



**FCC CFR47 PART 15 SUBPART E
CERTIFICATION
TEST REPORT**

FOR

DUAL MODE 2.4GHz / 5GHz MODULE FOR ACCESS POINT

**MODEL NUMBER: 100 RADIO CARD
FOR MOBILITY POINT 100/101/122**

BRAND NAME: TRAPEZE NETWORKS, INC.

FCC ID: QZE100

REPORT NUMBER: 03U1984-1B

ISSUE DATE: JUNE 11TH, 2003

Prepared for
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TABLE OF CONTENTS

| | |
|--|-----------|
| 1. TEST RESULT CERTIFICATION | 3 |
| 2. EUT DESCRIPTION | 4 |
| 3. TEST METHODOLOGY | 5 |
| 4. FACILITIES AND ACCREDITATION | 5 |
| 4.1. <i>FACILITIES AND EQUIPMENT</i> | <i>5</i> |
| 4.2. <i>TABLE OF ACCREDITATIONS AND LISTINGS</i> | <i>6</i> |
| 5. CALIBRATION AND UNCERTAINTY | 7 |
| 5.1. <i>MEASURING INSTRUMENT CALIBRATION</i> | <i>7</i> |
| 5.2. <i>MEASUREMENT UNCERTAINTY</i> | <i>7</i> |
| 5.3. <i>TEST AND MEASUREMENT EQUIPMENT</i> | <i>8</i> |
| 6. SETUP OF EQUIPMENT UNDER TEST | 8 |
| 6. SETUP OF EQUIPMENT UNDER TEST | 9 |
| 6.1. <i>EMISSION BANDWIDTH</i> | <i>13</i> |
| 6.2. <i>PEAK POWER</i> | <i>18</i> |
| 6.3. <i>MAXIMUM PERMISSIBLE EXPOSURE</i> | <i>24</i> |
| 6.4. <i>AVERAGE POWER</i> | <i>26</i> |
| 6.5. <i>PEAK POWER SPECTRAL DENSITY</i> | <i>27</i> |
| 6.6. <i>PEAK EXCURSION</i> | <i>33</i> |
| 6.7. <i>TRANSMISSION IN THE ABSENCE OF DATA</i> | <i>38</i> |
| 6.8. <i>TYPE OF ANTENNA</i> | <i>38</i> |
| 6.9. <i>FREQUENCY STABILITY</i> | <i>38</i> |
| 6.10. <i>CONDUCTED UNDESIRABLE EMISSIONS</i> | <i>39</i> |
| 6.11. <i>RADIATED EMISSIONS</i> | <i>44</i> |
| 6.12. <i>POWERLINE CONDUCTED EMISSIONS</i> | <i>66</i> |
| 6.13. <i>SETUP PHOTOS</i> | <i>69</i> |

1. TEST RESULT CERTIFICATION

COMPANY NAME: TRAPEZE NETWORKS, INC.
5753 W. LAS POSITAS BLVD.
PLEASANTON, CA 94588, U.S.A

EUT DESCRIPTION: DUAL MODE 2.4GHz / 5GHz MODULE FOR ACCESS POINT

MODEL: 100 RADIO CARD FOR MOBILITY POINT 100/101/102

DATE TESTED: MAY 7 – JUNE 10, 2003

| 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: This document reports conditions under which testing was conducted and results of tests performed. 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.

Note: The 5.2 GHz band is applicable to this report; other bands of operation (2.4 and 5.8 GHz) are documented in a separate report.

Approved & Released For CCS By:



MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:



NEELESH RAJ
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The Mobility Point 100/101/122 (model 122 has two band radios) operates in the 5.15-5.35GHz band. It has an output power of 13.77 dBm (23.8 mW) in the 5.15-5.35 GHz band. The EUT has a peak antenna gain of 2dBi.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/1992, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.







4. FACILITIES AND ACCREDITATION

4.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

4.2. TABLE OF ACCREDITATIONS AND LISTINGS

| Country | Agency | Scope of Accreditation | Logo |
|---------|-----------------|---|--|
| USA | FCC | 3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements |  1300 |
| Japan | VCCI | CISPR 22 Two OATS and one conducted Site |  R-1014, R-619, C-640 |
| Norway | NEMKO | EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1 |  ELA 117 |
| Norway | NEMKO | EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC |  ELA-171 |
| Taiwan | BSMI | CNS 13438 |  SL2-IN-E-1012 |
| Canada | Industry Canada | RSS210 Low Power Transmitter and Receiver |  IC2324 A,B,C, and F |

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measurement instruments utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer's recommendations, and are traceable to national standards.

5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| | |
|-------------------------------------|----------------|
| 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 | | | | |
|--------------------------|--------------|------------------|------------|------------|
| Name of Equipment | Manufacturer | Model No. | Serial No. | Due Date |
| Antenna, Horn 1 ~ 18 GHz | EMCO | 3115 | 2238 | 2/4/2004 |
| Amplifier 1-26GHz | MITEQ | NSP2600-SP | 924341 | 4/25/2004 |
| Amplifier 1-26GHz | MITEQ | NSP2600-SP | 924342 | 4/25/2004 |
| LISN, 10 kHz ~ 30 MHz | Solar | 8012-50-R-24-BNC | 837990 | 9/6/2003 |
| Line Filter | Lindgren | LMF-3489 | 497 | CNR |
| LISN, 10 kHz ~ 30 MHz | FCC | 50/250-25-2 | 114 | 9/6/2003 |
| EMI Test Receiver | R & S | ESHS 20 | 827129/006 | 7/17/2004 |
| PSA | AGILENT | E4446A | US42070220 | 1/13/2004 |
| Peak Power Meter | AGILENT | E4416A | 6B41291160 | 8/9/2003 |
| Power Sensor | AGILENT | E9327A | US40440755 | 8/9/2003 |
| EMI Test Receiver | HP | 8542E | 3942A00286 | 11/20/2003 |
| RF Filter Section | HP | 85420E | 3705A00256 | 11/20/2003 |
| Bilog Antenna | ARA | LPB-25201A | 1185 | 3/6/2004 |
| 10dB Pad | WEINSCHEL | 56-10 | K16148 | N/A |
| 5.15-5.35GHz | MICROTRONICS | BRC-13190 | 1 | N/A |

SETUP OF EQUIPMENT UNDER TEST

SETUP INFORMATION FOR TRANSMITTER TESTS

SUPPORT EQUIPMENT

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|-----------------------------------|---------------|-------------|---------------|--------------|
| Device Type | Manufacturer | Model | Serial Number | FCC ID |
| LAPTOP | IBM | THINKPAD | N/A | ANOC126P8056 |
| POE | LUXUL | N/A | N/A | N/A |
| AC ADAPTER | CISCO SYSTEMS | PSA18U-480C | PH107010912B | N/A |

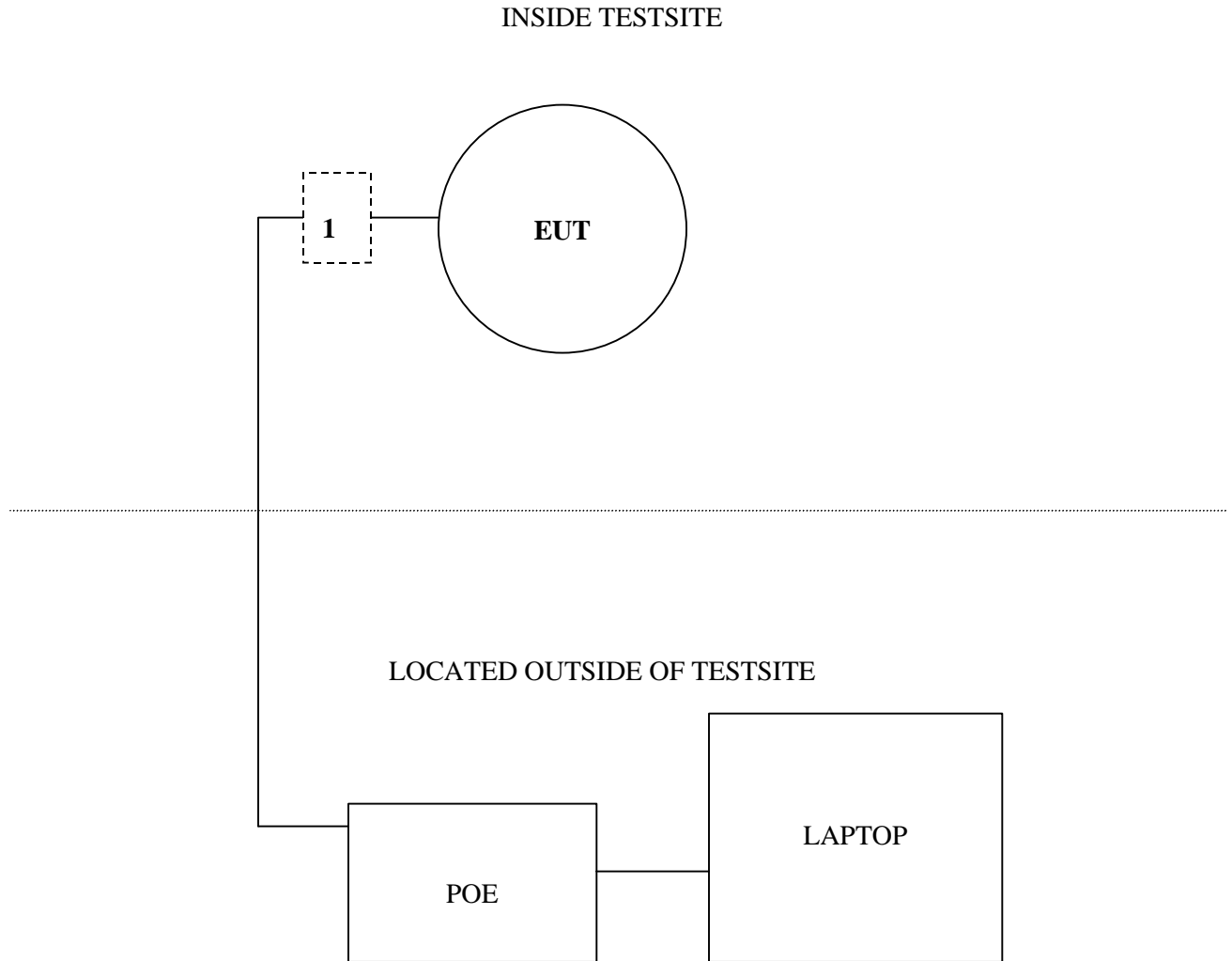
I/O CABLES

| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length | Remarks |
|-----------|----------|----------------------|----------------|------------|--------------|---------|
| 1 | ETHERNET | 2 | RJ-45 | UNSHIELDED | 12M | N/A |

TEST SETUP

The EUT was operated remotely by the laptop.

SETUP DIAGRAM FOR TRANSMITTER TESTS



SETUP INFORMATION FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|-----------------------------------|---------------|-------------|---------------|---------------|
| Device Type | Manufacturer | Model | Serial Number | FCC ID |
| LAPTOP | IBM | THINKPAD | N/A | AN0CH126P8056 |
| POE | LUXUL | N/A | N/A | N/A |
| AC ADAPTER | CISCO SYSTEMS | PSA18U-480C | PH107010912B | N/A |

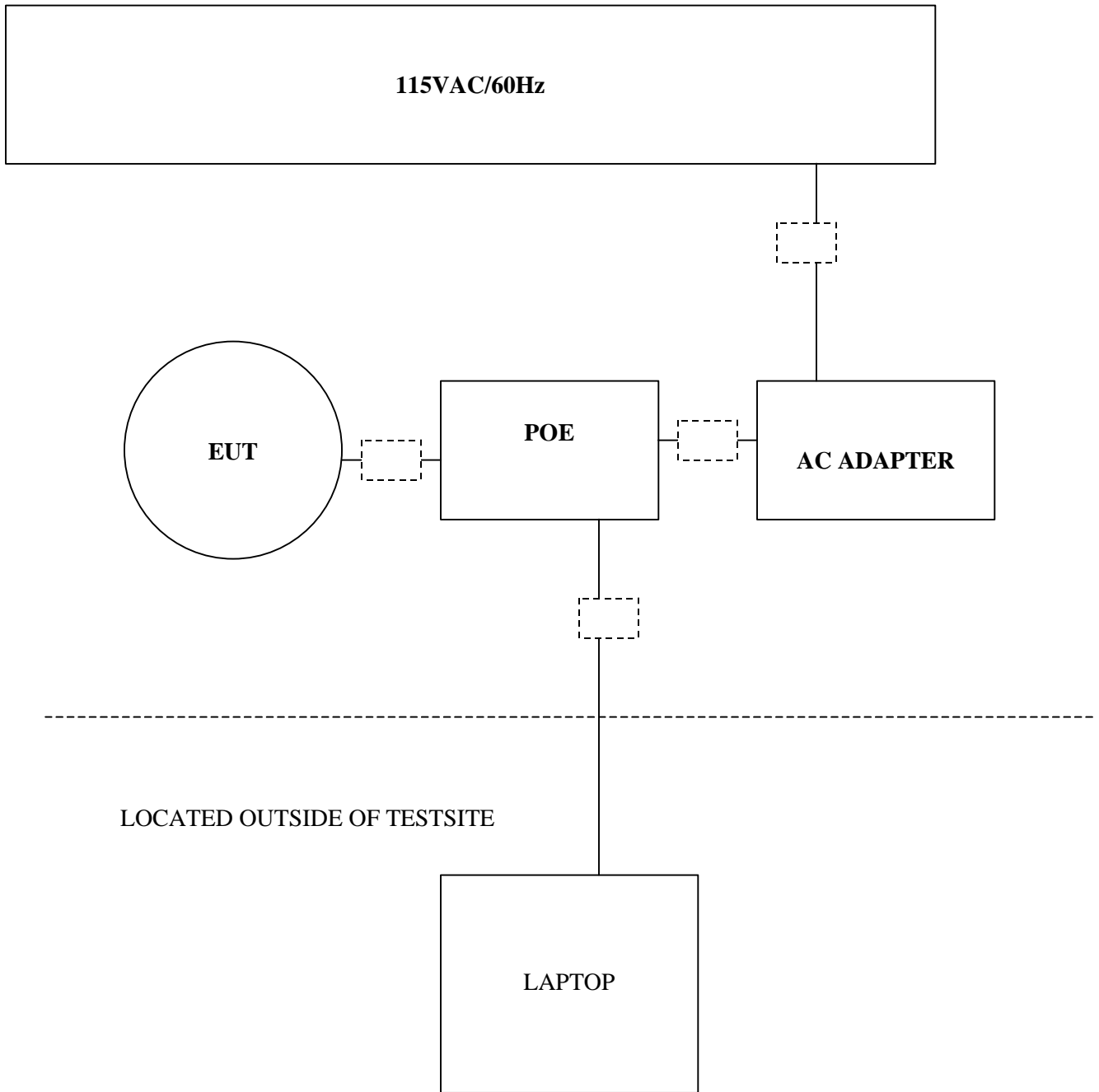
I/O CABLES

| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length | Remarks |
|-----------|----------|----------------------|----------------|------------|--------------|---------|
| 1 | ETHERNET | 2 | RJ-45 | UNSHIELDED | 3M | N/A |
| 2 | ETHERNET | 1 | RJ-45 | UNSHIELDED | 12M | N/A |
| 3 | DC PWR | 1 | DC PWR | UNSHIELDED | 2M | N/A |
| 4 | AC PWR | 1 | US115 | UNSHIELDED | 2M | N/A |

TEST SETUP

The EUT was operated remotely by the laptop.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



APPLICABLE LIMITS AND TEST RESULTS

6.1. EMISSION BANDWIDTH

LIMIT

§15.403 (c) 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.

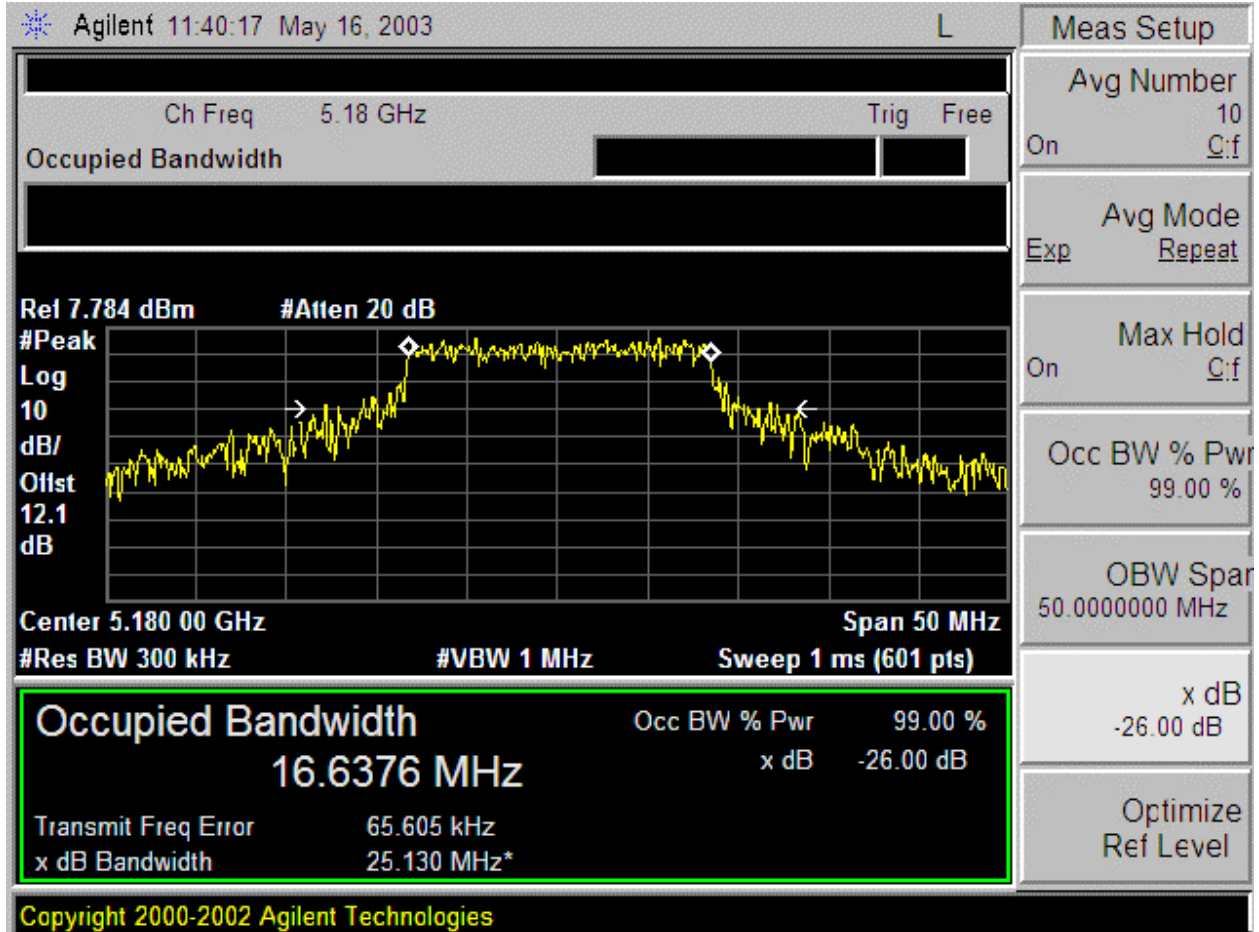
RESULTS

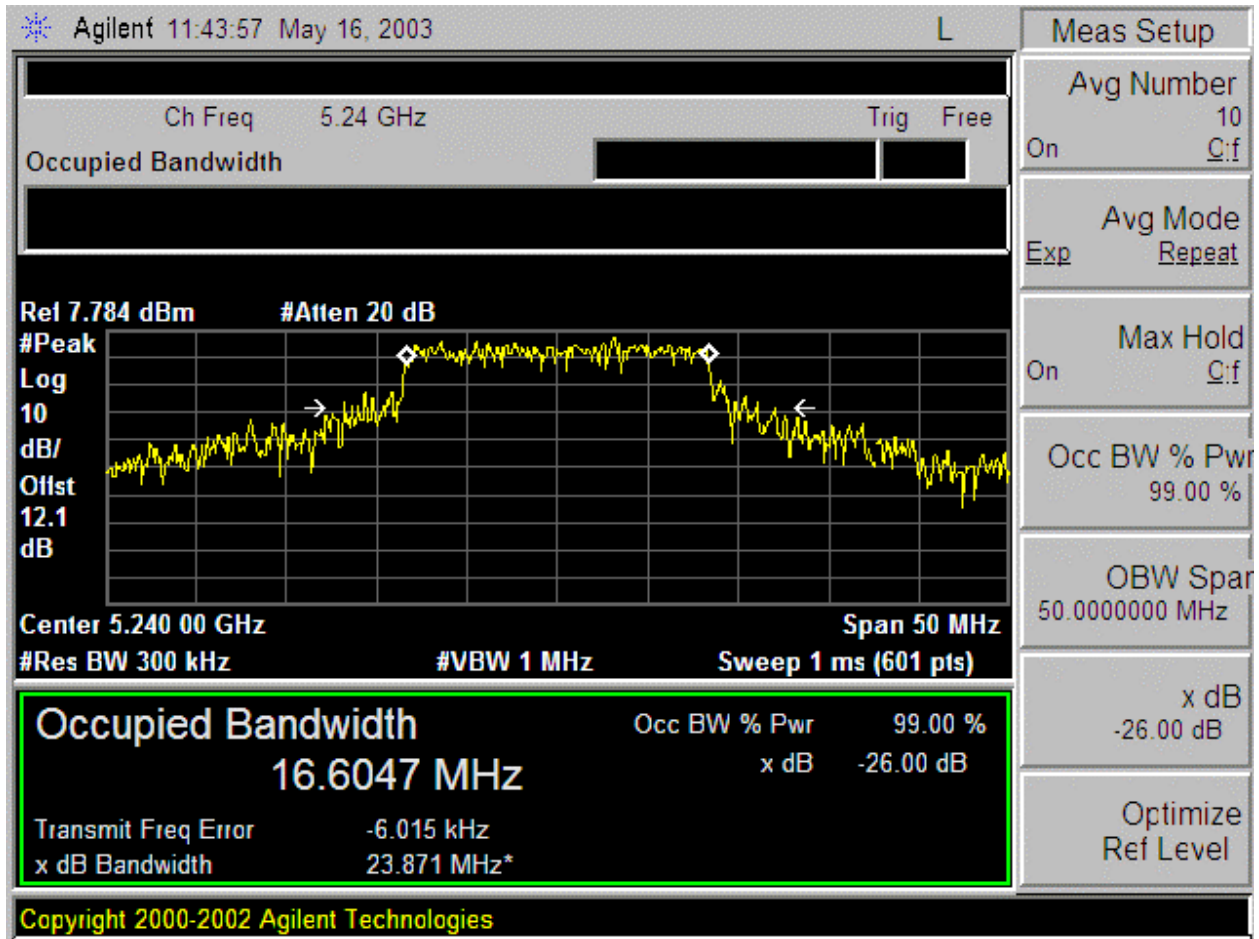
No non-compliance noted:

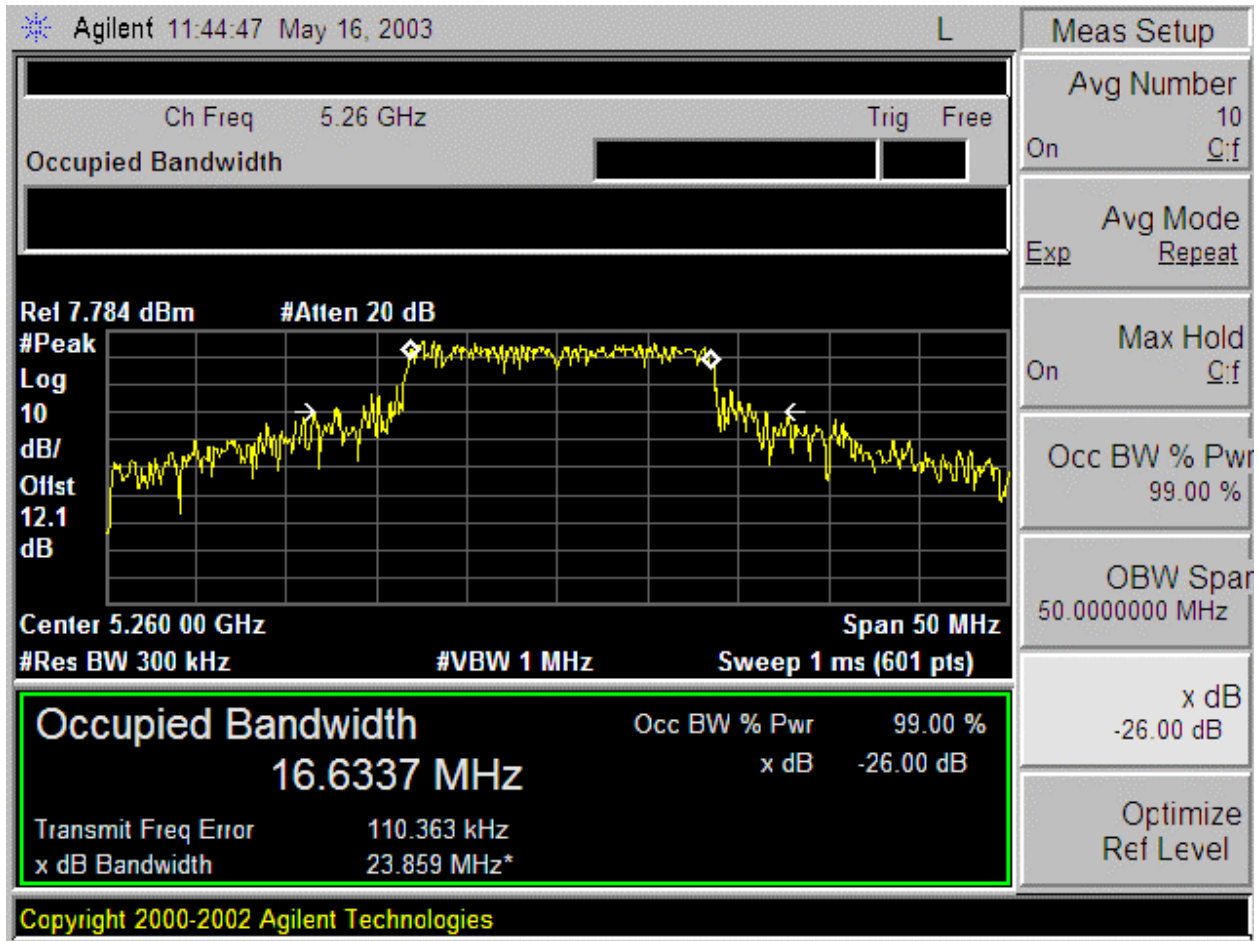
802.11a Normal Mode

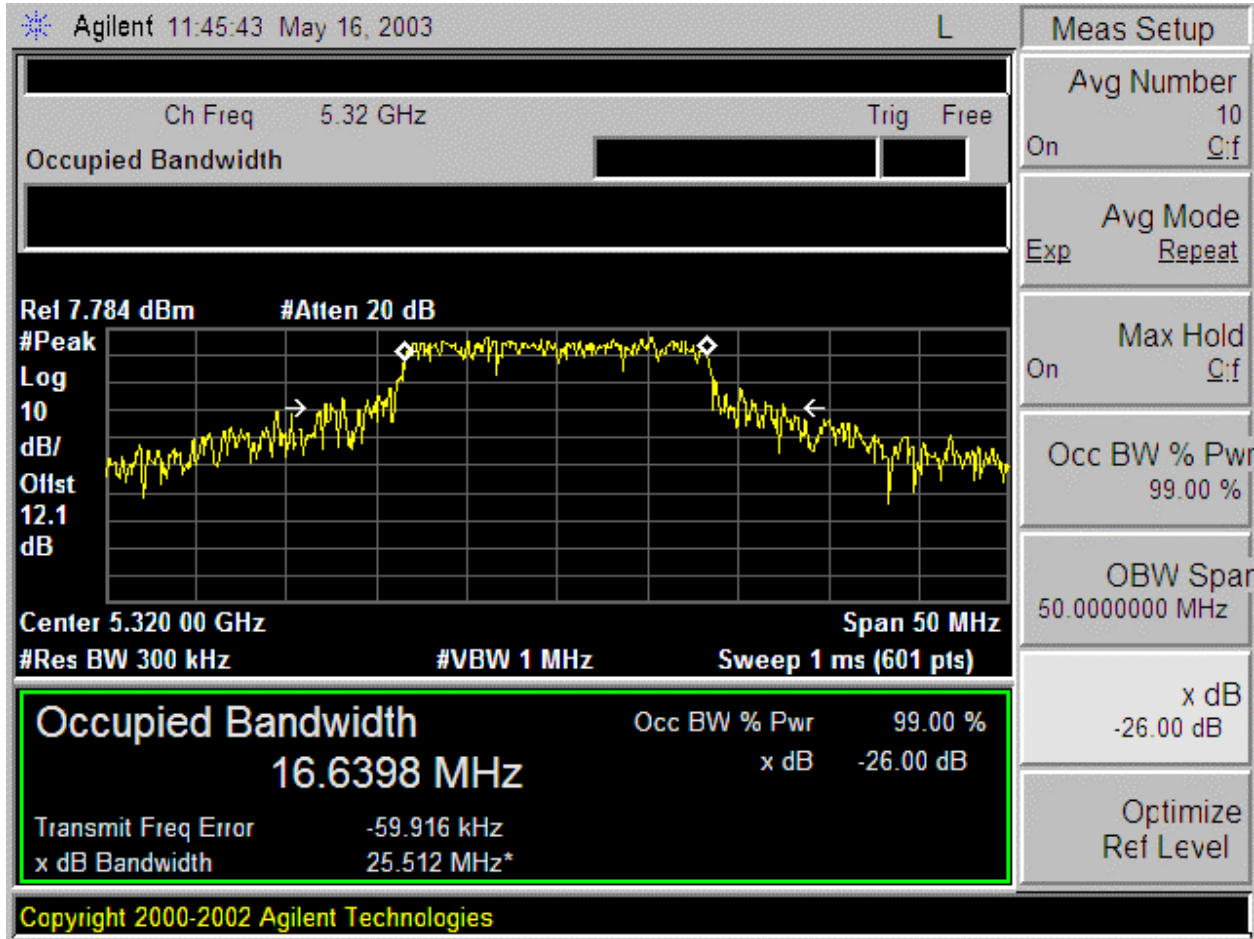
| Channel | Frequency (MHz) | B (MHz) | 10 Log B (dB) |
|---------|--------------------|------------|------------------|
| Low | 5180 | 25.13 | 14.00 |
| Middle | 5240 | 23.87 | 13.78 |
| Middle | 5260 | 23.86 | 13.78 |
| High | 5320 | 25.51 | 14.07 |

EMISSION BANDWIDTH (BASE MODE)









6.2. 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 (17 dBm) or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, 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 transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24 dBm) or $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, 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.

Limit in 5150 to 5250 MHz Band

| Mode | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | $4 + 10 \log B$ Limit (dBm) | Excess Antenna Gain (dB) | Limit (dBm) |
|--------|--------------------|-------------------------|------------|-----------------------------------|--------------------------------|----------------|
| Normal | 5180 | 17 | 25.13 | 18.00 | 0.00 | 17.00 |
| Normal | 5240 | 17 | 23.871 | 17.78 | 0.00 | 17.00 |

Limit in 5250 to 5350 MHz Band

| Mode | Frequency (MHz) | Fixed Limit (dBm) | B (MHz) | $11 + 10 \log B$ Limit (dBm) | Excess Antenna Gain (dB) | Limit (dBm) |
|--------|--------------------|-------------------------|------------|------------------------------------|--------------------------------|----------------|
| Normal | 5260 | 24 | 23.859 | 24.78 | 0.00 | 24.00 |
| Normal | 5320 | 24 | 25.512 | 25.07 | 0.00 | 24.00 |

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.

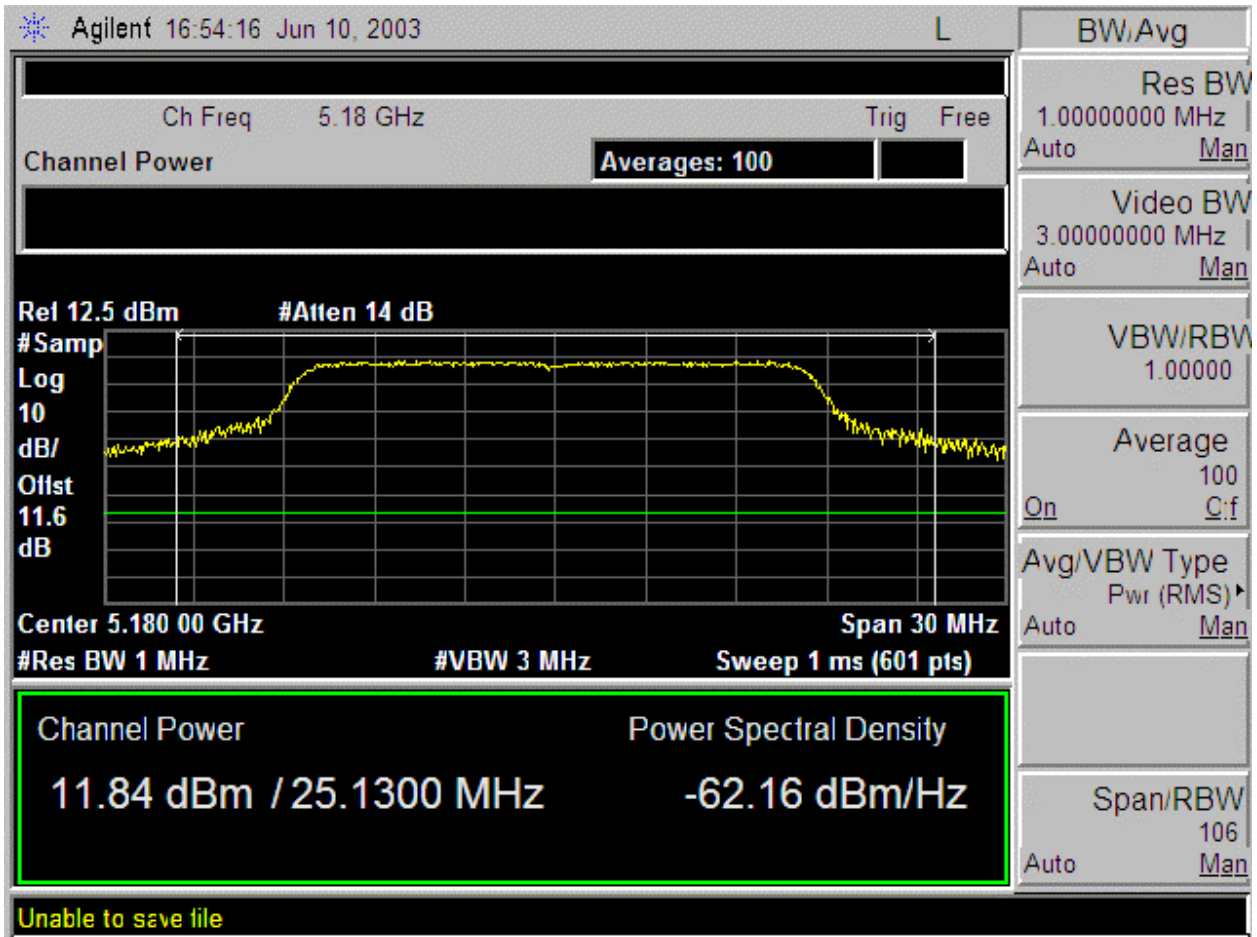
RESULTS

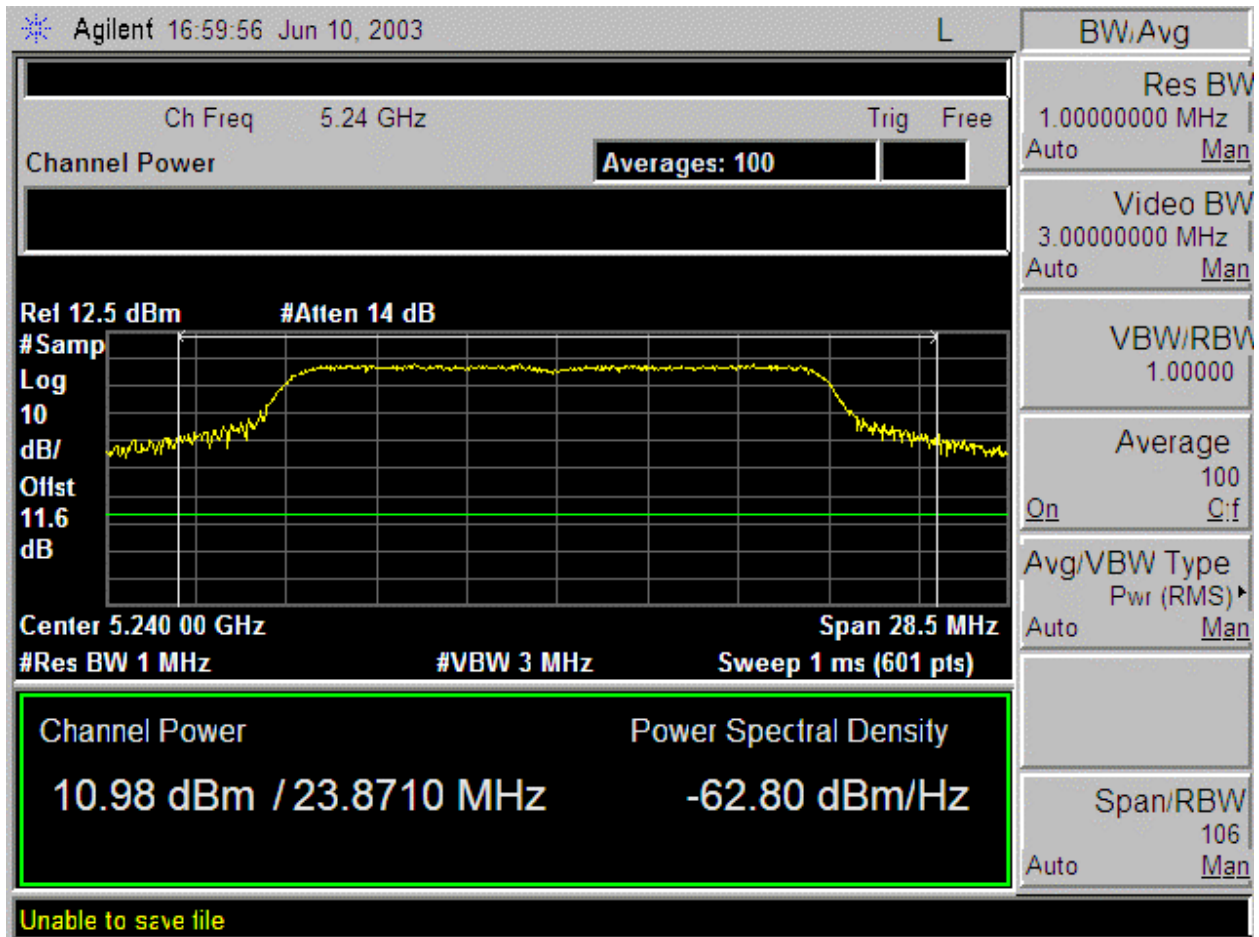
No non-compliance noted:

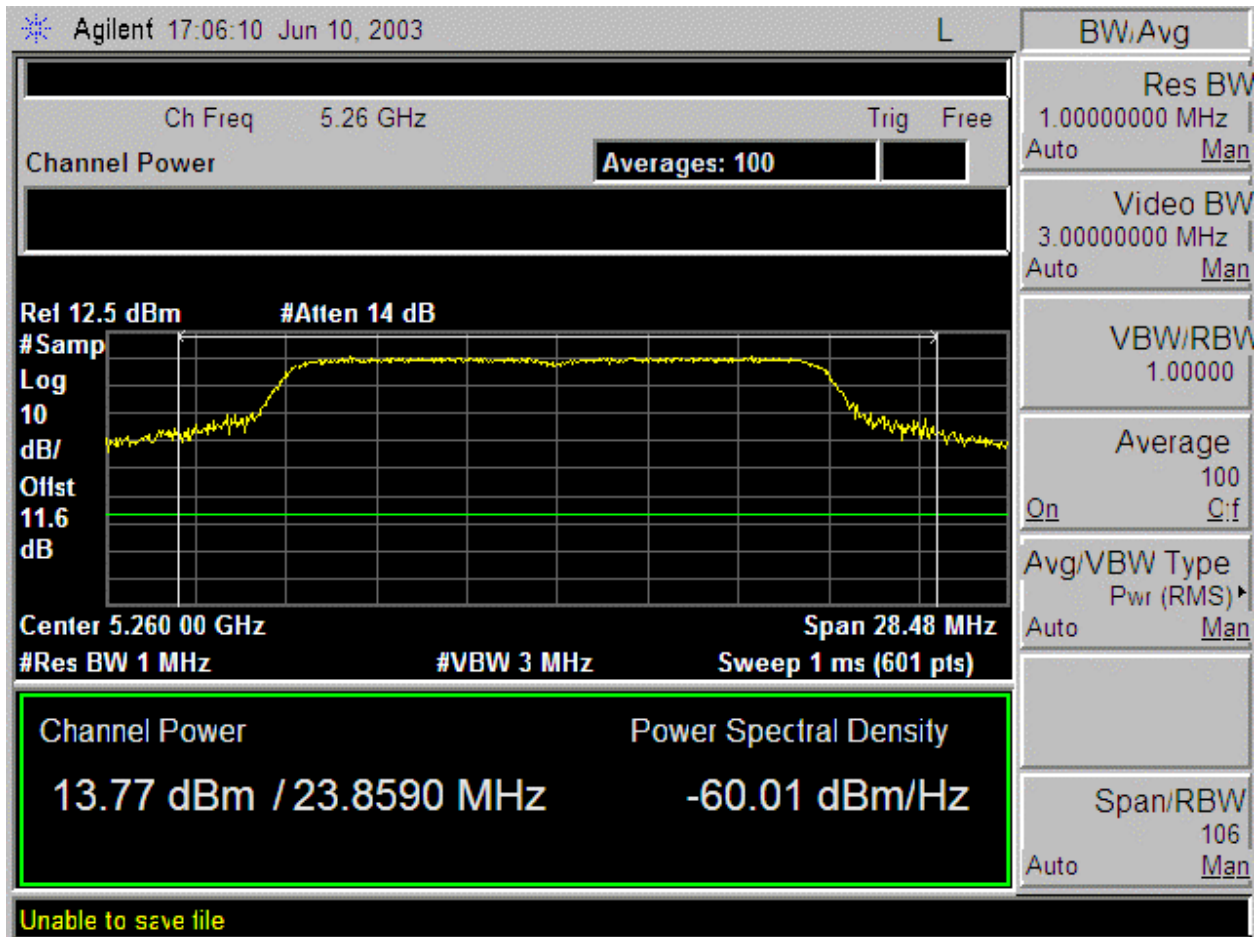
802.11a Normal Mode

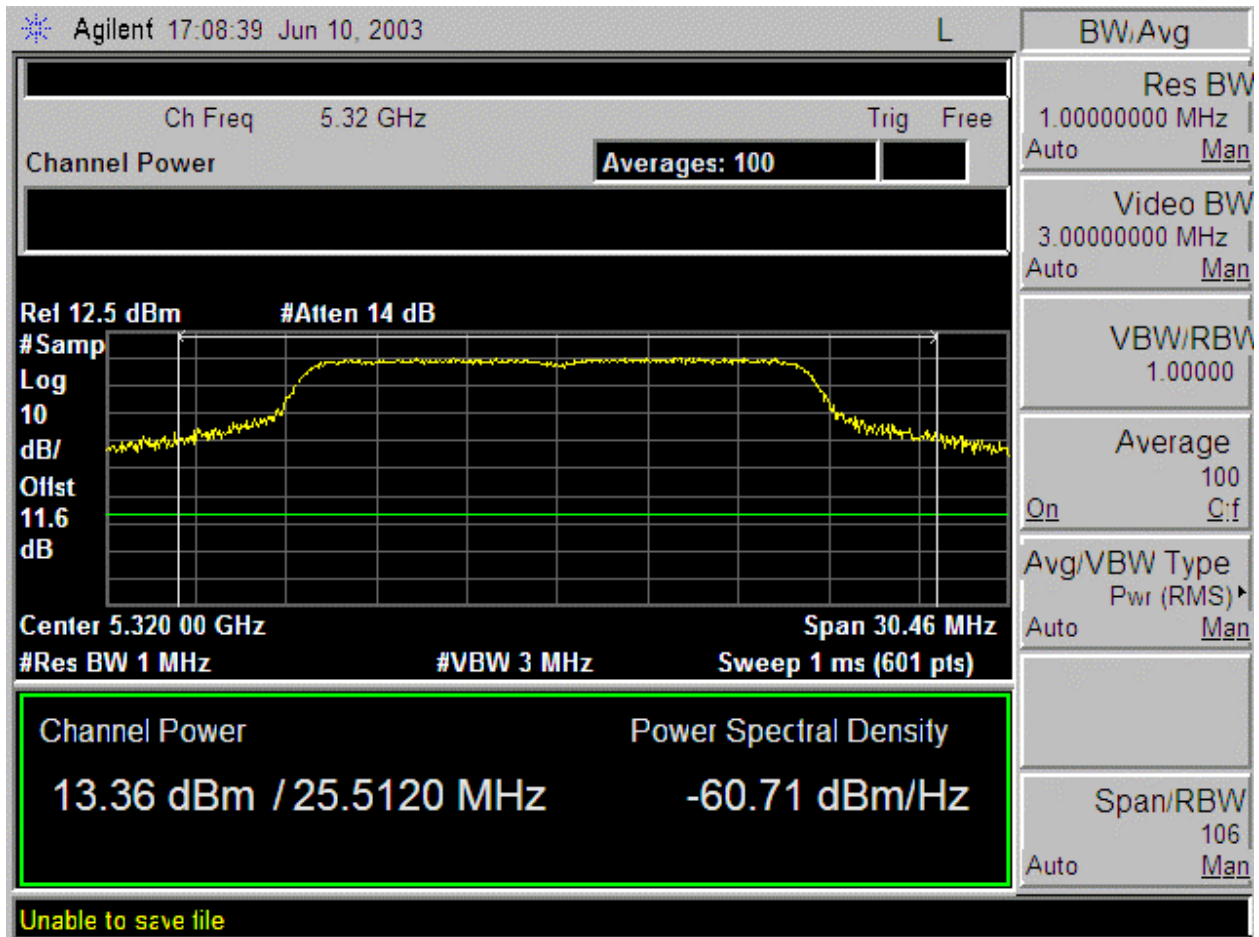
| Mode | Frequency (MHz) | Power (dBm) | Limit (dBm) | Margin (dB) |
|--------|-----------------|-------------|-------------|-------------|
| Low | 5180 | 11.84 | 17.00 | -5.16 |
| Middle | 5240 | 10.98 | 17.00 | -6.02 |
| Middle | 5260 | 13.77 | 24.00 | -10.23 |
| High | 5320 | 13.36 | 24.00 | -10.64 |

PEAK POWER (BASE MODE)









6.3. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§15.247 (b) (5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

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 mW and 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 / cm²

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 / cm²

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

LIMITS

S = 1.0 mW / cm² from 1.1310 Table 1

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.

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 | 13.77 | 2.00 | 1.73 |

6.4. AVERAGE POWER

LIMIT

None; reporting requirement only.

TEST PROCEDURE

The transmitter output is connected to a power meter. The power meter is set to read average power.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 12 dB (including 10 dB pad and 2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a Normal Mode

| Channel | Frequency (MHz) | Average Power (dBm) |
|---------|-----------------|---------------------|
| Low | 5180 | 12.06 |
| Middle | 5240 | 12.03 |
| Middle | 5260 | 15.08 |
| High | 5320 | 14.91 |

6.5. PEAK POWER SPECTRAL DENSITY

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 (17 dBm) or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, 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 transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24 dBm) or $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, 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 = 2 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.

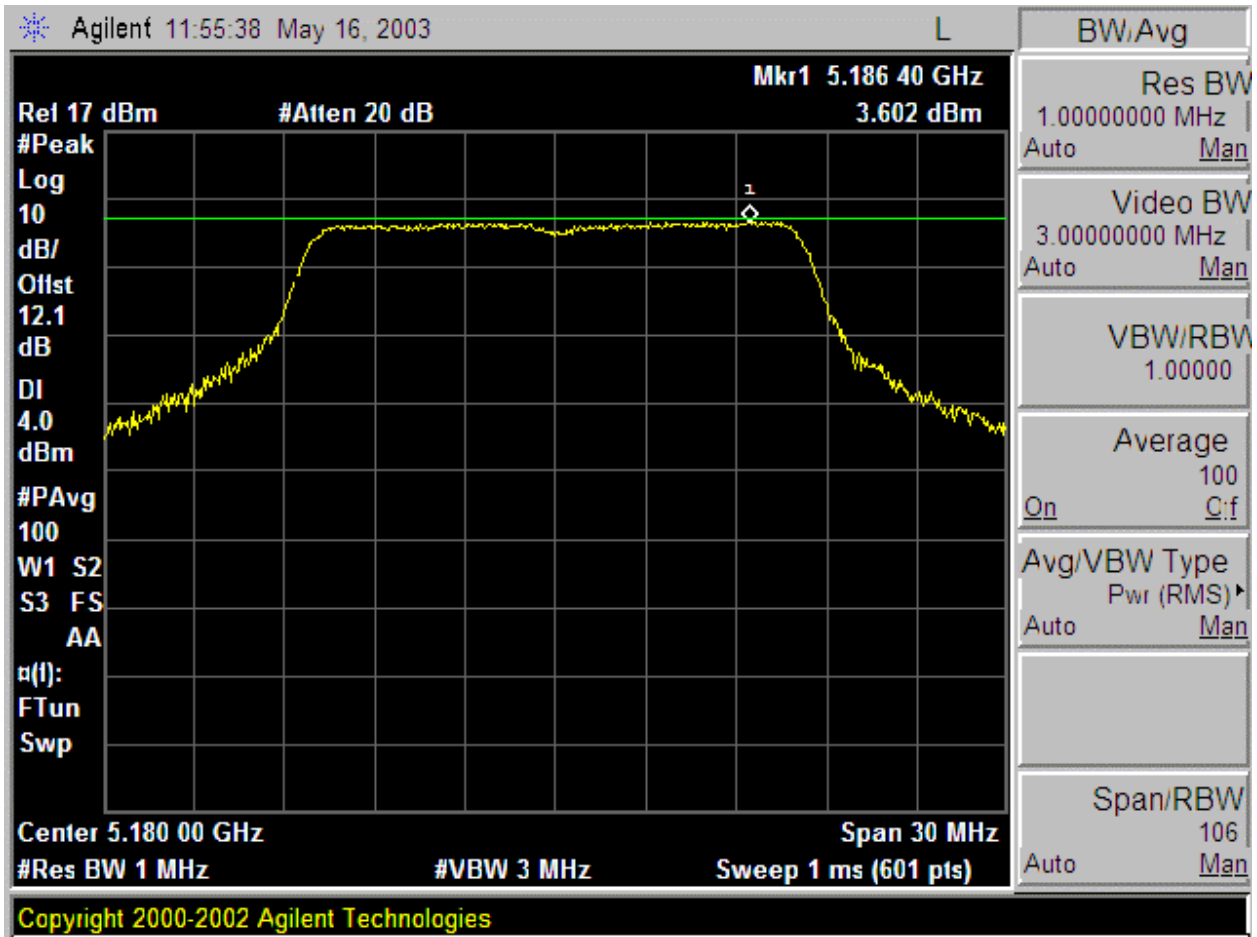
RESULTS

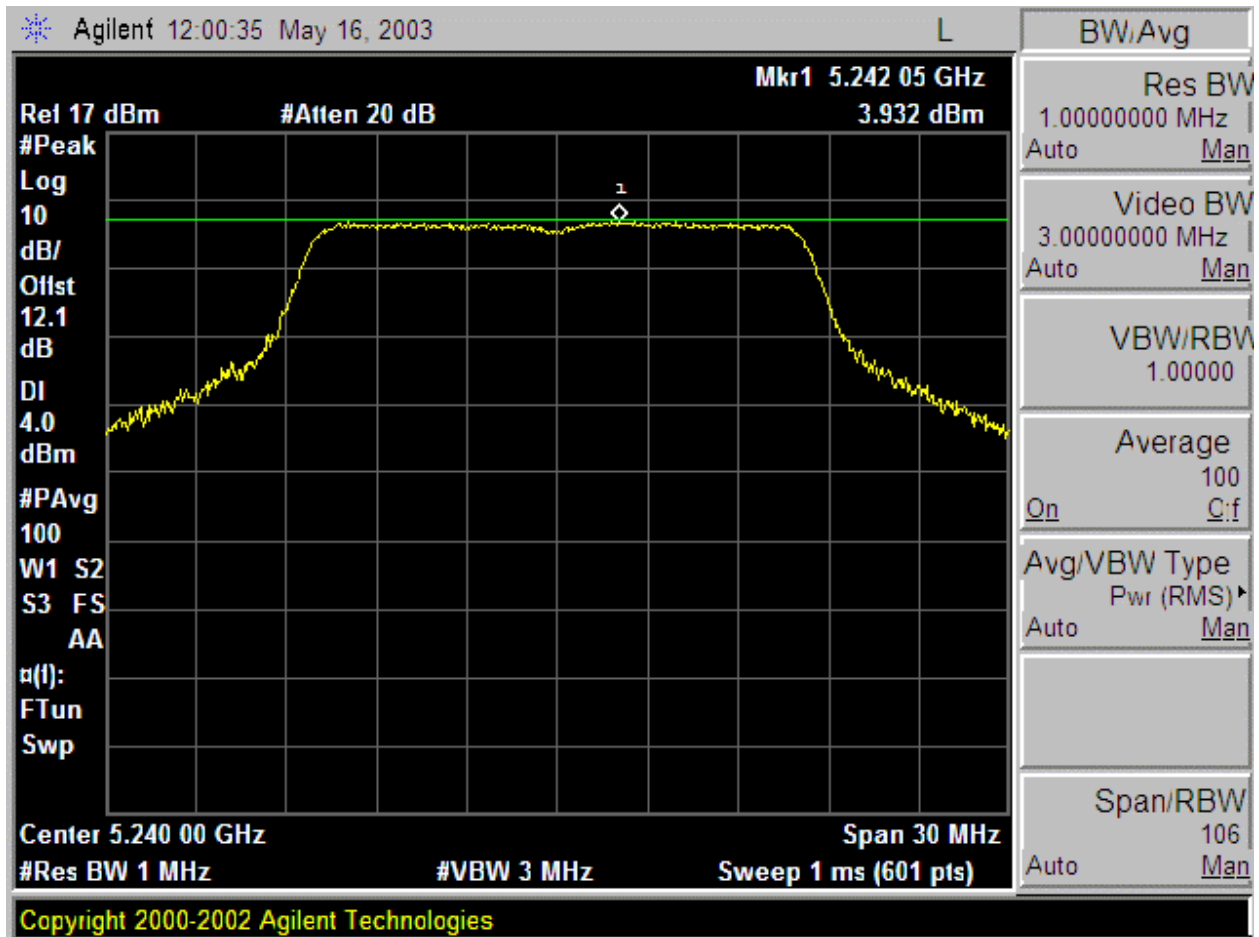
No non-compliance noted:

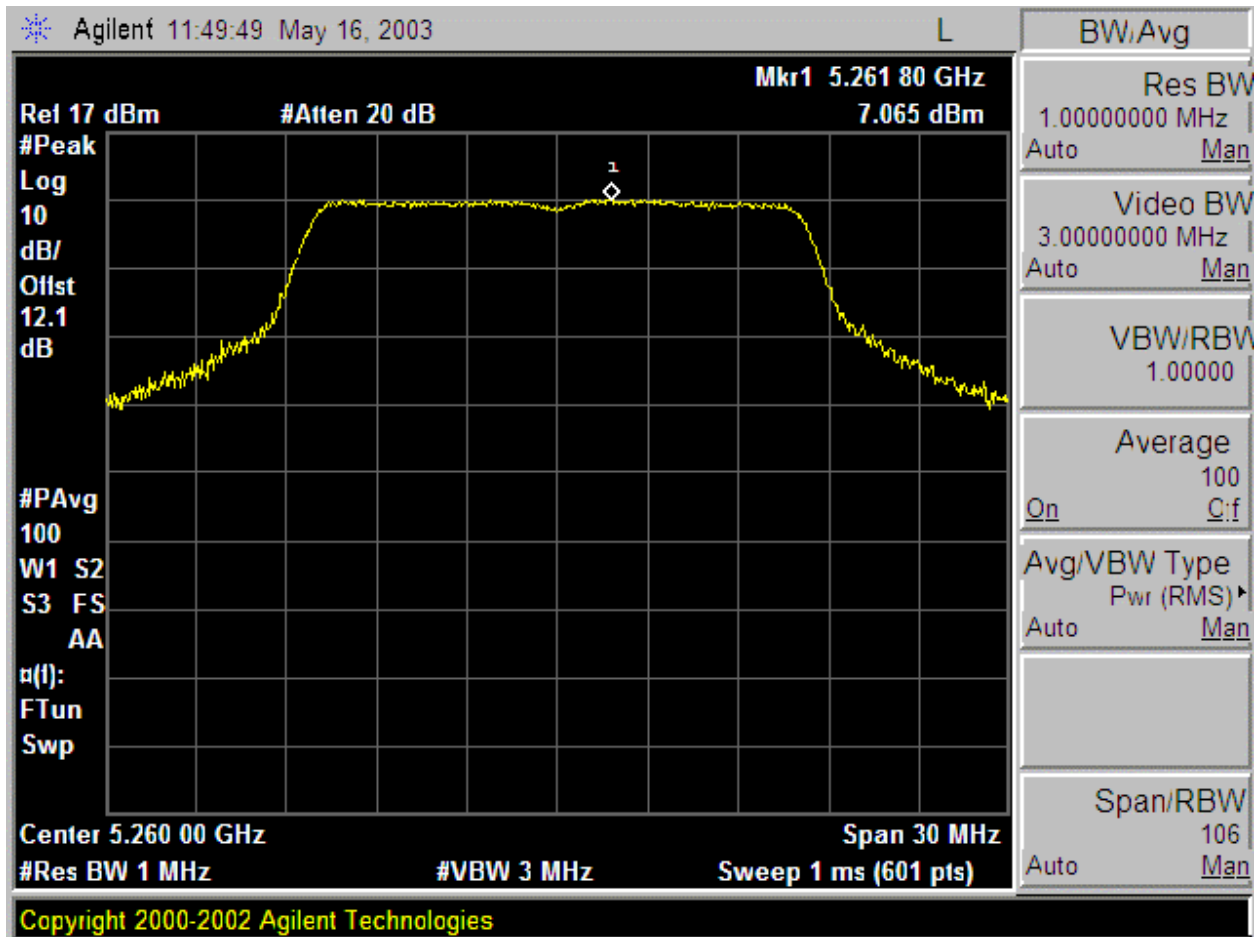
802.11a Normal Mode

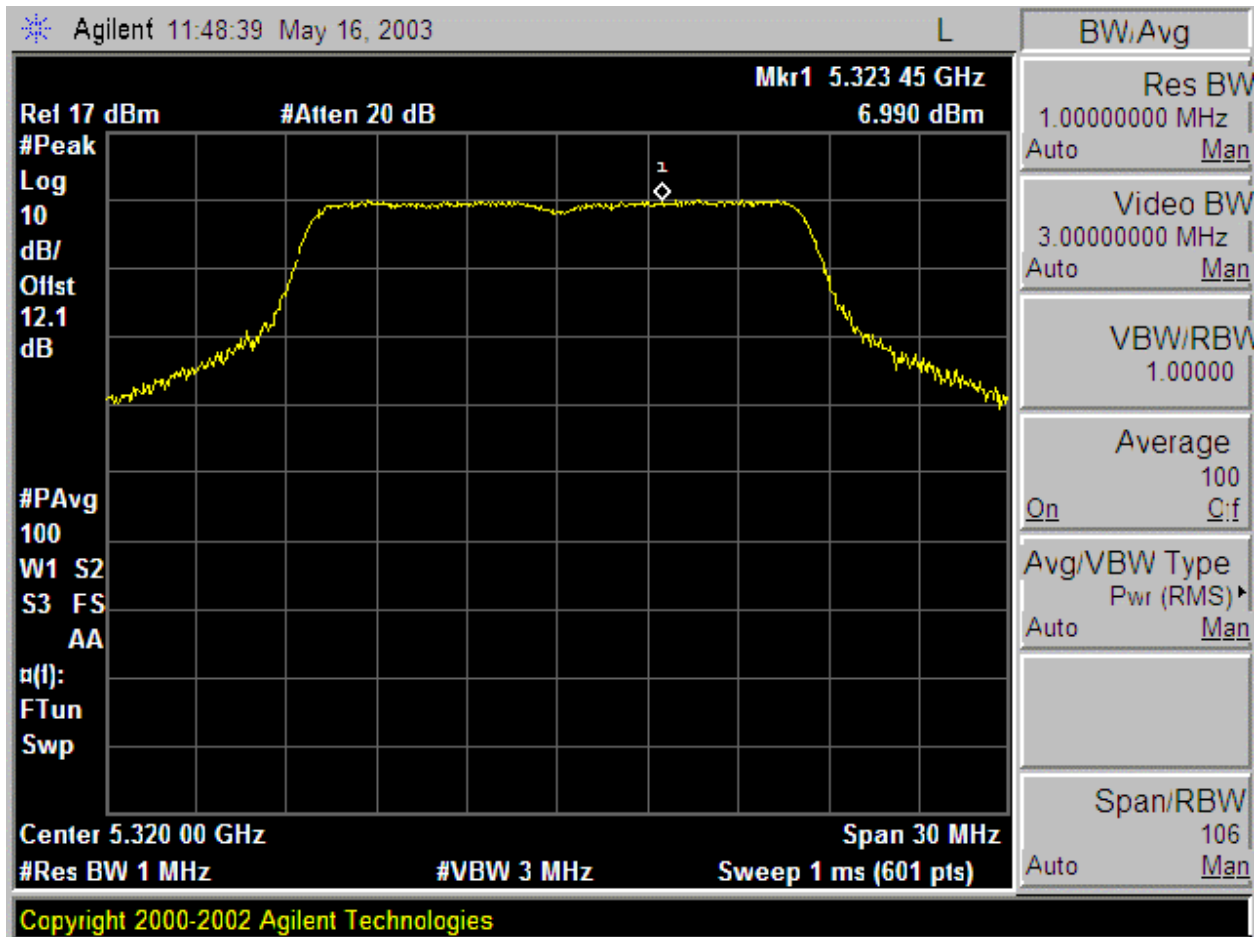
| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Margin (dB) |
|---------|--------------------|---------------|----------------|----------------|
| Low | 5180 | 3.60 | 4.00 | -0.40 |
| Middle | 5240 | 3.93 | 4.00 | -0.07 |
| Middle | 5260 | 7.07 | 11.00 | -3.94 |
| High | 5320 | 6.99 | 11.00 | -4.01 |

PPSD (BASE MODE)









6.6. 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 Normal Mode

| Channel | Frequency (MHz) | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---------|-----------------|---------------------|------------|-------------|
| Low | 5180 | 10.20 | 13 | -2.80 |
| Middle | 5240 | 9.35 | 13 | -3.65 |
| Middle | 5260 | 9.80 | 13 | -3.20 |
| High | 5320 | 7.35 | 13 | -5.65 |

PEAK EXCURSION (BASE MODE)

