FCC CFR47 PART 15 SUBPART C CERTIFICATION

TEST REPORT

FOR

MINI PCI TYPE 3B MISO 802.11 a/b/g WLAN CARD

MODEL NUMBER: AGN1012MP-02

FCC ID: SA3-AGN1012MP0200

REPORT NUMBER: 04U3052-2

ISSUE DATE: FEBRUARY 7TH, 2005

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

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

Revision History

Rev.	Revisions	Revised By

TABLE OF CONTENTS

1. TEST RESULT DECLARATION 4

2. EQUIPMENT UNDER TEST 5

2.1. DESCRIPTION OF EUT 5

2.2. MAXIMUM OUTPUT POWER 5

2.3. DESCRIPTION OF AVAILABLE ANTENNAS 5

2.4. SOFTWARE AND FIRMWARE 5

2.5. WORST-CASE 6

3. TEST METHODOLOGY 6

4. FACILITIES AND ACCREDITATION 6

5. CALIBRATION AND UNCERTAINTY 7

5.1. MEASURING INSTRUMENT CALIBRATION 7

5.2. MEASUREMENT UNCERTAINTY 7

5.3. TEST AND MEASUREMENT EQUIPMENT 8

6. SETUP OF EQUIPMENT UNDER TEST 9

7. APPLICABLE LIMITS AND TEST RESULTS 11

7.1. CHANNEL TESTS FOR THE 5150 TO 5350 MHz BAND 11

7.1.1. EMISSION BANDWIDTH 11
7.1.2. PEAK POWER 15
7.1.3. MAXIMUM PERMISSIBLE EXPOSURE 20
7.1.4. AVERAGE POWER 23
7.1.5. PEAK POWER SPECTRAL DENSITY 24
7.1.6. PEAK EXCURSION 29
7.1.7. CONDUCTED SPURIOUS EMISSIONS 33

7.2. RADIATED EMISSIONS 37

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS 37
7.2.2. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5350 MHz BAND 40
7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz 49

7.3. POWERLINE CONDUCTED EMISSIONS 50

8. SETUP PHOTOS 54

1. TEST RESULT DECLARATION

COMPANY NAME: AIRGO NETWORKS INC
900 ARASTRADERO ROAD
PALO ALTO, CA 94304 U.S.A.

EUT DESCRIPTION: MiniPCI type 3b MISO 802.11 a/b/g WLAN Card

MODEL: AGN1012MP-02

DATE TESTED: October 25 – November 7, 2004

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART E	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.
.

Approved & Released For CCS By: Tested By:

YAN ZHENG
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

DAVID GARCIA & HITESH. H. SOLANKI
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EQUIPMENT UNDER TEST

2.1. DESCRIPTION OF EUT

The EUT is a MiniPCI Type 3b MISO 802.11 a/b/g WLAN Card, which has one transmitter and two receivers.

The radio module is manufactured by Airgo Networks Inc.

2.2. MAXIMUM OUTPUT POWER

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

5150 to 5250 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	14.42	27.67

5250 to 5350 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5260 - 5320	802.11a	19.74	94.19

2.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two Centurion D-Puck antennas for diversity, each with a maximum gain of 3 dBi in the 2.4 GHz band and 4 dBi in the 5.2 GHZ as well as 5.8 GHz band.

2.4. SOFTWARE AND FIRMWARE

The test software was excised during the tests.

2.5. WORST-CASE

For the a mode all data was taken at 6Mbps (highest power and higest PSD results).

3. 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.

4. 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.

No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. 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%.

5.3. 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**
Peak Power Meter	Agilent	E4416A	GB41291160	11/7/2004
Peak / Average Power Sensor	Agilent	E9327A	US40440755	11/7/2004
EMI Test Receiver	R & S	ESIB40	100192	11/21/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29301	12/26/2004
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	6/10/2005
Antenna, Horn 18 ~ 26 GHz	ARA	MWH-2640/B	1029	38324
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/2004
RF Filter Section	HP	85420E	3705A00256	11/21/2004
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	12/22/2004
Spectrum Analyzer	Agilent	E4446A	MY43360112	1/13/2005
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/2005
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/21/2005
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/21/2005
AC Power Source, 10KVA	ACS	AFC-10K-AFC-2	J1568	CNR
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
PreAmplifier 26-40 GHz	MITEQ	NSP4000-SP2	924343	6/1/2005
1.5 GHz High Pass Filter	Micro-Tronics	HPM13193	2	N/A

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC/DC Adapter	Dell	AA2031	CN 09364U-12761-0BP-0QXN	N/A
Laptop	Dell	PP01L	CN 04P240-48463-2BK-4131	DoC

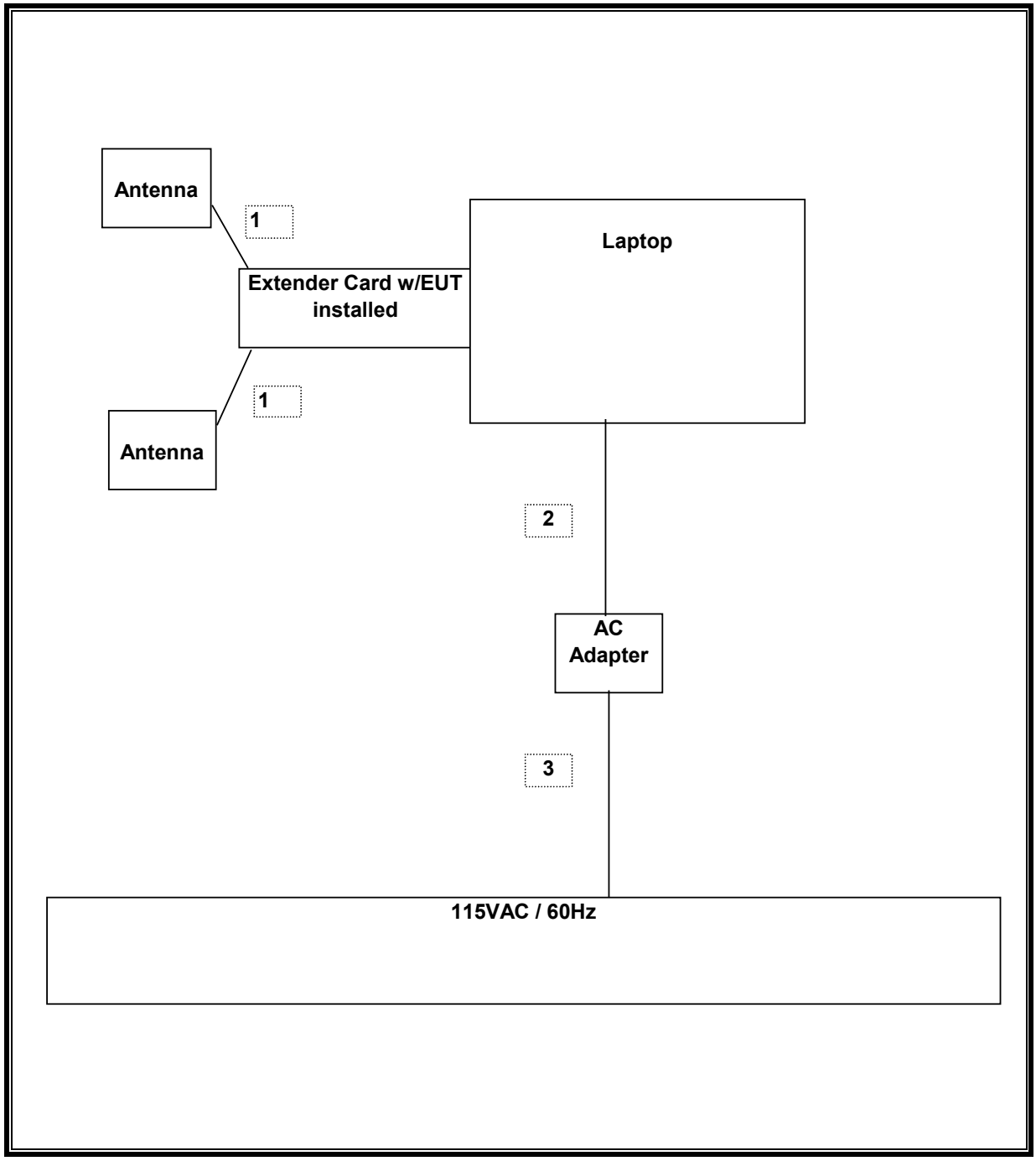
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	Antenna	2		Shielded	.48m	Yes
2	DC	1	DC	Unshielded	1.8m	No
3	AC	1	AC	Unshielded	1.8m	No

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



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. CHANNEL TESTS FOR THE 5150 TO 5350 MHz BAND

7.1.1. EMISSION BANDWIDTH

LIMIT

§15.403 (i) Emission bandwidth. For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

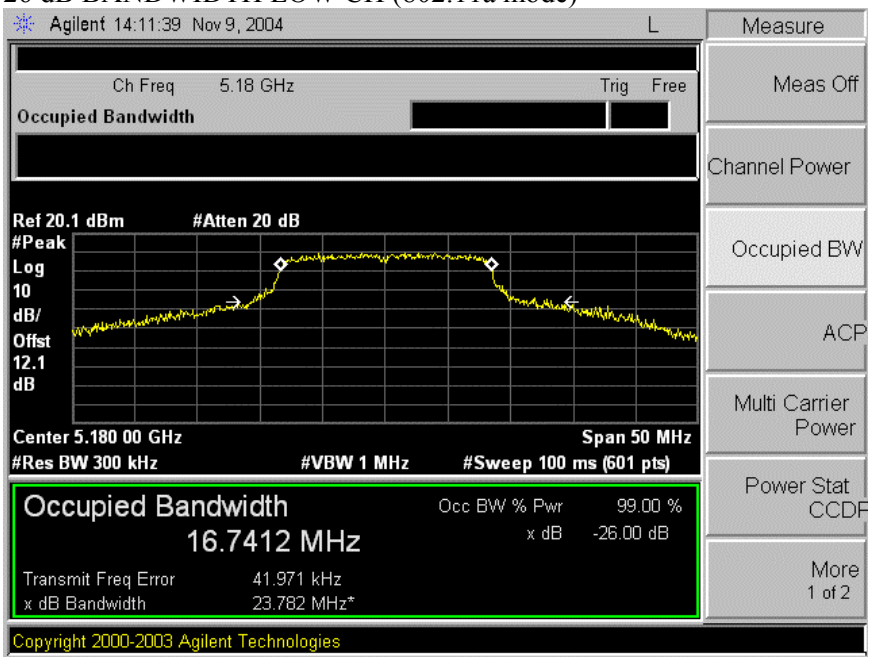
No non-compliance noted:

802.11a Mode

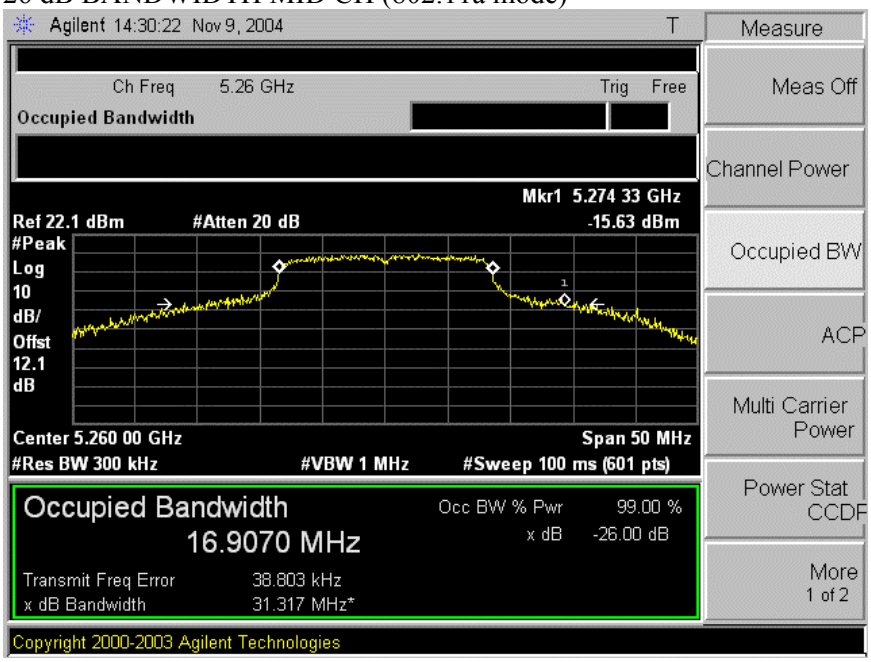
Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5180	23.78	13.76
Middle	5260	31.31	14.96
High	5320	32.18	15.08

26 dB EMISSION BANDWIDTH (802.11a MODE)

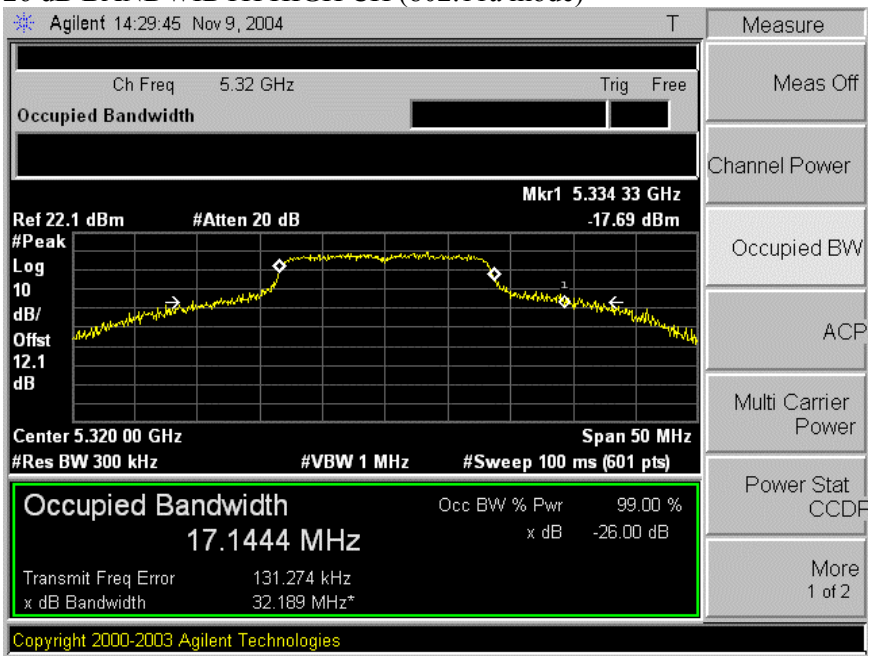
26 dB BANDWIDTH LOW CH (802.11a mode)



26 dB BANDWIDTH MID CH (802.11a mode)



26 dB BANDWIDTH HIGH CH (802.11a mode)



7.1.2. PEAK POWER

LIMIT

§15.407 (a) (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407 (a) (1) For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

LIMITS AND RESULTS

No non-compliance noted:

Limit in 5150 to 5250 MHz Band

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	23.78	17.76	4.00	17.00

Limit in 5250 to 5350 MHz Band

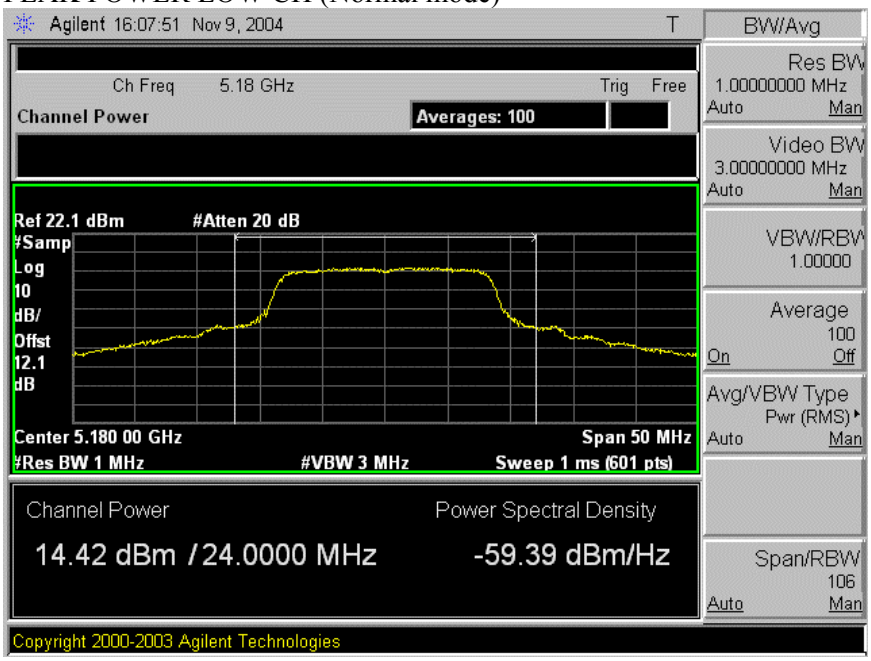
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Mid	5260	24	31.31	25.96	4.00	24.00
High	5320	24	32.18	26.08	4.00	24.00

Results

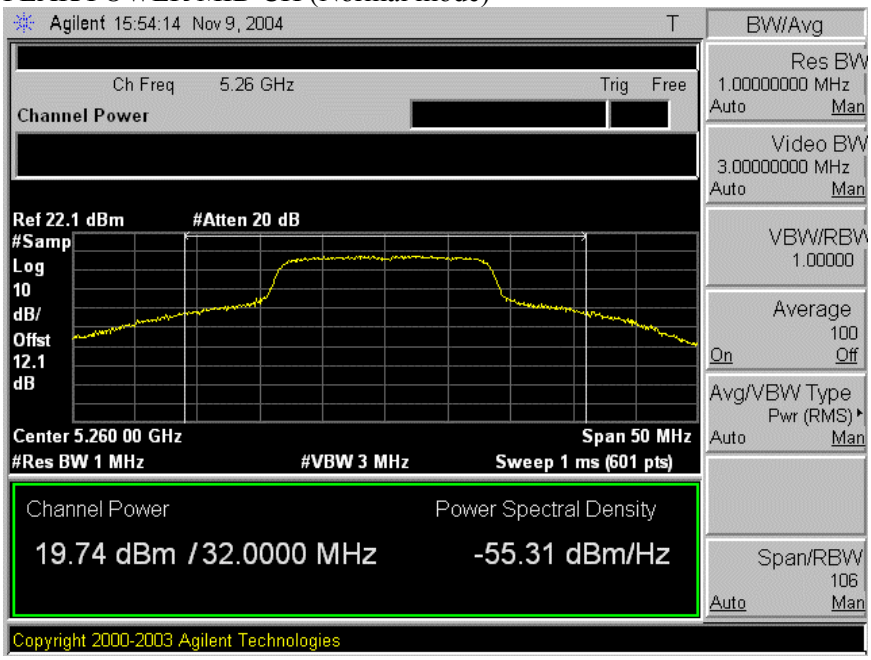
Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.42	17.00	-2.58
Mid	5260	19.74	24.00	-4.26
High	5320	18.15	24.00	-5.85

PEAK POWER (NORMAL MODE)

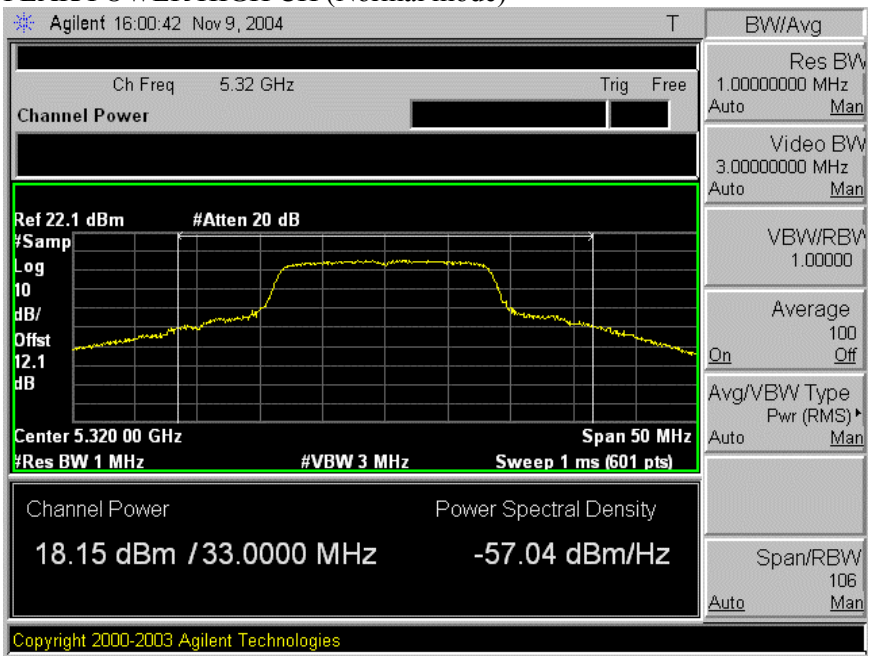
PEAK POWER LOW CH (Normal mode)



PEAK POWER MID CH (Normal mode)



PEAK POWER HIGH CH (Normal mode)



7.1.3. 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

$S = E ^ 2 / 3770$

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

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$ Equation (1)

where

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

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

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

RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11a	1.0	19.74	4.00	4.34

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.1.4. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 12.12 dB (including 10 dB pad and 2.12 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5180	15.00
Middle	5260	20.09
High	5320	18.00

7.1.5. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.407 (a) (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407 (a) (1) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain = 4.0 dBi, therefore there is no reduction due to antenna gain.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

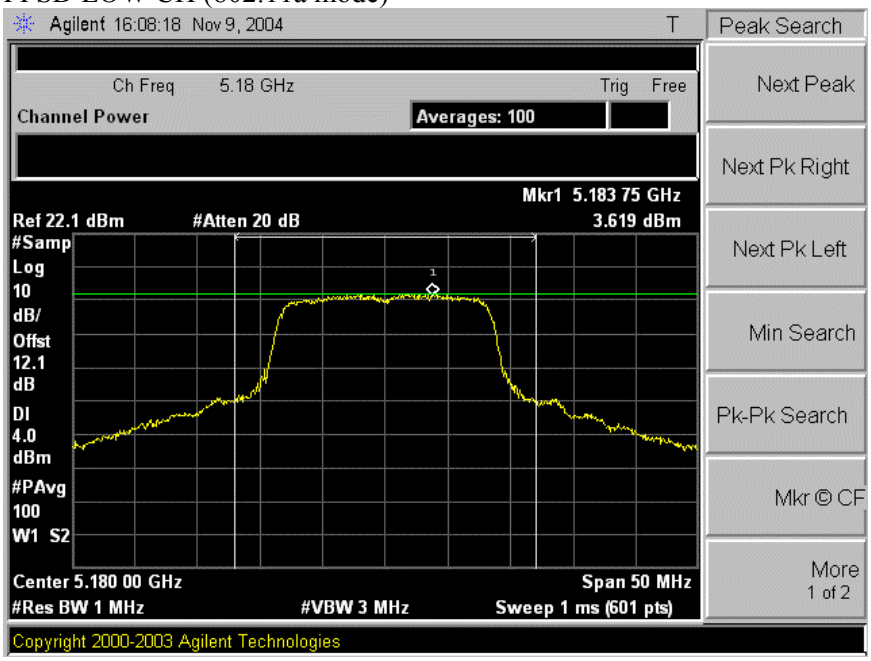
No non-compliance noted:

802.11a Mode

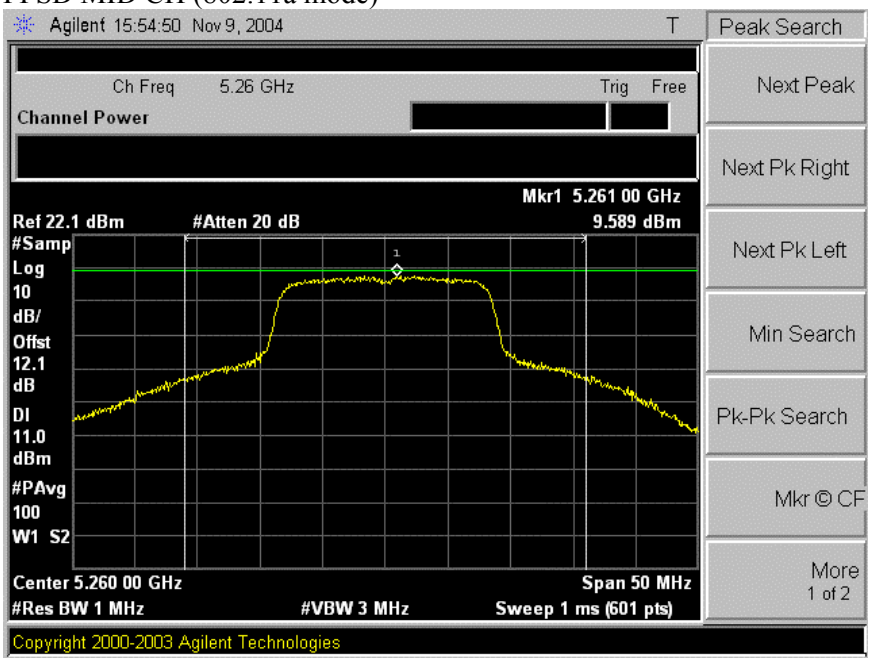
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.62	4.00	-0.38
Mid	5260	9.59	11.00	-1.41
High	5320	6.97	11.00	-4.03

PEAK POWER SPECTRAL DENSITY (802.11a MODE)

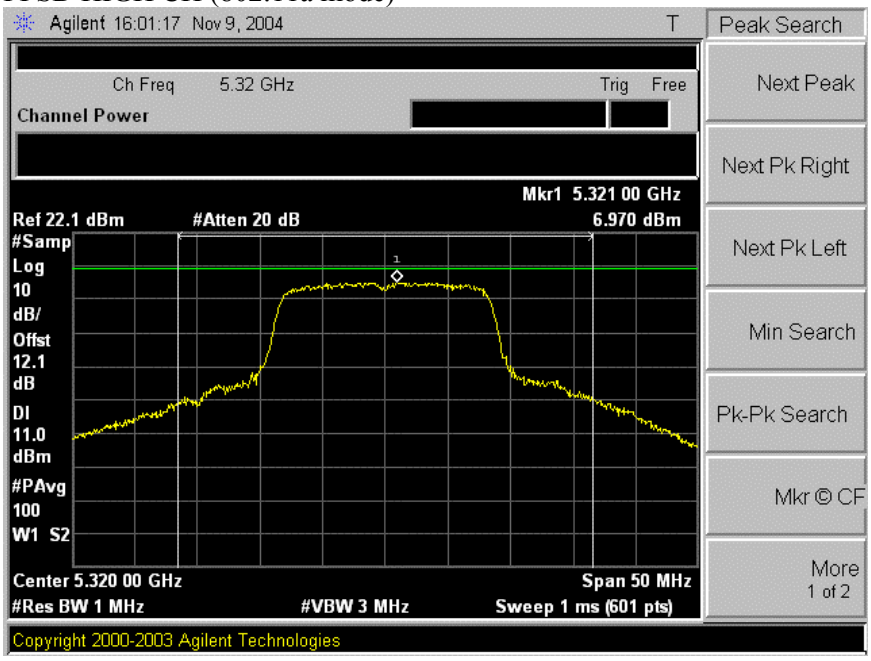
PPSD LOW CH (802.11a mode)



PPSD MID CH (802.11a mode)



PPSD HIGH CH (802.11a mode)



7.1.6. PEAK EXCURSION

LIMIT

§15.407 (a) (6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

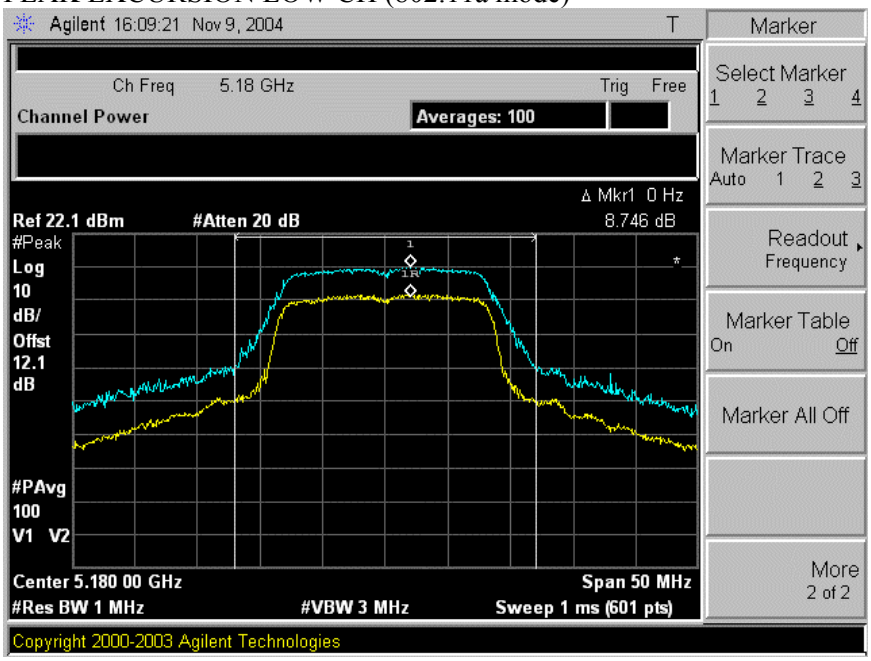
No non-compliance noted:

802.11a Mode

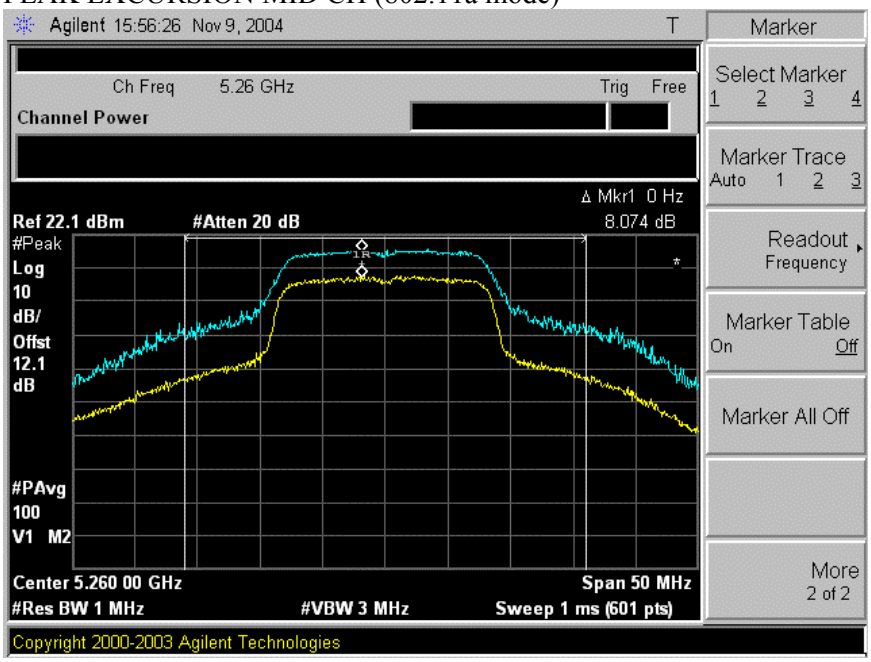
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.75	13	-4.25
Middle	5260	8.07	13	-4.93
High	5320	9.00	13	-4.00

PEAK EXCURSION (802.11a MODE)

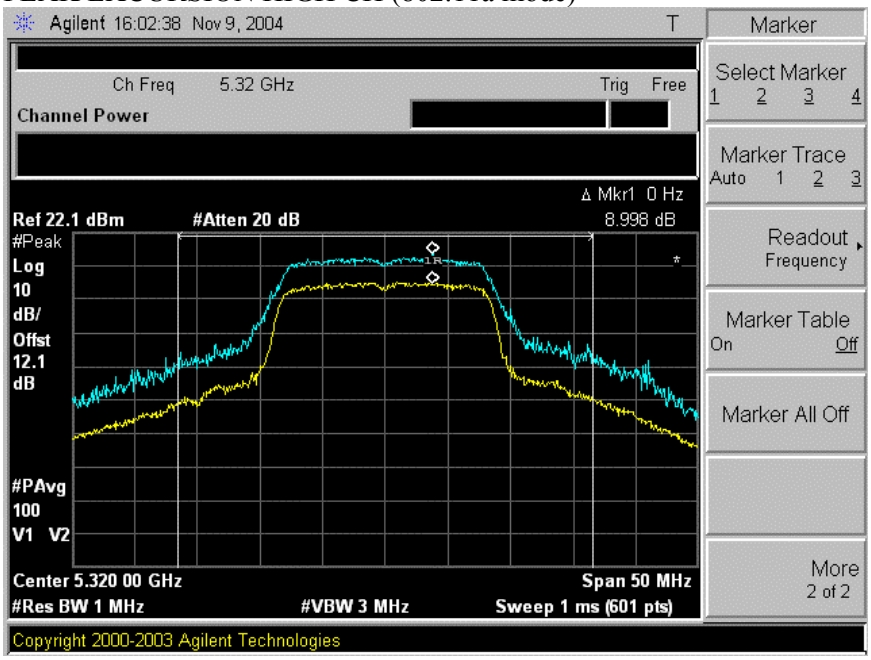
PEAK EXCURSION LOW CH (802.11a mode)



PEAK EXCURSION MID CH (802.11a mode)



PEAK EXCURSION HIGH CH (802.11a mode)



7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.407 (b) (1 & 2) For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

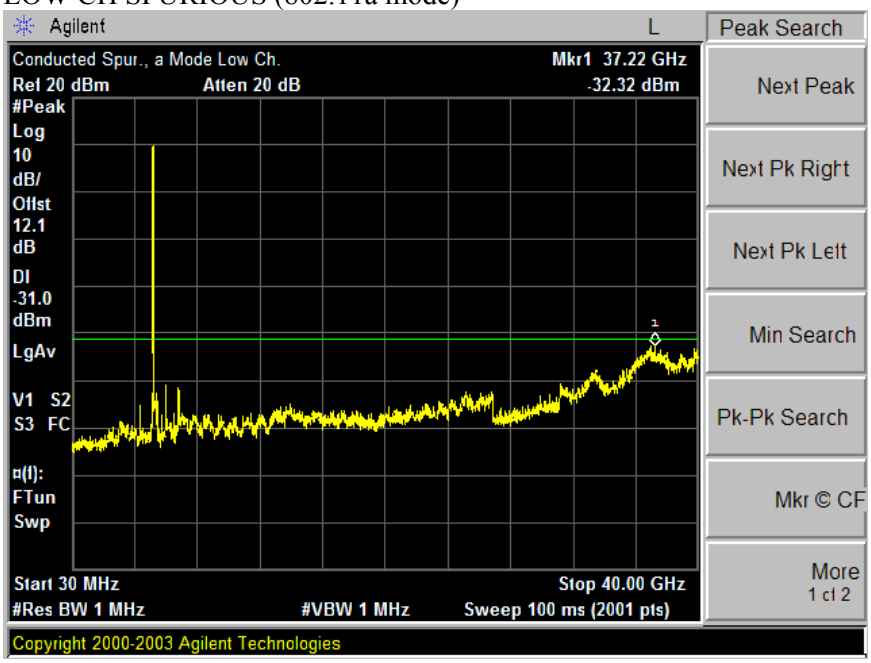
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

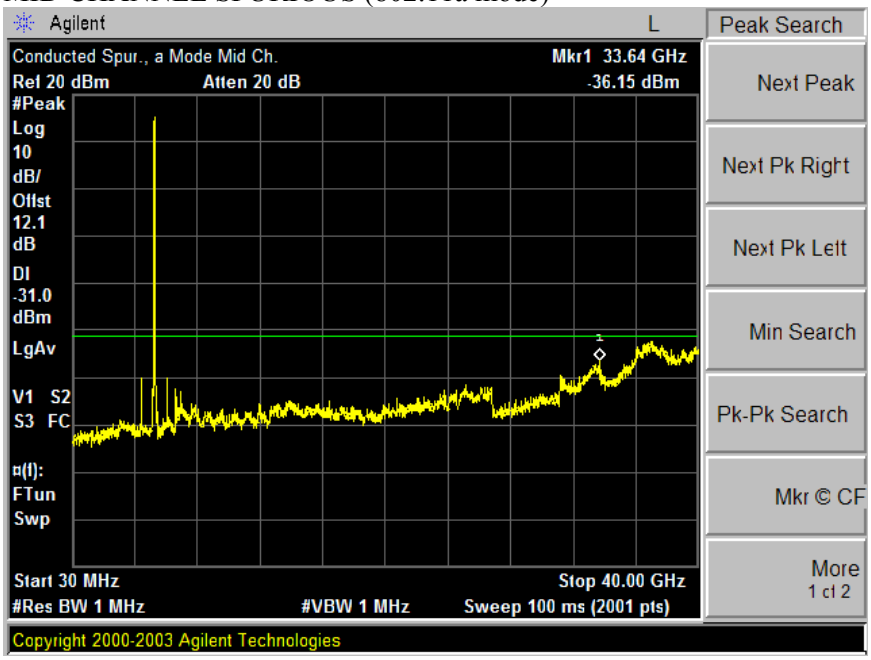
No non-compliance noted:

SPURIOUS EMISSIONS (802.11a MODE)

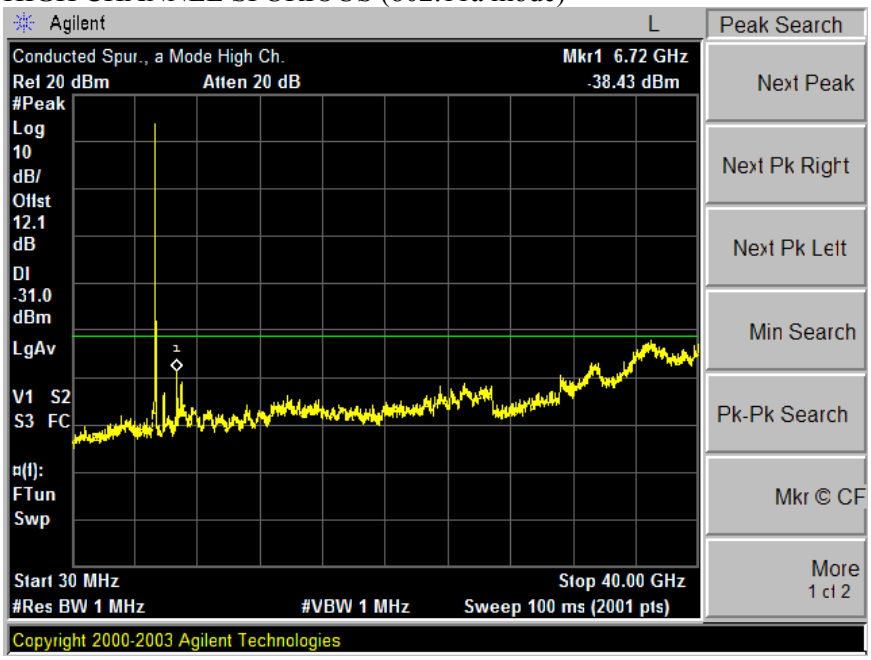
LOW CH SPURIOUS (802.11a mode)



MID CHANNEL SPURIOUS (802.11a mode)



HIGH CHANNEL SPURIOUS (802.11a mode)



7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

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

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

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

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

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

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

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

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

TEST PROCEDURE

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

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

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

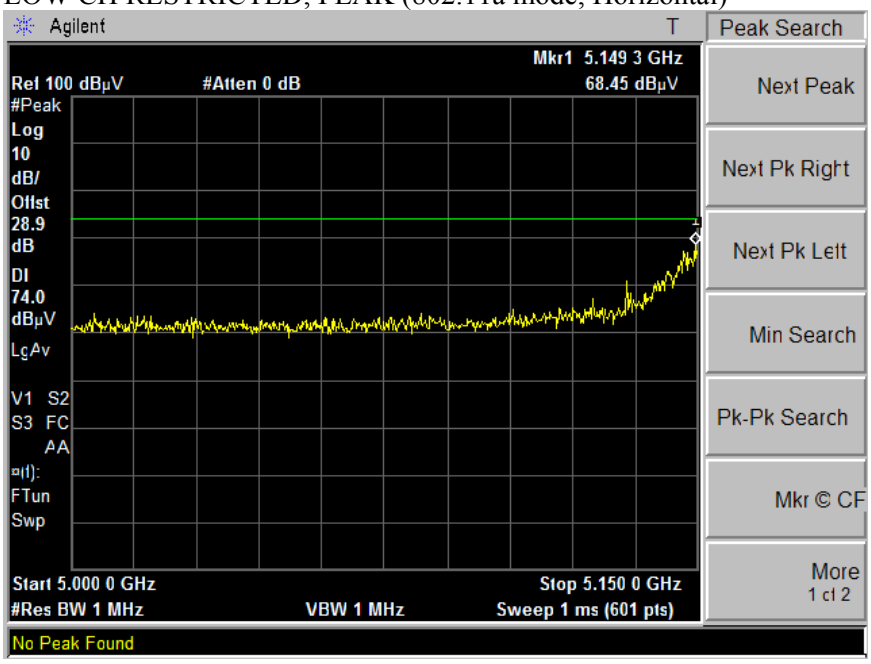
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each band.

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.

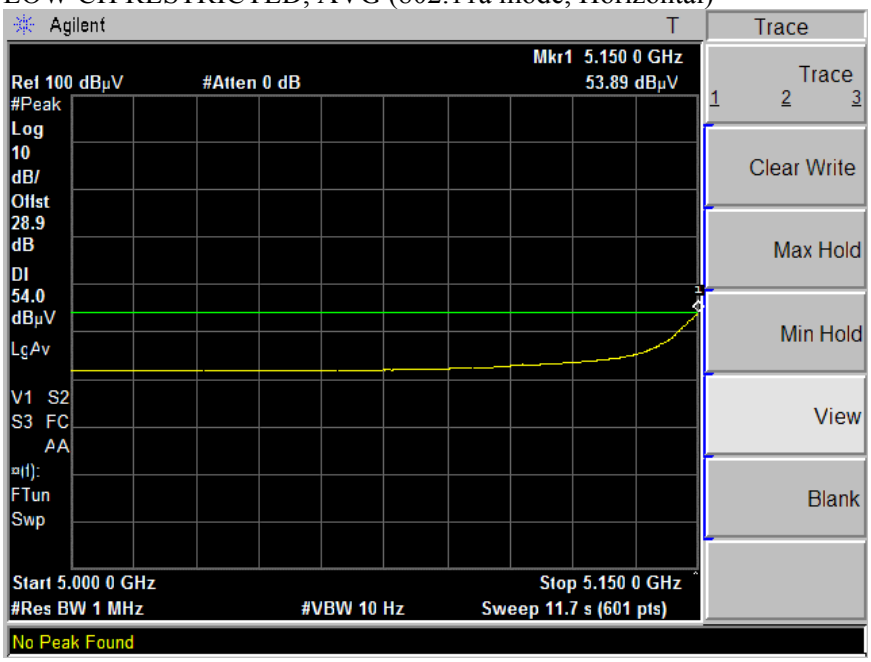
7.2.2. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5350 MHz BAND

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

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

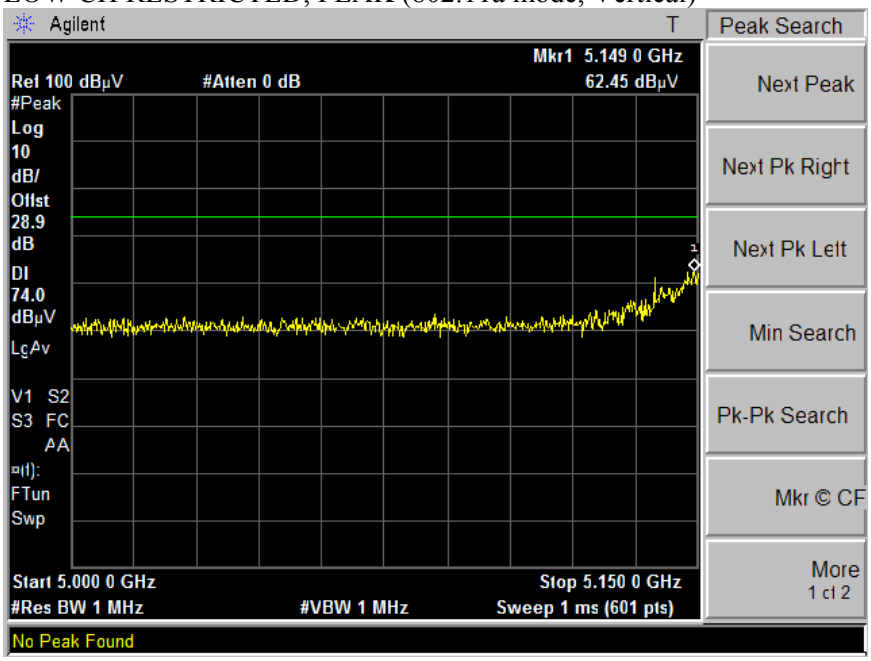


LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)

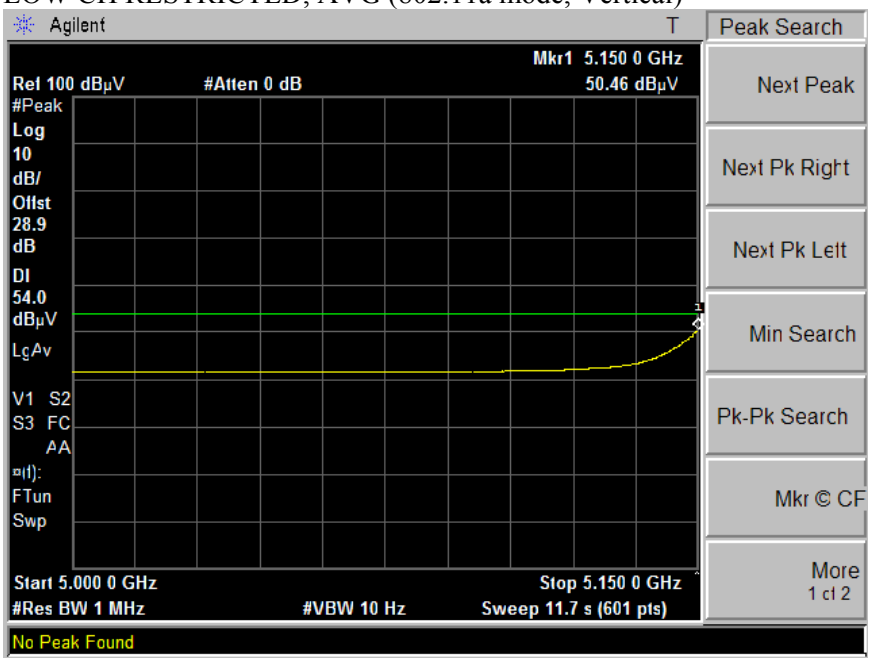


RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

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

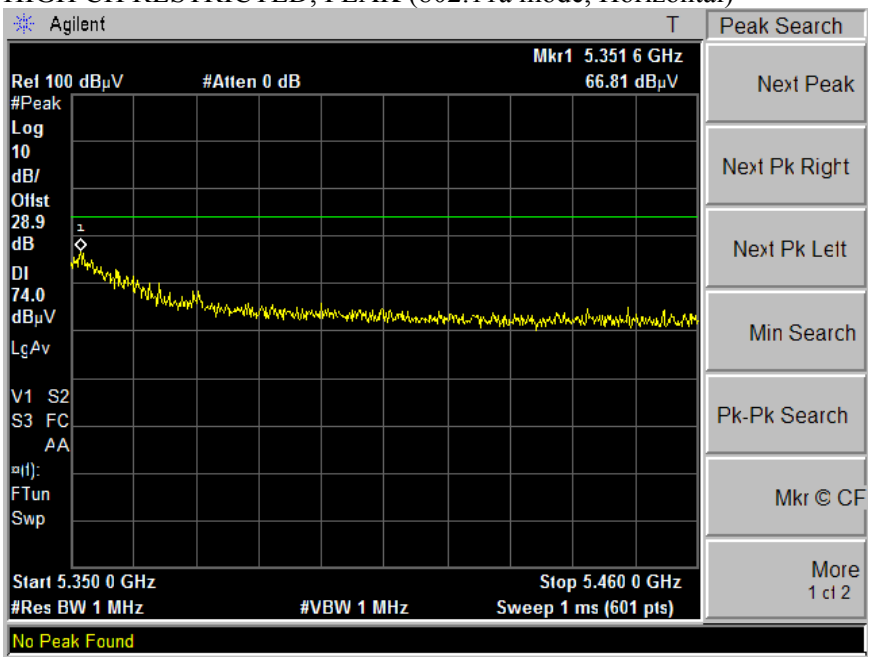


LOW CH RESTRICTED, AVG (802.11a mode, Vertical)

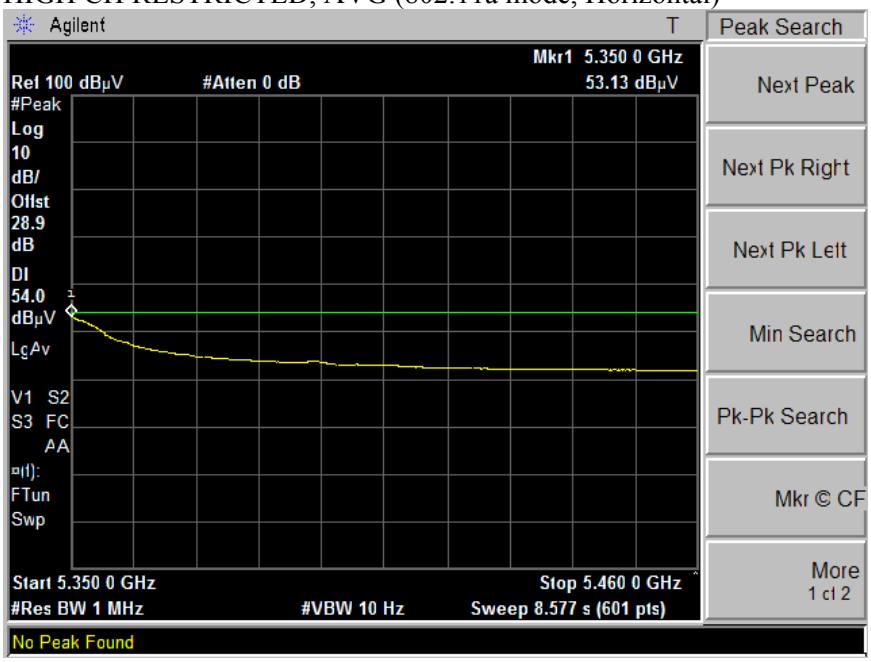


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

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

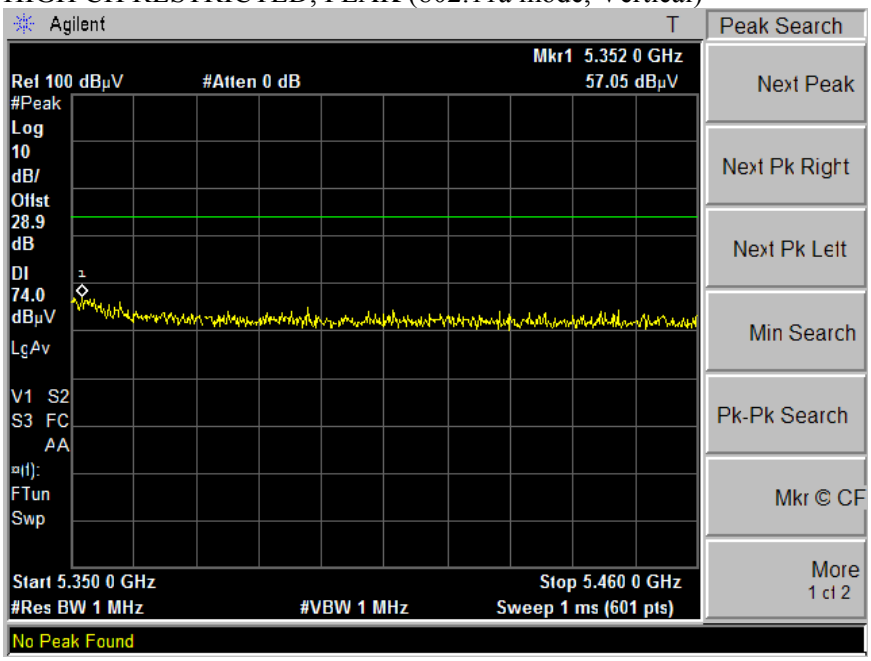


HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)

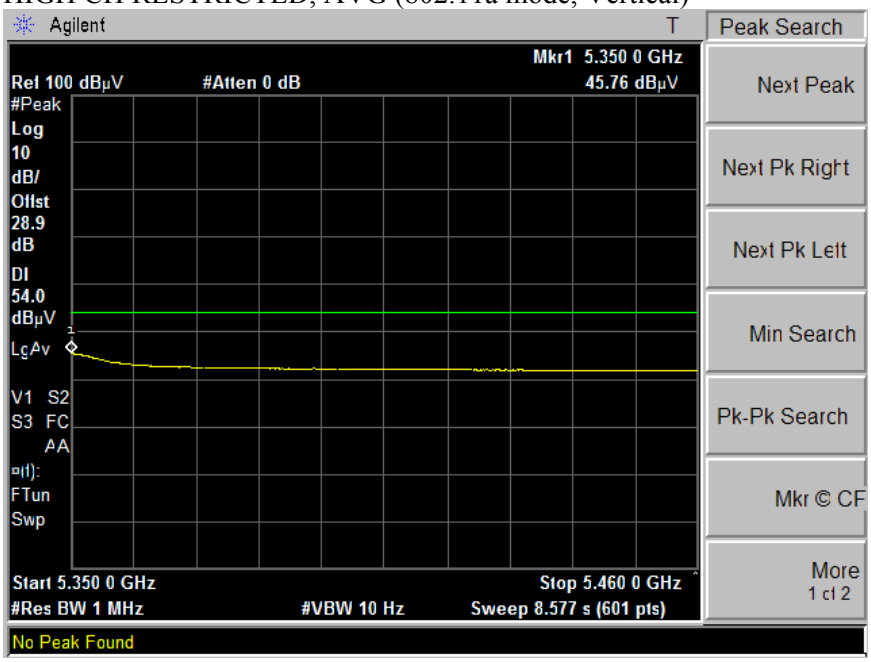


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

10/27/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04U3052-1
Company: Air Go
EUT Descrip.: 802.11 a/b/g Mini PCI Type 3 MIMO WLAN Card
EUT M/N: AGN1012MP-02
Test Target: FCC 15.247, 15.249, 15.205
Mode Oper: 5.2GHz Band

Test Equipment:

EMCO Horn 1-18GHz: T120; S/N: 29310 @3m
Pre-amplifer 1-26GHz: T34 HP 8449B
Pre-amplifer 26-40GHz:
Horn > 18GHz: T39; ARA 18-26GHz; S/N:1013

Hi Frequency Cables
2 foot cable:
3 foot cable: 3_David
4 foot cable:
12 foot cable: 12_Yan

HPF: HPF_7.6GHz
Reject Filter:

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)
5180 Channel															
10.360	3.0	50.2	39.5	37.2	7.2	-34.1	0.0	0.8	61.3	50.6	74	54	-12.7	-3.4	V
15.540	3.0	43.0	32.3	40.2	8.6	-31.4	0.0	0.7	61.2	50.5	74	54	-12.8	-3.5	V
10.360	3.0	41.9	32.2	37.2	7.2	-34.1	0.0	0.8	53.0	43.3	74	54	-21.0	-10.7	H
15.540	3.0	41.3	30.0	40.2	8.6	-31.4	0.0	0.7	59.5	48.2	74	54	-14.5	-5.8	H
5260 Channel															
10.520	3.0	43.0	31.5	37.3	7.3	-34.0	0.0	0.8	54.4	42.9	74	54	-19.6	-11.1	H
15.780	3.0	48.1	35.3	40.3	8.7	-31.3	0.0	0.7	66.5	53.7	74	54	-7.5	-0.3	H
15.780	3.0	47.6	34.7	40.3	8.7	-31.3	0.0	0.7	66.0	53.1	74	54	-8.0	-0.9	V
10.520	3.0	42.7	32.0	37.3	7.3	-34.0	0.0	0.8	54.1	43.4	74	54	-19.9	-10.6	V
5320 Channel															
10.640	3.0	46.8	36.9	37.4	7.3	-33.9	0.0	0.8	58.4	48.5	74	54	-15.6	-5.5	V
15.960	3.0	45.8	35.0	40.4	8.7	-31.2	0.0	0.7	64.4	53.6	74	54	-9.6	-0.4	V
10.640	3.0	45.1	36.0	37.4	7.3	-33.9	0.0	0.8	56.7	47.6	74	54	-17.3	-6.4	H
15.960	3.0	43.4	31.9	40.4	8.7	-31.2	0.0	0.7	62.0	50.5	74	54	-12.0	-3.5	H

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

7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

NOT PERFORMED. PER CUSTOMER REQUEST, CUSTOMER WILL PROVIDE SEPARATE REPORT FOR THESE MEASUREMENTS.

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.

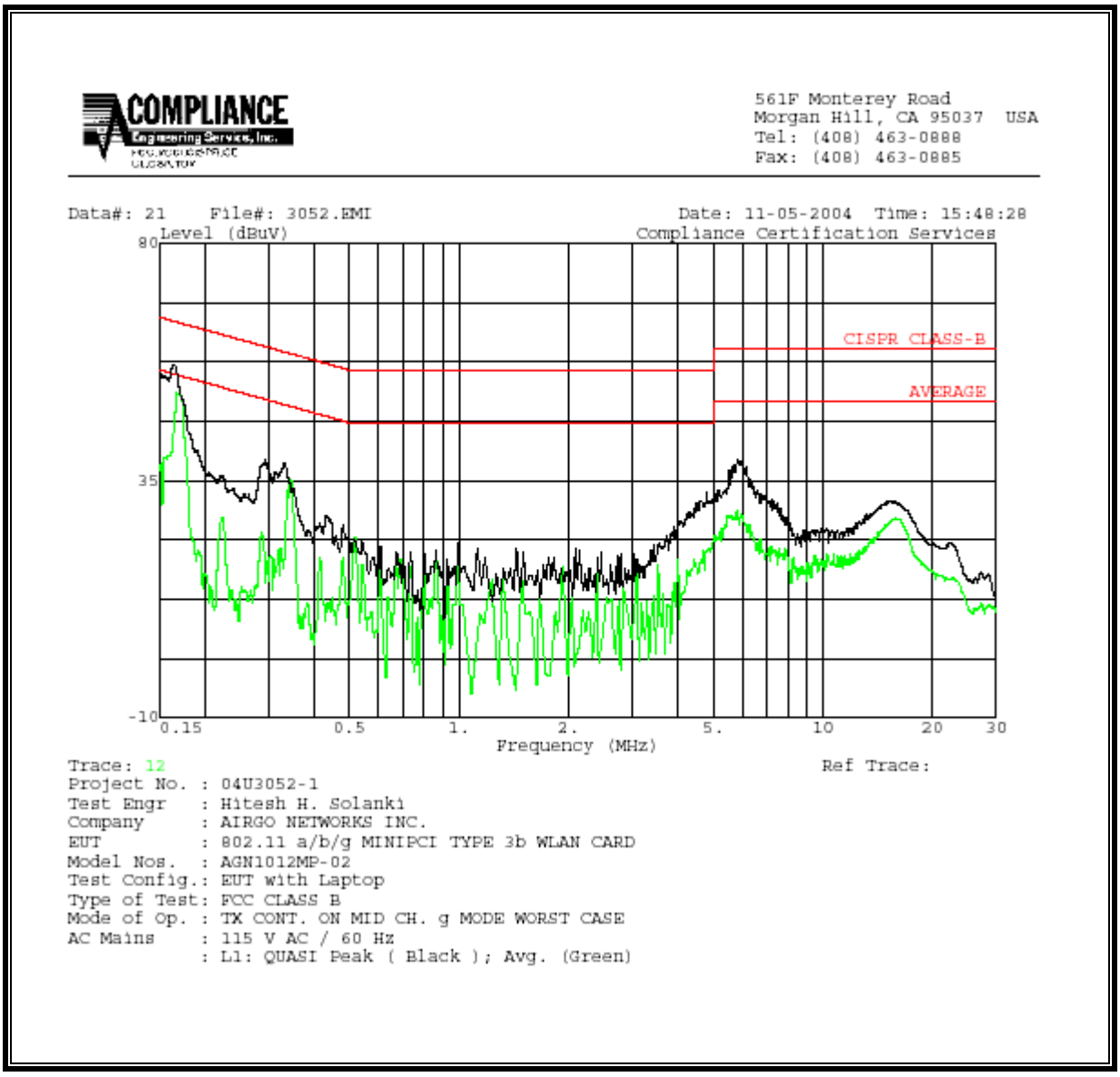
RESULTS

No non-compliance noted:

6 WORST EMISSIONS

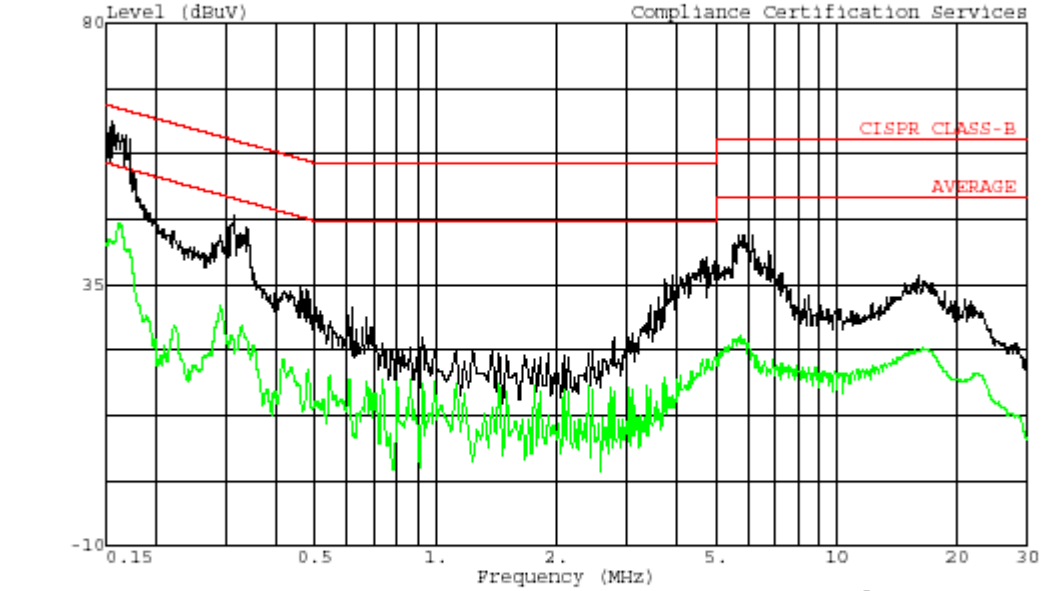
CONDUCTED EMISSIONS DATA (115VAC 60Hz) FCC									
Freq.	Reading			Closs	Limit	FCC B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	64.34	--	51.56	0.00	66.00	56.00	-10.92	-4.44	L1
4.85	39.72	--	22.22	0.00	56.00	46.00	-23.14	-23.78	L1
5.99	45.36	--	28.00	0.00	60.00	50.00	-21.00	-22.00	L1
0.16	63.16	--	45.41	0.00	65.83	55.83	-2.67	-10.42	L2
4.72	39.54	--	22.22	0.00	56.00	46.00	-16.46	-23.78	L2
5.87	43.56	--	26.12	0.00	60.00	50.00	-16.44	-23.88	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS

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



Trace: 35 Ref Trace:
Project No. : 04U3052-1
Test Engr : Hitesh H. Solanki
Company : AIRGO NETWORKS INC.
EUT : 802.11 a/b/g MINIPCI TYPE 3b WLAN CARD
Model Nos. : AGN1012MP-02
Test Config.: EUT with Laptop
Type of Test: FCC CLASS B
Mode of Op. : TX CONT. ON MID CH. g MODE WORST CASE
AC Mains : 115 V AC / 60 Hz
: L2: Peak (Black); Avg. (Green)

8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT