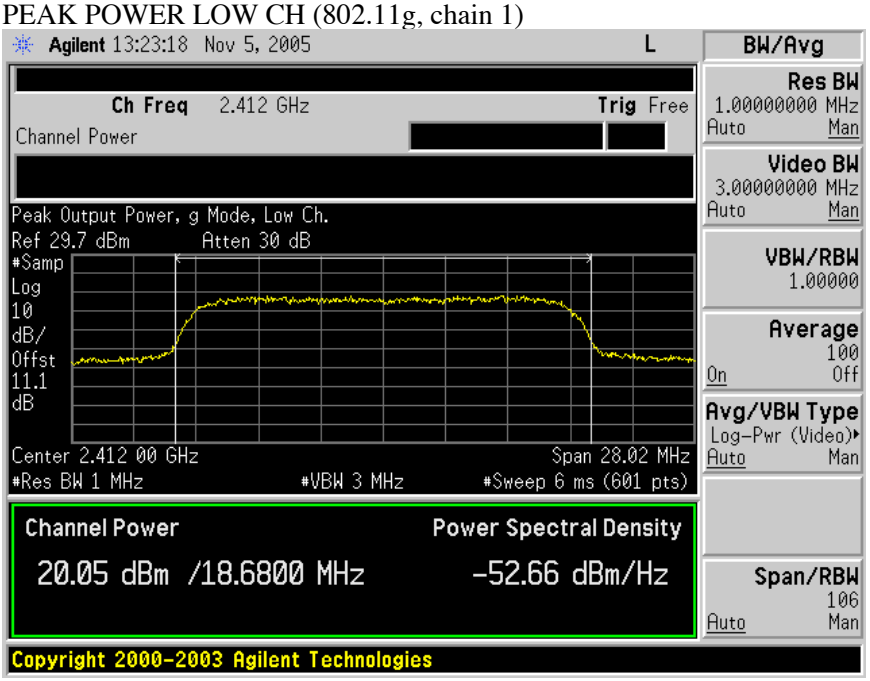


PEAK POWER HIGH CH (802.11g, chain 0)

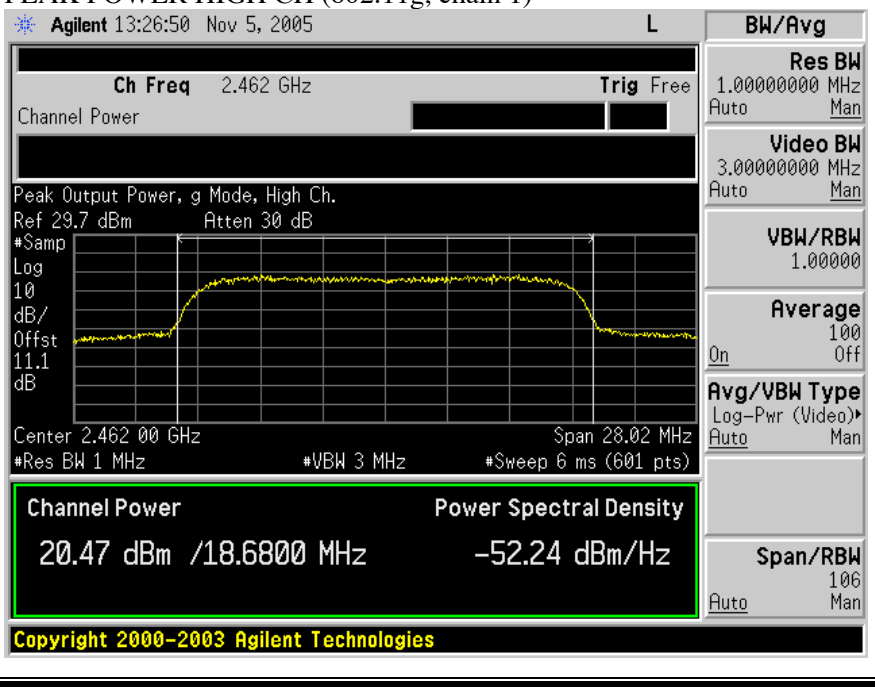


OUTPUT POWER (802.11g, CHAIN 1)

PEAK POWER LOW CH (802.11g, chain 1)

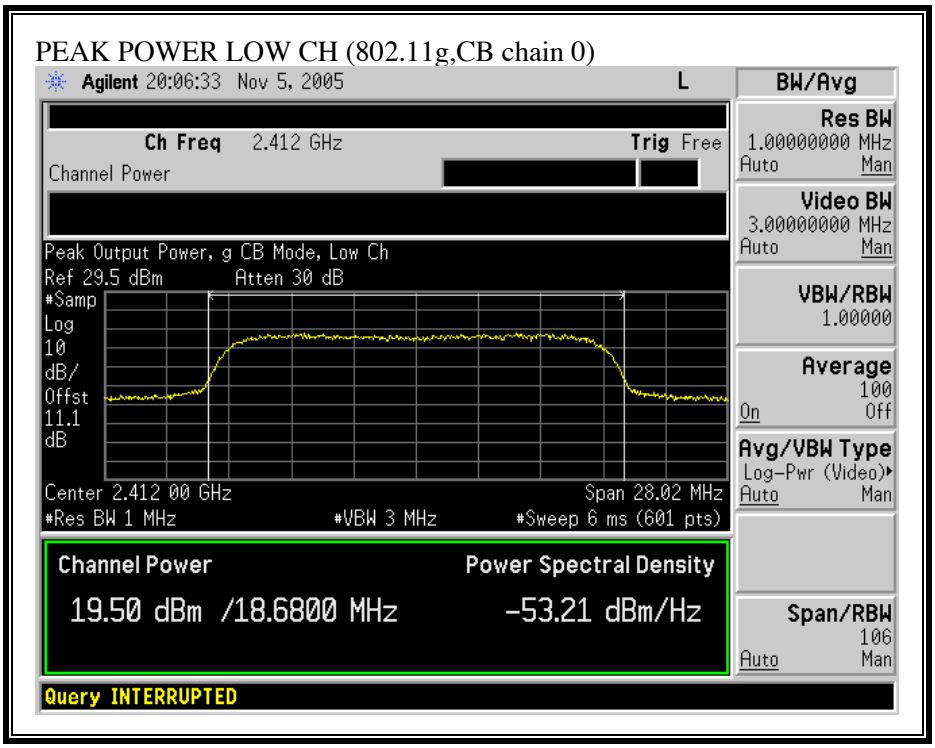


PEAK POWER HIGH CH (802.11g, chain 1)

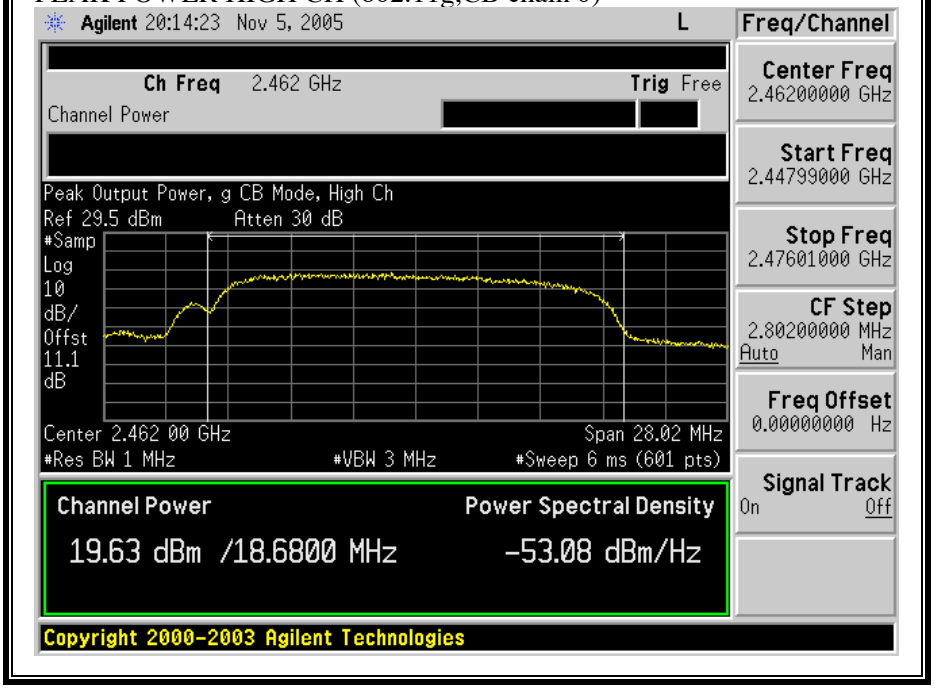


OUTPUT POWER (802.11g,CB CHAIN 0)

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

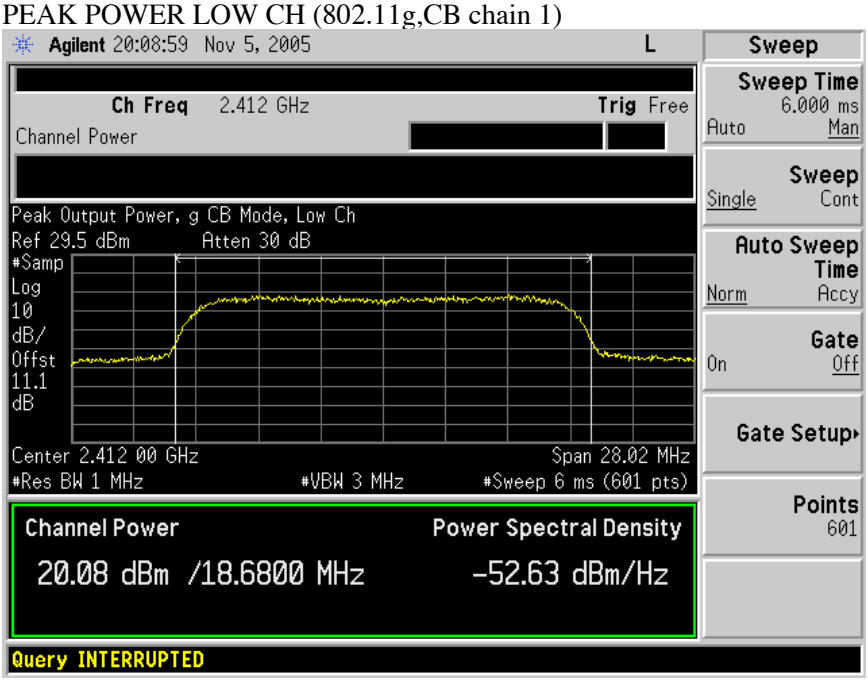


PEAK POWER HIGH CH (802.11g,CB chain 0)

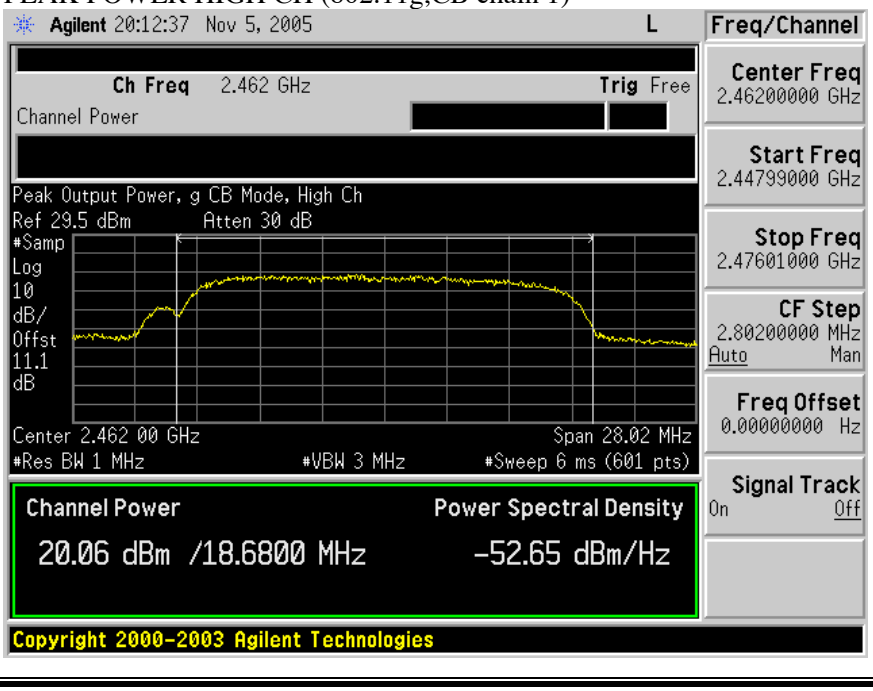


OUTPUT POWER (802.11g,CB CHAIN 1)

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

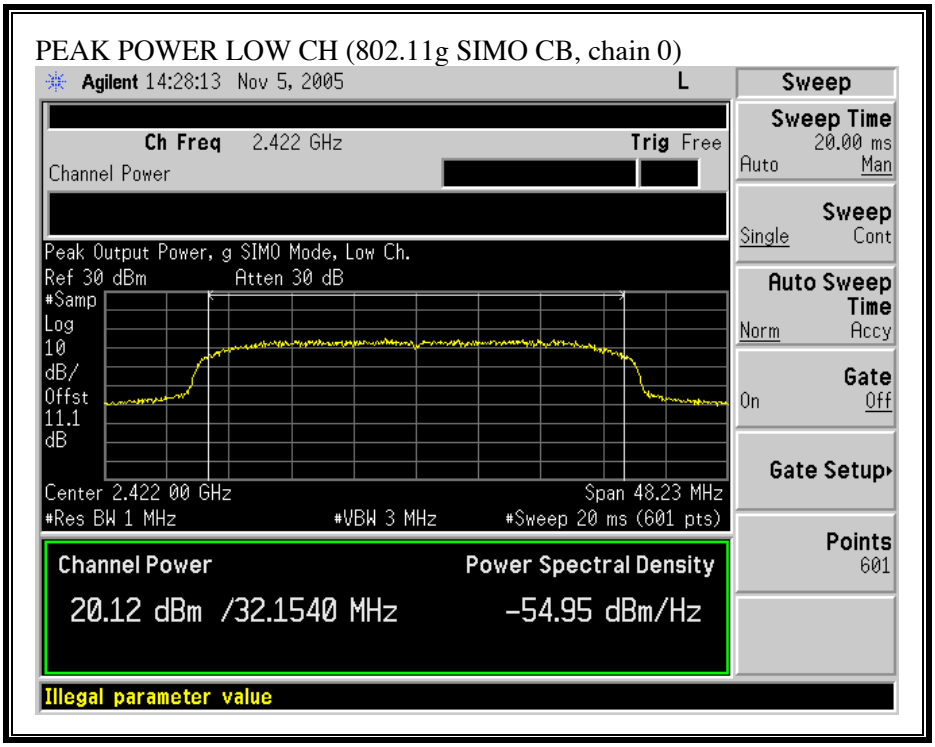


PEAK POWER HIGH CH (802.11g,CB chain 1)

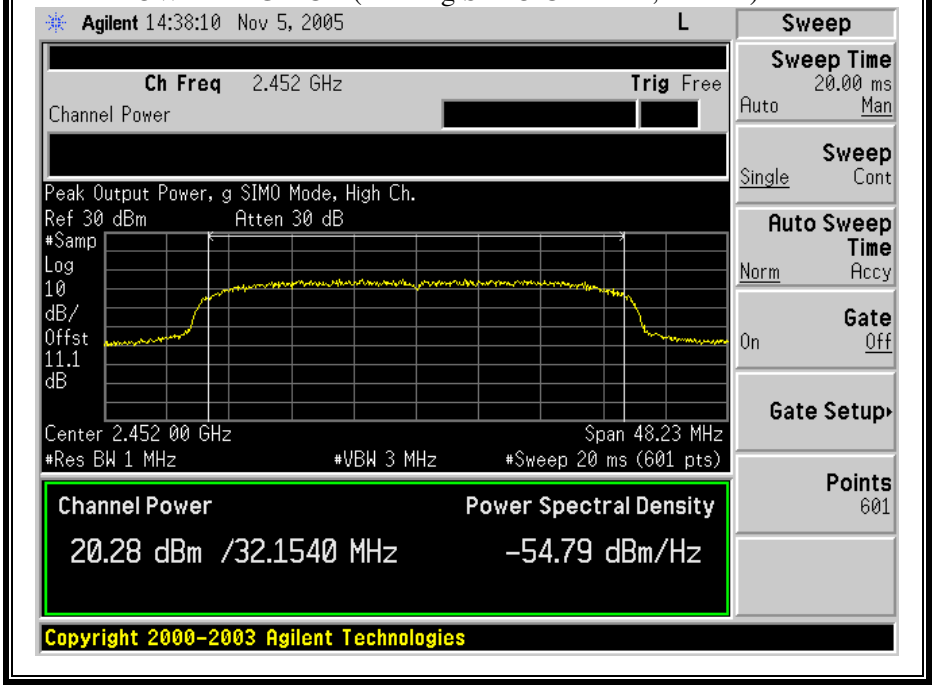


OUTPUT POWER (802.11g SIMO CHANNEL BOND MODE, CHAIN 0)

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

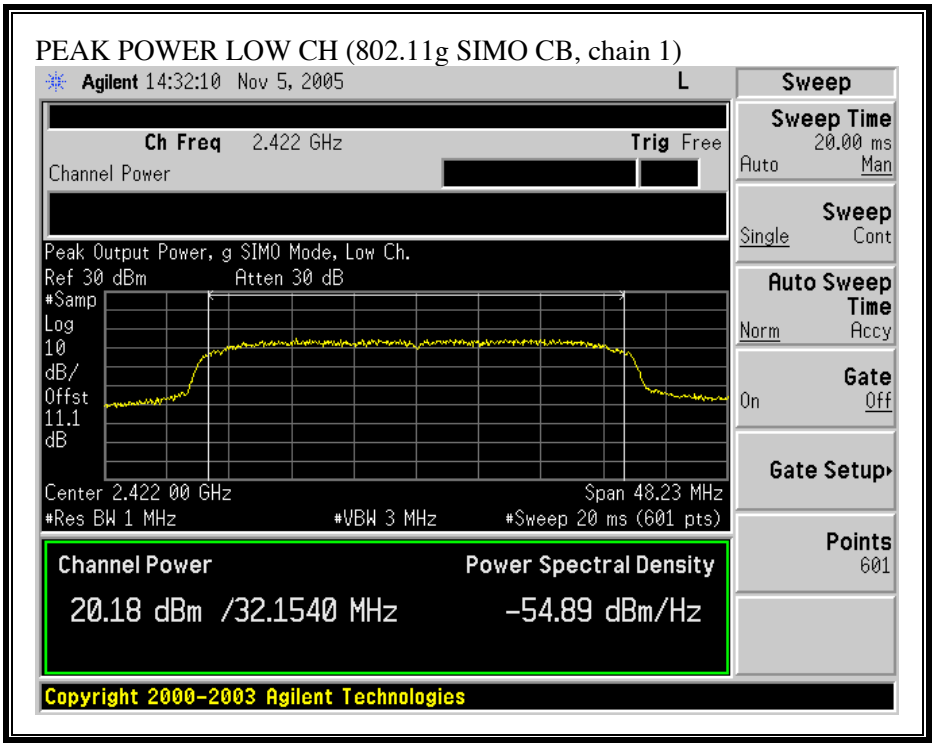


PEAK POWER HIGH CH (802.11g SIMO CB mode, chain 0)

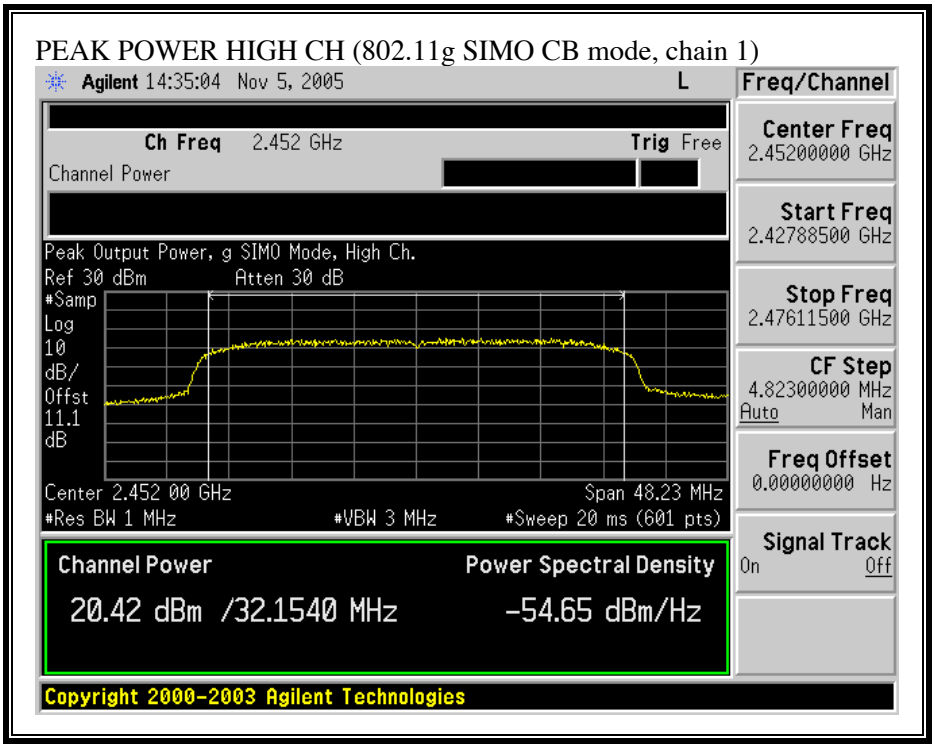


OUTPUT POWER (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

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



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



7.1.2. 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 = √ (30 * P * G) / d

and

S = E ^ 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 = √ ((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 * √ ((30 * (P / 1000) * G) / (3770 * S))
d = 0.282 * √ (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 ^ ((P + G) / 20) / √ 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 ^ ((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	23.27	2.00	0.07
802.11g	20.0	23.11	2.00	0.06
802.11g CB	20.0	22.86	2.00	0.06
802.11g SIMO CB	20.0	23.36	2.00	0.07

7.1.3. TX Software Gain Settings

To achieve the RF output powers reported above, , the EUT control software was set to the following gain settings :

802.11b Mode

Channel	Frequency (MHz)	Gain Setting Chain 0	Gain Setting Chain 1
Low	2412	42	38
High	2462	40	32

802.1g Mode

Channel	Frequency (MHz)	Gain Setting Chain 0	Gain Setting Chain 1
Low	2412	53	47
High	2462	49	41

802.11g CHANNEL BOND Mode

Channel	Frequency (MHz)	Gain Setting Chain 0	Gain Setting Chain 1
Low	2412	53	47
High	2462	49	41

802.11g SIMO CHANNEL BOND Mode

Channel	Frequency (MHz)	Gain Setting Chain 0	Gain Setting Chain 1
Low	2422	57	51
High	2452	54	48

7.1.4. 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	-5.41	1.18	2.04	8	-5.96
2462	-4.05	-5.32	-1.63	8	-9.63

802.11g Mode

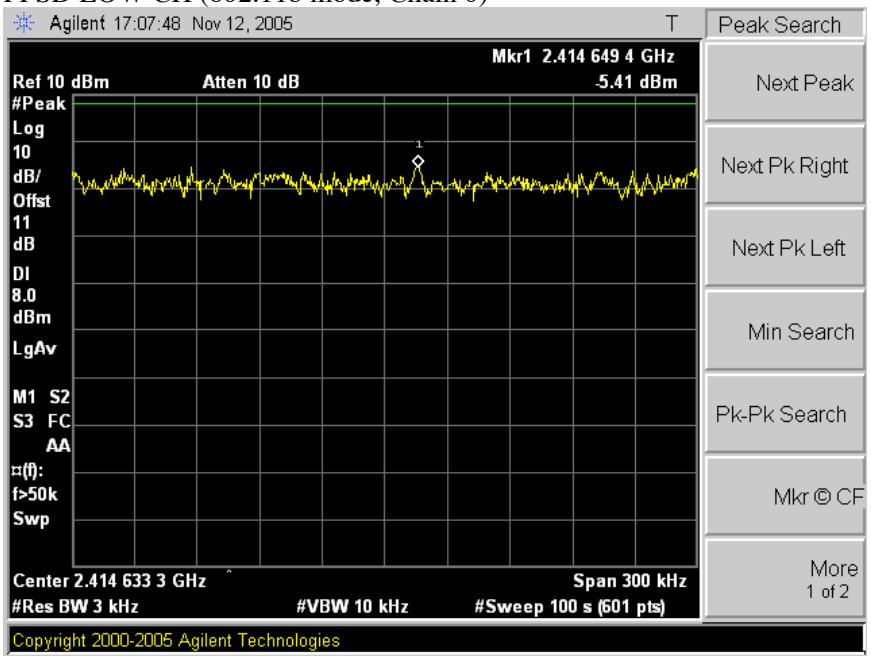
Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
2412	-4.55	-4.59	-1.56	8	-9.56
2462	-4.72	-4.60	-1.65	8	-9.65

802.11g SIMO CHANNEL BOND Mode

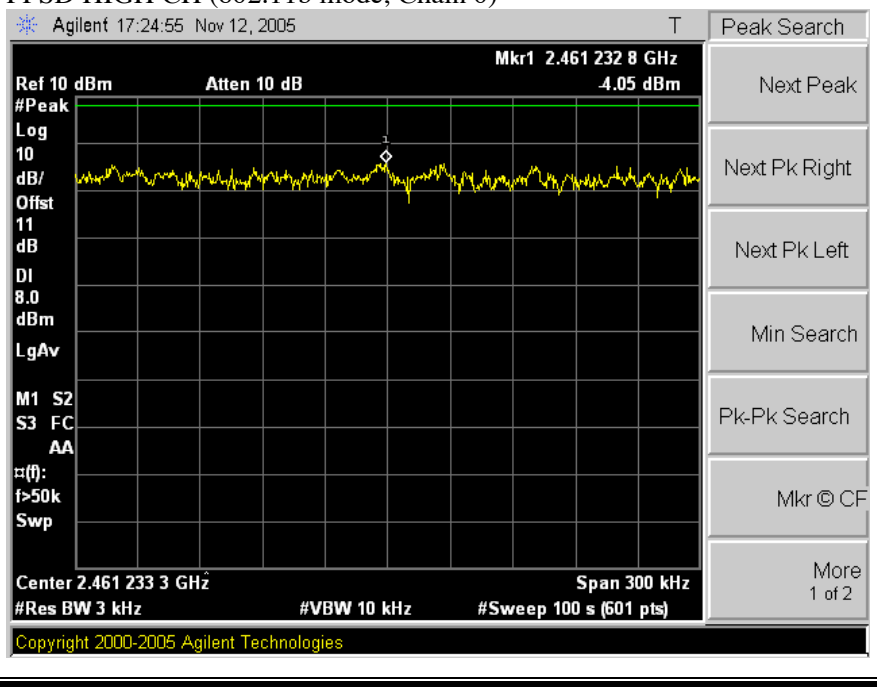
Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Margin (dB)
2422	-8.09	-8.26	-5.16	8	-13.16
2452	-7.38	-7.50	-4.43	8	-12.43

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

PPSD LOW CH (802.11b mode, Chain 0)

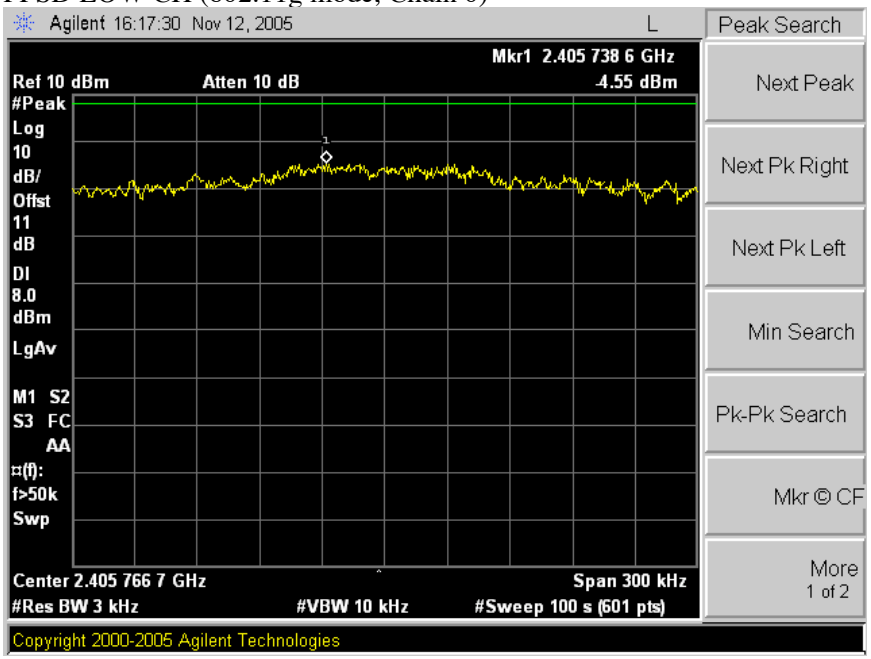


PPSD HIGH CH (802.11b mode, Chain 0)

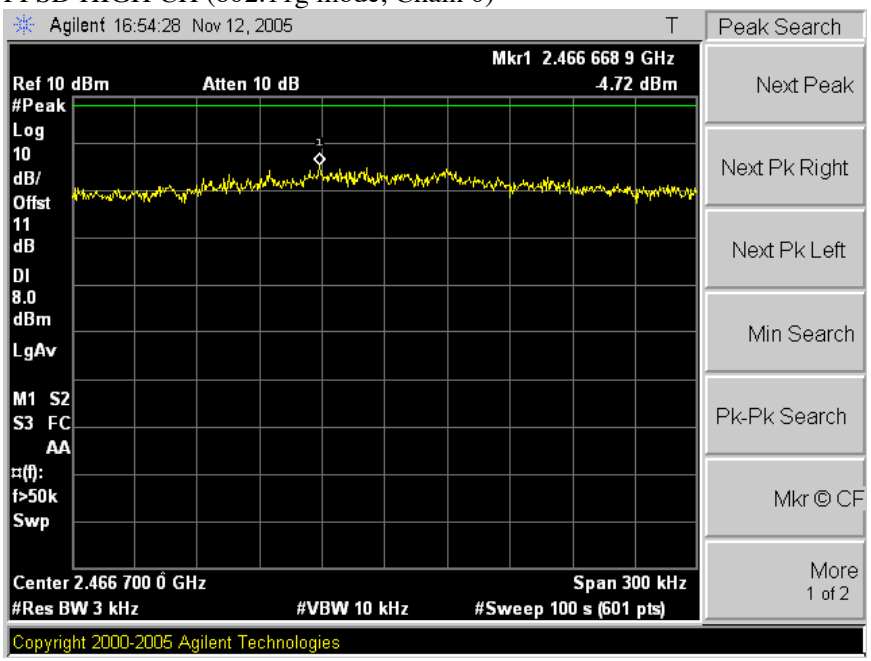


PEAK POWER SPECTRAL DENSITY (802.11g MODE, CHAIN 0)

PPSD LOW CH (802.11g mode, Chain 0)

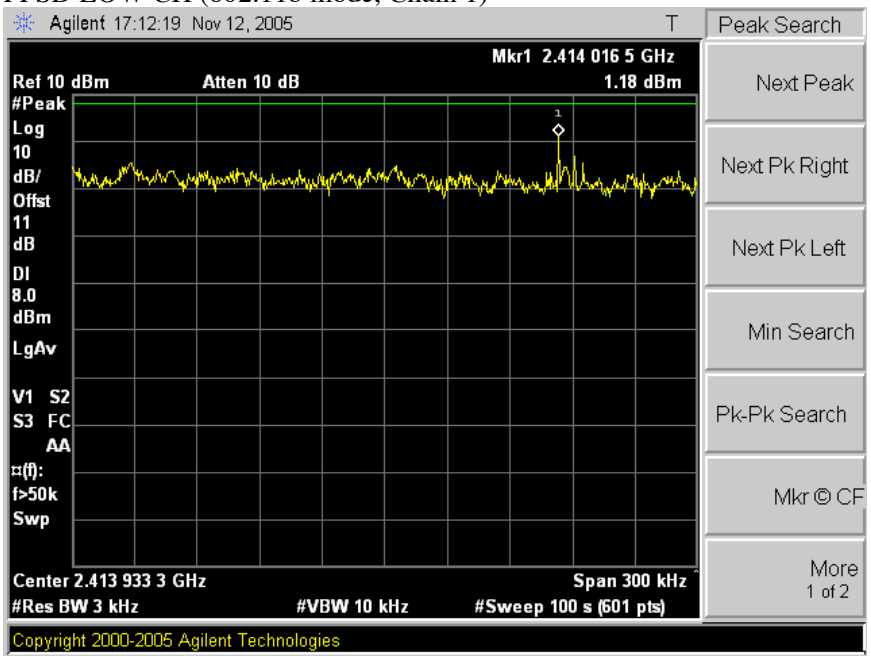


PPSD HIGH CH (802.11g mode, Chain 0)

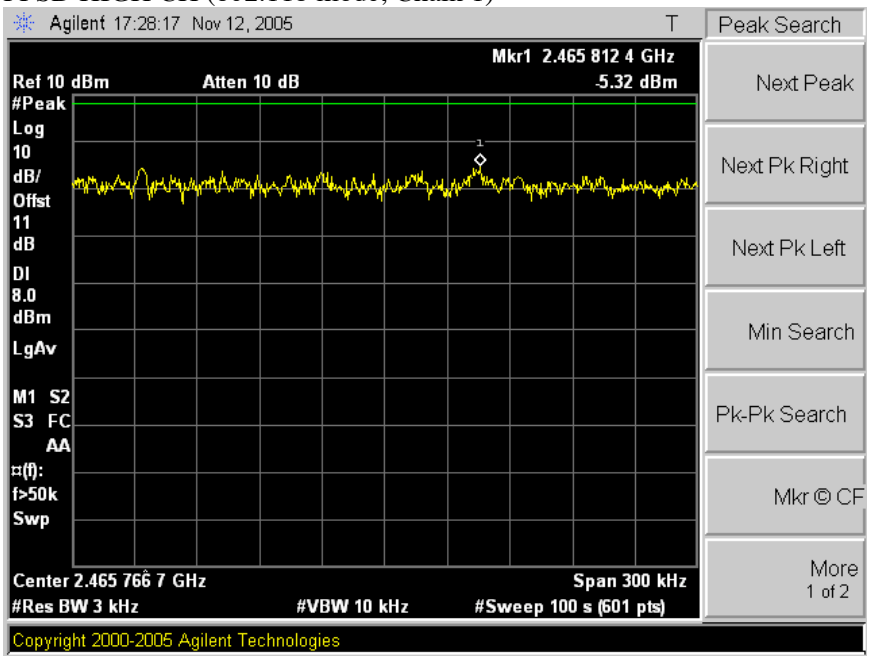


PEAK POWER SPECTRAL DENSITY (802.11b MODE, CHAIN 1)

PPSD LOW CH (802.11b mode, Chain 1)

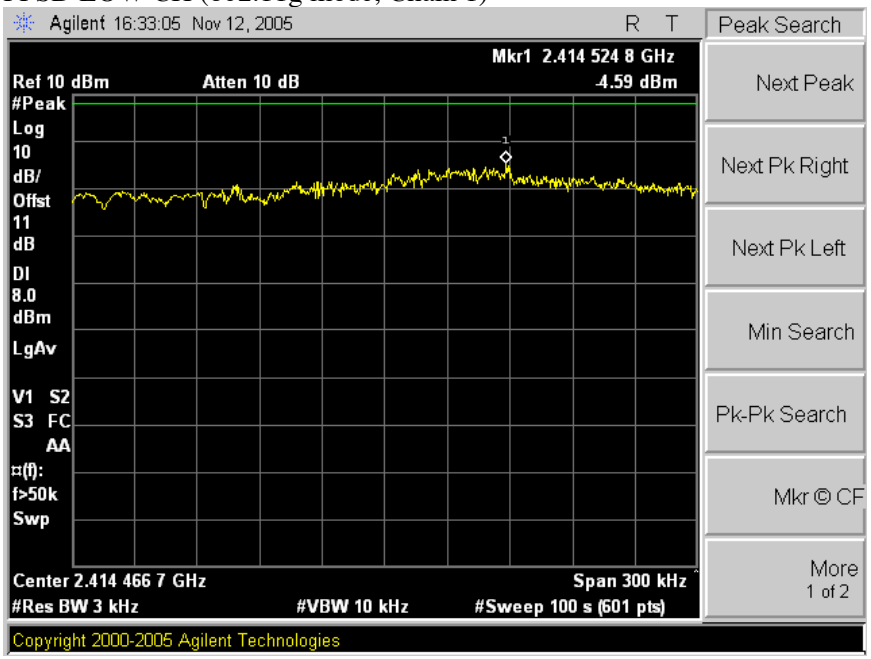


PPSD HIGH CH (802.11b mode, Chain 1)

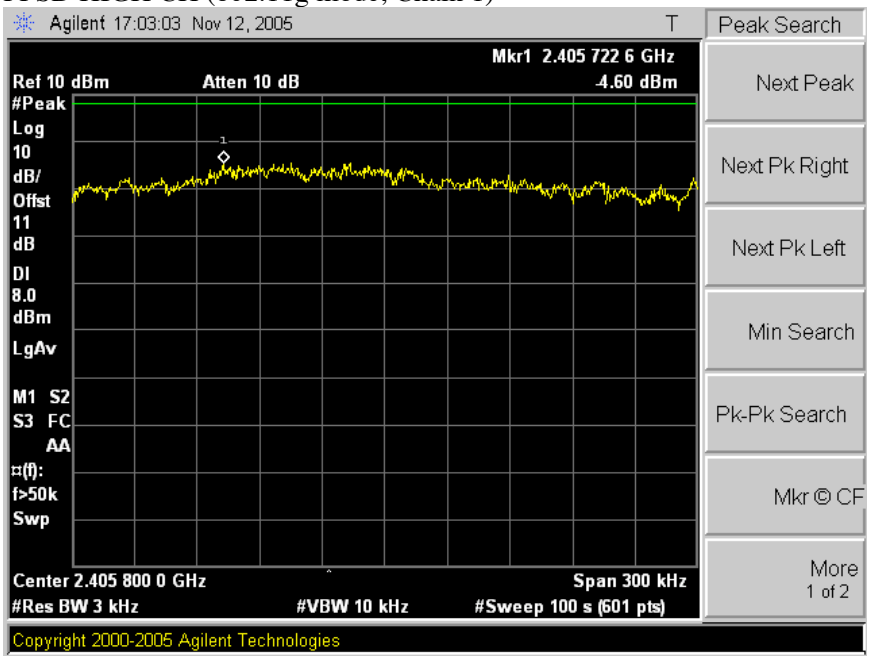


PEAK POWER SPECTRAL DENSITY (802.11g MODE, CHAIN 1)

PPSD LOW CH (802.11g mode, Chain 1)

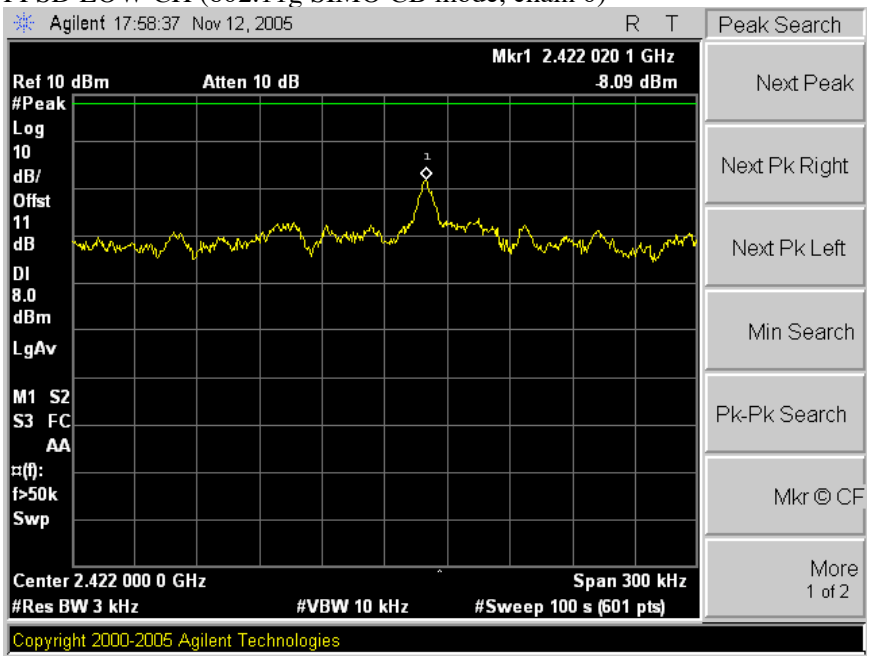


PPSD HIGH CH (802.11g mode, Chain 1)

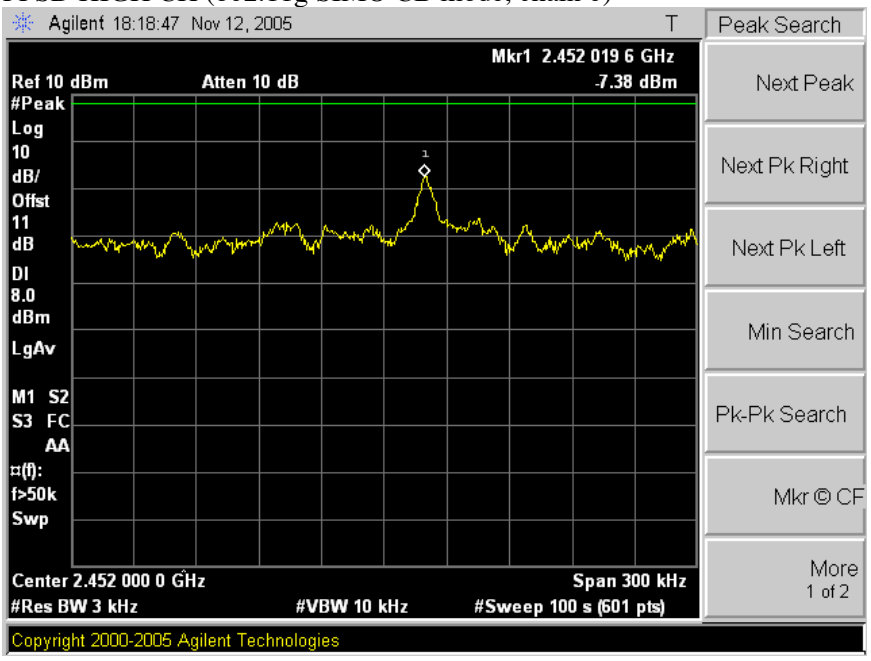


PEAK POWER SPECTRAL DENSITY (802.11g SIMO CHANNEL BOND MODE, CHAIN 0)

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

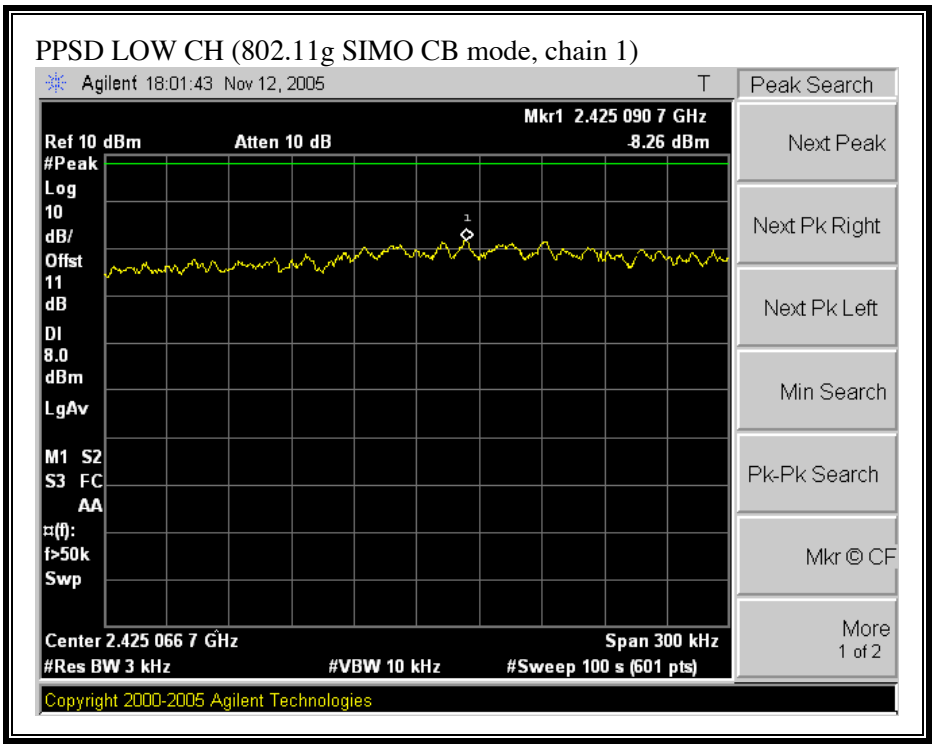


PPSD HIGH CH (802.11g SIMO CB mode, chain 0)

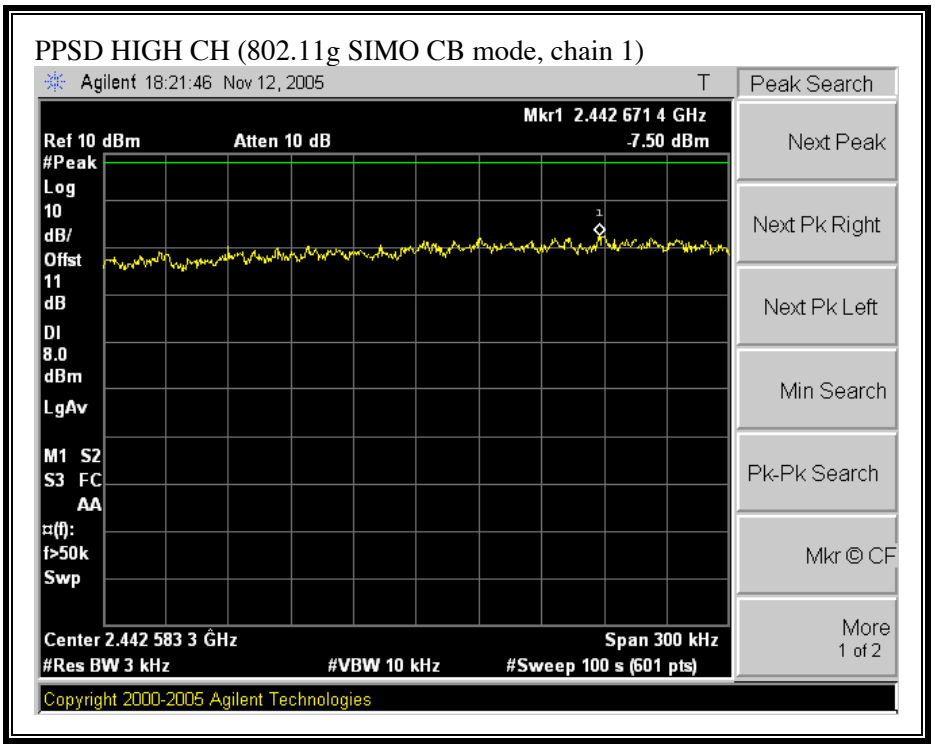


PEAK POWER SPECTRAL DENSITY (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

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



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



7.1.5. 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.

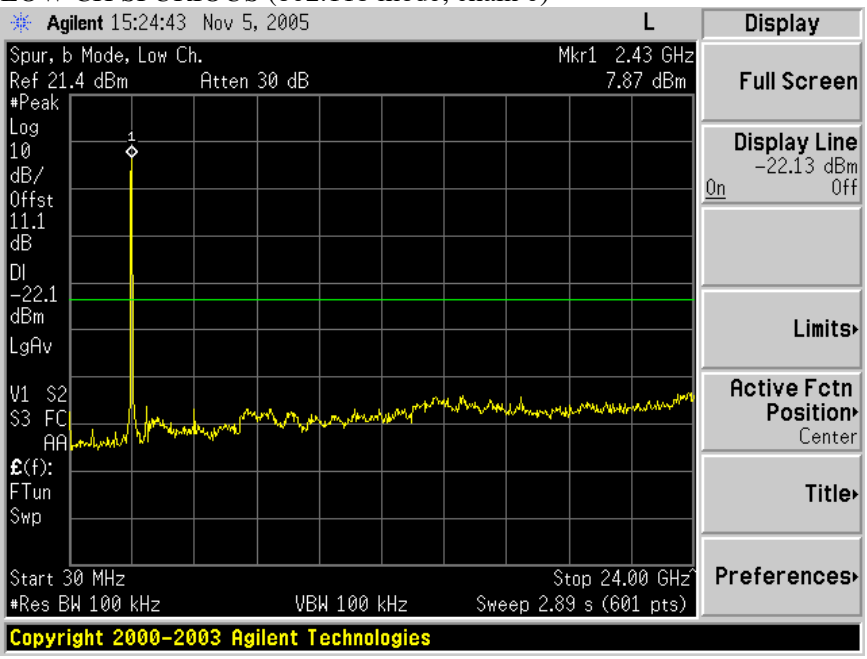
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

No non-compliance noted:

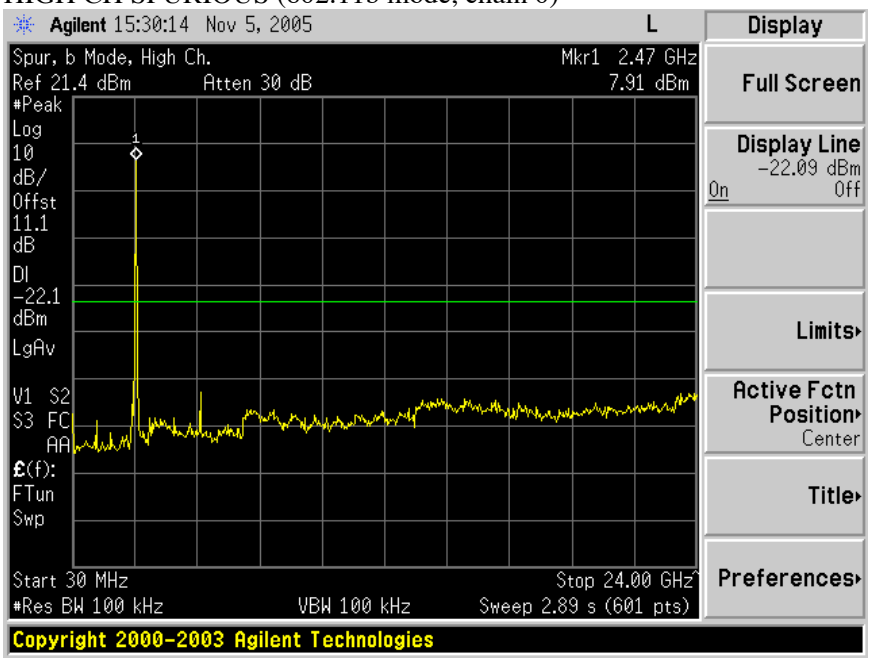
SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE), CHAIN 0

LOW CH SPURIOUS (802.11b mode, chain 0)



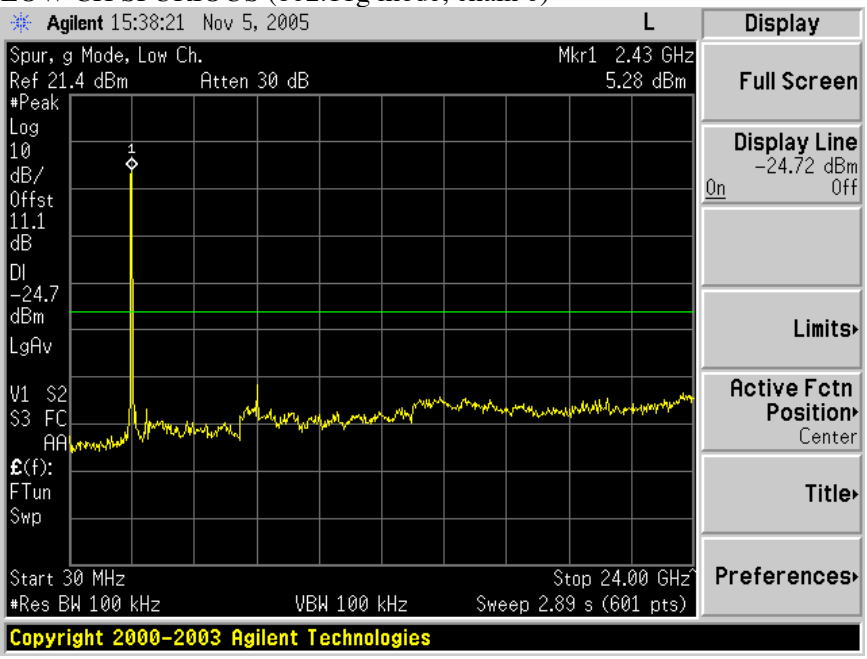
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE, CHAIN 0)

HIGH CH SPURIOUS (802.11b mode, chain 0)



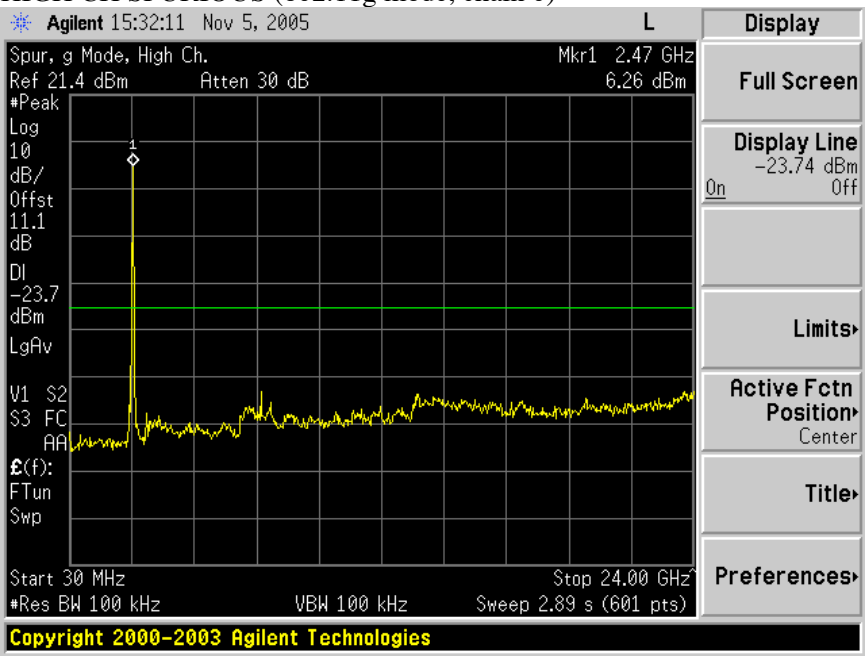
SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE, CHAIN 0)

LOW CH SPURIOUS (802.11g mode, chain 0)



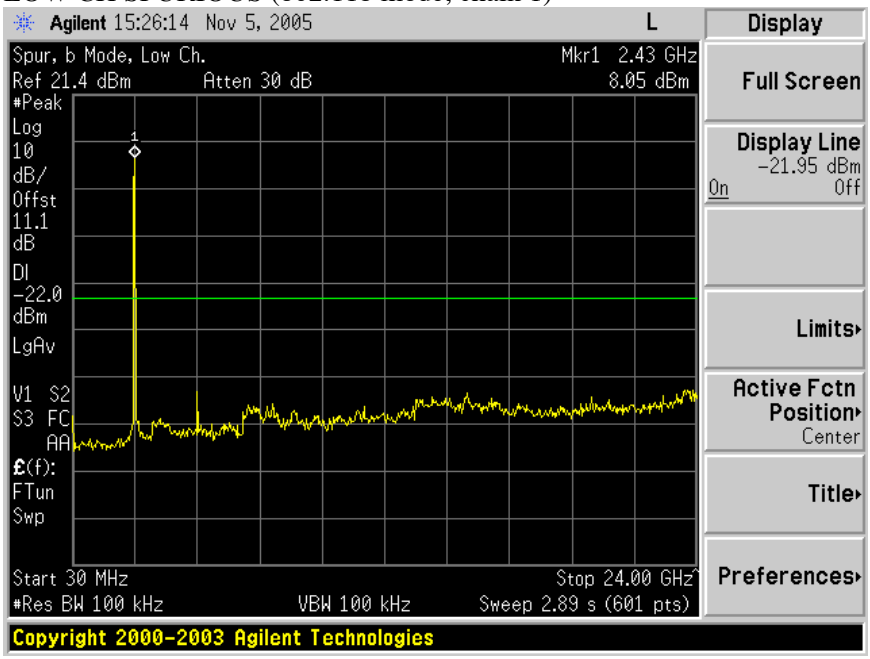
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE, CHAIN 0)

HIGH CH SPURIOUS (802.11g mode, chain 0)



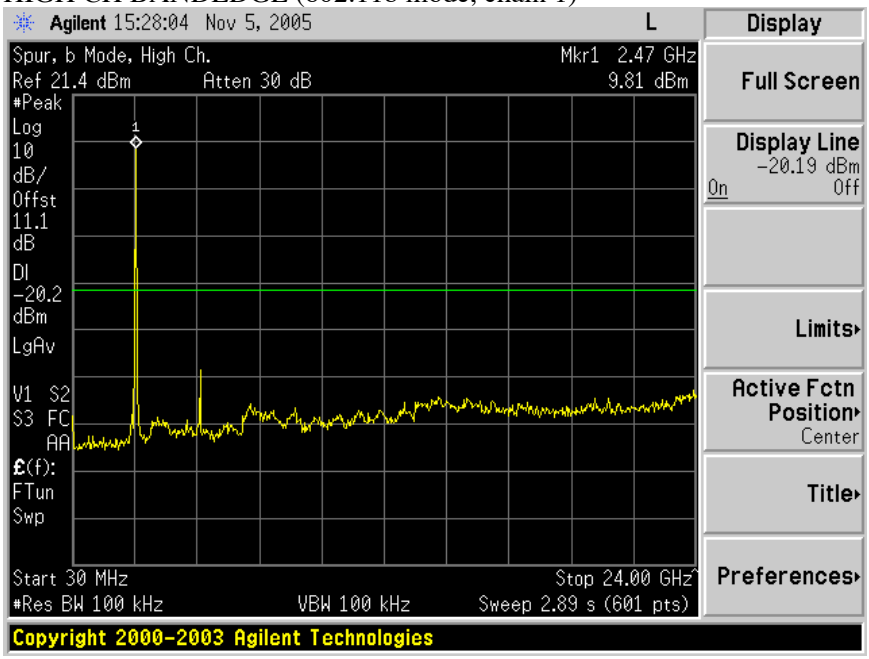
SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE, CHAIN 1

LOW CH SPURIOUS (802.11b mode, chain 1)



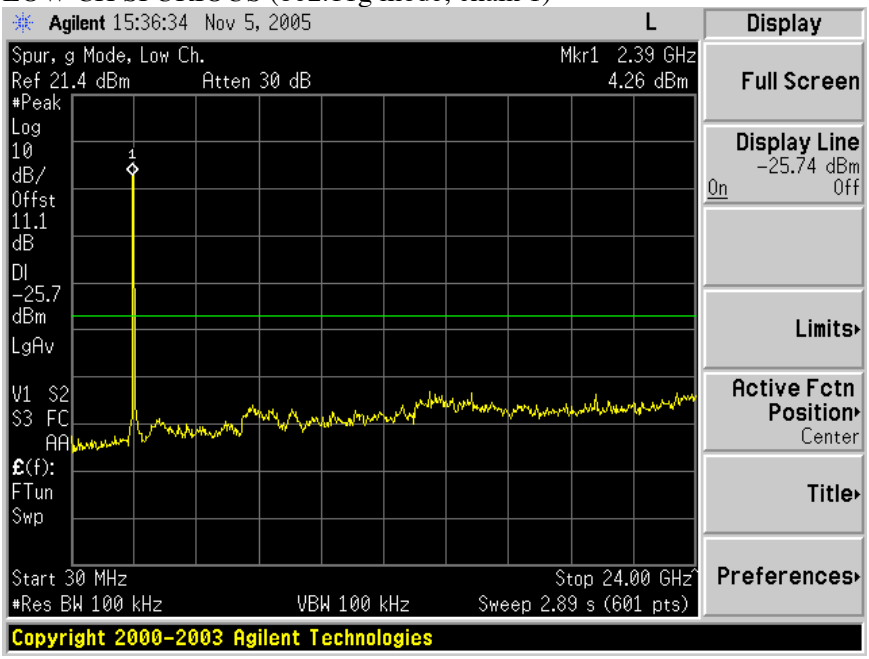
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE, CHAIN 1)

HIGH CH BANDEDGE (802.11b mode, chain 1)



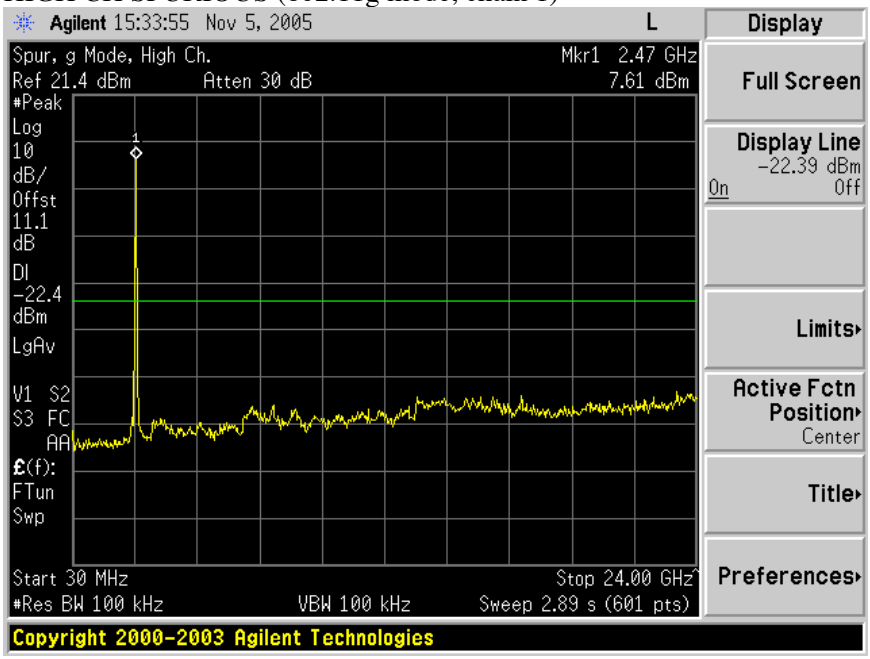
SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE, CHAIN 1)

LOW CH SPURIOUS (802.11g mode, chain 1)



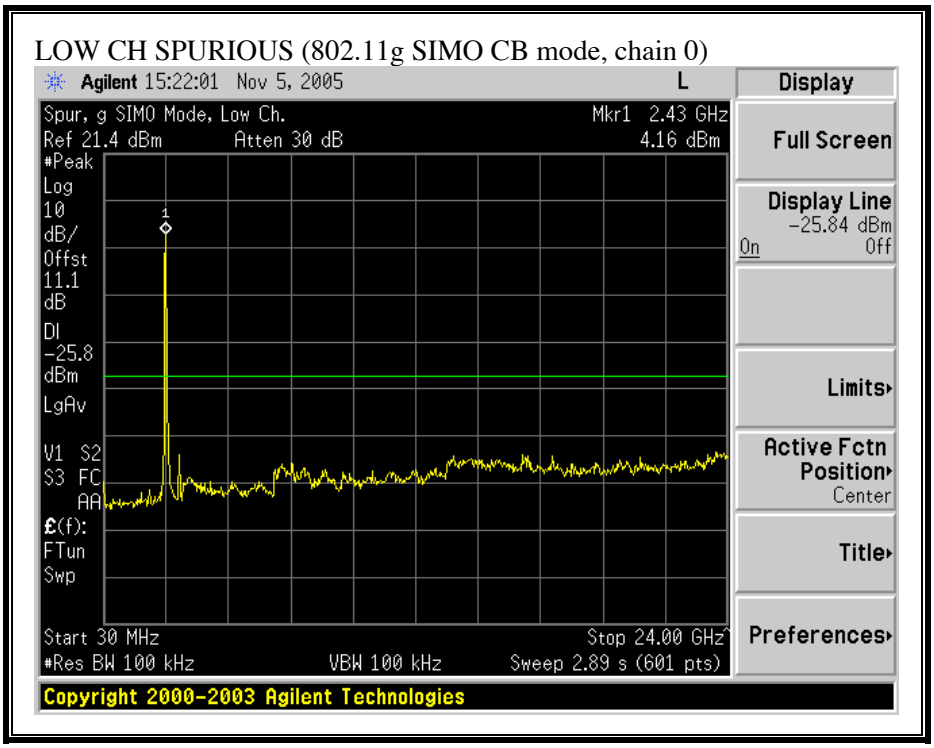
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE, CHAIN 1)

HIGH CH SPURIOUS (802.11g mode, chain 1)



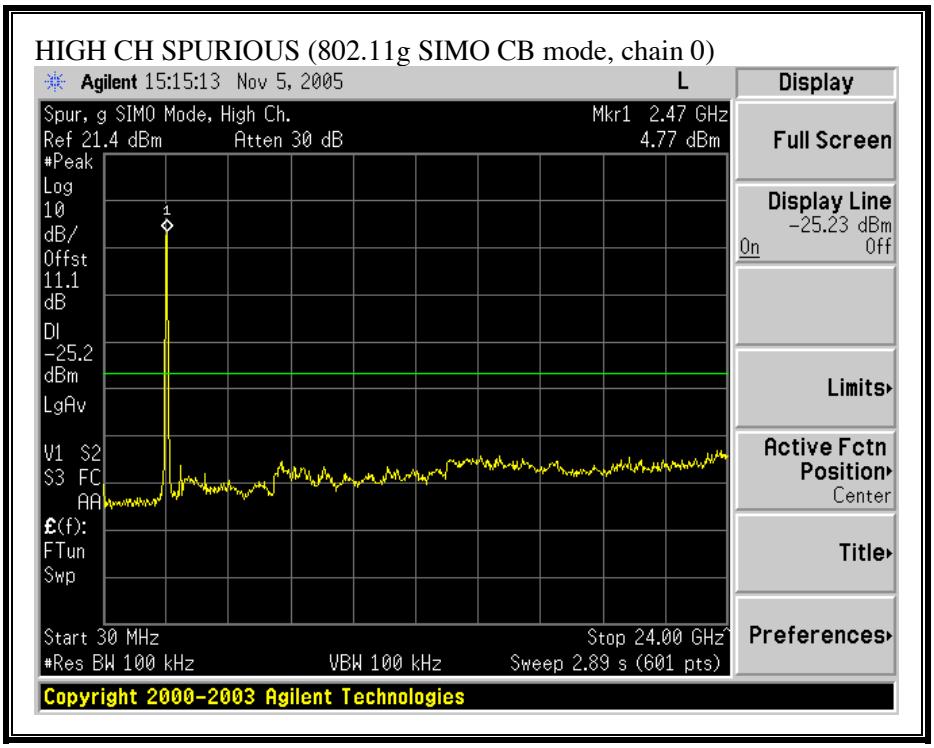
SPURIOUS EMISSIONS, LOW CHANNEL (802.11g SIMO CB MODE, CHAIN 0)

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



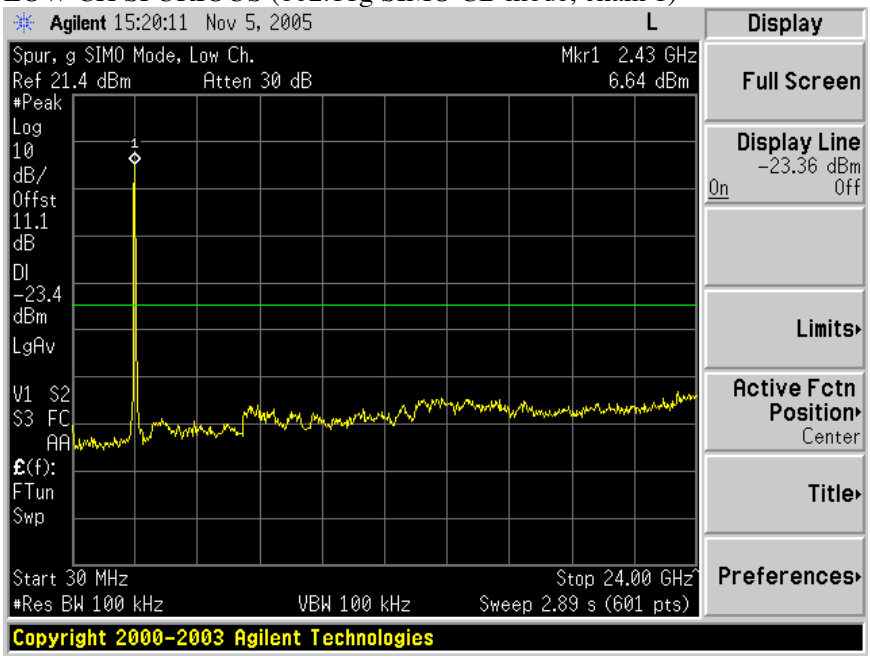
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g SIMO CHANNEL BOND MODE, CHAIN 0)

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



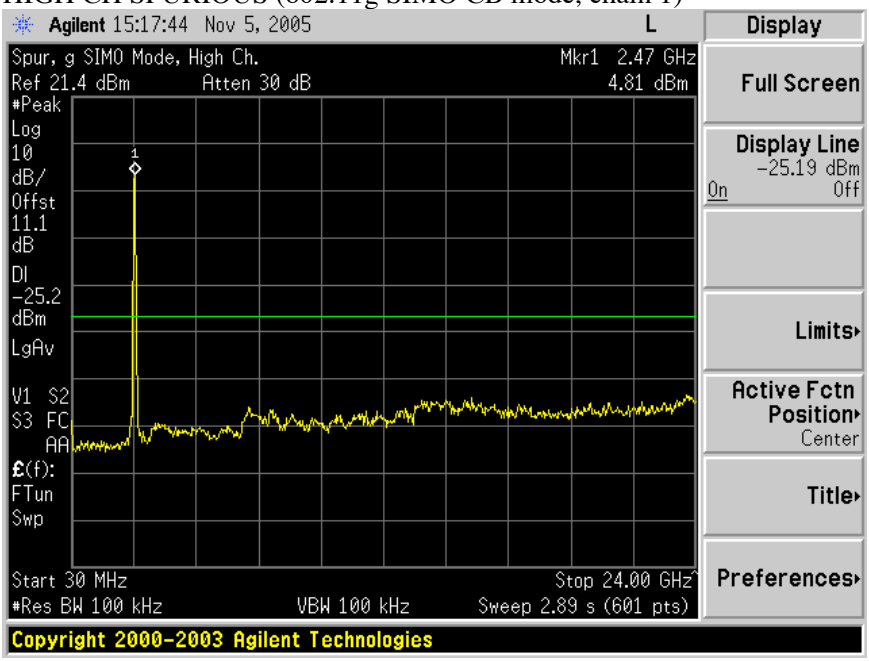
SPURIOUS EMISSIONS, LOW CHANNEL (802.11g SIMO CHANNEL BOND MODE, CHAIN 1)

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



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

HIGH CH 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.

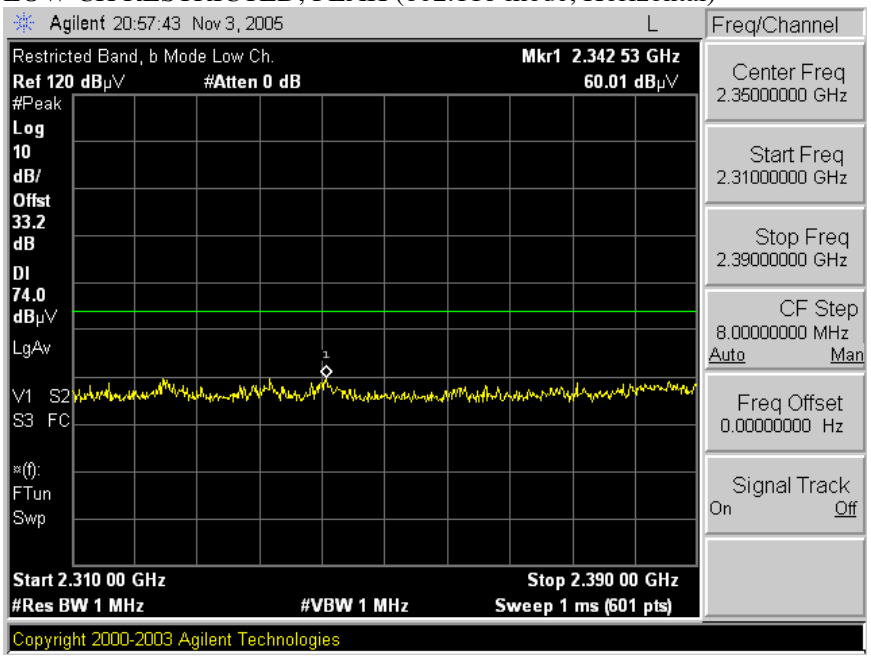
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

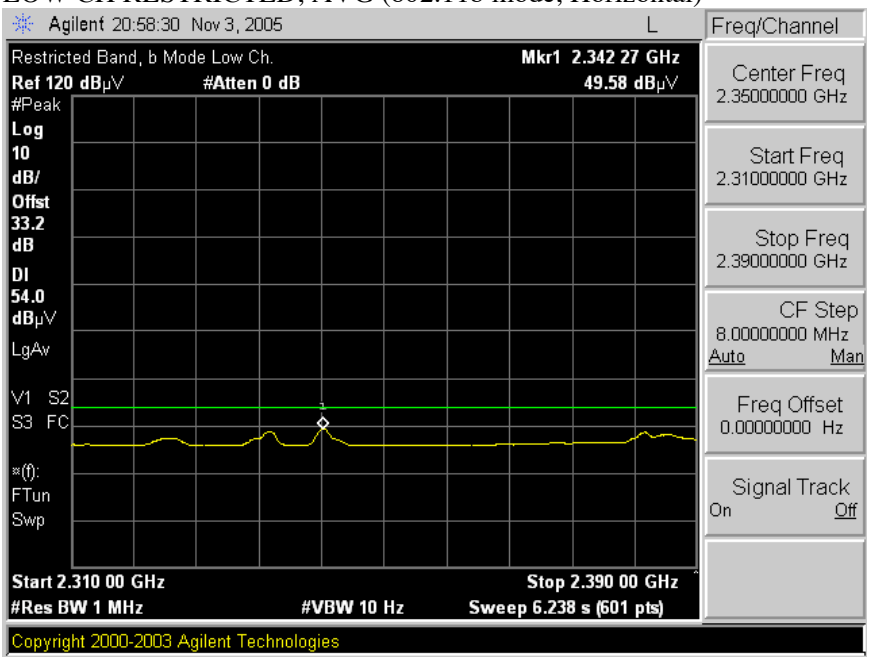
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

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

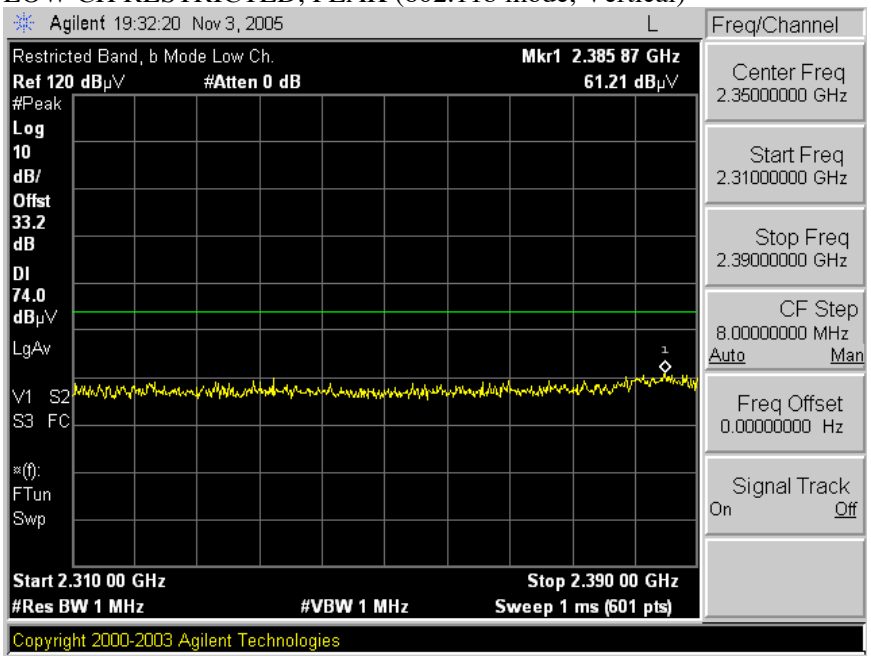


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

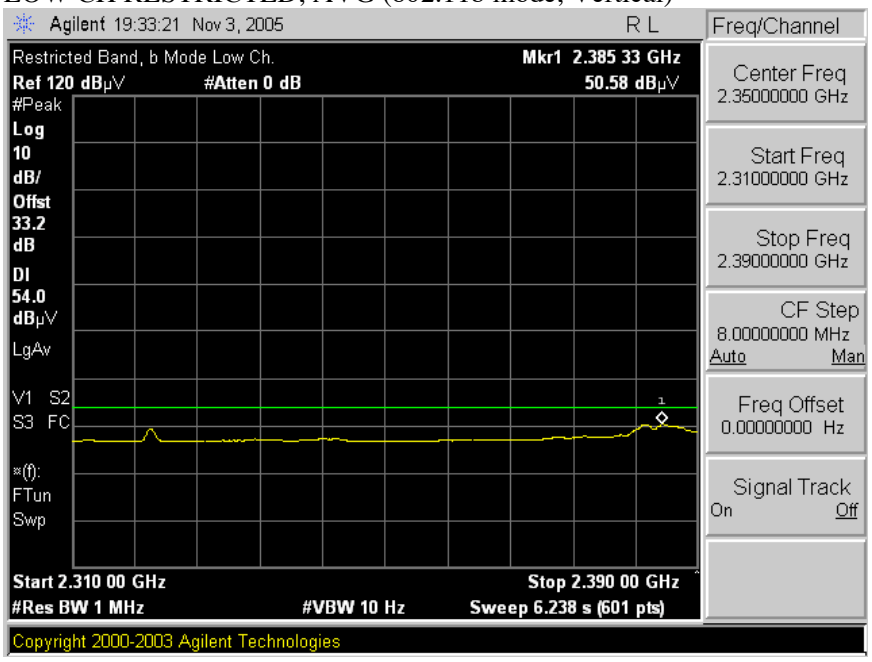


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

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

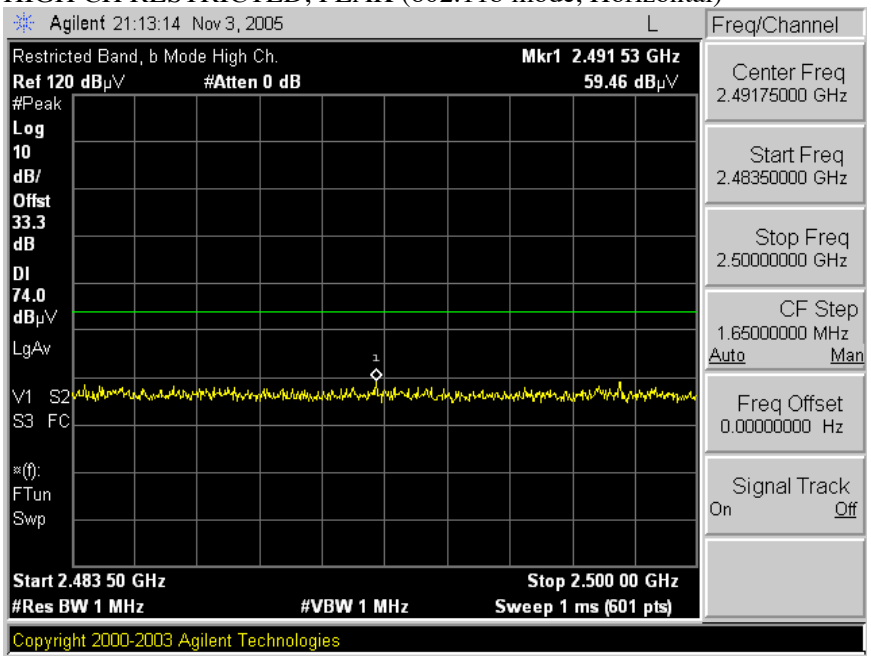


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

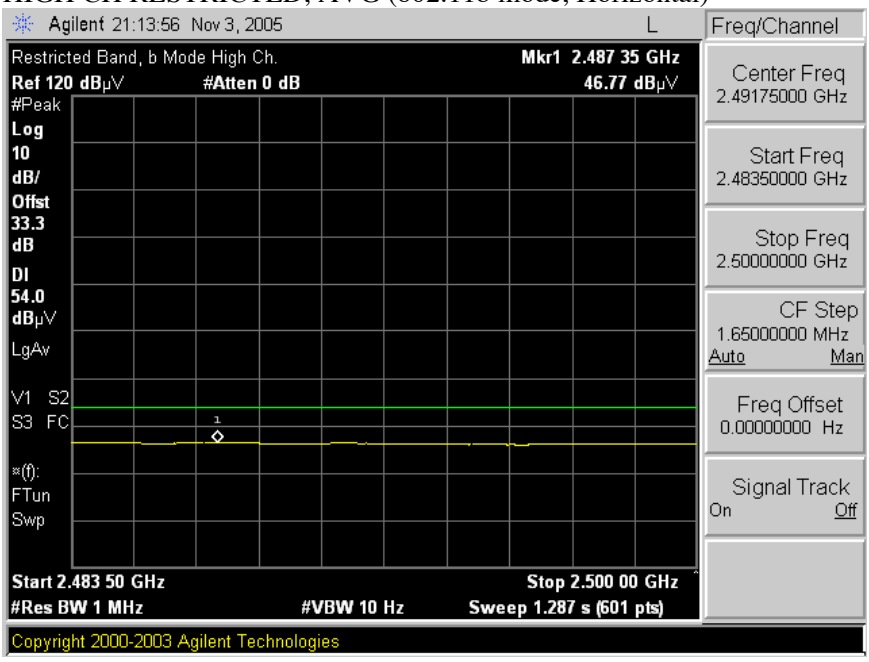


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

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

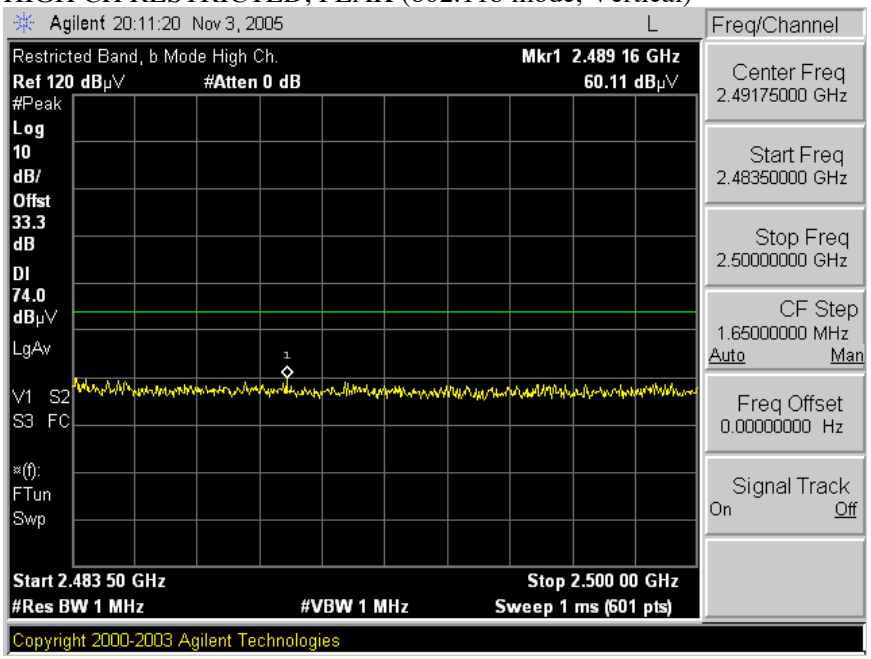


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

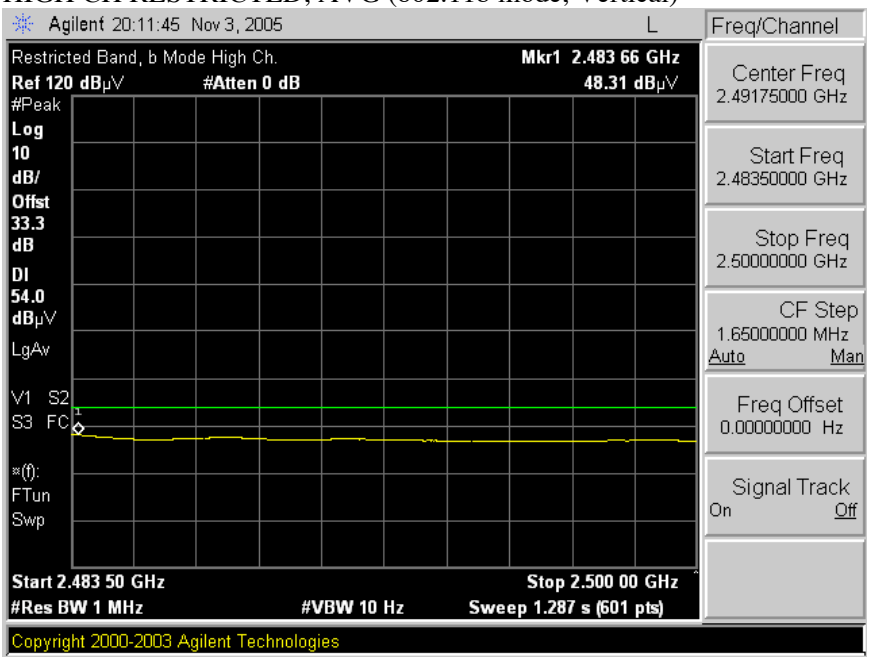


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

11/08/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Ninous Davoudi
Project #: 05U3807
Company: Airgo
EUT Descrip.: Gen 3 2x3 APX miniPCI Card
EUT M/N: SA3-AGN3023MX0100-
Test Target: FCC 15.247
Mode Oper:
Average Power Meter: Low = 21 dBm, Mid = 21 dBm, High = 21 dBm / chain

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T120; S/N: 29310 @1m	T144 Miteq 3008A00931		

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Ninous 202575001	Ninous 208946002	HPF_4.0GHz	

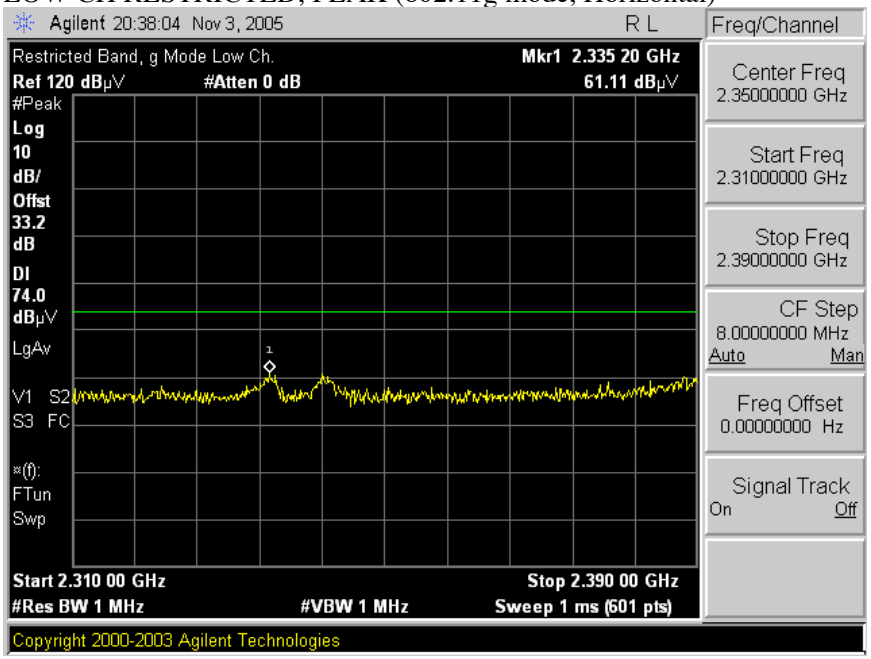
Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

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															
4.824	3.0	51.0	48.6	33.9	3.2	-36.5	0.0	0.6	52.2	49.8	74	54	-21.8	-4.2	V
4.824	3.0	44.3	39.6	33.9	3.2	-36.5	0.0	0.6	45.5	40.8	74	54	-28.5	-13.2	H
7.236	3.0	42.5	31.0	35.9	3.7	-36.2	0.0	0.6	46.5	35.0	74	54	-27.5	-19.0	H
7.236	3.0	43.8	33.3	35.9	3.7	-36.2	0.0	0.6	47.8	37.3	74	54	-26.2	-16.7	V
9.648	3.0	43.1	37.8	37.6	4.5	-37.0	0.0	0.8	49.1	43.7	74	54	-24.9	-10.3	V
9.648	3.0	42.6	36.7	37.6	4.5	-37.0	0.0	0.8	48.5	42.6	74	54	-25.5	-11.4	H
12.060	3.0	39.9	27.9	38.6	4.9	-35.4	0.0	0.9	49.0	36.9	74	54	-25.0	-17.1	H
12.060	3.0	40.0	27.9	38.6	4.9	-35.4	0.0	0.9	49.0	37.0	74	54	-25.0	-17.1	V
Note: no signal detected above this frequency															V
Mid ch															
4.874	3.0	51.0	48.8	34.0	3.2	-36.5	0.0	0.6	52.3	50.1	74	54	-21.7	-3.9	V
4.874	3.0	46.0	42.3	34.0	3.2	-36.5	0.0	0.6	47.3	43.6	74	54	-26.7	-10.4	H
7.311	3.0	42.3	30.9	35.9	3.8	-36.2	0.0	0.6	46.4	34.9	74	54	-27.6	-19.1	H
7.311	3.0	43.5	33.1	35.9	3.8	-36.2	0.0	0.6	47.6	37.2	74	54	-26.4	-16.8	V
9.748	3.0	42.2	35.7	37.7	4.5	-37.0	0.0	0.8	48.2	41.8	74	54	-25.8	-12.2	V
9.748	3.0	42.5	35.5	37.7	4.5	-37.0	0.0	0.8	48.5	41.5	74	54	-25.5	-12.5	H
12.185	3.0	40.3	28.1	38.6	5.0	-35.4	0.0	0.9	49.4	37.2	74	54	-24.6	-16.8	H
12.185	3.0	40.3	28.0	38.6	5.0	-35.4	0.0	0.9	49.4	37.1	74	54	-24.6	-16.9	V
Note: no signal detected above this frequency															
High ch															
4.924	3.0	52.1	49.5	34.0	3.2	-36.5	0.0	0.6	53.4	50.8	74	54	-20.6	-3.2	V
4.924	3.0	46.6	43.4	34.0	3.2	-36.5	0.0	0.6	48.0	44.7	74	54	-26.0	-9.3	H
7.386	3.0	41.7	30.4	35.9	3.8	-36.2	0.0	0.6	45.8	34.5	74	54	-28.2	-19.5	H
7.386	3.0	45.2	34.7	35.9	3.8	-36.2	0.0	0.6	49.3	38.8	74	54	-24.7	-15.2	V
9.848	3.0	42.9	35.5	37.8	4.5	-37.0	0.0	0.8	49.1	41.6	74	54	-24.9	-12.4	V
9.848	3.0	41.1	31.8	37.8	4.5	-37.0	0.0	0.8	47.2	37.9	74	54	-26.8	-16.1	H
12.310	3.0	41.6	28.7	38.7	5.0	-35.4	0.0	0.9	50.7	37.9	74	54	-23.3	-16.1	H
12.310	3.0	41.2	28.7	38.7	5.0	-35.4	0.0	0.9	50.3	37.8	74	54	-23.7	-16.2	V
Note: no signal detected above this frequency															

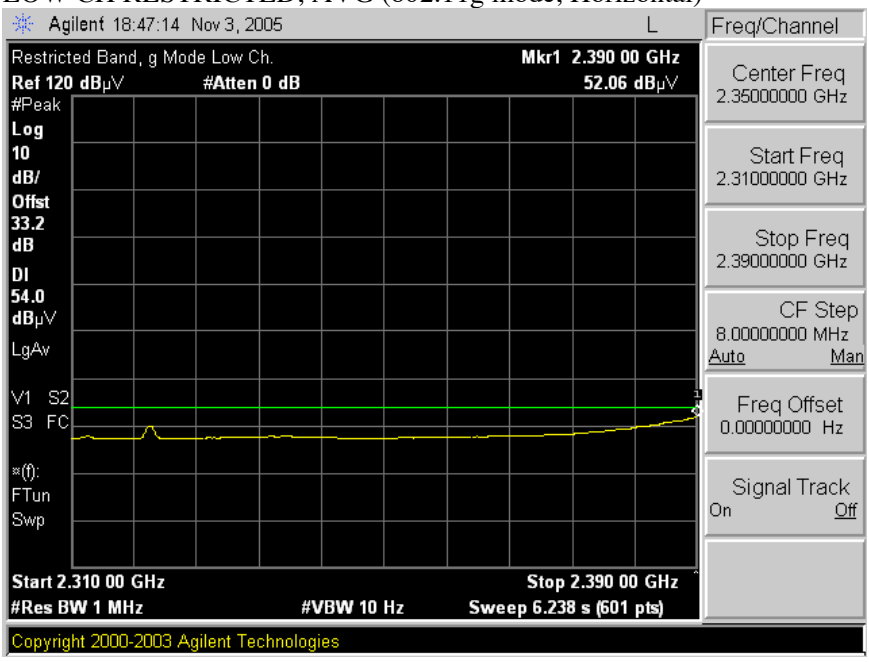
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

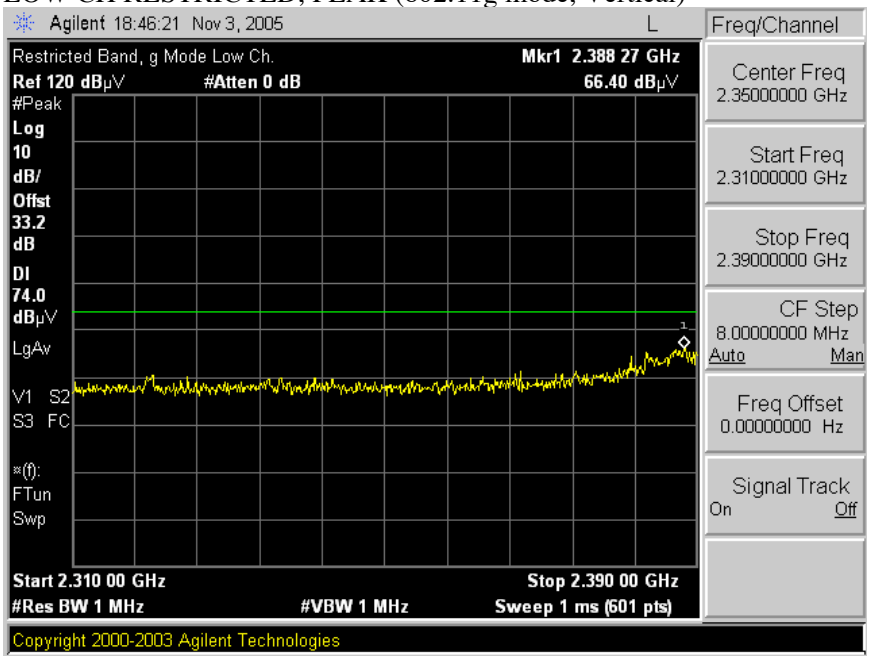


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

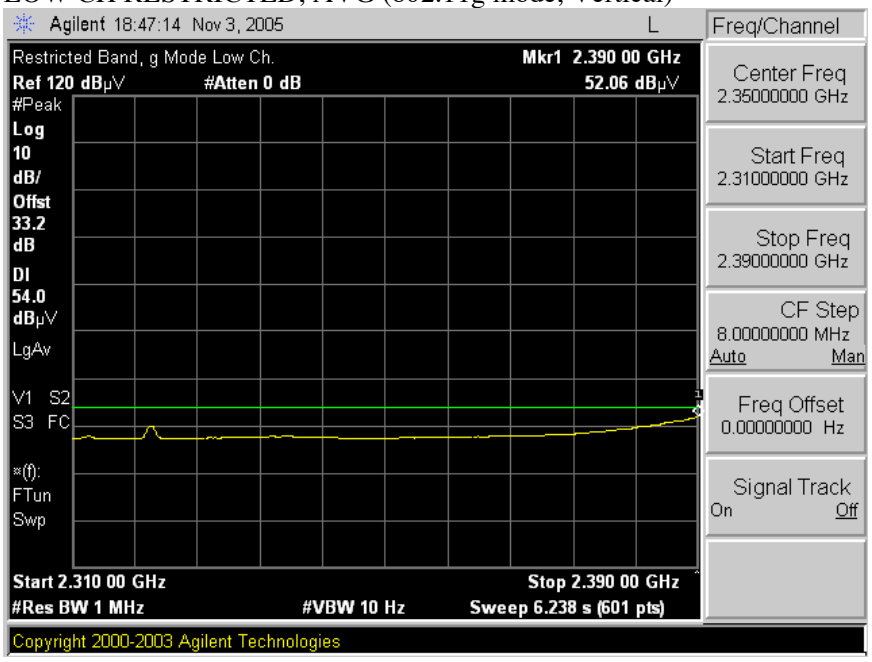


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

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

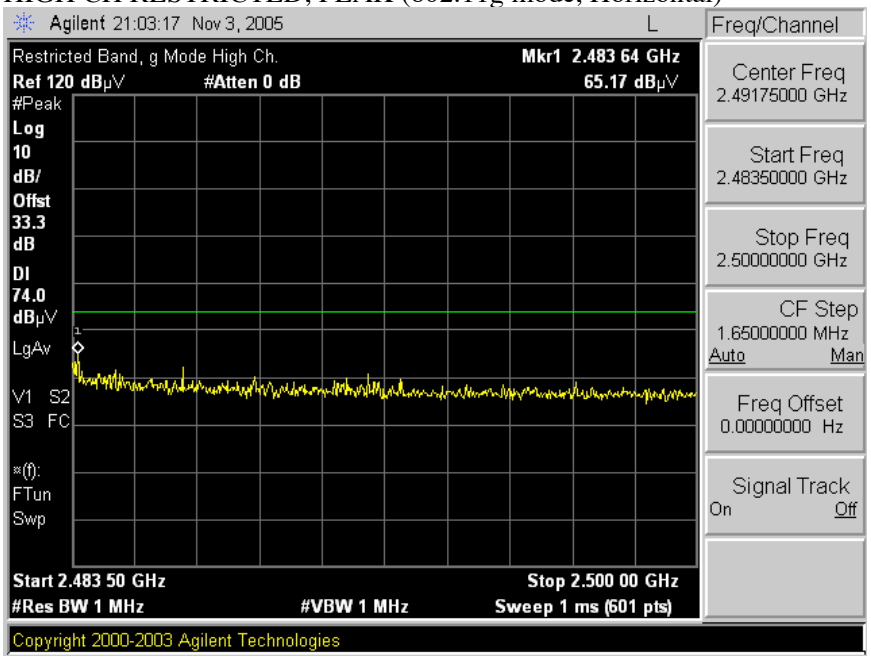


LOW CH RESTRICTED, AVG (802.11g mode, Vertical)

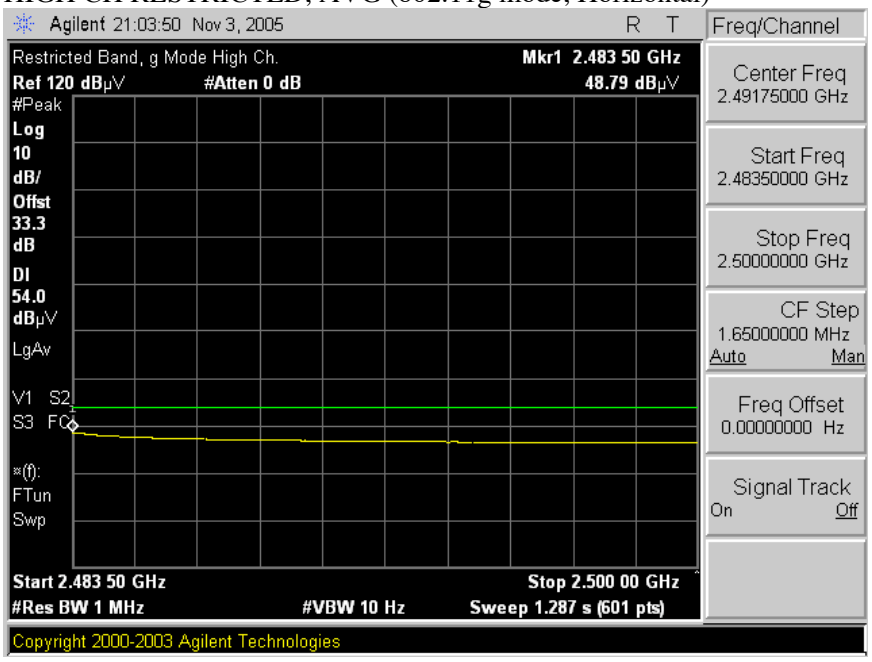


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

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

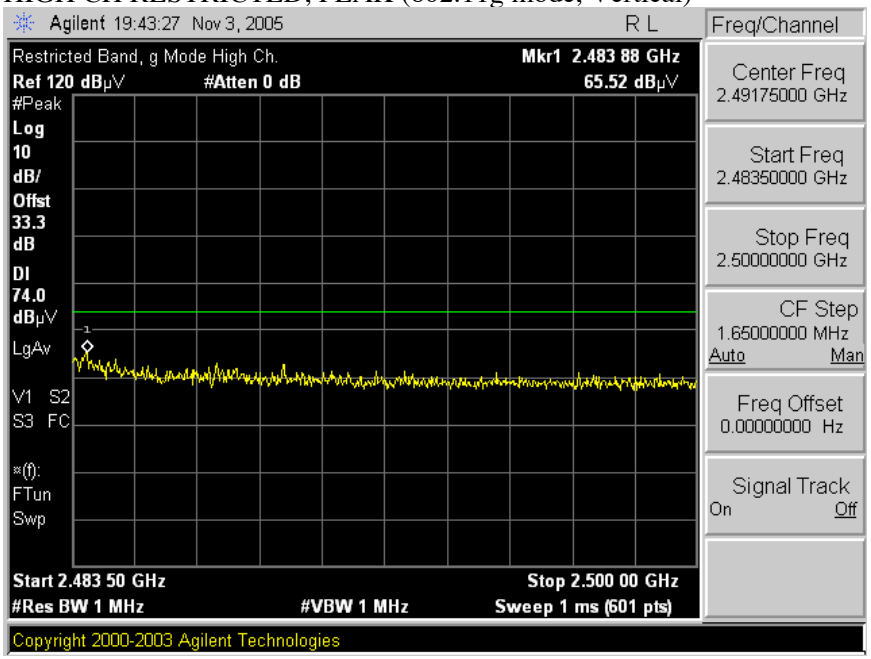


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

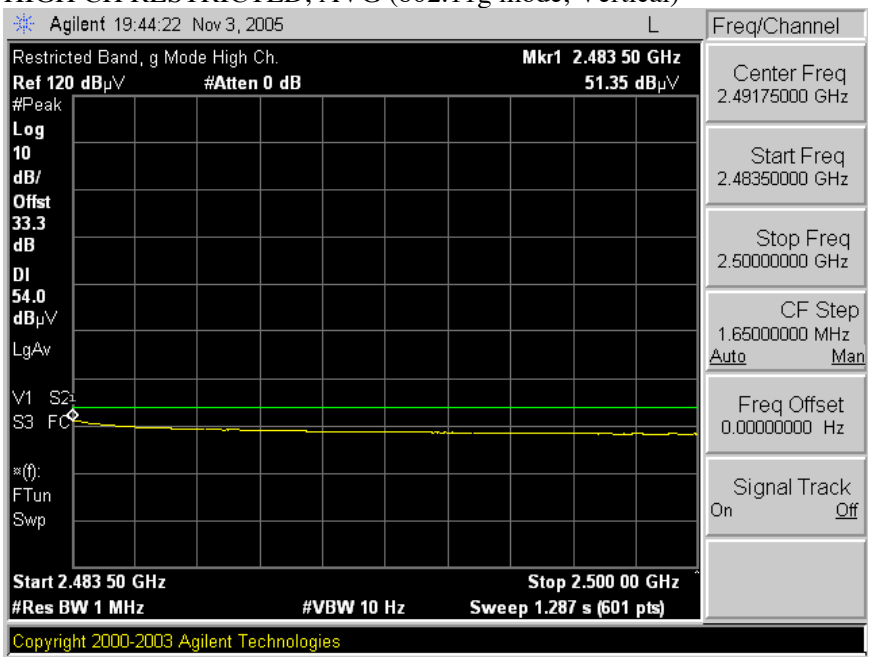


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (g MODE)

11/08/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Ninous Davoudi
Project #: 05U3807
Company: Airgo
EUT Descrip.: Gen 3 2x3 APX miniPCI Card
EUT M/N: SA3-AGN3023MX0100-
Test Target: FCC 15.247
Mode Oper:
Average Power Meter: Low = 21 dBm, Mid = 21 dBm, High = 21 dBm

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T120; S/N: 29310 @1m	T144 Miteq 3008A00931		

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Ninous 202575001	Ninous 208946002	HPF_4.0GHz	

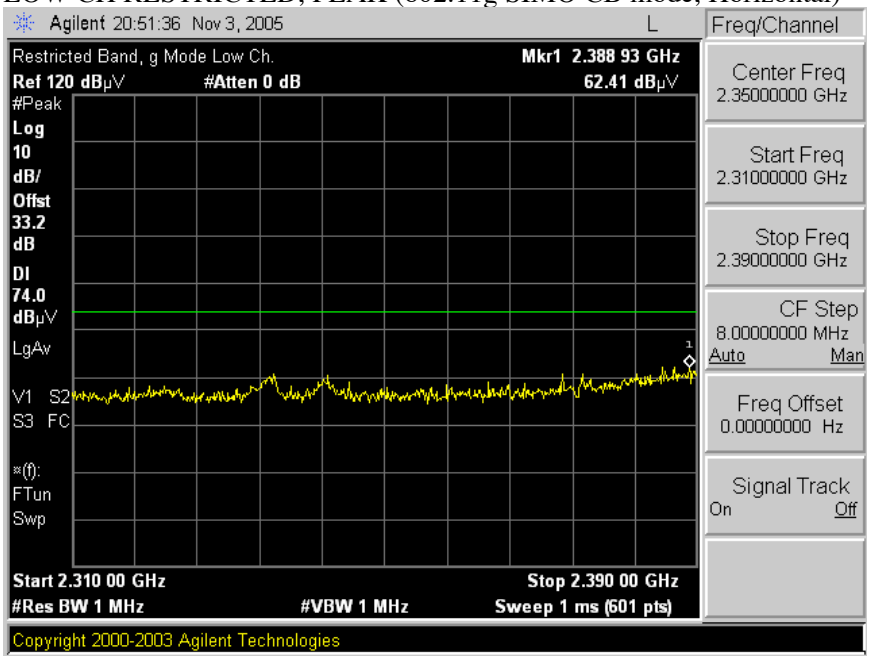
Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

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	63.8	47.6	33.9	3.2	-36.5	0.0	0.6	65.1	48.9	74	54	-8.9	-5.1	V
4.824	3.0	57.5	43.3	33.9	3.2	-36.5	0.0	0.6	58.7	44.5	74	54	-15.3	-9.5	H
7.236	3.0	44.0	32.6	35.9	3.7	-36.2	0.0	0.6	48.0	36.6	74	54	-26.0	-17.4	H
7.236	3.0	49.3	35.9	35.9	3.7	-36.2	0.0	0.6	53.3	39.9	74	54	-20.7	-14.1	V
9.648	3.0	44.7	33.6	37.6	4.5	-37.0	0.0	0.8	50.6	39.5	74	54	-23.4	-14.5	V
9.648	3.0	45.7	33.3	37.6	4.5	-37.0	0.0	0.8	51.6	39.2	74	54	-22.4	-14.8	H
12.060	3.0	44.7	33.1	38.6	4.9	-35.4	0.0	0.9	53.7	42.1	74	54	-20.3	-11.9	H
12.060	3.0	44.7	32.9	38.6	4.9	-35.4	0.0	0.9	53.7	42.0	74	54	-20.3	-12.1	V
Note: no signal detected above thisfrequency															
High ch															
4.924	3.0	60.3	45.6	34.0	3.2	-36.5	0.0	0.6	61.7	46.9	74	54	-12.3	-7.1	V
4.924	3.0	56.3	41.8	34.0	3.2	-36.5	0.0	0.6	57.6	43.2	74	54	-16.4	-10.8	H
7.386	3.0	43.2	32.1	35.9	3.8	-36.2	0.0	0.6	47.3	36.2	74	54	-26.7	-17.8	H
7.386	3.0	44.0	32.2	35.9	3.8	-36.2	0.0	0.6	48.1	36.3	74	54	-25.9	-17.7	V
9.848	3.0	44.1	33.3	37.8	4.5	-37.0	0.0	0.8	50.2	39.4	74	54	-23.8	-14.6	V
9.848	3.0	44.8	32.9	37.8	4.5	-37.0	0.0	0.8	50.9	39.1	74	54	-23.1	-14.9	H
12.310	3.0	44.5	33.0	38.7	5.0	-35.4	0.0	0.9	53.7	42.1	74	54	-20.3	-11.9	H
12.310	3.0	44.8	33.0	38.7	5.0	-35.4	0.0	0.9	53.9	42.2	74	54	-20.1	-11.8	V
Note: no signal detected above thisfrequency															

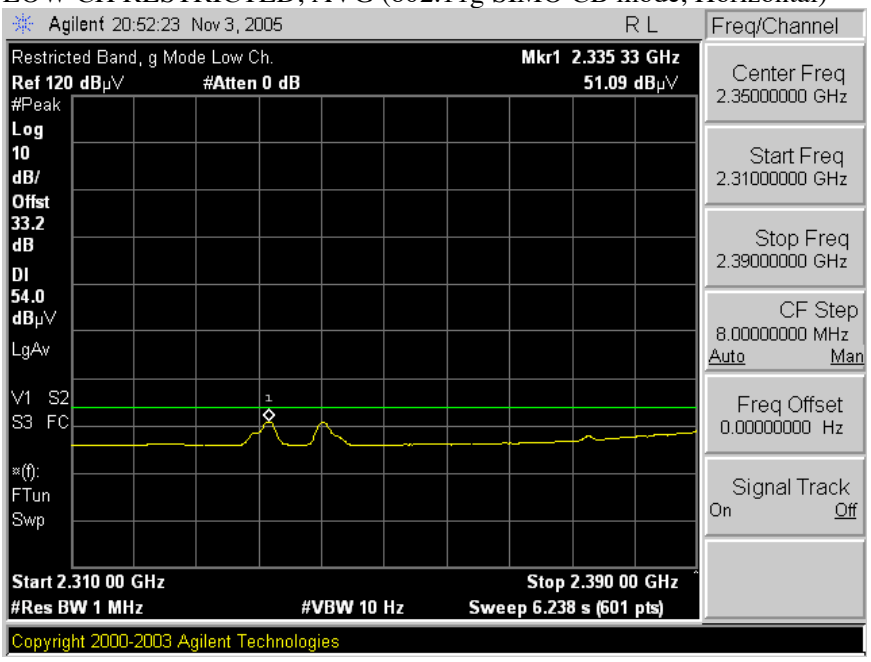
f	Measurement Frequency	Amp	Preamp Gain			Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak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

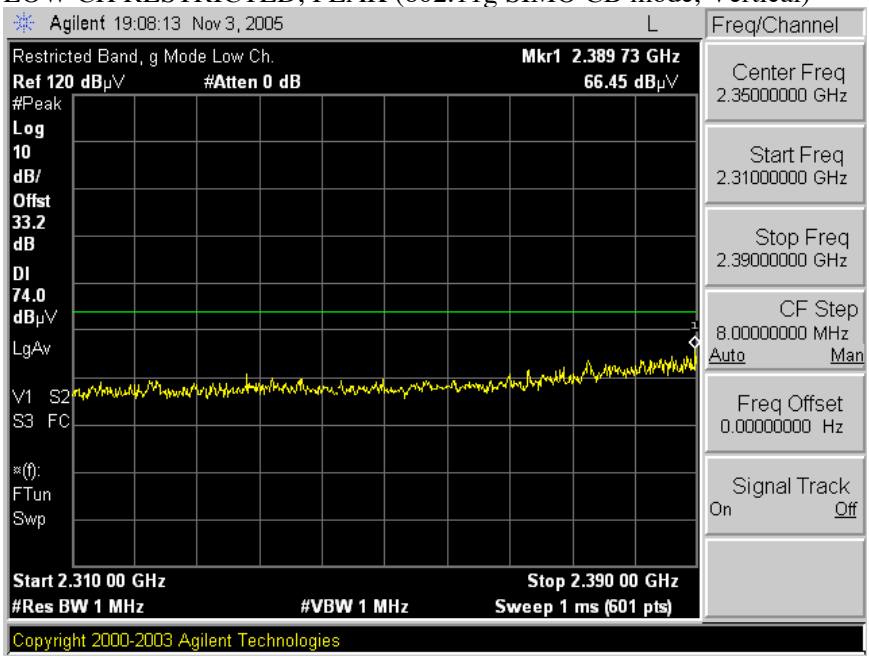


LOW CH RESTRICTED, AVG (802.11g SIMO CB mode, Horizontal)

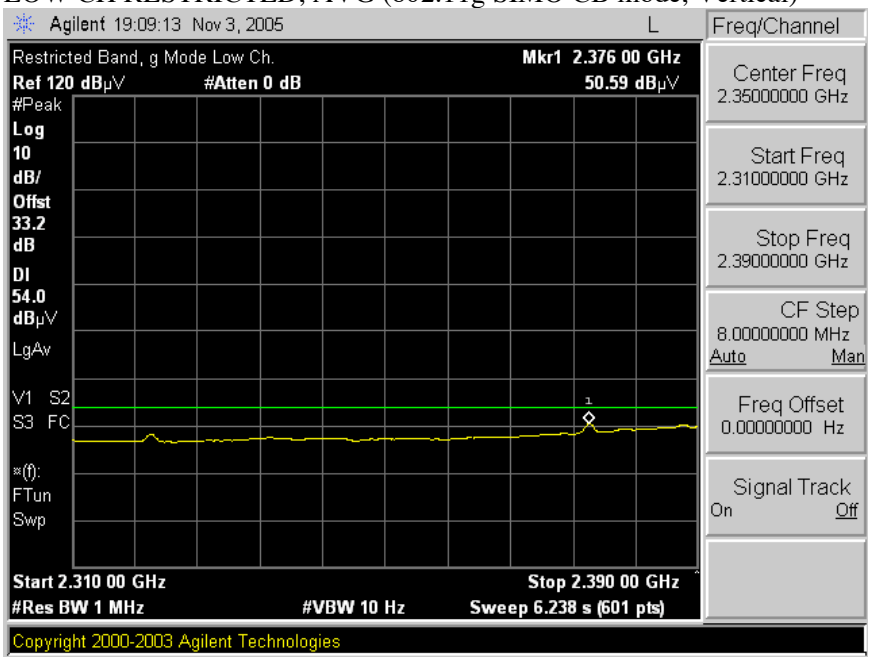


RESTRICTED BANDEDGE (SIMO CHANNEL BOND MODE, LOW CHANNEL, VERTICAL)

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

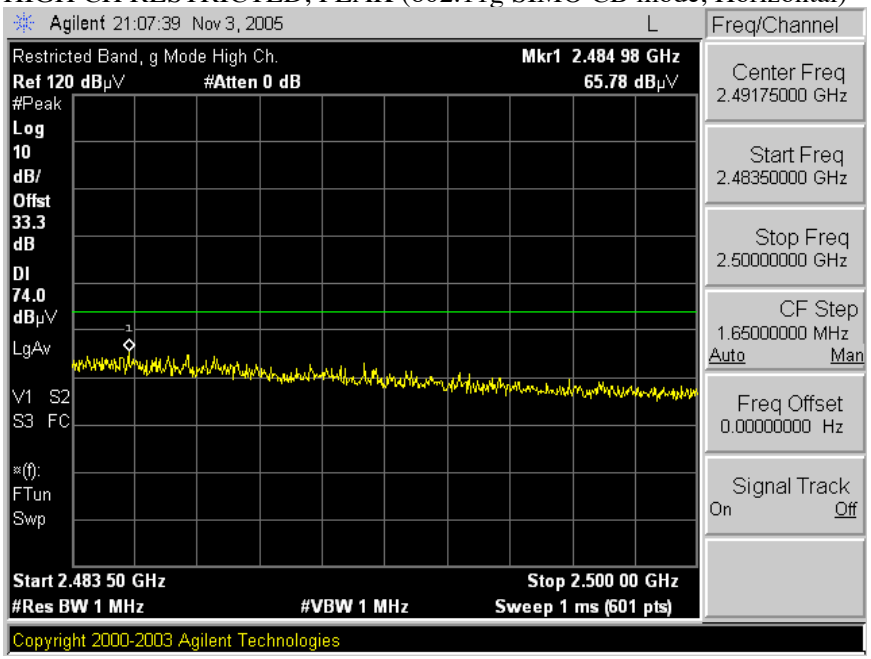


LOW CH RESTRICTED, AVG (802.11g SIMO CB mode, Vertical)

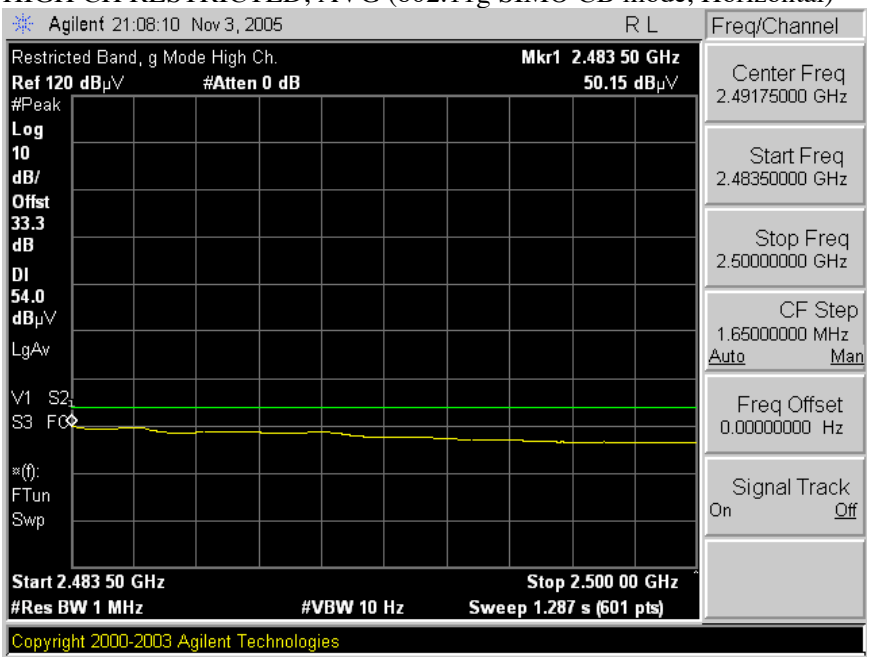


RESTRICTED BANDEDGE (SIMO CHANNEL BOND MODE, HIGH CHANNEL, HORIZONTAL)

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

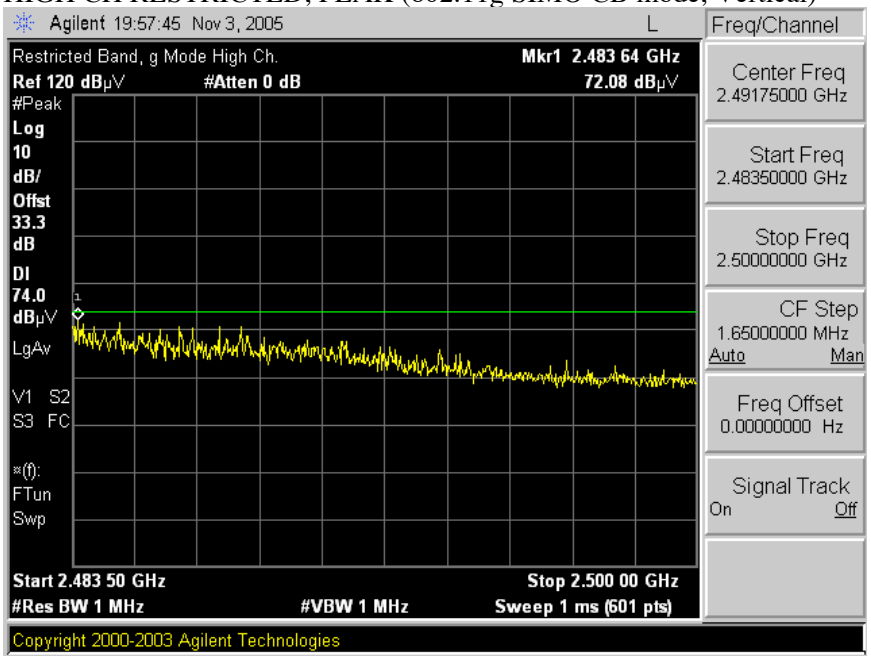


HIGH CH RESTRICTED, AVG (802.11g SIMO CB mode, Horizontal)

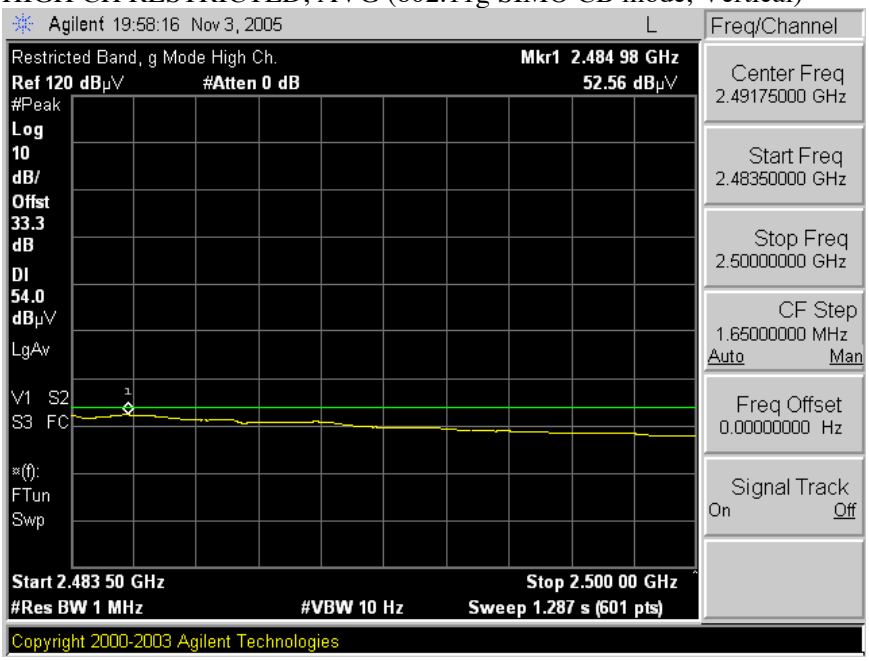


RESTRICTED BANDEDGE (SIMO CHANNEL BOND MODE, HIGH CHANNEL, VERTICAL)

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)

11/08/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Ninous Davoudi
Project #: 05U3807
Company: Airgo
EUT Descrip.: Gen 3 2x3 APX miniPCI Card
EUT M/N: SA3-AGN3023MX0100-
Test Target: FCC 15.247
Mode Oper:
Average Power Meter: Low = 21 dBm, Mid = 21 dBm, High = 21 dBm

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T120; S/N: 29310 @1m	T144 Miteq 3008A00931		

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Ninous 202575001	Ninous 208946002	HPF_4.0GHz	

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

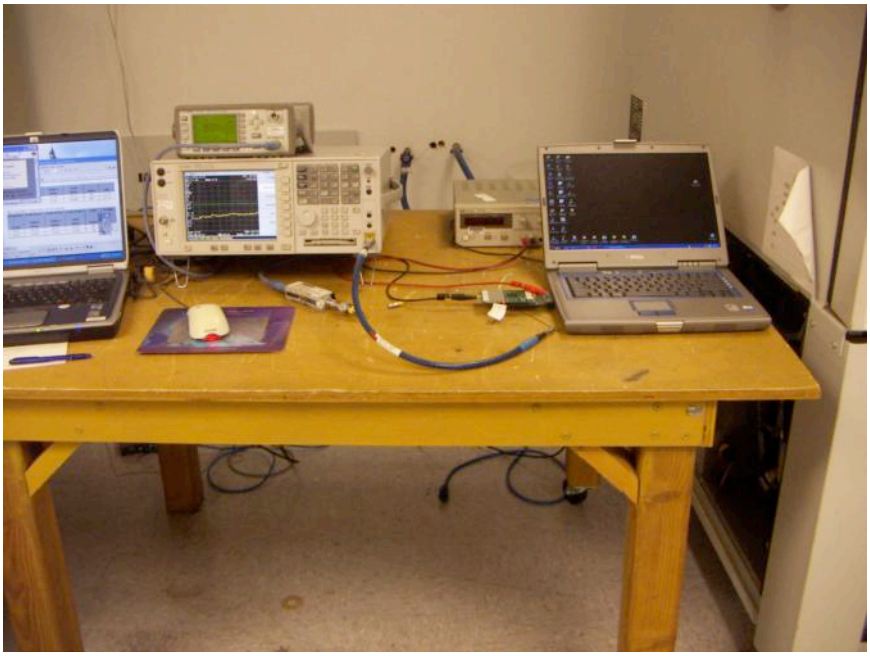
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low ch															
4.824	3.0	61.3	43.9	33.9	3.2	-36.5	0.0	0.6	62.5	45.2	74	54	-11.5	-8.8	V
4.824	3.0	55.5	39.4	33.9	3.2	-36.5	0.0	0.6	56.7	40.6	74	54	-17.3	-13.4	H
7.236	3.0	43.6	32.6	35.9	3.7	-36.2	0.0	0.6	47.6	36.6	74	54	-26.4	-17.4	H
7.236	3.0	44.5	33.3	35.9	3.7	-36.2	0.0	0.6	48.5	37.3	74	54	-25.5	-16.7	V
9.648	3.0	44.6	33.3	37.6	4.5	-37.0	0.0	0.8	50.6	39.3	74	54	-23.4	-14.7	V
9.648	3.0	44.3	33.2	37.6	4.5	-37.0	0.0	0.8	50.3	39.1	74	54	-23.7	-14.9	H
12.060	3.0	46.8	33.4	38.6	4.9	-35.4	0.0	0.9	55.8	42.5	74	54	-18.2	-11.5	H
12.060	3.0	44.3	32.4	38.6	4.9	-35.4	0.0	0.9	53.3	41.4	74	54	-20.7	-12.6	V
Note: no signal detected above this frequency															
High ch															
4.924	3.0	58.4	49.3	34.0	3.2	-36.5	0.0	0.6	59.8	50.6	74	54	-14.2	-3.4	V
4.924	3.0	53.4	42.6	34.0	3.2	-36.5	0.0	0.6	54.7	44.0	74	54	-19.3	-10.0	H
7.386	3.0	53.3	38.9	35.9	3.8	-36.2	0.0	0.6	57.4	43.0	74	54	-16.6	-11.0	H
7.386	3.0	58.3	40.0	35.9	3.8	-36.2	0.0	0.6	62.4	44.1	74	54	-11.6	-9.9	V
9.848	3.0	49.4	37.0	37.8	4.5	-37.0	0.0	0.8	55.6	43.1	74	54	-18.4	-10.9	V
9.848	3.0	48.7	36.2	37.8	4.5	-37.0	0.0	0.8	54.8	42.3	74	54	-19.2	-11.7	H
12.310	3.0	48.6	37.0	38.7	5.0	-35.4	0.0	0.9	57.8	46.1	74	54	-16.2	-7.9	H
12.310	3.0	49.1	37.0	38.7	5.0	-35.4	0.0	0.9	58.3	46.1	74	54	-15.7	-7.9	V
Note: no signal detected above this frequency															

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		

8. SETUP PHOTOS

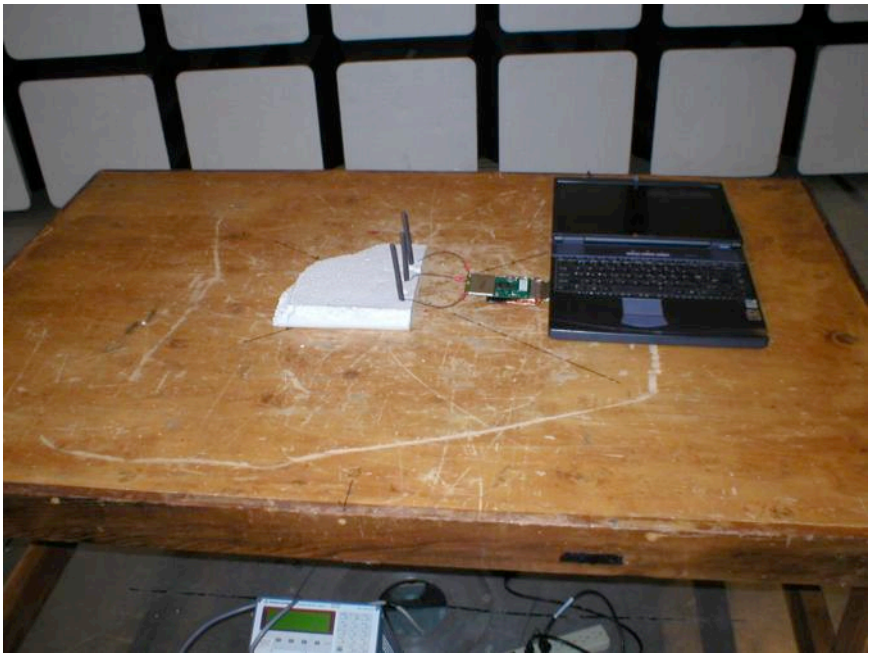
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

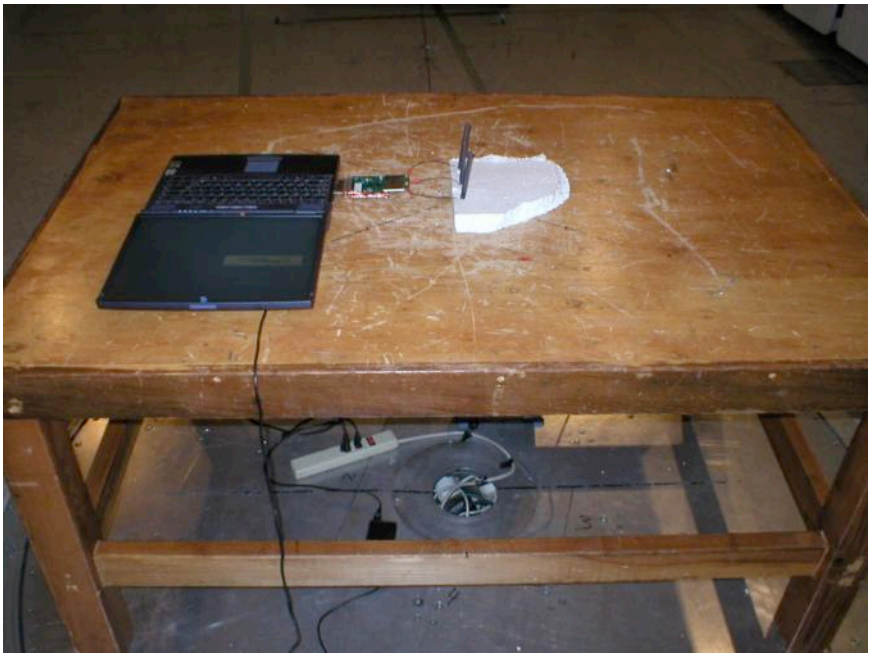


RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO



RADIATED BACK PHOTO



END OF REPORT