



**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*

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Revision History

| <u>Rev.</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|------------------|-------------------|
|-------------|------------------|-------------------|

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## 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:



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COMPLIANCE CERTIFICATION SERVICES

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## 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<br>(MHz) | Mode    | Output Power<br>(dBm) | Output Power<br>(mW) |
|--------------------------|---------|-----------------------|----------------------|
| 5180 - 5240              | 802.11a | 14.42                 | 27.67                |

#### 5250 to 5350 MHz Authorized Band

| Frequency Range<br>(MHz) | Mode    | Output Power<br>(dBm) | Output Power<br>(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 highest 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    |

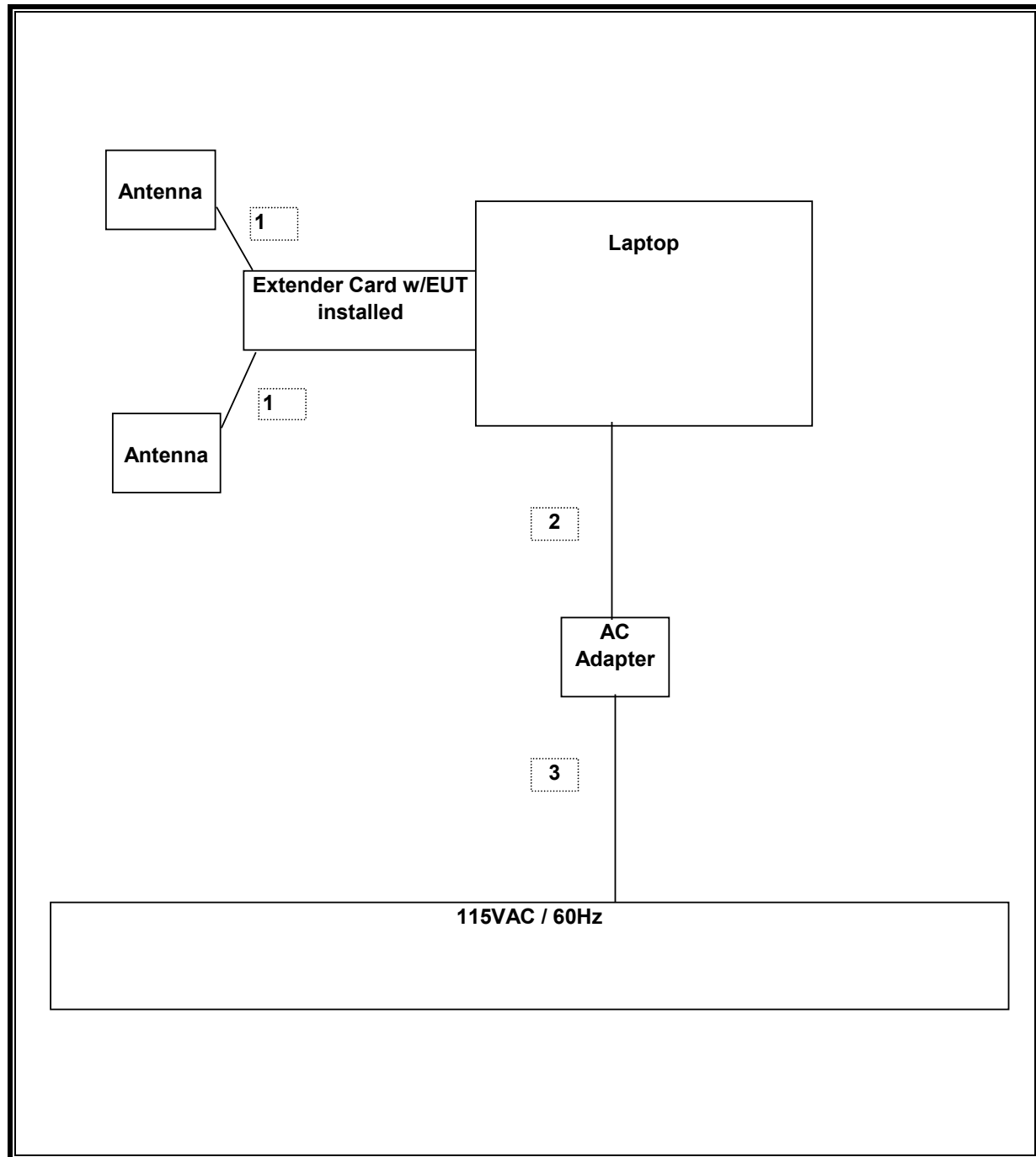
### I/O CABLES

| 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.

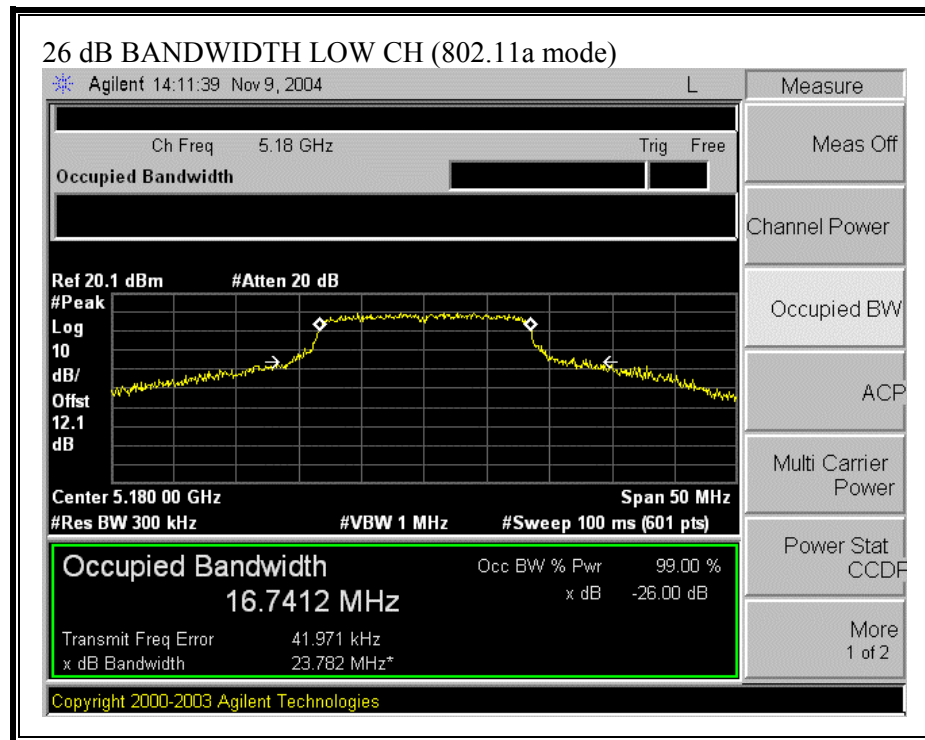
##### RESULTS

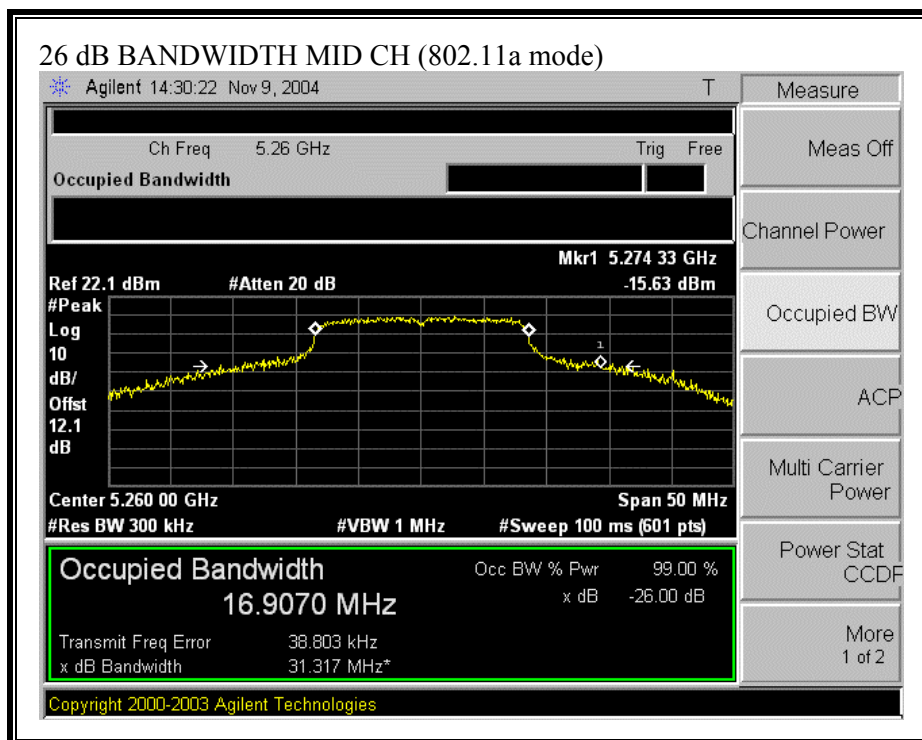
No non-compliance noted:

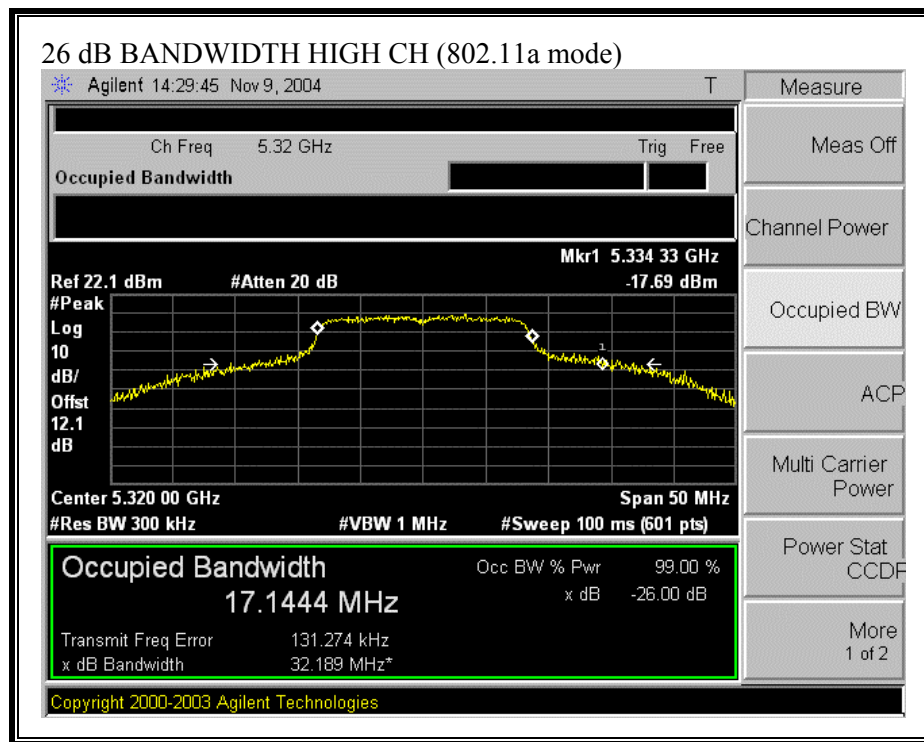
802.11a Mode

| Channel | Frequency<br>(MHz) | B<br>(MHz) | 10 Log B<br>(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)**







### **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  $4 \text{ dBm} + 10 \log B$ , 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  $11 \text{ dBm} + 10 \log B$ , 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<br>(MHz) | Fixed<br>Limit<br>(dBm) | B<br>(MHz) | 4 + 10 Log B<br>Limit<br>(dBm) | Antenna<br>Gain<br>(dBi) | Limit<br>(dBm) |
|---------|--------------------|-------------------------|------------|--------------------------------|--------------------------|----------------|
| Low     | 5180               | 17                      | 23.78      | 17.76                          | 4.00                     | 17.00          |

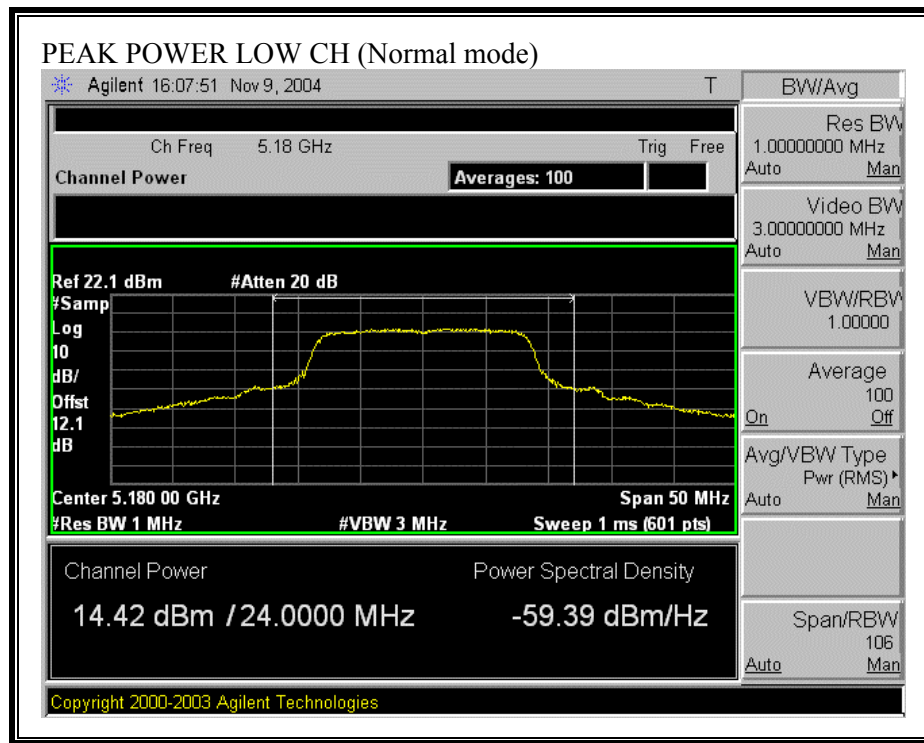
Limit in 5250 to 5350 MHz Band

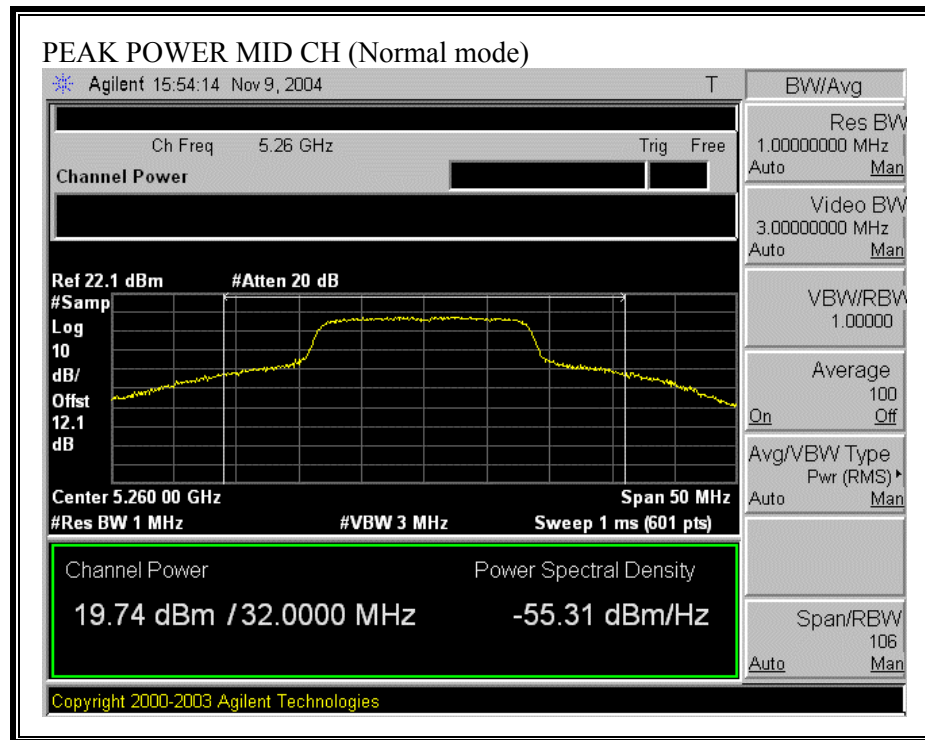
| Channel | Frequency<br>(MHz) | Fixed<br>Limit<br>(dBm) | B<br>(MHz) | 11 + 10 Log B<br>Limit<br>(dBm) | Antenna<br>Gain<br>(dBi) | Limit<br>(dBm) |
|---------|--------------------|-------------------------|------------|---------------------------------|--------------------------|----------------|
|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

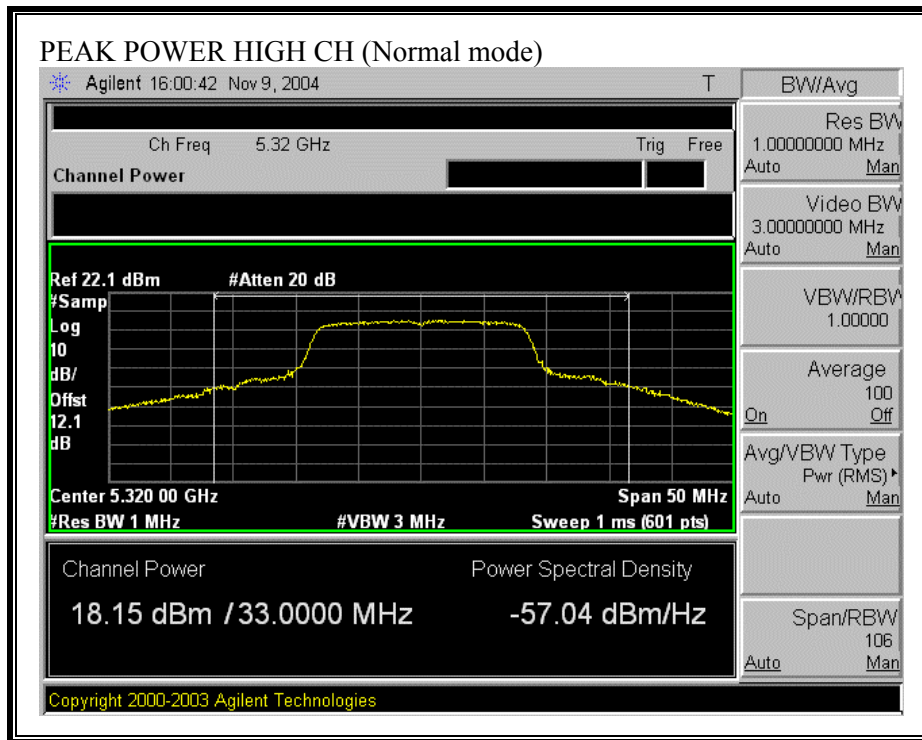
Results

| Channel | Frequency<br>(MHz) | Power<br>(dBm) | Limit<br>(dBm) | Margin<br>(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)**







### 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 <sup>2</sup> ) | 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 <sup>2</sup> )              | 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 <sup>2</sup> )              | 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 <sup>2</sup> ) | 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:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

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<sup>2</sup>

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

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

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm<sup>2</sup>

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

## **LIMITS**

From §1.1310 Table 1 (B),  $S = 1.0 \text{ mW/cm}^2$

## **RESULTS**

No non-compliance noted:

| <b>Mode</b> | <b>Power Density<br/>Limit<br/>(mW/cm<sup>2</sup>)</b> | <b>Output<br/>Power<br/>(dBm)</b> | <b>Antenna<br/>Gain<br/>(dBi)</b> | <b>MPE<br/>Distance<br/>(cm)</b> |
|-------------|--------------------------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|
| 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

| <b>Channel</b> | <b>Frequency<br/>(MHz)</b> | <b>Average Power<br/>(dBm)</b> |
|----------------|----------------------------|--------------------------------|
| 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.

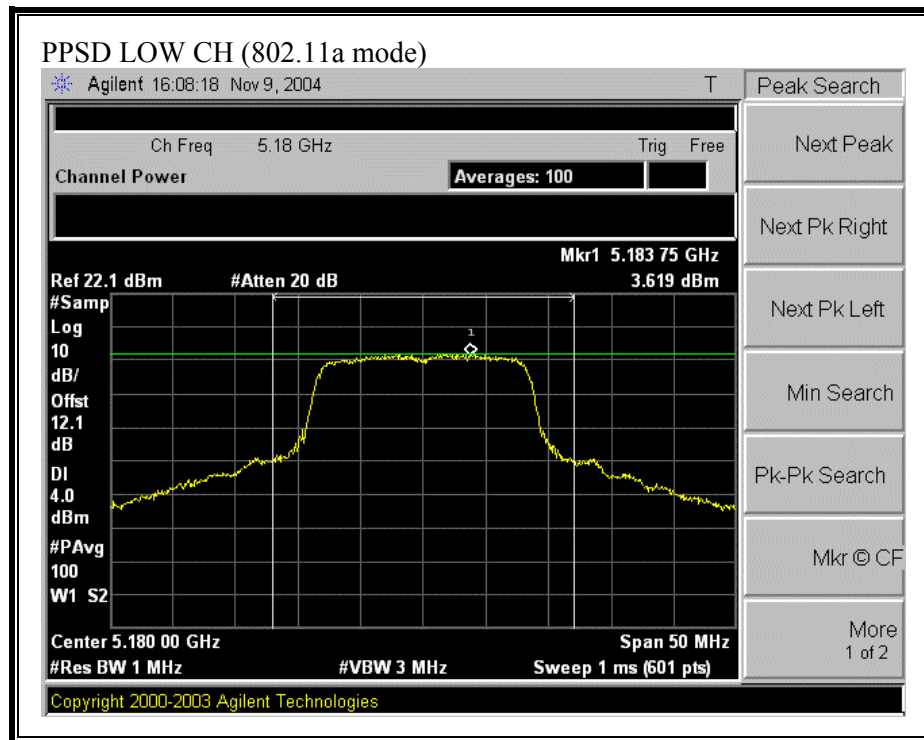
## **RESULTS**

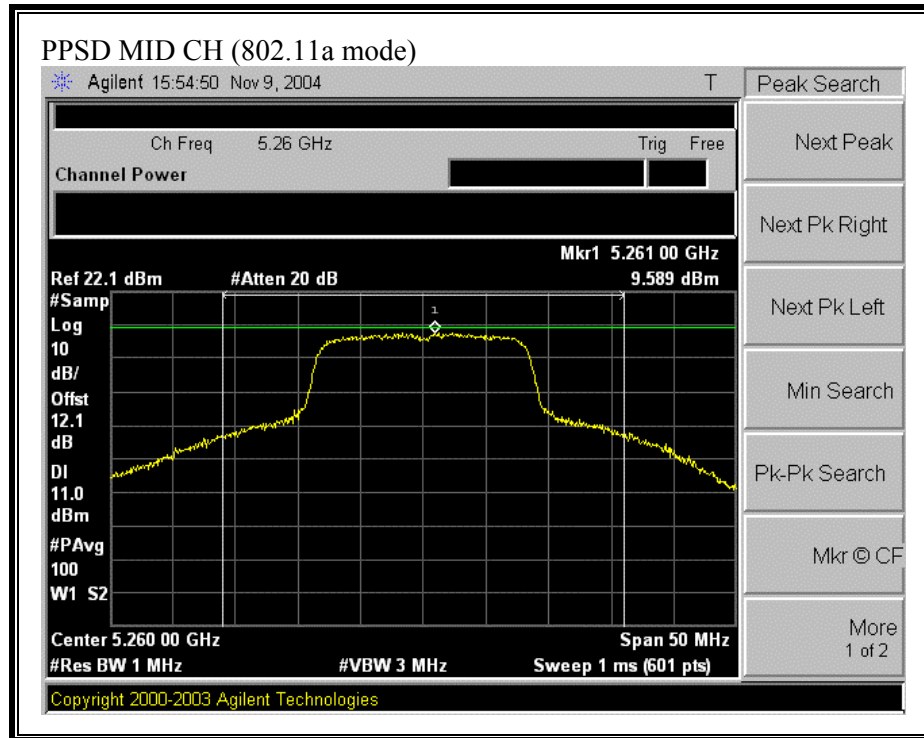
No non-compliance noted:

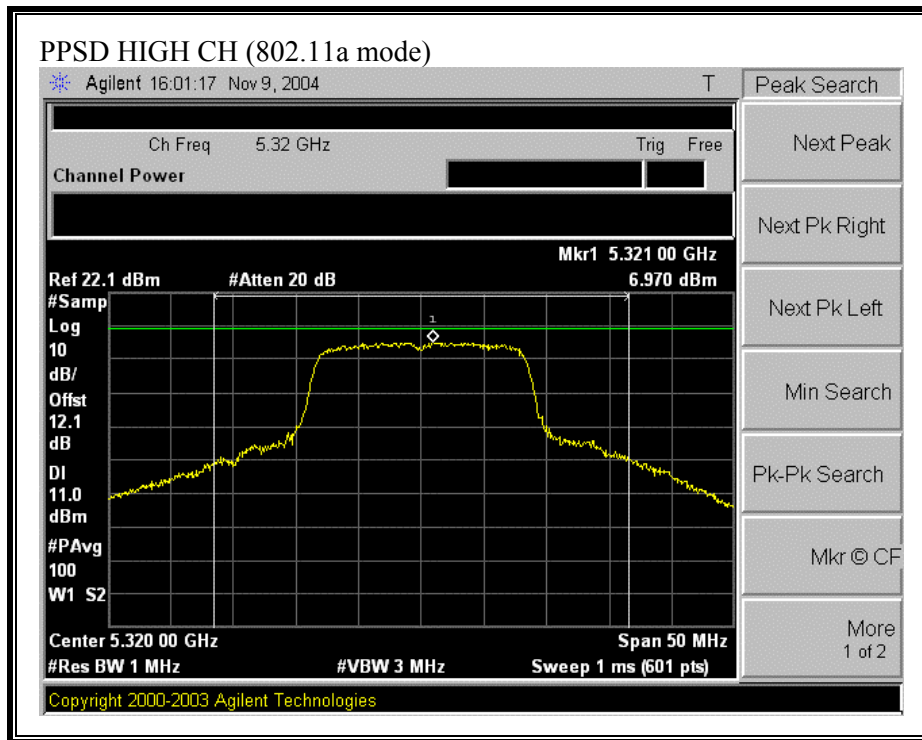
802.11a Mode

| <b>Channel</b> | <b>Frequency<br/>(MHz)</b> | <b>PPSD<br/>(dBm)</b> | <b>Limit<br/>(dBm)</b> | <b>Margin<br/>(dB)</b> |
|----------------|----------------------------|-----------------------|------------------------|------------------------|
| 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)**







### 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.

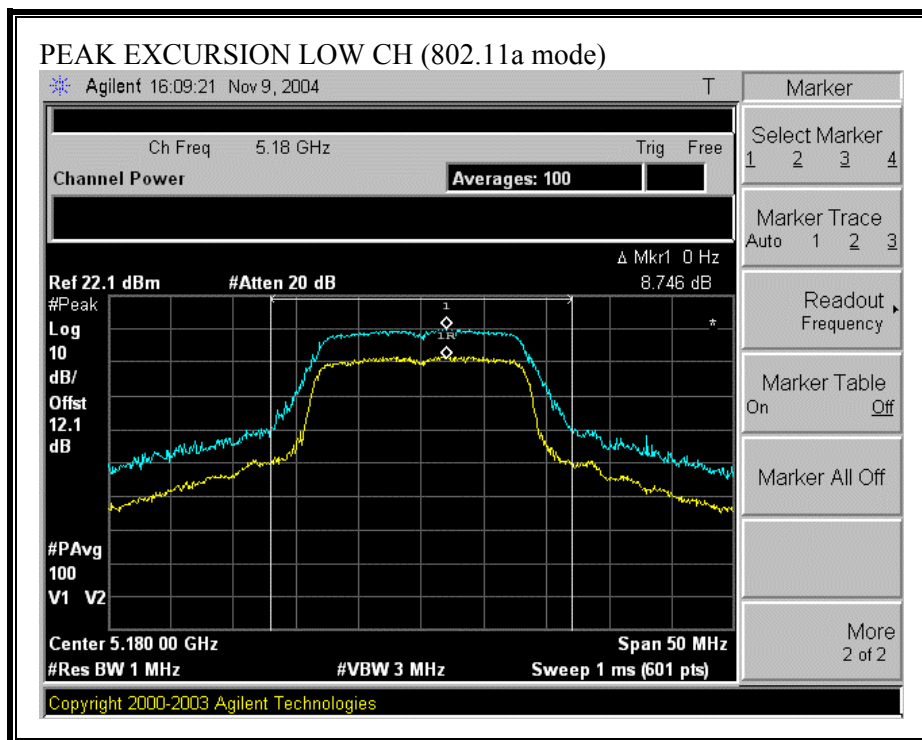
#### RESULTS

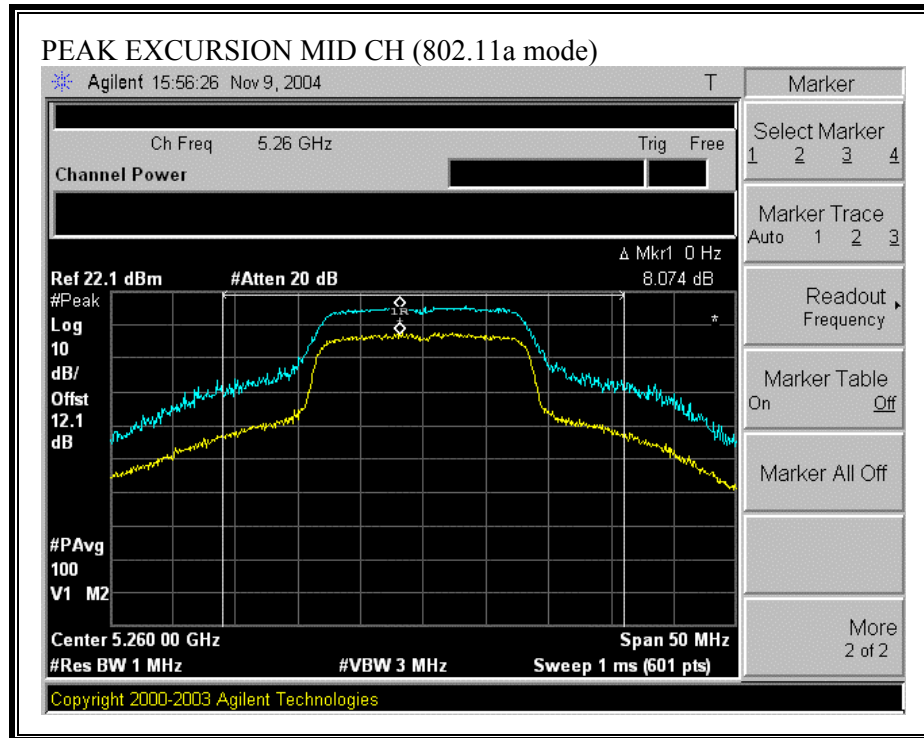
No non-compliance noted:

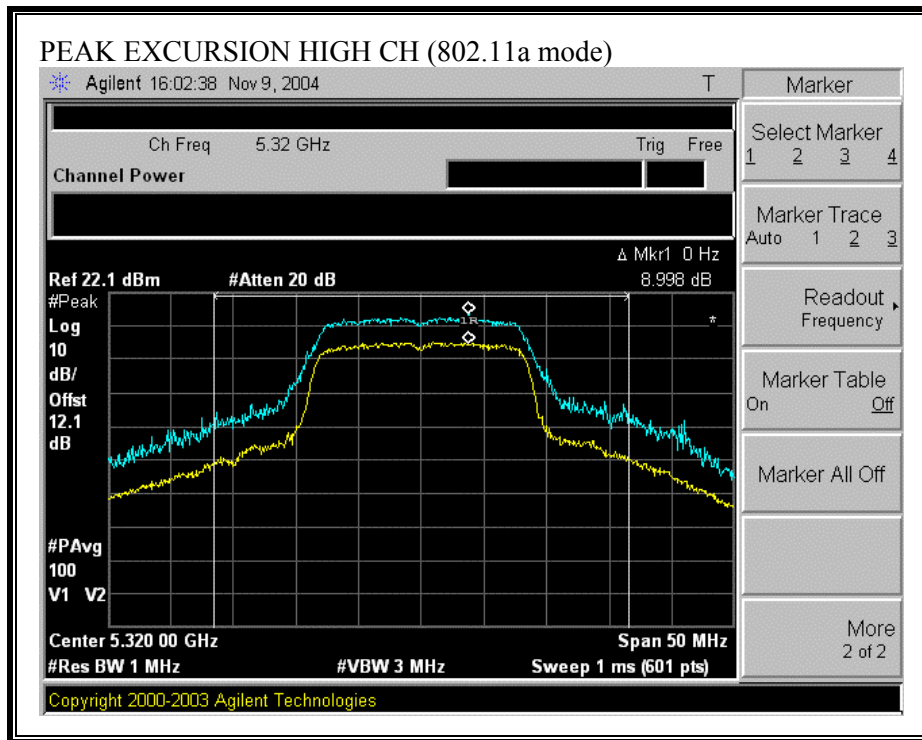
802.11a Mode

| Channel | Frequency<br>(MHz) | Peak Excursion<br>(dB) | Limit<br>(dB) | Margin<br>(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)**







## **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.

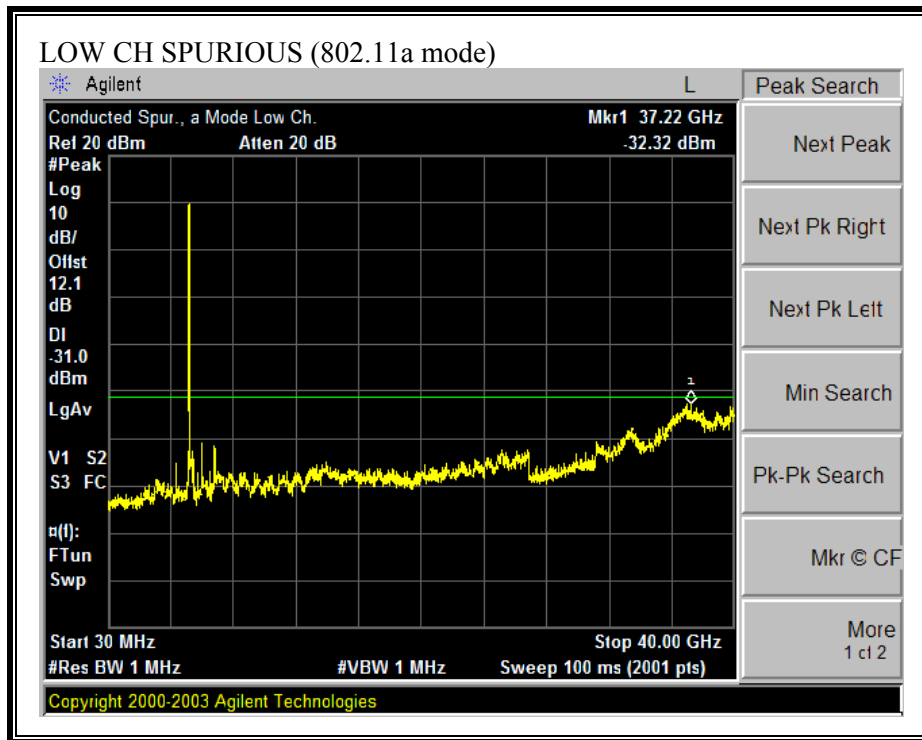
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

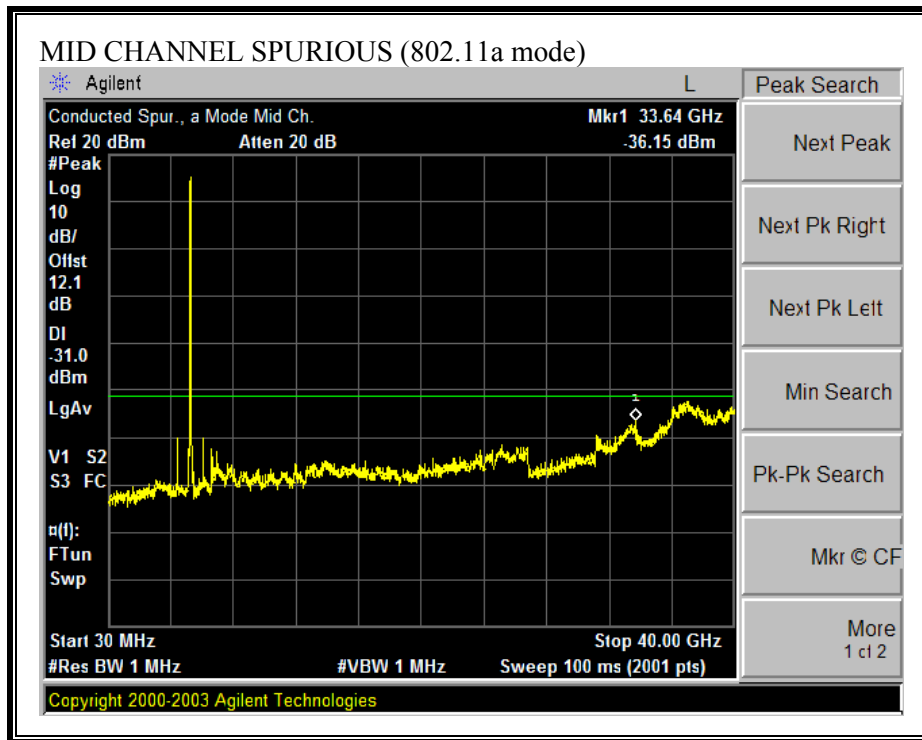
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

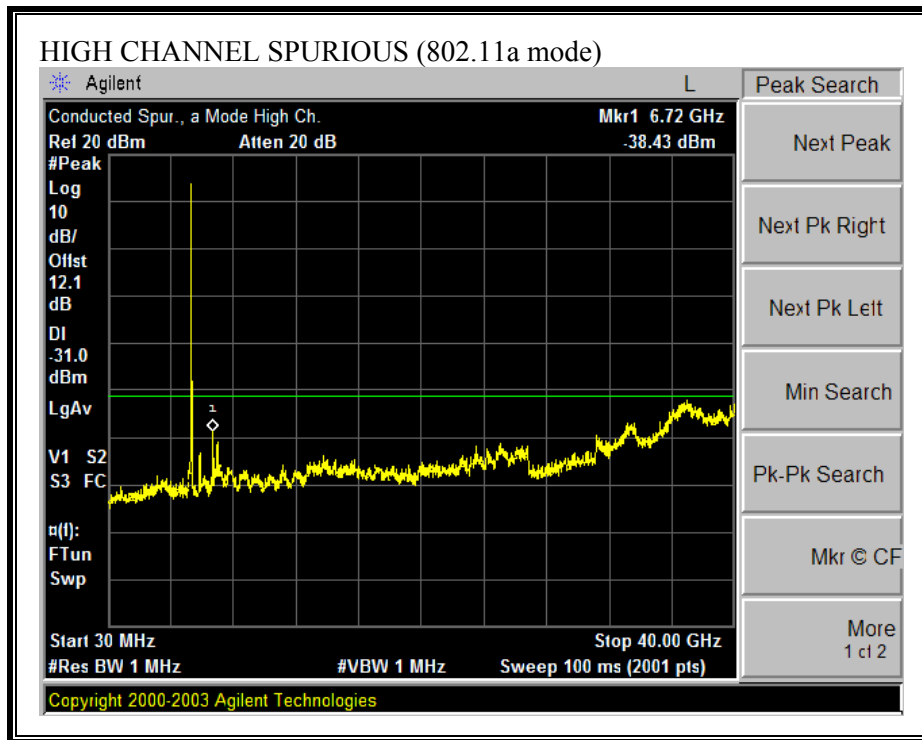
### **RESULTS**

No non-compliance noted:

**SPURIOUS EMISSIONS (802.11a MODE)**







## 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       |
| <sup>1</sup> 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     | ( <sup>2</sup> ) |
| 13.36 - 13.41              |                       |                 |                  |

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> 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<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(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.

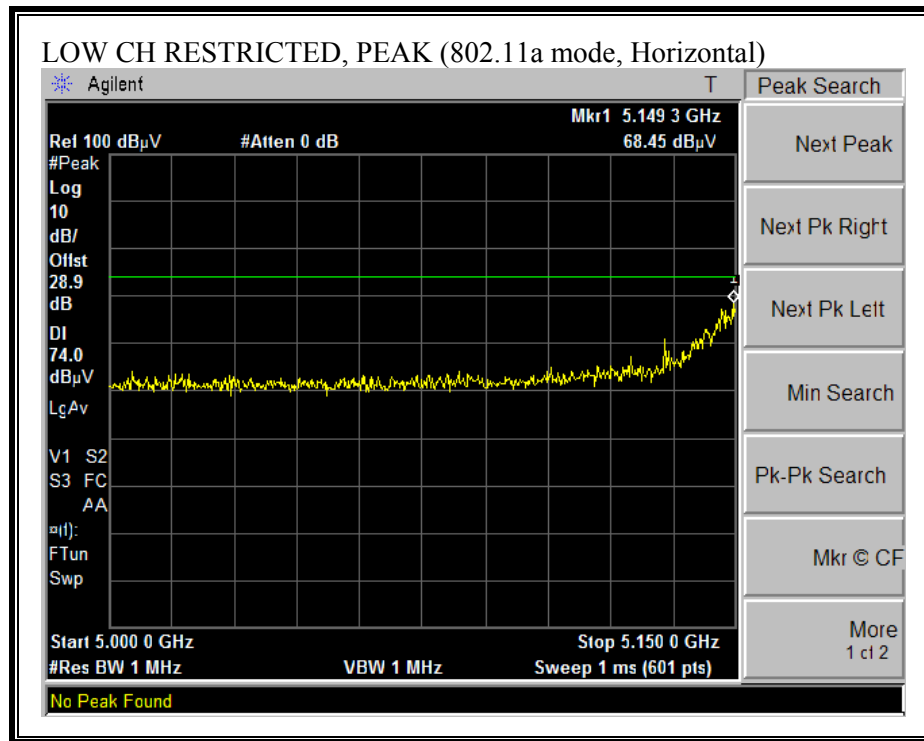
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

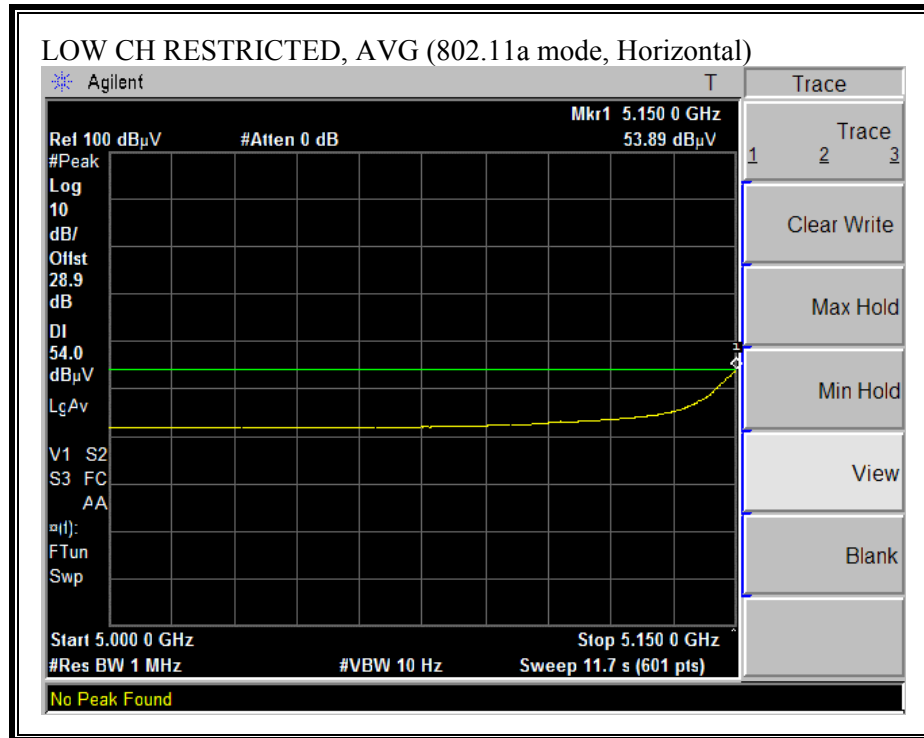
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each band.

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.

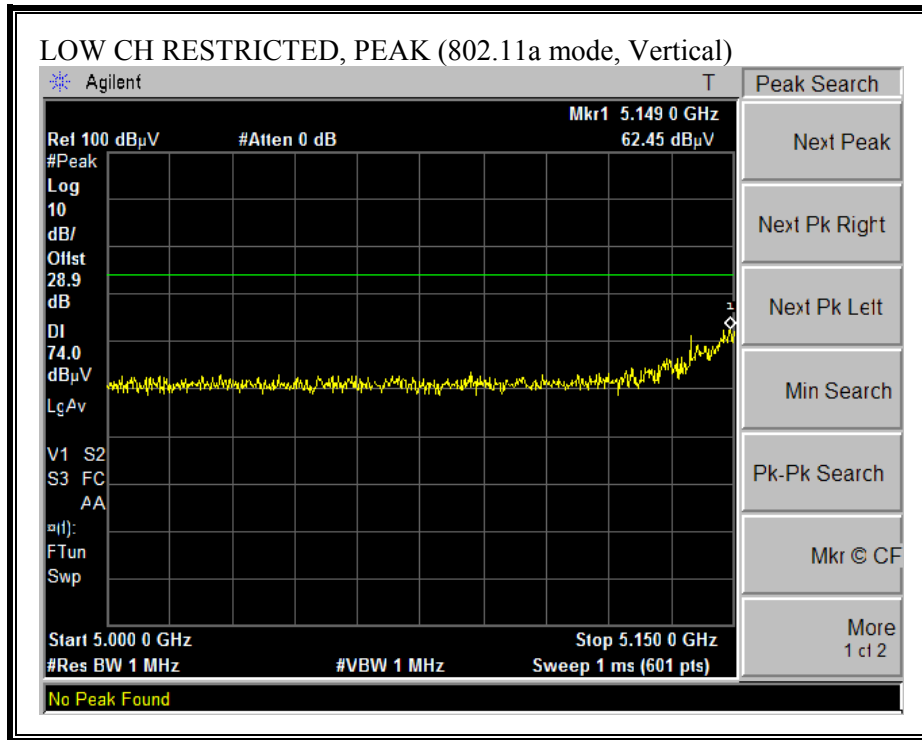
## 7.2.2. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5350 MHz BAND

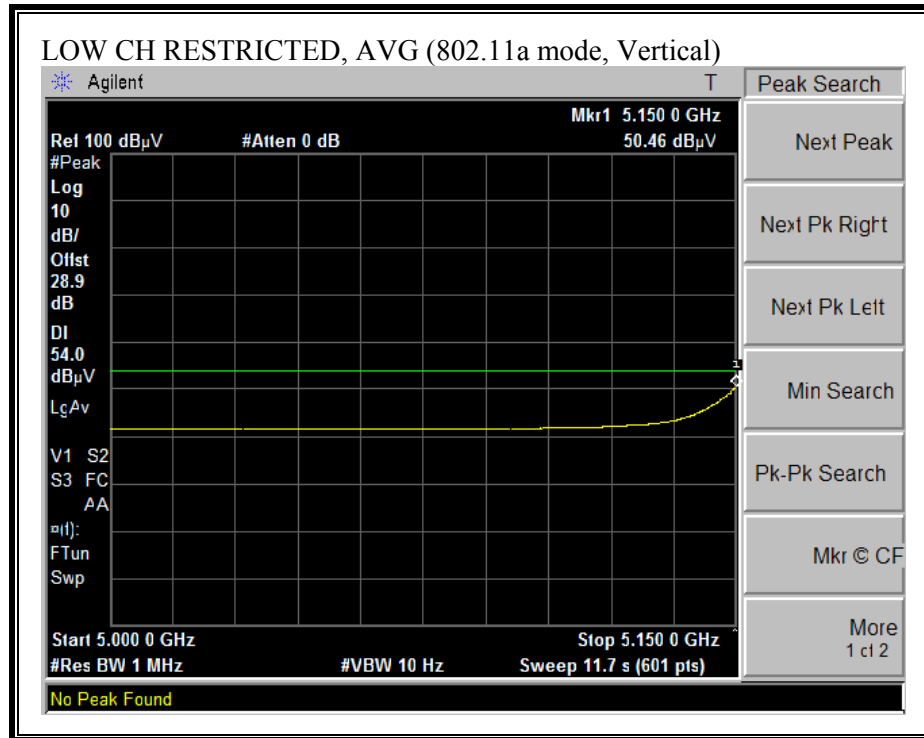
### RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)



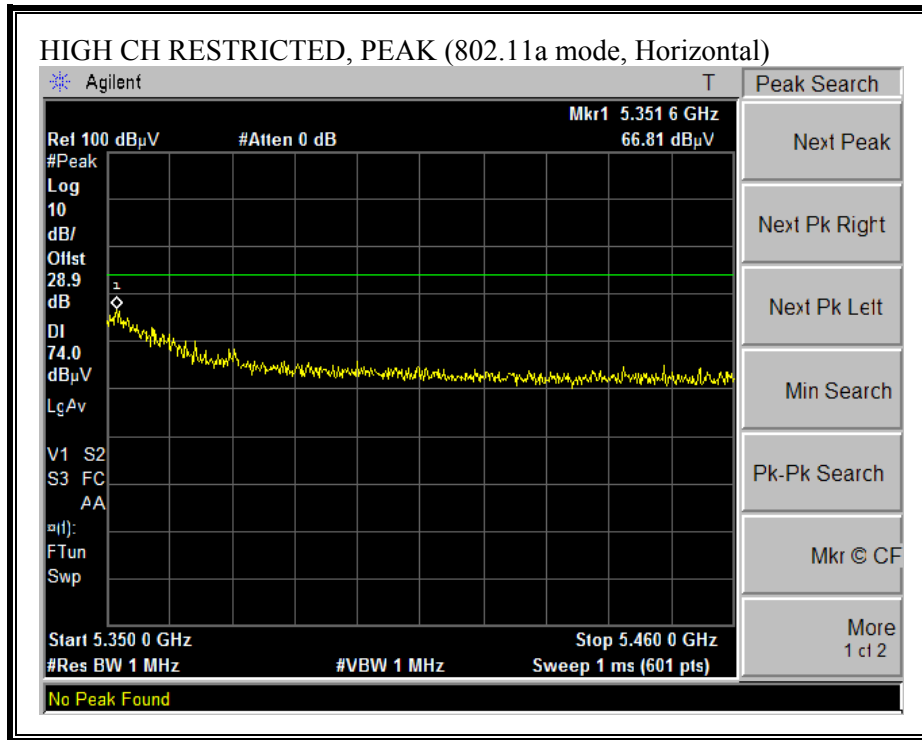


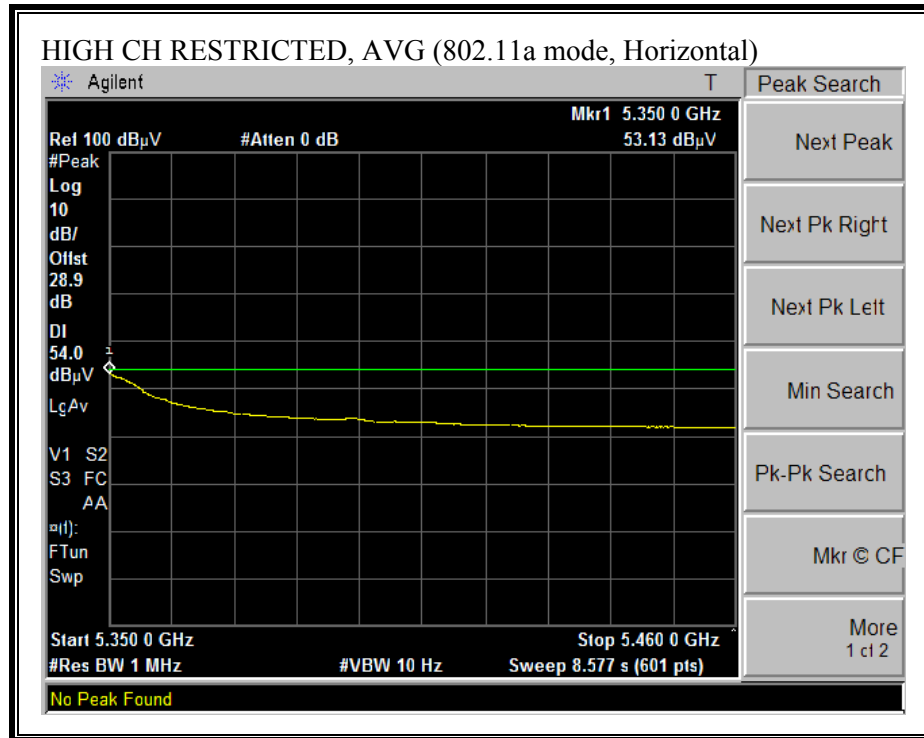
**RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)**



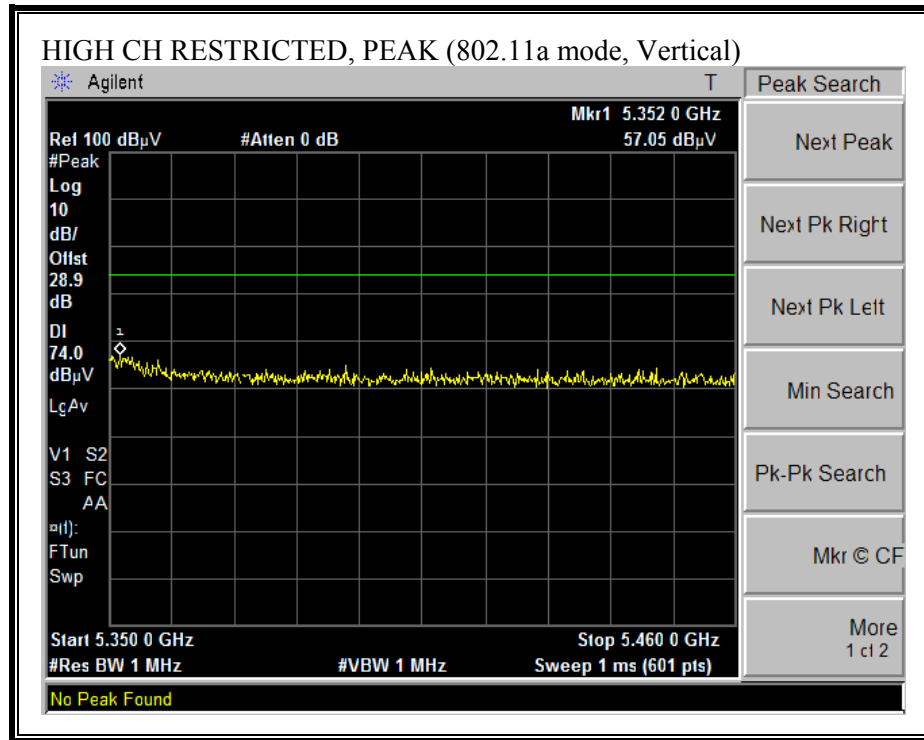


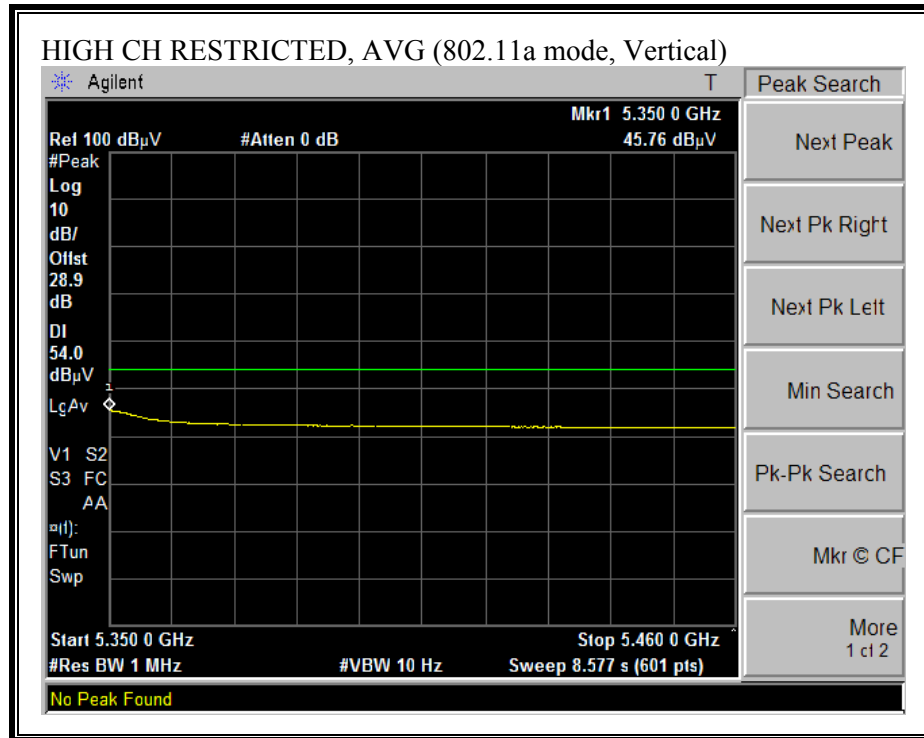
**RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)**





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





[illegible]

### **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  $\mu$ H/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.

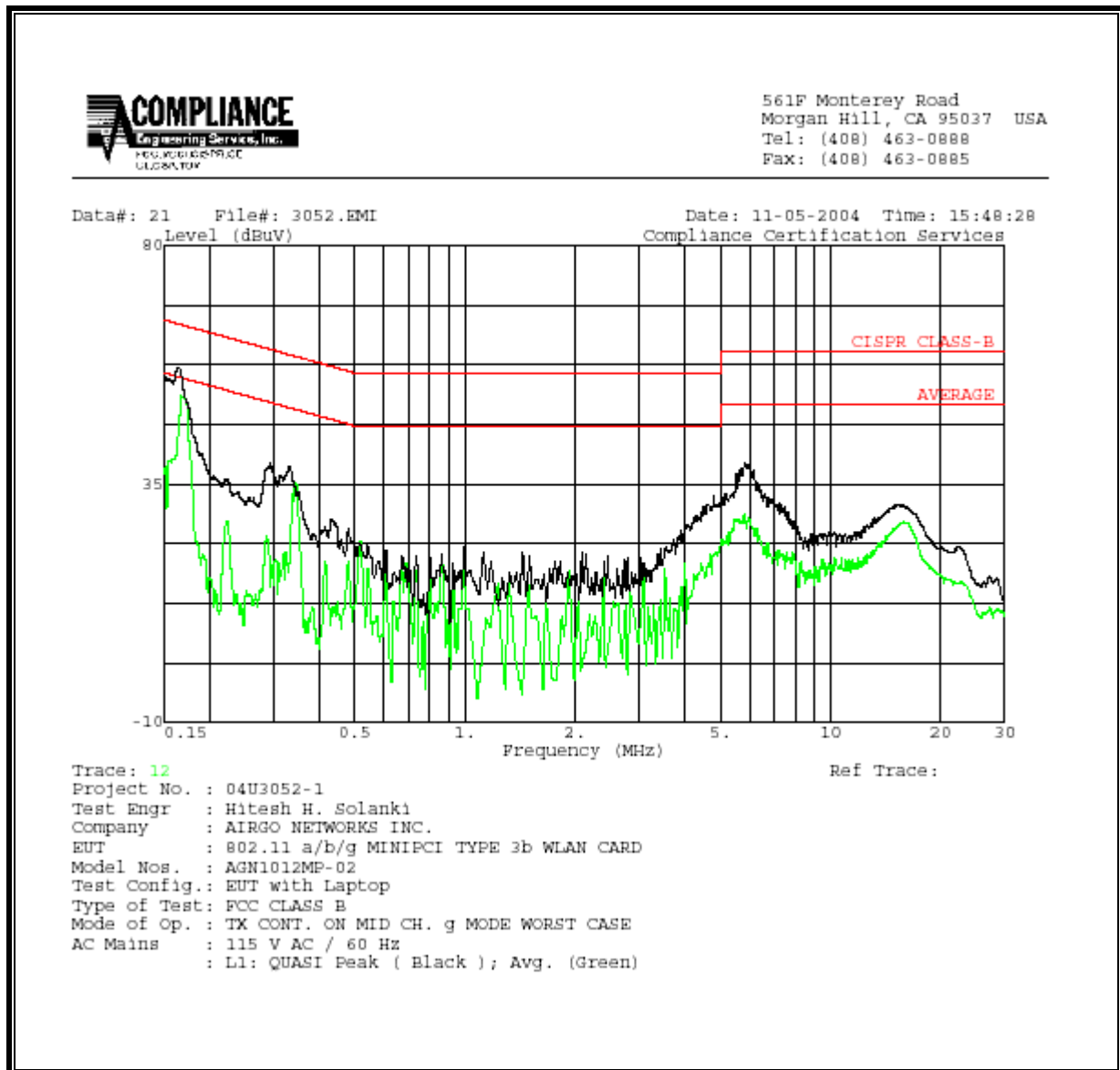
#### RESULTS

No non-compliance noted:

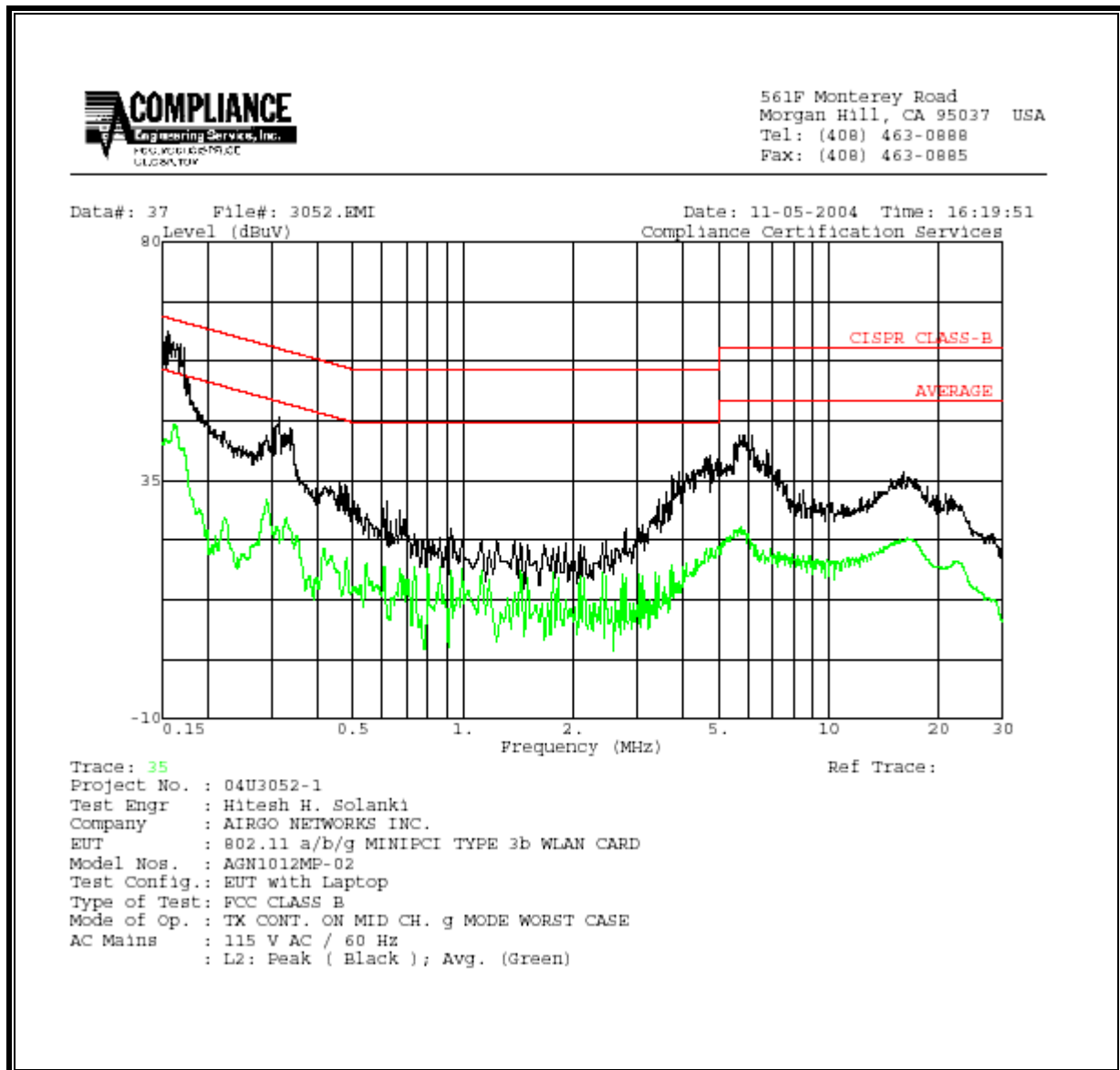
# **6 WORST EMISSIONS**

| 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

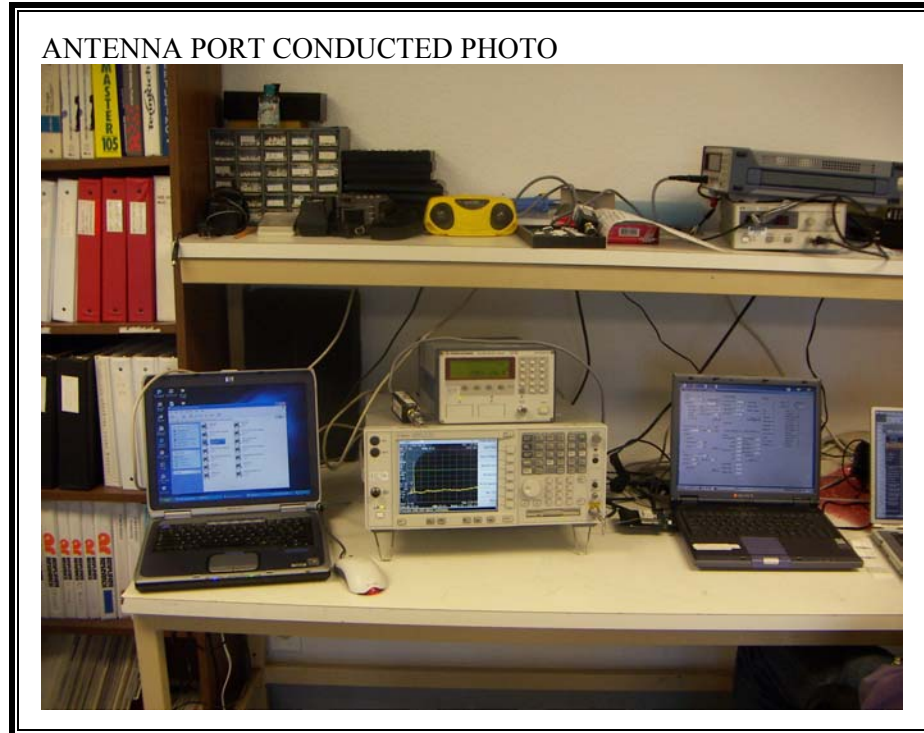


## LINE 2 RESULTS



## 8. SETUP PHOTOS

### ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



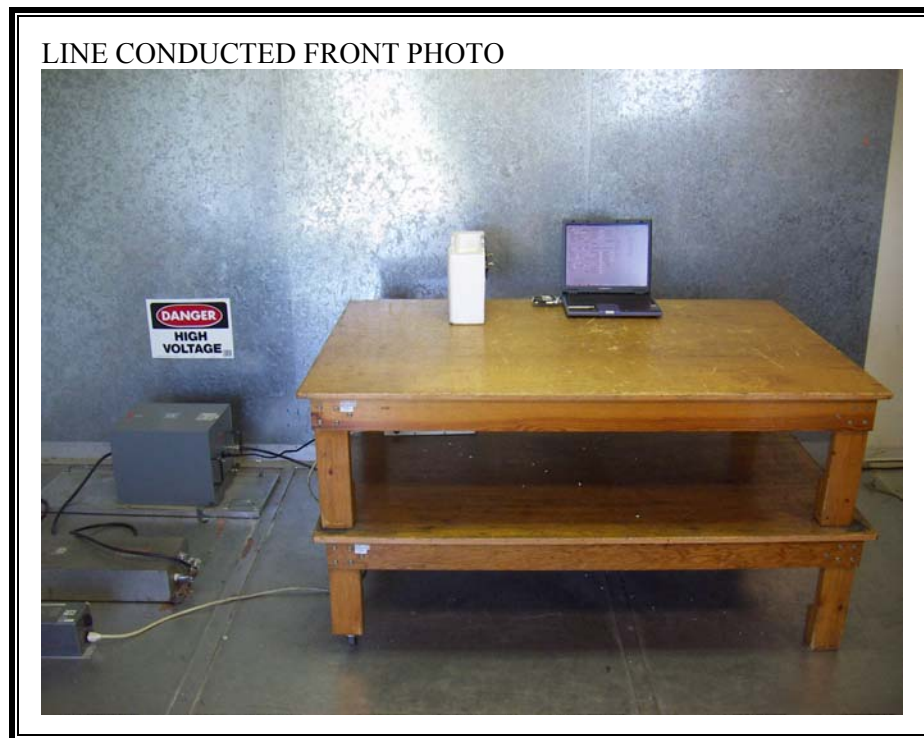
**RADIATED RF MEASUREMENT SETUP**



RADIATED BACK PHOTO



**POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP**



LINE CONDUCTED BACK PHOTO



**END OF REPORT**