



**FCC CFR47 PART 15 SUBPART E
CERTIFICATION**

TEST REPORT

FOR

802.11A/G PCI ADAPTER

MODEL NUMBER: AIR-PI21AG-A-K9

FCC ID: LDK102051

REPORT NUMBER: 03U2286-2

ISSUE DATE: OCTOBER 30, 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
5. CALIBRATION AND UNCERTAINTY	6
5.1. MEASURING INSTRUMENT CALIBRATION	6
5.2. MEASUREMENT UNCERTAINTY	6
5.3. TEST AND MEASUREMENT EQUIPMENT	7
6. SETUP OF EQUIPMENT UNDER TEST.....	8
7. APPLICABLE LIMITS AND TEST RESULTS.....	12
7.1. EMISSION BANDWIDTH	12
7.2. PEAK POWER.....	16
7.3. MAXIMUM PERMISSIBLE EXPOSURE.....	21
7.4. AVERAGE POWER.....	23
7.5. PEAK POWER SPECTRAL DENSITY	24
7.6. PEAK EXCURSION	28
7.7. CONDUCTED SPURIOUS EMISSIONS	32
7.8. RADIATED EMISSIONS	36
7.8.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS	36
7.8.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ	39
7.8.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHZ	48
7.8.4. POWERLINE CONDUCTED EMISSIONS	52
8. SETUP PHOTOS.....	55

1. TEST RESULT CERTIFICATION

COMPANY NAME: CISCO SYSTEMS, INC.
170 WEST TASMAN
SAN JOSE, CA 95134, USA

EUT DESCRIPTION: 802.11A/G PCI ADAPTER

MODEL: AIR-PI21AG-A-K9

DATE TESTED: OCTOBER 6 - OCTOBER 30, 2003

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART E	NO NON-COMPLIANCE NOTED

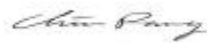
Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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:

Tested By:



MICHAEL HECKROTTE
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2. EUT DESCRIPTION

The EUT is an 802.11a/b/g transceiver on a PCI card.

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

Mode	Output Power (dBm)	Output Power (mW)
802.11a Normal	15.05	31.99

The radio utilizes a single flying lead straight antenna, with a maximum assembly (including cable) gain of 0.93 dBi in the 5.2 GHz band.

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

The open area test sites and conducted 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 or imply product endorsement by NVLAP or any agency of the US Government.

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:

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 AND MEASUREMENT EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
EMI Test Receiver	R & S	ESHS 20	827129/006	4/18/04
LISN 10 KHz-30MHz	FCC	50/250-25-2	114	11/6/03
Line Filter	Lindgren	LMF-3489	497	NCR
LISN 10 KHz-30MHz	Solar	8012-50-R-24-BNC	837990	11/6/03
Bilog Antenna	AR	LPB-25201A	1185	3/6/04
EMI Receiver	HP	8542E	3942A00280	11/20/03
RF Filter Section	HP	85420E	3705A00256	11/20/03
Pre-Amplifier, 1-26GHz	Miteq	NSP2600-SP	924342	4/15/04
PSA Spectrum Analyzer	Agilent	E4446A	NA	1/23/04
Horn	EMCO	3115	2238	2/4/04
7.6GHz HPF	Microwave	HP7600-9SS	NA	NCR

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Monitor	Dell	M780	5322DE20E049	DoC
Keyboard	Dell	SK-8110	NA	DoC
Mouse	Dell	M-SAW34	LZA30519730	DZL211029
PC	Dell	DHP	J4V181S	DoC

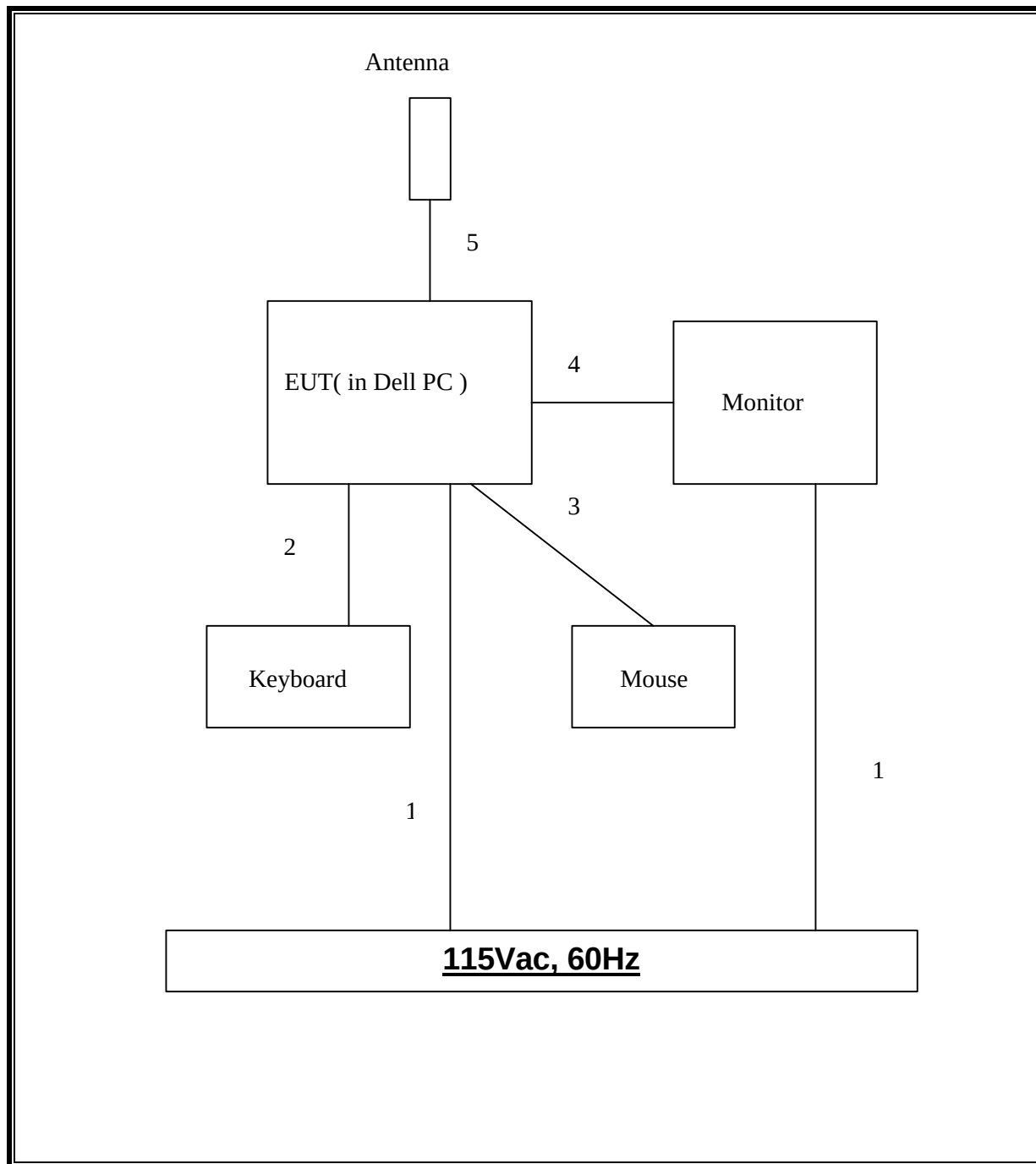
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	AC	Un-Shielded	2m	Bundled cable for LC test
2	KB	1	PS/2	Un-Shielded	2m	NA
3	Mouse	1	PS/2	Un-Shielded	2m	NA
4	Video	1	DB15	Shielded	1m	One Torroid on each end
5	Antenna	1	Antenna	Un-Shielded	1m	NA

TEST SETUP

The EUT is installed in a host Desktop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



SETUP INFORMATION FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Monitor	Dell	M780	5322DE20E049	DoC
Keyboard	Dell	SK-8110	NA	DoC
Mouse	Dell	M-SAW34	LZA30519730	DZL211029
PC	Dell	DHP	J4V181S	DoC
Modem	ACEEX	1414	9013540	1FAXDM1414
Printer	HP	2225C	2541S41679	BS46XU2225C

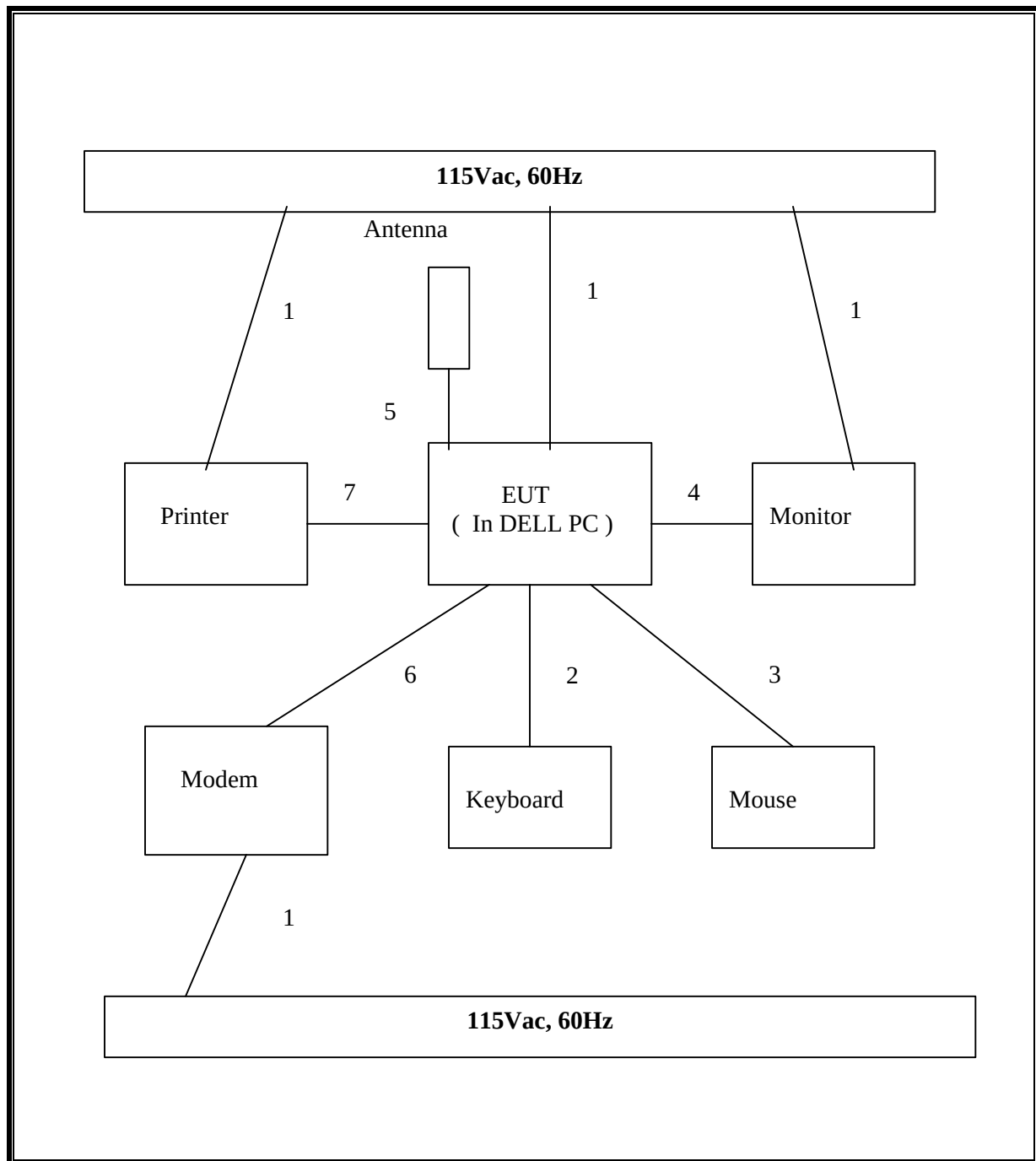
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	4	AC	Un-Shielded	2m	Bundled cable for LC test
2	KB	1	PS/2	Un-Shielded	2m	NA
3	Mouse	1	PS/2	Un-Shielded	2m	NA
4	Video	1	DB15	Shielded	1m	One Torroid on each end
5	Antenna	1	Antenna	Un-Shielded	1m	NA
6	Serial	1	DB9	Un-Shielded	1m	NA
7	Parallel	1	DB25	Shielded	2m	NA

TEST SETUP

The EUT is installed in a host computer during the tests. Test software exercised the host computer and radio card.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. EMISSION BANDWIDTH

LIMIT

None; for reporting purposes only.

§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

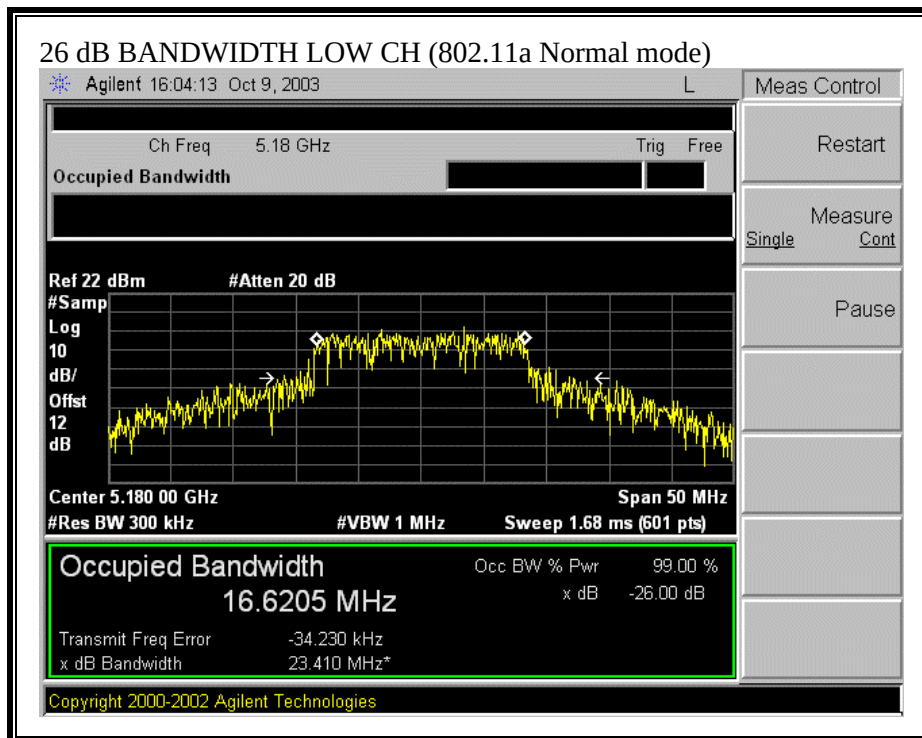
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

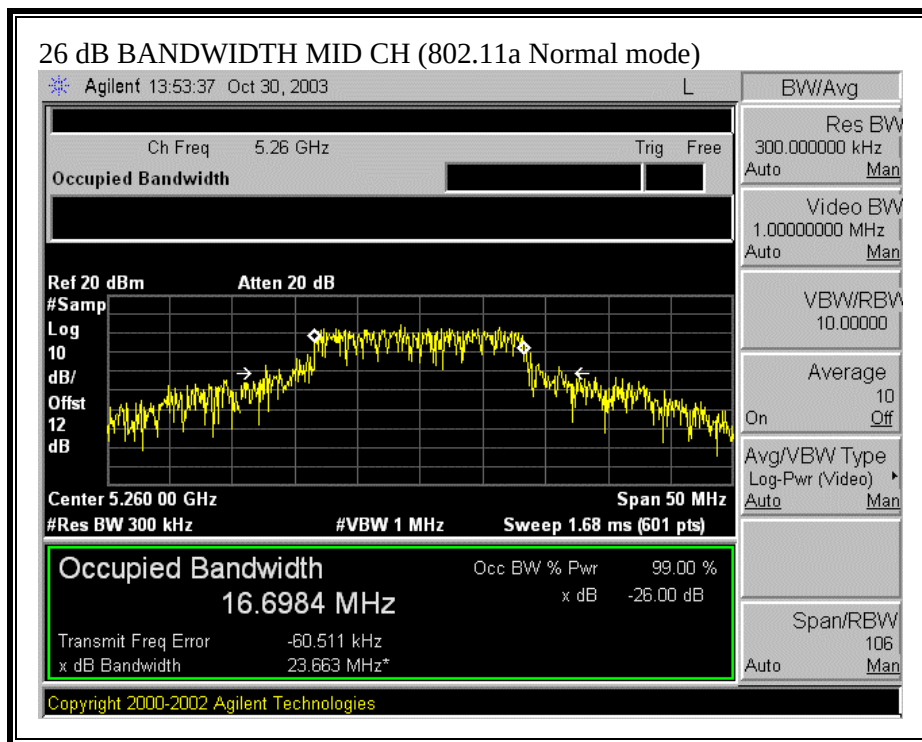
RESULTS

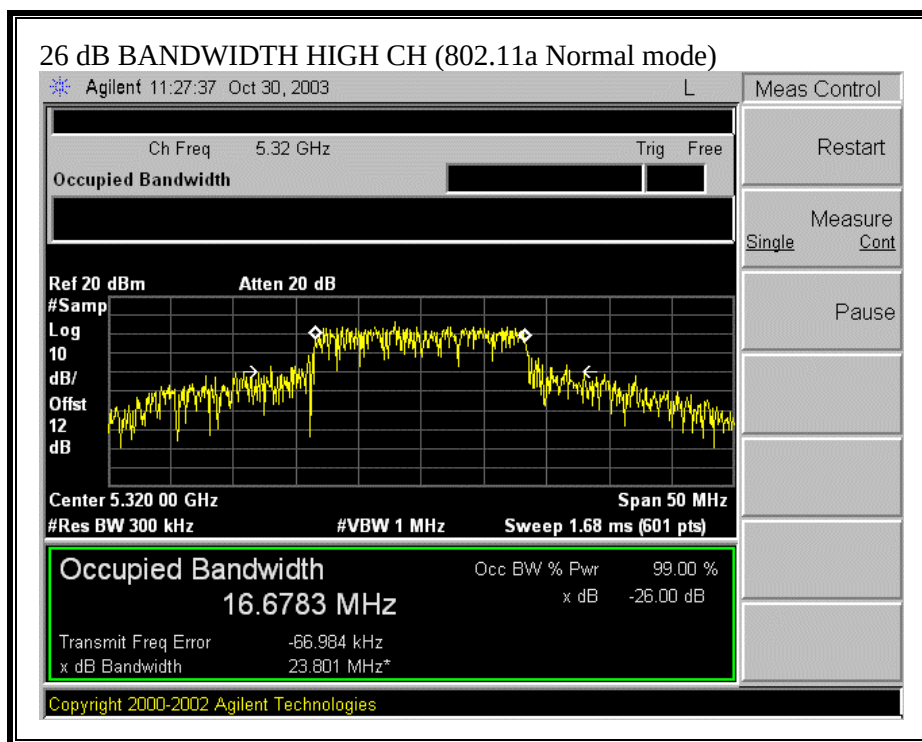
Normal Mode

Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5180	23.41	13.69
Middle	5260	23.66	13.74
High	5320	23.80	13.77

26 dB EMISSION BANDWIDTH (802.11a NORMAL MODE)







7.2. 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.

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

Mode	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Excess Antenna Gain (dB)	Limit (dBm)
Normal	5180	17	23.41	17.69	0.00	17.00

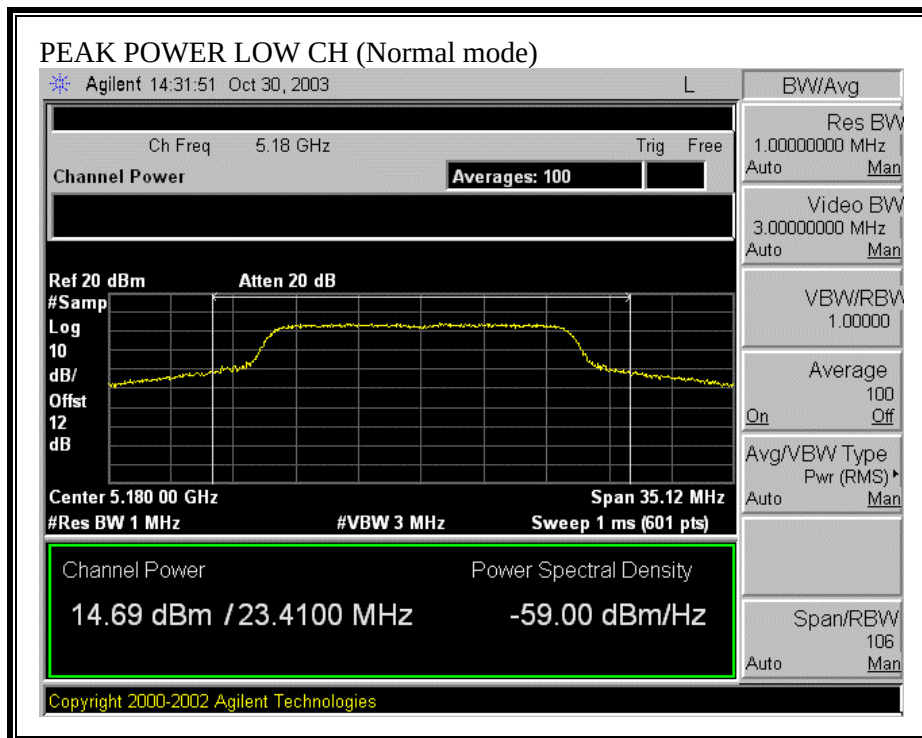
Limit in 5250 to 5350 MHz Band

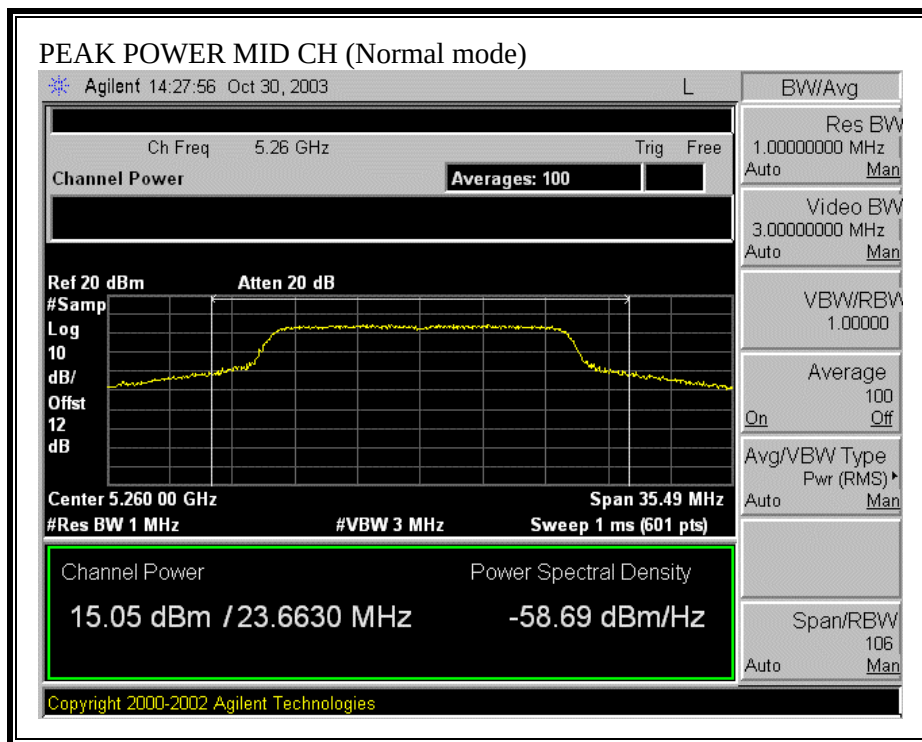
Mode	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Excess Antenna Gain (dB)	Limit (dBm)
Normal	5260	24	23.66	24.74	0.00	24.00
Normal	5320	24	23.80	24.77	0.00	24.00

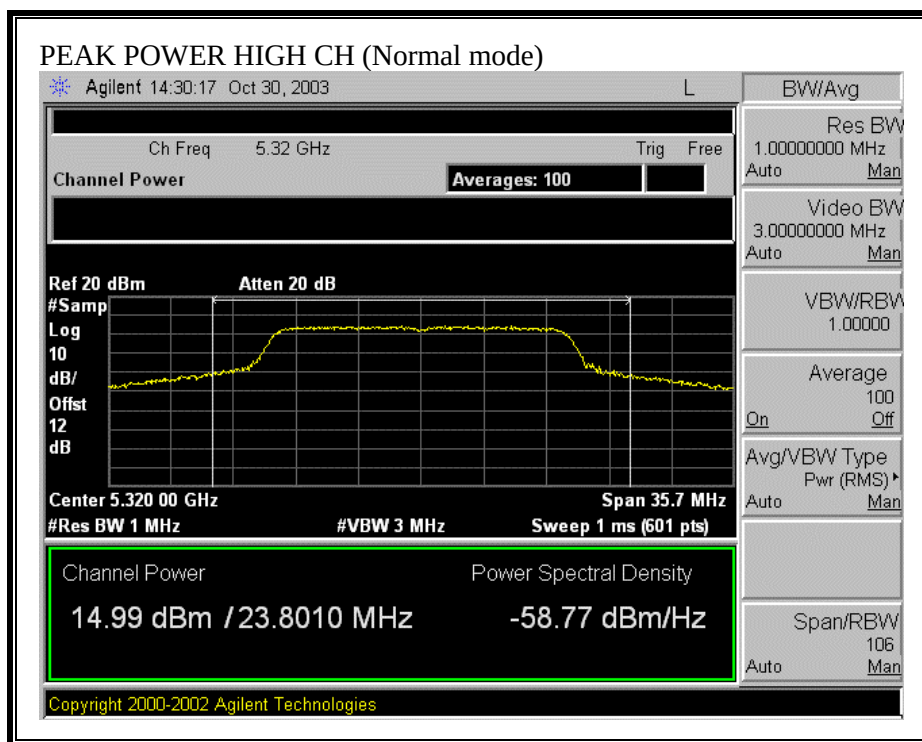
Normal Mode Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.69	17.00	-2.31
Middle	5260	15.05	24.00	-8.95
High	5320	14.99	24.00	-9.01

PEAK POWER (NORMAL MODE)







7.3. 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

RESULTS

No non-compliance noted:

Power Density Limit (mW/cm ²)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
1.0	15.05	0.93	1.78

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.

7.4. 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 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.

Normal Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5180	14.82
Middle	5260	15.07
High	5320	14.83

7.5. 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 = 0.93 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.

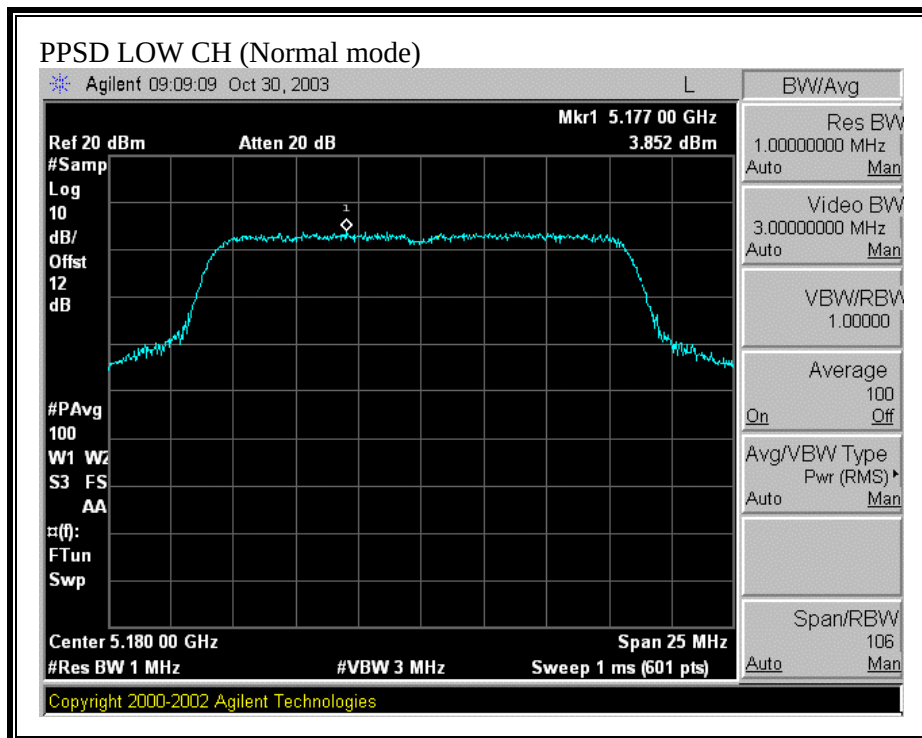
RESULTS

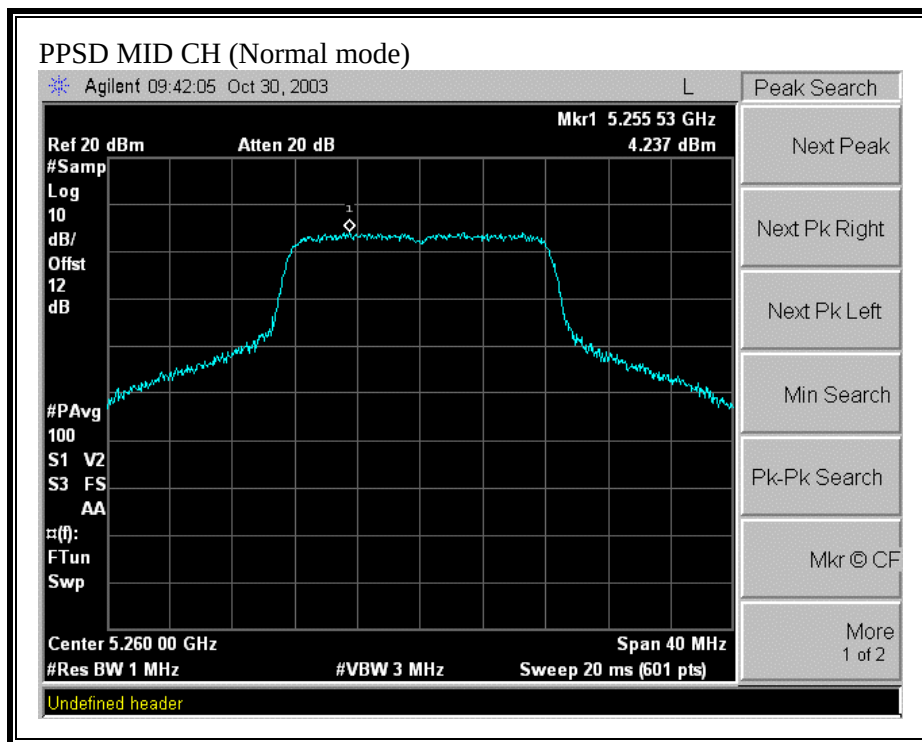
No non-compliance noted:

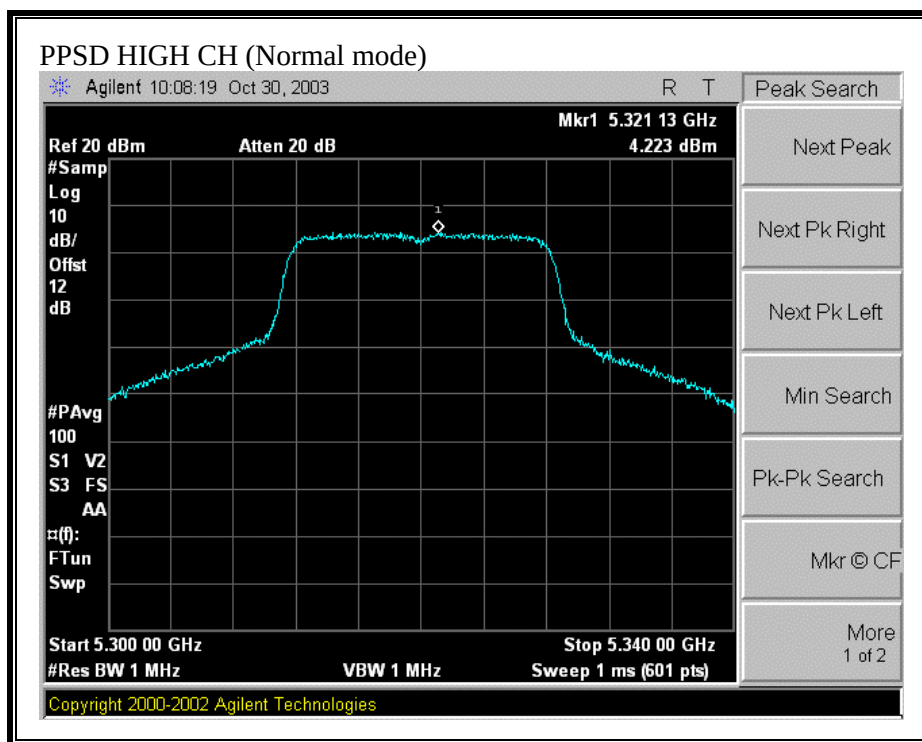
Normal Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.85	4.00	-0.15
Middle	5260	4.24	11.00	-6.76
High	5320	4.22	11.00	-6.78

PEAK POWER SPECTRAL DENSITY (NORMAL MODE)







7.6. 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.

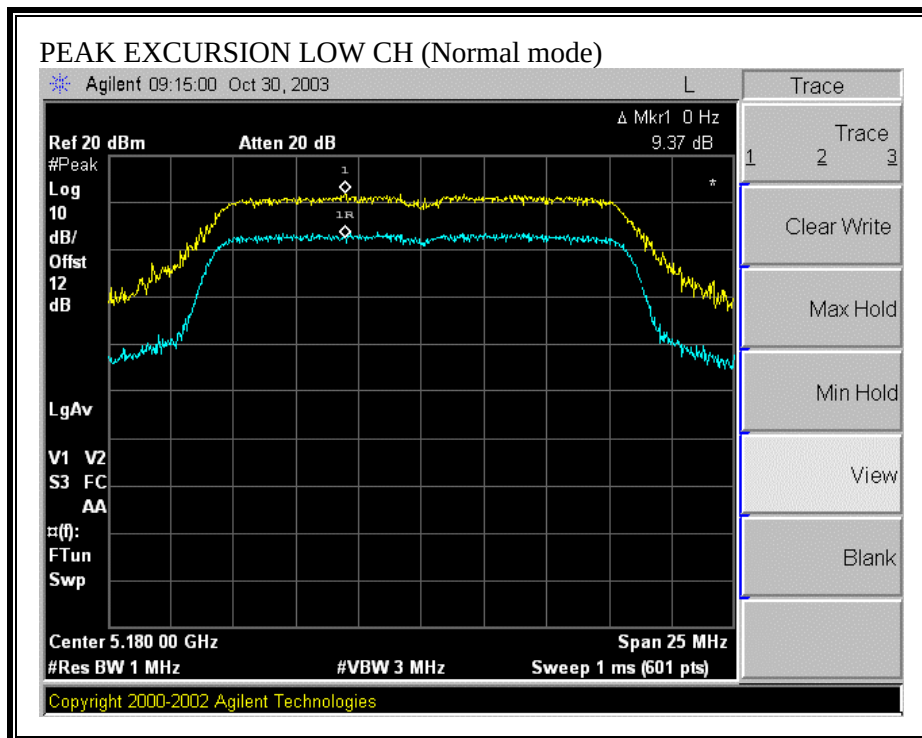
RESULTS

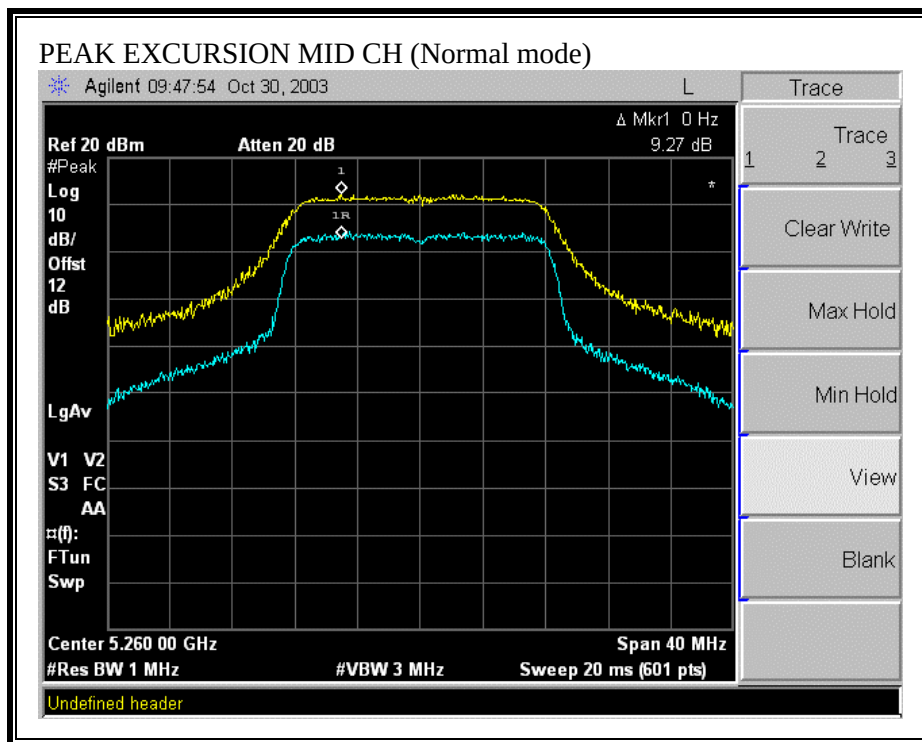
No non-compliance noted:

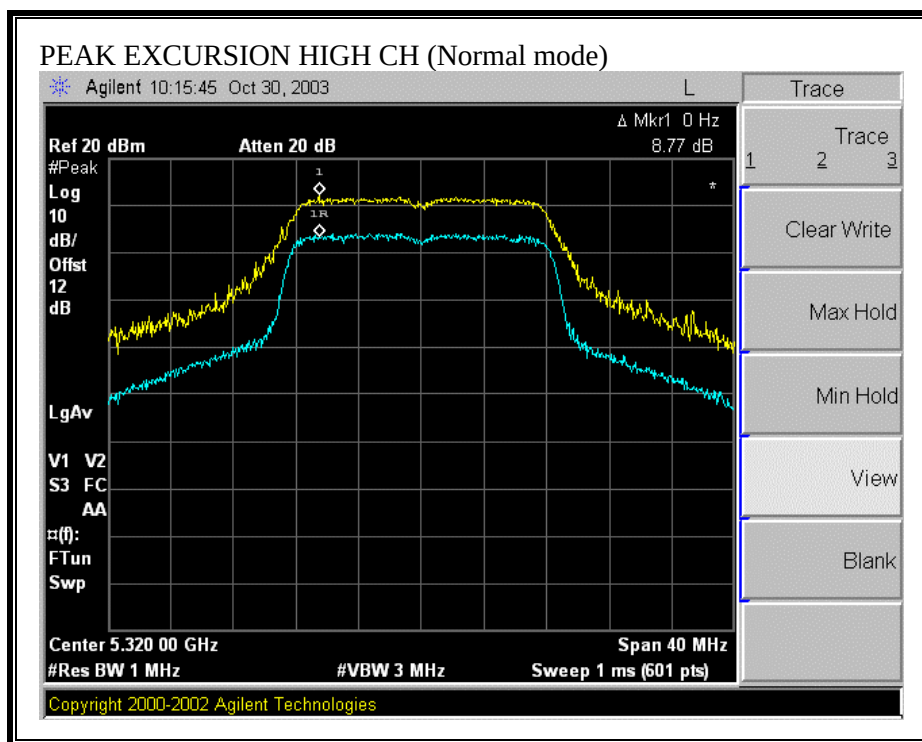
Normal Mode

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.37	13	-3.63
Middle	5260	9.27	13	-3.73
High	5320	8.77	13	-4.23

PEAK EXCURSION (NORMAL MODE)







7.7. 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.

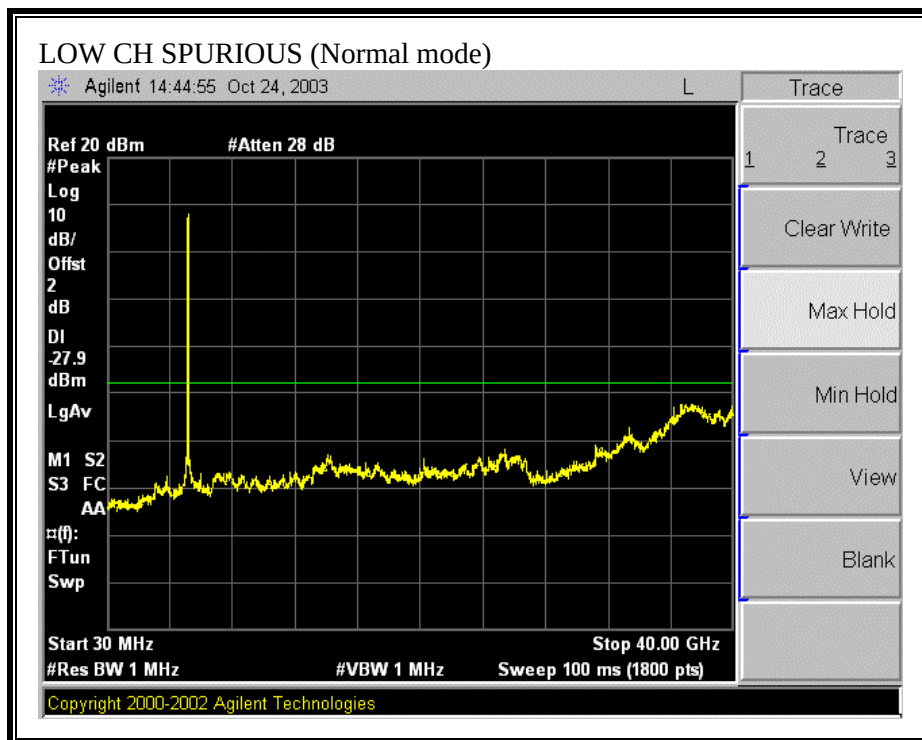
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

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

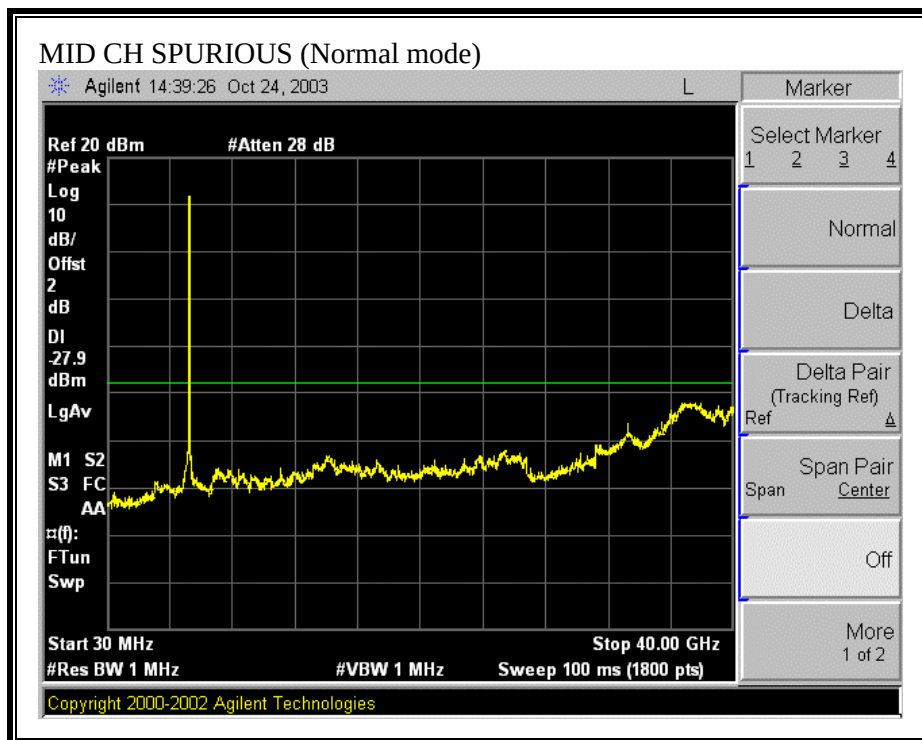
RESULTS

No non-compliance noted:

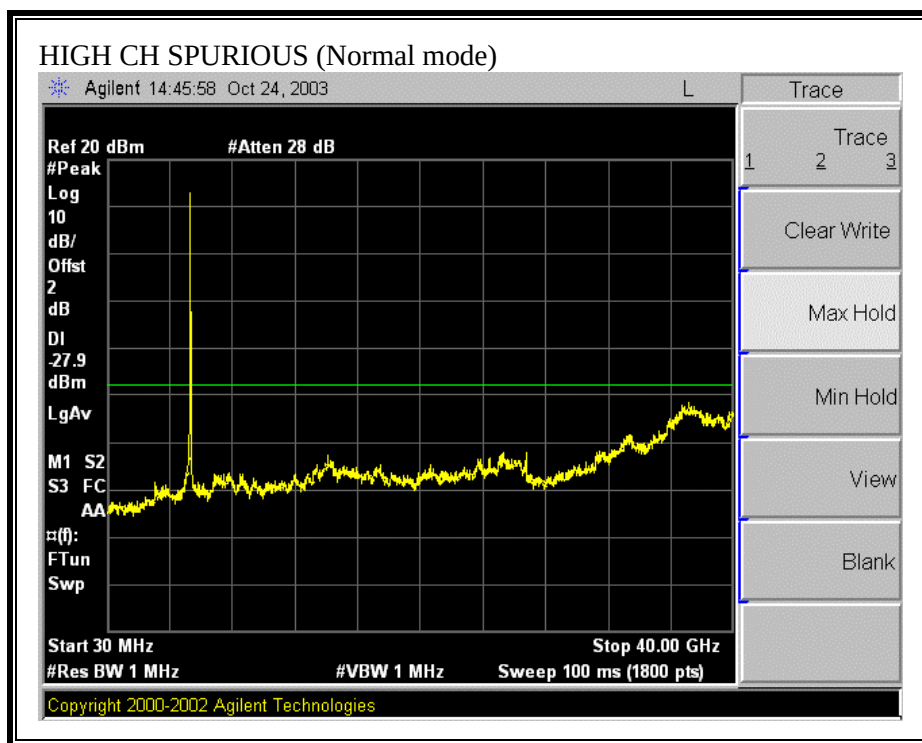
SPURIOUS EMISSIONS, LOW CHANNEL (NORMAL MODE)



SPURIOUS EMISSIONS, MID CHANNEL (NORMAL MODE)



SPURIOUS EMISSIONS, HIGH CHANNEL (NORMAL MODE)



7.8. RADIATED EMISSIONS

7.8.1. 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.

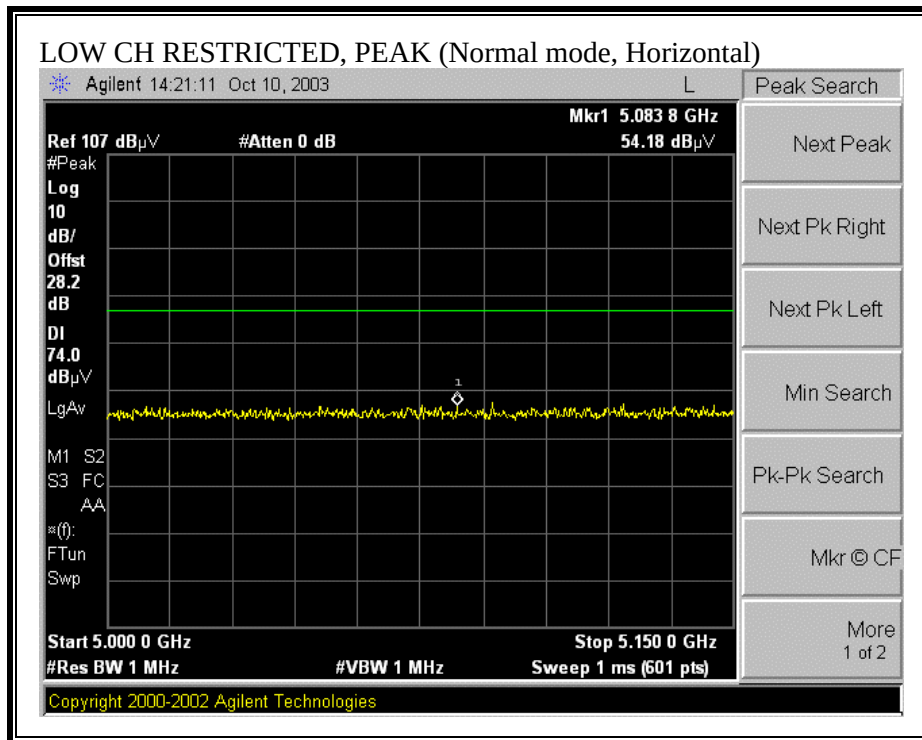
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

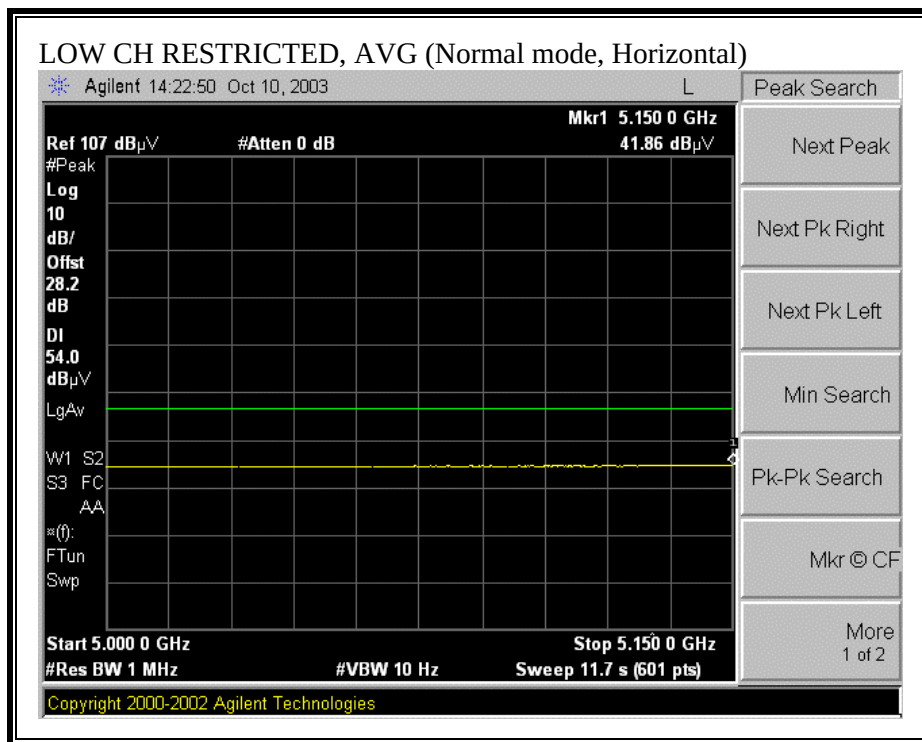
RESULTS

No non-compliance noted:

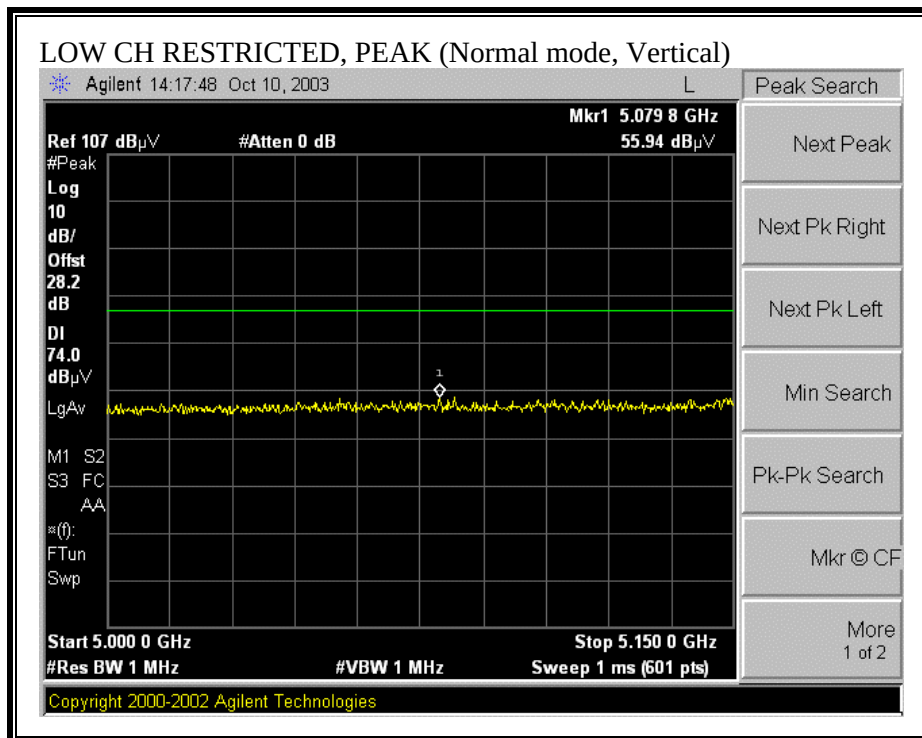
7.8.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

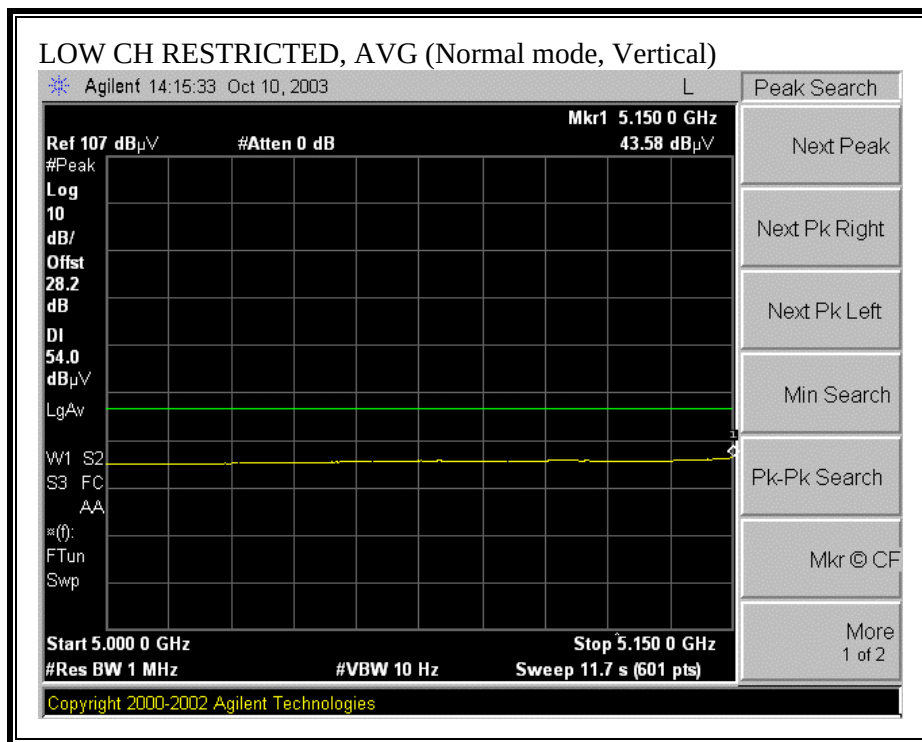
RESTRICTED BANDEDGE (NORMAL MODE, LOW CHANNEL, HORIZONTAL)



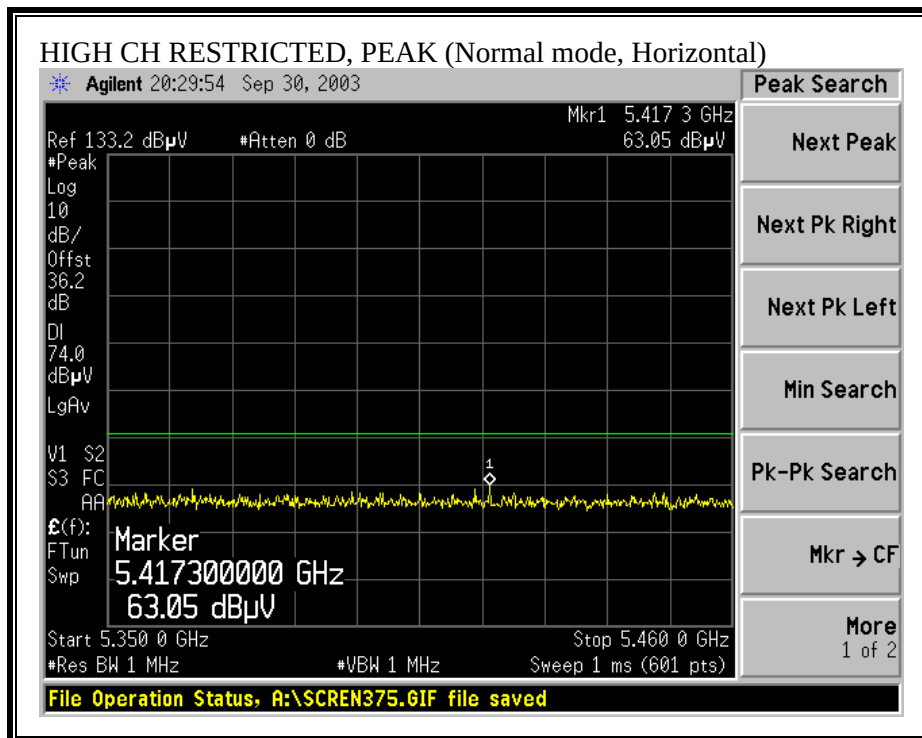


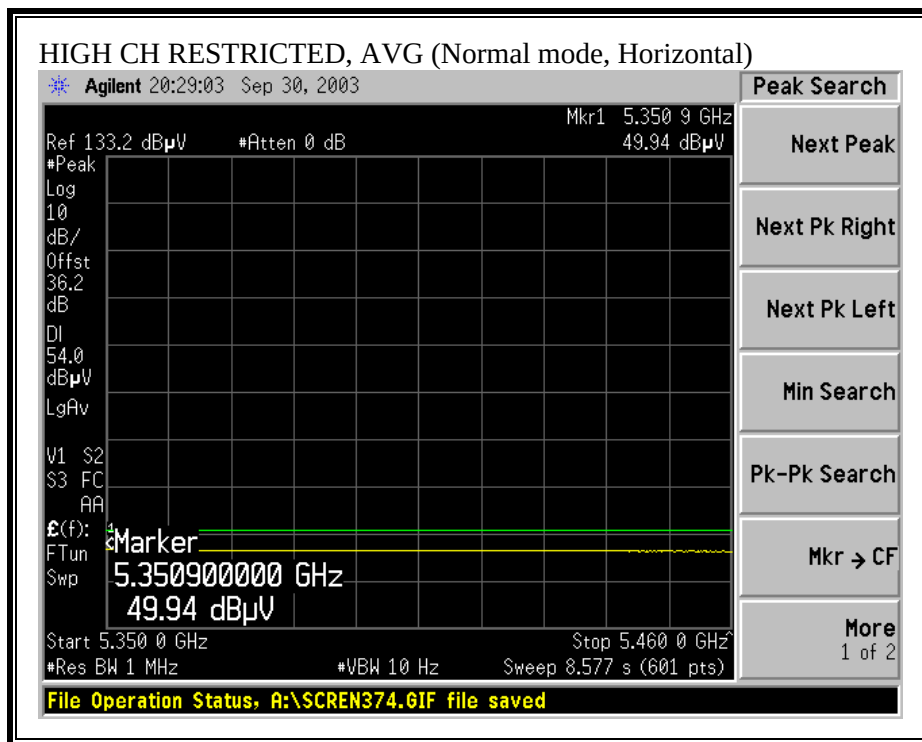
RESTRICTED BANDEDGE (NORMAL MODE, LOW CHANNEL, VERTICAL)



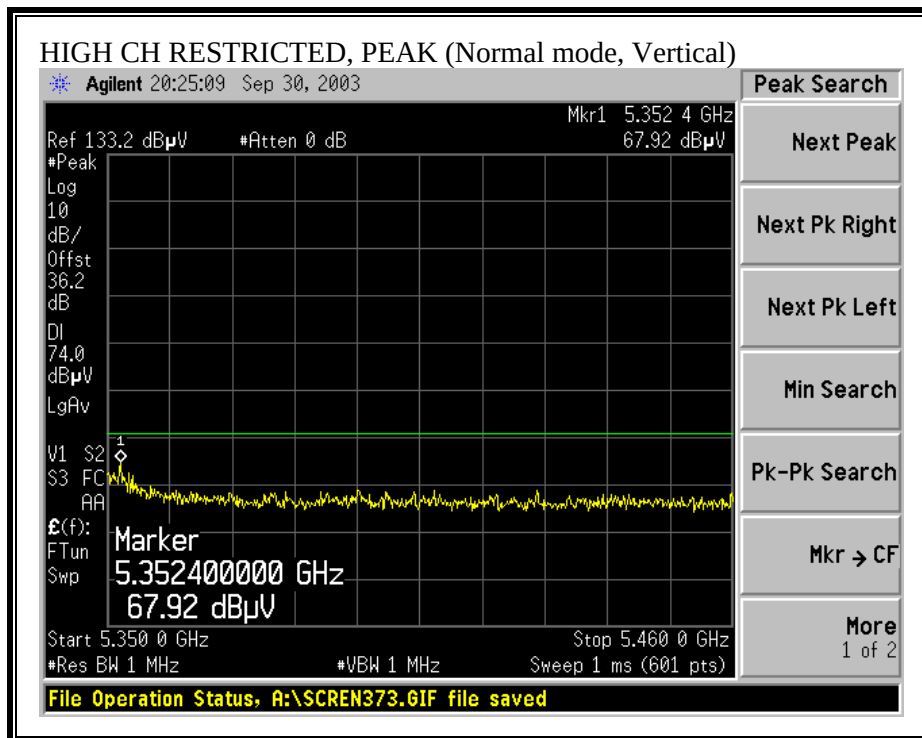


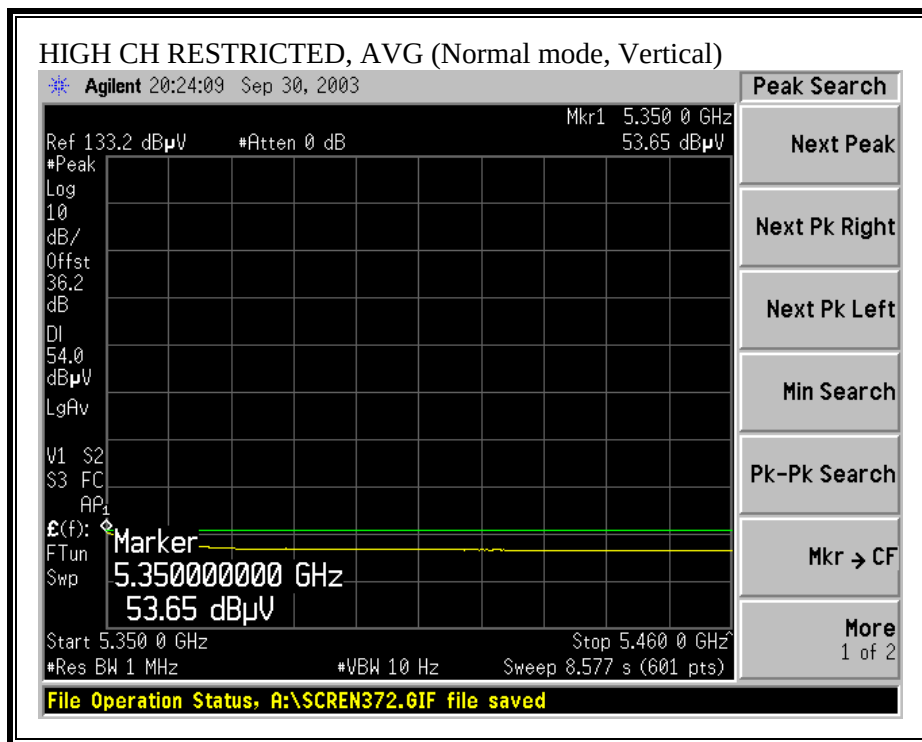
RESTRICTED BANDEDGE (NORMAL MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (NORMAL MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (NORMAL MODE, L M & H CHANNEL)

10/07/03 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 03u2286-1
Company: Ambit Microsystem Corporation
EUT Descr.: 802.11 a/b/g Comb Module PCI
EUT M/N: TBD
Test Target: FCC 15.407
Mode Oper: Tx

Test Equipment:

EMCO Horn 1-18GHz T60; S/N: 2238 @3m	Pre-amplifier 1-26GHz T87 Miteq 924342	Spectrum Analyzer Agilent E4446A Analyzer	Horn > 18GHz
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Hi Frequency Cables
☐ (2 ft) ☒ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☒ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

11a, UNII WLAN

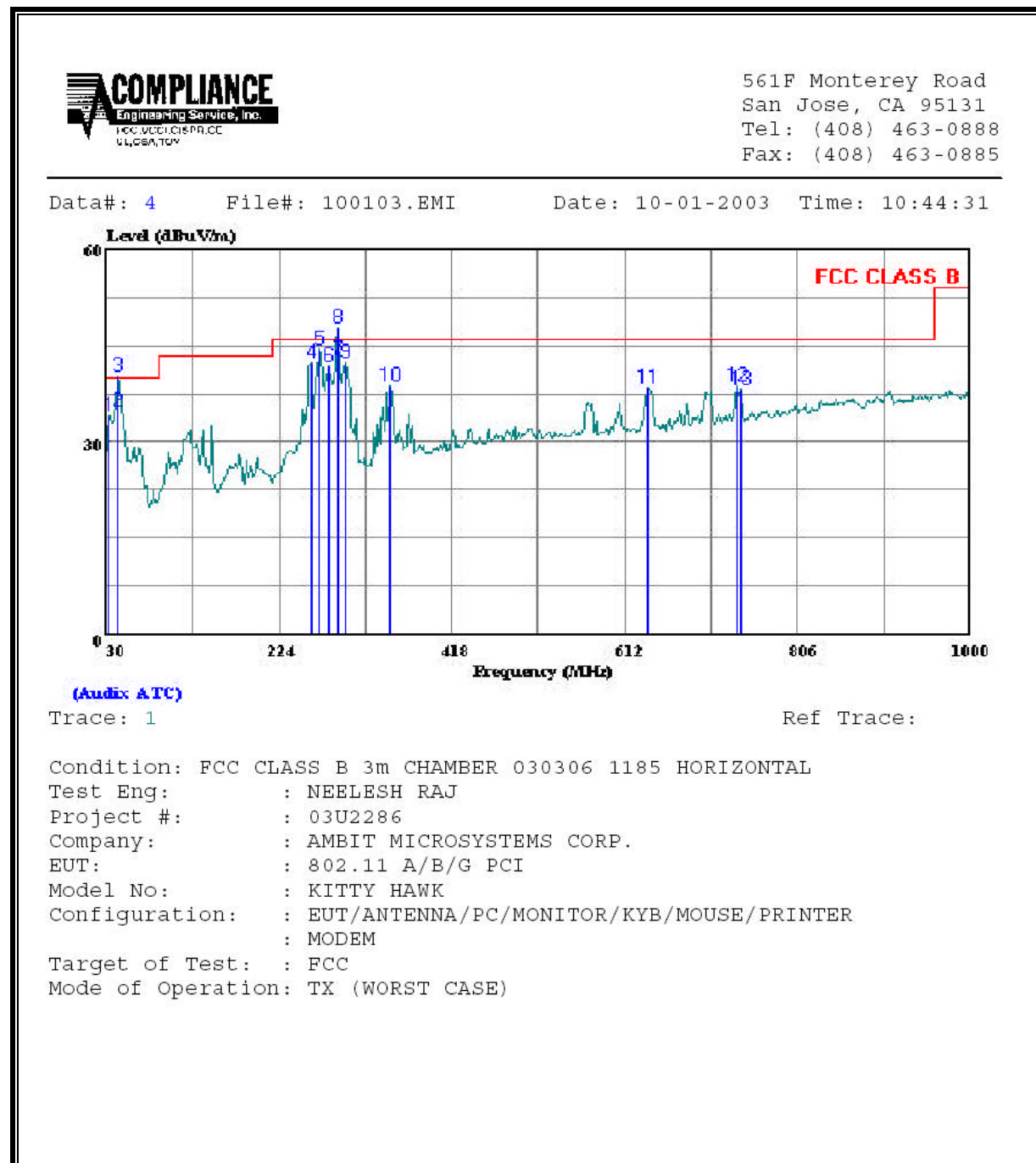
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
Transmitting at low ch															
10.360	9.8	48.4	36.7	38.3	6.5	-41.6	0.0	1.0	52.5	40.8	74.0	54.0	-21.5	-13.2	V
15.540	9.8	50.9	39.6	39.4	8.1	-45.5	0.0	1.0	53.8	42.5	74.0	54.0	-20.2	-11.5	V
10.360	9.8	47.7	35.5	38.3	6.5	-41.6	0.0	1.0	51.8	39.6	74.0	54.0	-22.2	-14.4	H
15.540	9.8	49.7	39.2	39.4	8.1	-45.5	0.0	1.0	52.6	42.1	74.0	54.0	-21.4	-11.9	H
Transmitting at mid ch															
10.520	9.8	50.4	38.0	38.2	6.6	-41.4	0.0	1.0	54.7	42.3	74.0	54.0	-19.3	-11.7	V
15.780	9.8	52.8	38.5	38.7	8.2	-45.6	0.0	1.0	55.1	40.8	74.0	54.0	-18.9	-13.2	V
10.520	9.8	51.3	39.5	38.2	6.6	-41.4	0.0	1.0	55.6	43.8	74.0	54.0	-18.4	-10.2	H
15.780	9.8	53.5	41.1	38.7	8.2	-45.6	0.0	1.0	55.8	43.4	74.0	54.0	-18.2	-10.6	H
Transmitting at high ch															
10.640	9.8	48.5	37.0	38.2	6.6	-41.3	0.0	1.0	53.0	41.5	74.0	54.0	-21.0	-12.5	V
15.960	9.8	50.3	38.0	36.3	8.2	-45.7	0.0	1.0	50.1	37.8	74.0	54.0	-23.9	-16.2	V
10.640	9.8	46.0	36.0	38.2	6.6	-41.3	0.0	1.0	50.5	40.5	74.0	54.0	-23.5	-13.5	H
15.960	9.8	47.0	36.3	38.3	8.2	-45.7	0.0	1.0	48.8	38.1	74.0	54.0	-25.2	-15.9	H

No other emissions were detected above system noise.

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		

7.8.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHZ

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



Page: 1

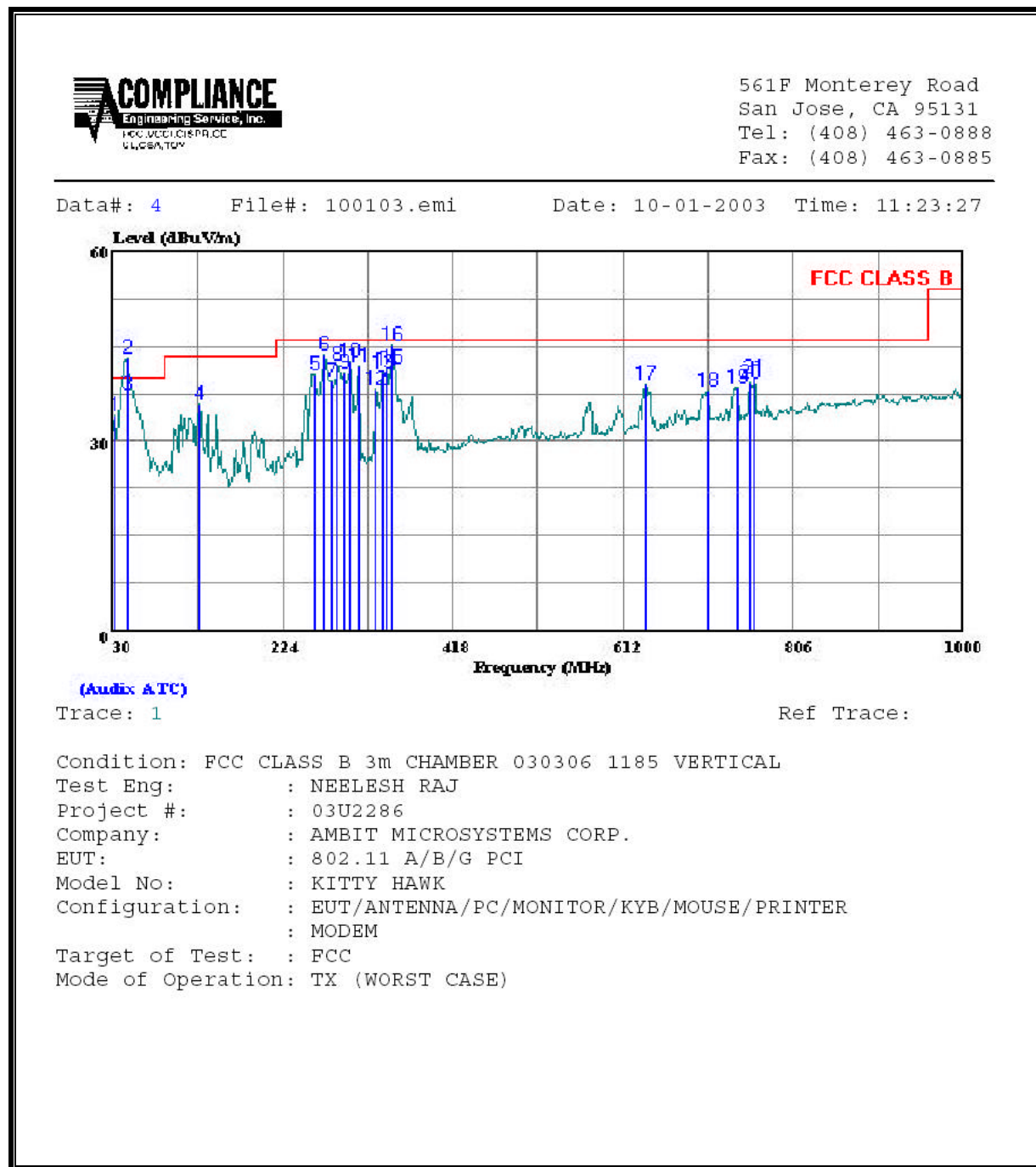
	Freq	Read Level	Probe Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV/m	dBuV/m	dB	
1	31.940	16.55	16.97	0.56	34.08	40.00	-5.92	Peak
2	43.580	18.22	16.05	0.64	34.92	40.00	-5.08	QP
3 *	43.580	23.35	16.14	0.64	40.13	40.00	0.13	Peak
4	259.890	28.83	11.82	1.59	42.24	46.00	-3.76	Peak
5	269.590	30.99	11.88	1.61	44.48	46.00	-1.52	Peak
6	279.290	28.16	11.94	1.64	41.74	46.00	-4.26	Peak
7	288.990	29.13	11.99	1.67	42.79	46.00	-3.21	QP

Data#: 4 File#: 100103.EMI Date: 10-01-2003 Time: 10:44:31

Page: 2

	Freq	Read Level	Probe Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV/m	dBuV/m	dB	
8 *	288.990	34.21	12.00	1.66	47.87	46.00	1.87	Peak
9	298.690	28.57	12.05	1.73	42.35	46.00	-3.65	Peak
10	349.130	23.53	13.31	1.87	38.71	46.00	-7.29	Peak
11	638.190	17.83	18.03	2.65	38.51	46.00	-7.49	Peak
12	737.130	16.77	19.04	2.91	38.72	46.00	-7.28	Peak
13	741.980	16.27	19.11	2.90	38.28	46.00	-7.72	Peak

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



Page: 1

	Freq	Read Level	Probe Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV/m	dBuV/m	dB	
1	31.940	16.55	16.97	0.56	34.08	40.00	-5.92	Peak
2 *	46.490	26.44	15.91	0.65	43.01	40.00	3.01	Peak
3	46.490	21.11	15.57	0.66	37.34	40.00	-2.66	QP
4	128.940	24.92	9.79	1.05	35.76	43.50	-7.75	Peak
5	259.890	27.22	11.82	1.59	40.63	46.00	-5.37	Peak
6	271.530	30.07	11.89	1.61	43.57	46.00	-2.43	Peak
7	279.290	25.86	11.94	1.64	39.44	46.00	-6.56	Peak

Data#: 4 File#: 100103.emi Date: 10-01-2003 Time: 11:23:27
Page: 2

	Freq	Read Level	Probe Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV/m	dBuV/m	dB	
8	286.080	28.49	11.98	1.69	42.16	46.00	-3.84	Peak
9	293.840	26.97	12.03	1.71	40.71	46.00	-5.29	Peak
10	300.630	28.70	12.06	1.71	42.47	46.00	-3.53	Peak
11	310.330	27.65	12.32	1.78	41.75	46.00	-4.25	Peak
12	329.730	23.47	12.85	1.83	38.15	46.00	-7.85	Peak
13	337.490	25.92	13.02	1.85	40.79	46.00	-5.21	Peak
14	342.340	26.19	13.14	1.85	41.18	46.00	-4.82	Peak
15	349.130	26.54	13.28	1.86	41.68	46.00	-4.32	QP
16	349.130	30.01	13.31	1.87	45.19	46.00	-0.81	Peak
17	638.190	18.21	18.03	2.65	38.89	46.00	-7.11	Peak
18	708.030	16.62	18.67	2.75	38.04	46.00	-7.96	Peak
19	741.980	16.34	19.11	2.90	38.35	46.00	-7.65	Peak
20	756.530	16.96	19.28	2.92	39.16	46.00	-6.84	Peak
21	761.380	17.72	19.34	2.92	39.98	46.00	-6.02	Peak

7.8.4. 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 μ 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.

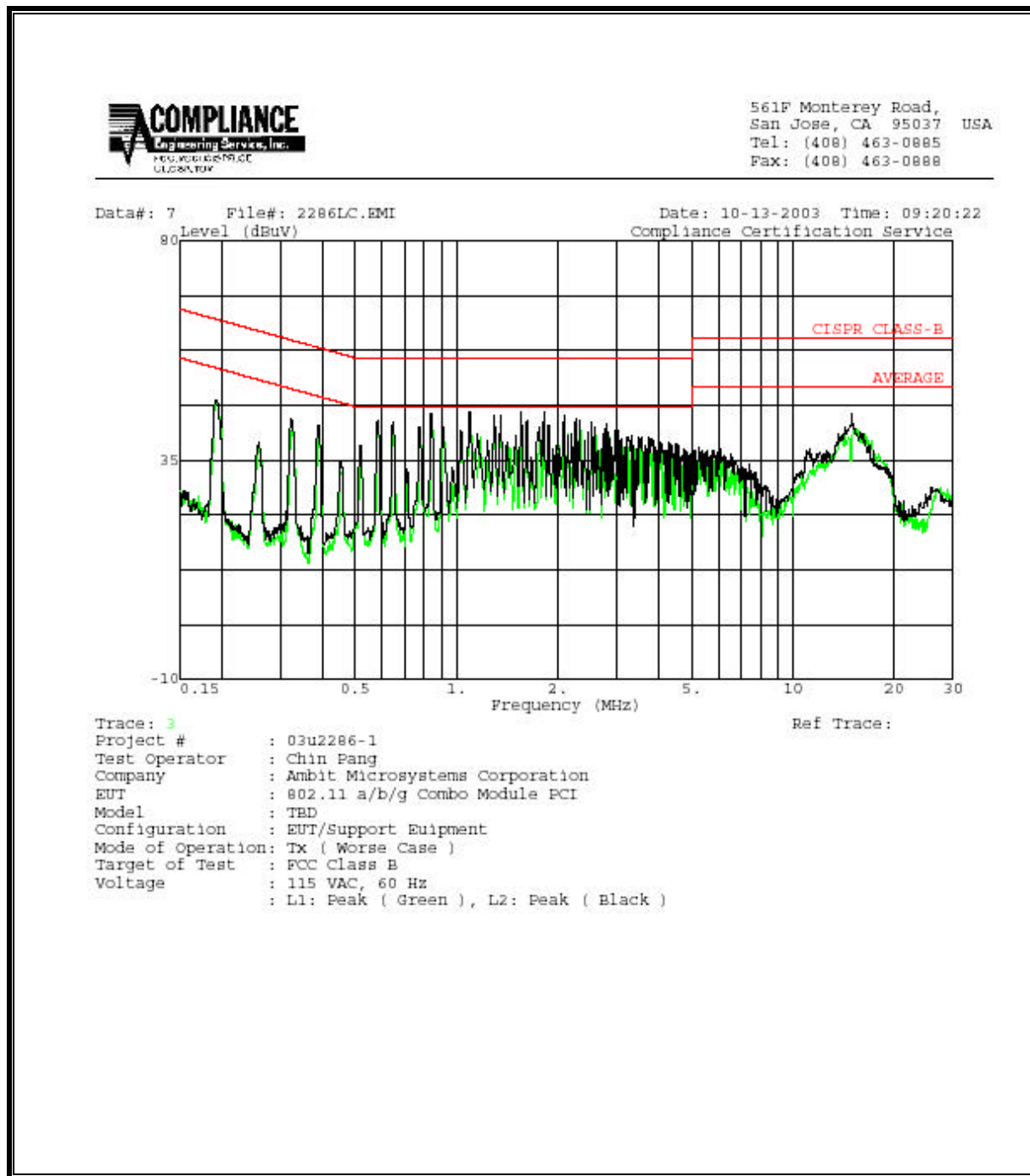
RESULTS

No non-compliance noted:

6 WORST EMISSIONS

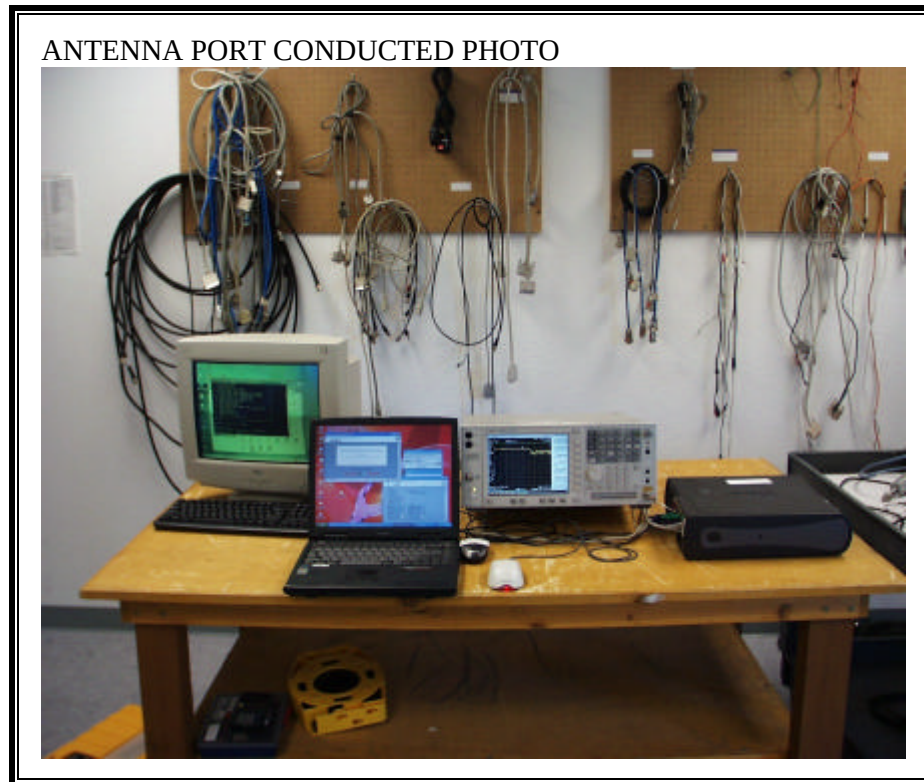
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.84	42.32	--	--	0.00	56.00	46.00	-13.68	-3.68	L1
1.09	43.52	--	--	0.00	56.00	46.00	-12.48	-2.48	L1
2.31	43.00	--	--	0.00	56.00	46.00	-13.00	-3.00	L1
0.84	44.46	--	--	0.00	56.00	46.00	-11.54	-1.54	L2
1.09	45.04	--	--	0.00	56.00	46.00	-10.96	-0.96	L2
1.82	44.74	--	--	0.00	56.00	46.00	-11.26	-1.26	L2
6 Worst Data									

LINE 1 AND LINE 2 RESULTS

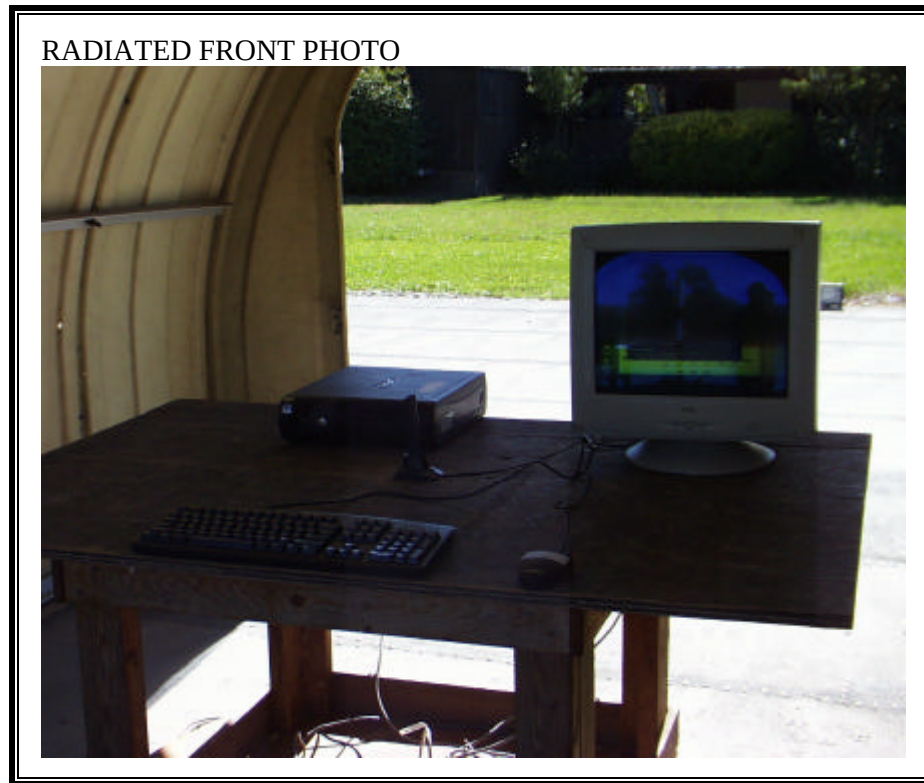


8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP



RADIATED BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



LINE CONDUCTED BACK PHOTO



END OF REPORT