



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

FOR

802.11 a/b/g PCI EXPRESS CARD

MODEL NUMBER: WM3965ABG

FCC ID: PD9WM3965ABG

REPORT NUMBER: 06U10130-2

ISSUE DATE: APRIL 10, 2006

Prepared for
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NVLAP[®]
LAB CODE:200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
-	4/10/06	Initial Issue	D.G.

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY.....	5
4.1. MEASURING INSTRUMENT CALIBRATION.....	5
4.2. MEASUREMENT UNCERTAINTY.....	5
5. EQUIPMENT UNDER TEST.....	6
5.1. DESCRIPTION OF EUT	6
5.2. MAXIMUM OUTPUT POWER	6
5.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	6
5.4. SOFTWARE AND FIRMWARE	6
5.5. WORST-CASE CONFIGURATION AND MODE.....	6
5.6. DESCRIPTION OF TEST SETUP	7
6. TEST AND MEASUREMENT EQUIPMENT	9
7. LIMITS AND RESULTS	10
7.1. CHANNEL TESTS FOR THE 5150 TO 5350 MHz BAND	10
7.1.1. EMISSION BANDWIDTH	10
7.1.2. PEAK POWER	14
7.1.3. MAXIMUM PERMISSIBLE EXPOSURE	19
7.1.4. AVERAGE POWER.....	22
7.1.5. PEAK POWER SPECTRAL DENSITY	23
7.1.6. PEAK EXCURSION	28
7.1.7. CONDUCTED SPURIOUS EMISSIONS.....	32
7.1.8. FREQUENCY STABILITY	36
7.2. RADIATED EMISSIONS.....	39
7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS	39
7.2.2. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5350 MHz BAND	42
7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz.....	51
7.3. POWERLINE CONDUCTED EMISSIONS	55
8. SETUP PHOTOS.....	59

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: INTEL CORPORATION
2111 N.E. 25TH AVE.
HILLSBORO, OR 97124, USA

EUT DESCRIPTION: 802.11a/b/g PCI EXPRESS CARD

MODEL: WM3965ABG

SERIAL NUMBER: 000529096

DATE TESTED: MARCH 29 to APRIL 1, 2006

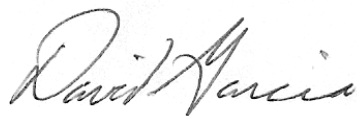
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

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

Approved & Released For CCS By:

Tested By:



DAVID GARCIA
EMC SUPERVISOR
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THANH NGUYEN
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

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

The radio module is manufactured by Intel Corporation.

5.2. MAXIMUM OUTPUT POWER

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

5150 to 5350 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5320	802.11a UNII	15.91	38.99

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes external WLAN self standing dual band vertically polarized antenna with a 1.5m cable and a stripline connector, the maximum gain -1.65 dBi in the 5.18 GHz band.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing were CRTU rev. 4.0.22. KIRTLAND for b and g mode, GRTT version 1.1.1 for a mode.

The test utility software used during testing was CRTU.EXE and GRTT.EXE.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 5320 MHz for the 5150 to 5350 MHz band.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Desktop Computer	Intel	N/A	N/A	N/A
Mouse	HP	M042KC	30536213	DoC
Keyboard	HP	5183	BF32119779	E5XKB5183
Monitor	NOKIA	920C	973	N/A

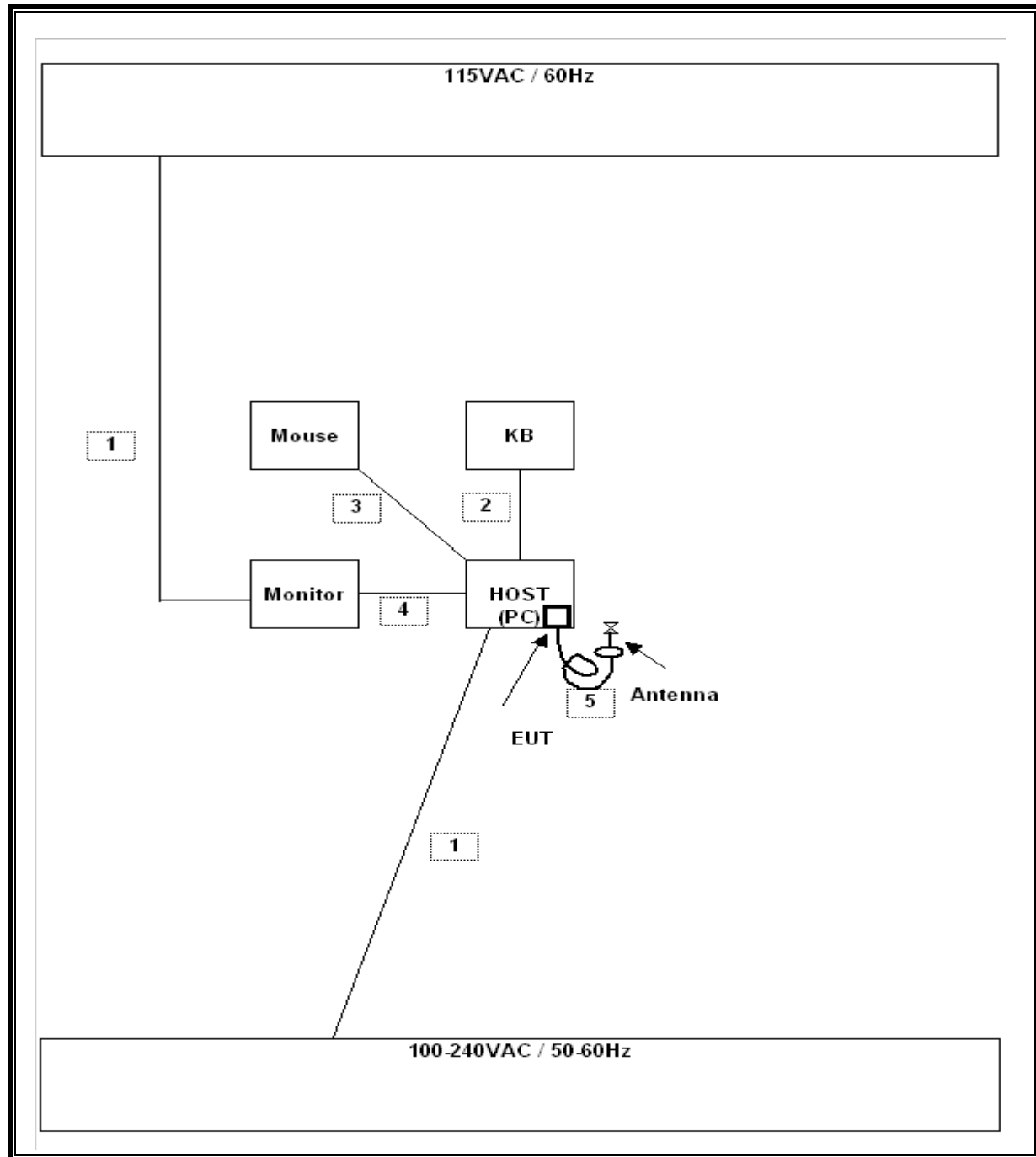
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	US 115V	Un-shielded	2m	No
2	KB	1	PS/2	Shielded	2m	Yes
3	Mouse	1	PS/2	Un-shielded	2m	Yes
4	Video	1	DB15	Shielded	2m	Yes
5	Antenna	1	Antenna	Un-shielded	1m	Yes

TEST SETUP

The EUT is installed outside a host desktop computer via a PCI to PCI Express extension board during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/29/2007
RF Filter Section	HP	85420E	3705A00256	3/29/2007
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	3/3/2007
Preamplifier, 1 ~ 26.5 GHz	Agilent	8449B	3008A00561	10/3/2007
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29301	4/22/2006
Antenna, Horn 18 ~ 26 GHz	ARA	MWH-1826/B	1049	9/12/2006
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2006
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	8/30/2006
EMI Test Receiver	R & S	ESHS 20	827129/006	6/3/2006
AC Power Source, 10 kVA	ACS	AFC-10K-AFC-2	J1568	1/0/1900
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/2007
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/2007
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42510266	10/19/2006

7. LIMITS AND 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.

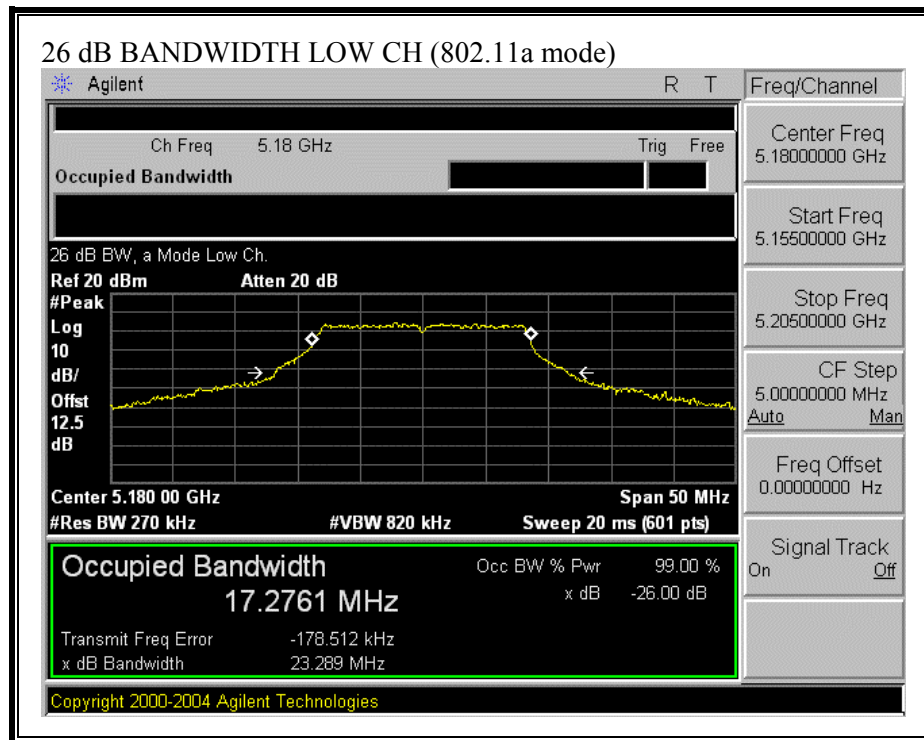
RESULTS

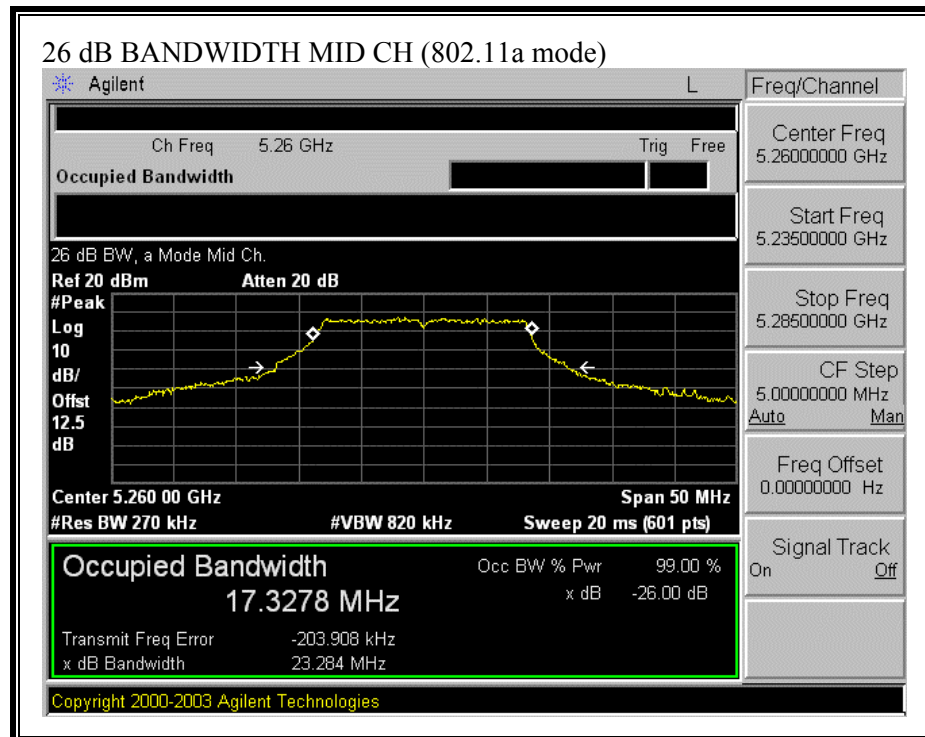
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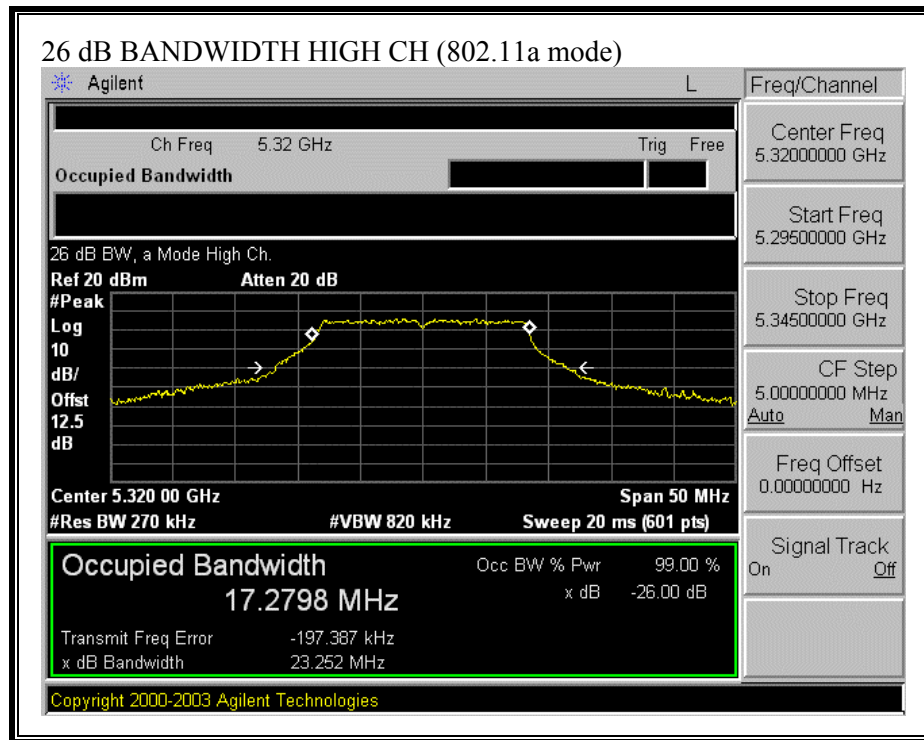
802.11a Mode

Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5180	23.29	13.67
Middle	5260	23.28	13.67
High	5320	23.25	13.66

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 (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	23.289	17.67	-1.65	17.00

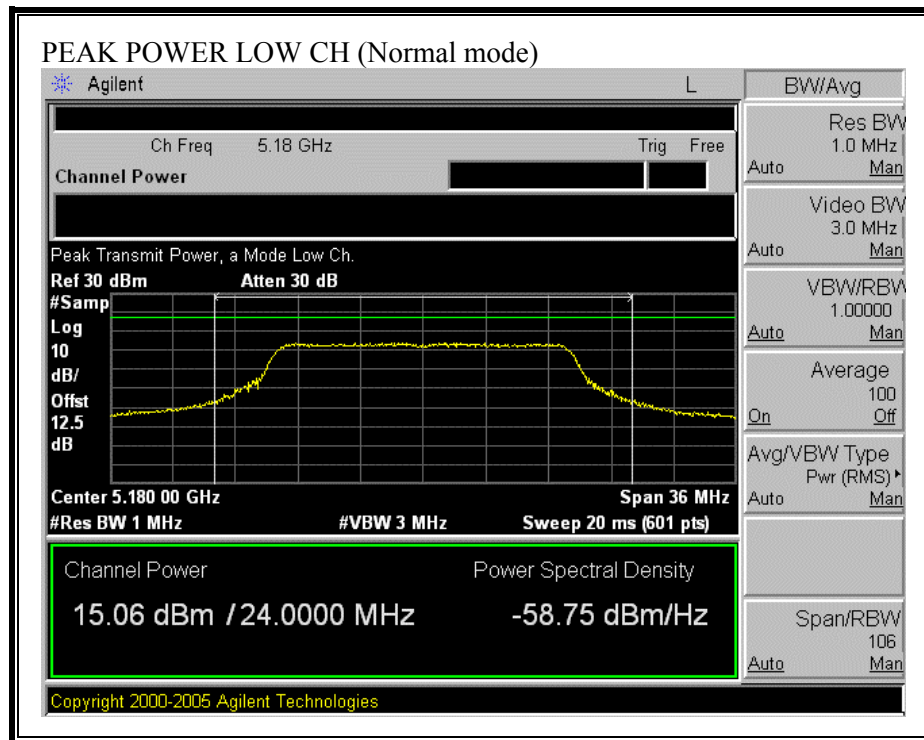
Limit in 5250 to 5350 MHz Band

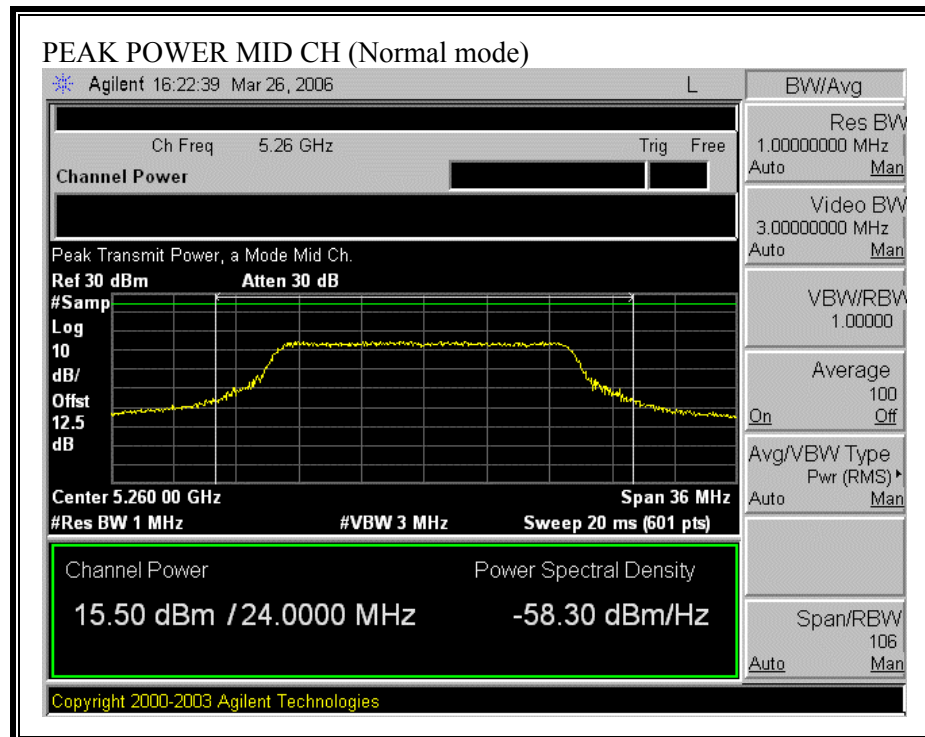
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Mid	5260	24	23.284	24.67	-1.65	24.00
High	5320	24	23.252	24.66	-1.65	24.00

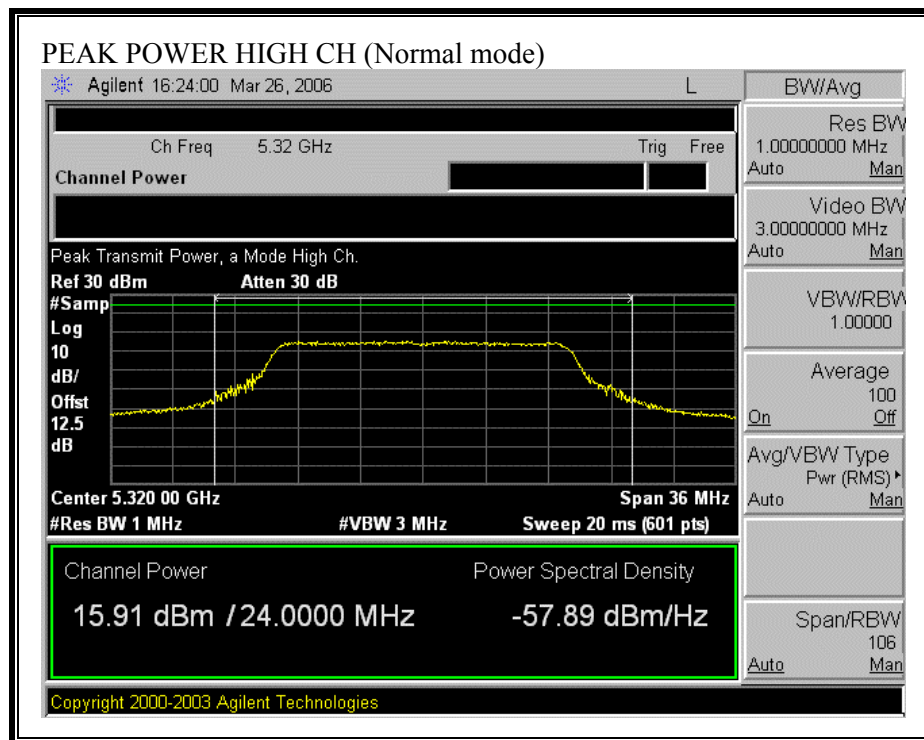
Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	15.06	17.00	-1.94
Mid	5260	15.50	24.00	-8.50
High	5320	15.91	24.00	-8.09

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 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:

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

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

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

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

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

Rearranging terms to calculate the power density at a specific distance yields

$$S = 0.0795 * 10^{((P + G) / 10)} / (d^2)$$

LIMITS

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

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm²)
802.11a	20.0	15.91	-1.65	0.01

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 11.75 dB (including 10 dB pad and 1.75 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	15.66
Middle	5260	15.86
High	5320	15.50

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 = -1.65 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.

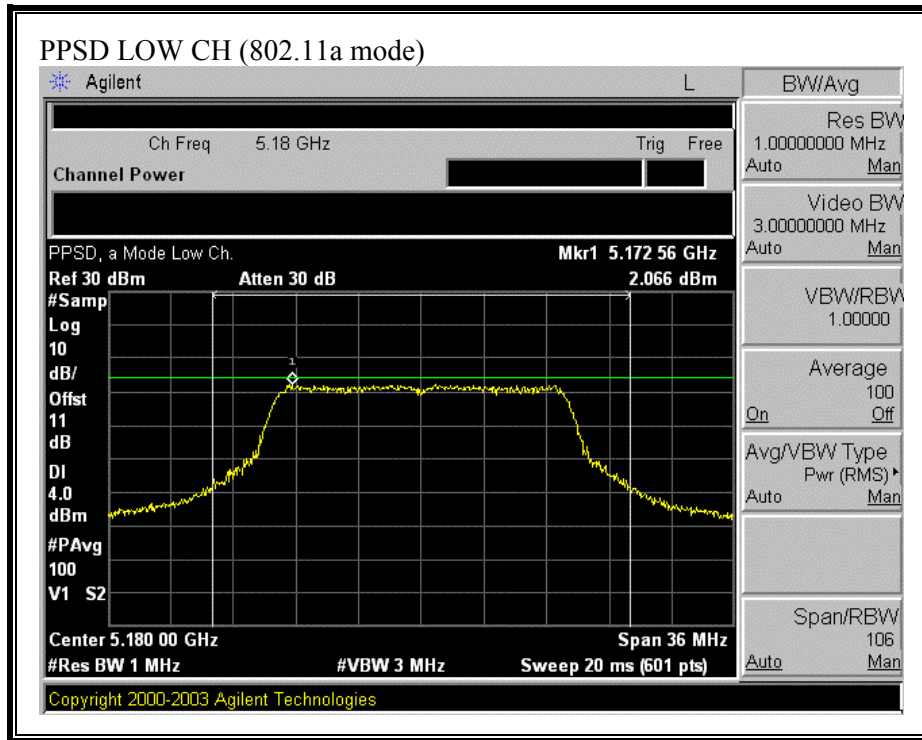
RESULTS

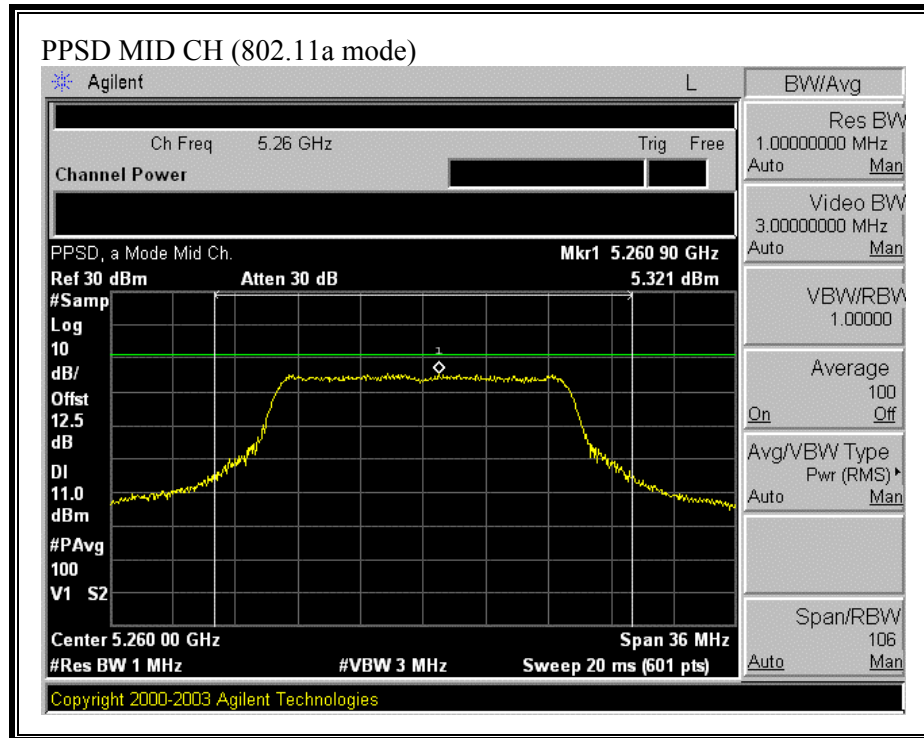
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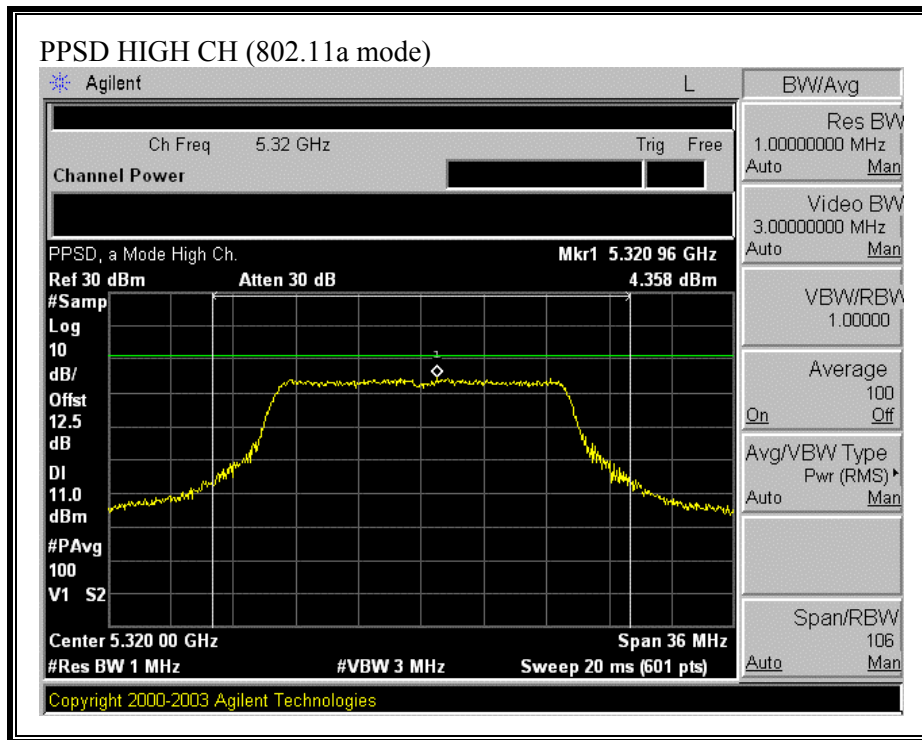
802.11a Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	2.07	4.00	-1.93
Mid	5260	5.32	11.00	-5.68
High	5320	4.36	11.00	-6.64

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.

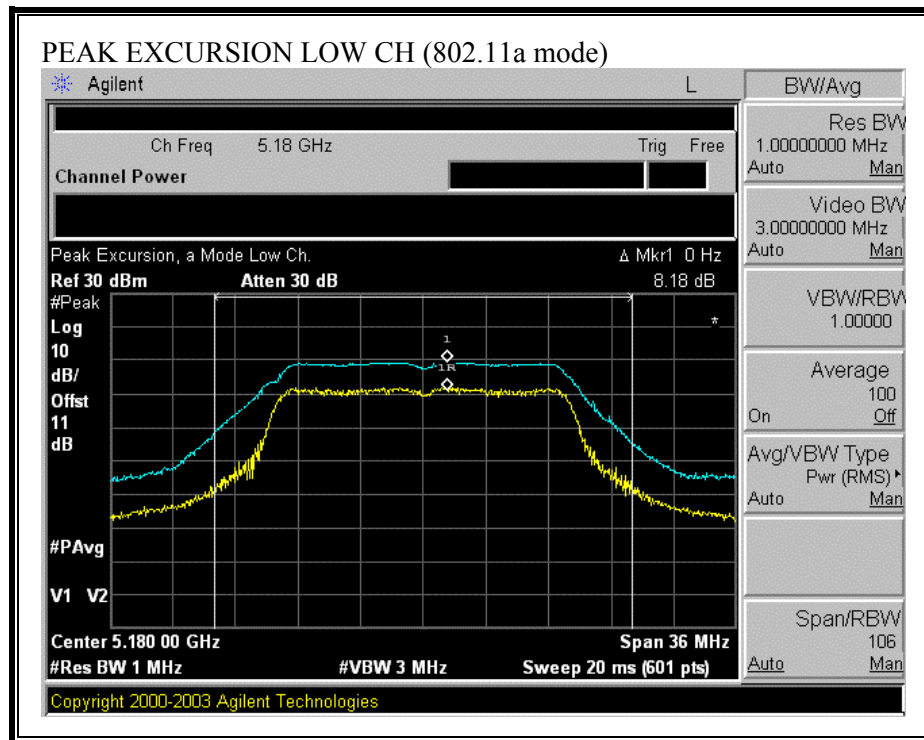
RESULTS

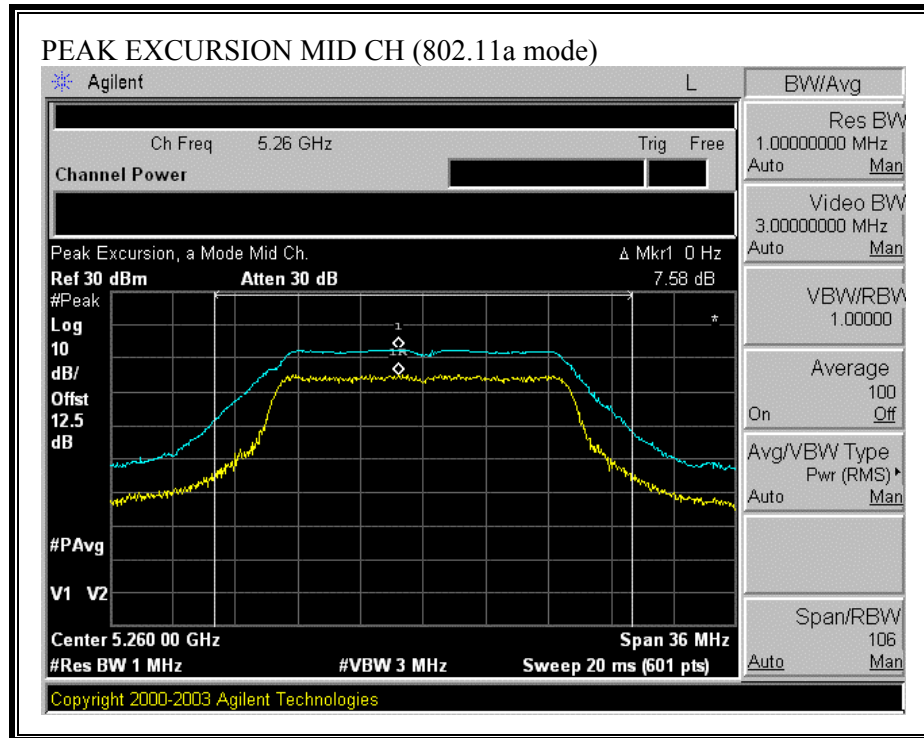
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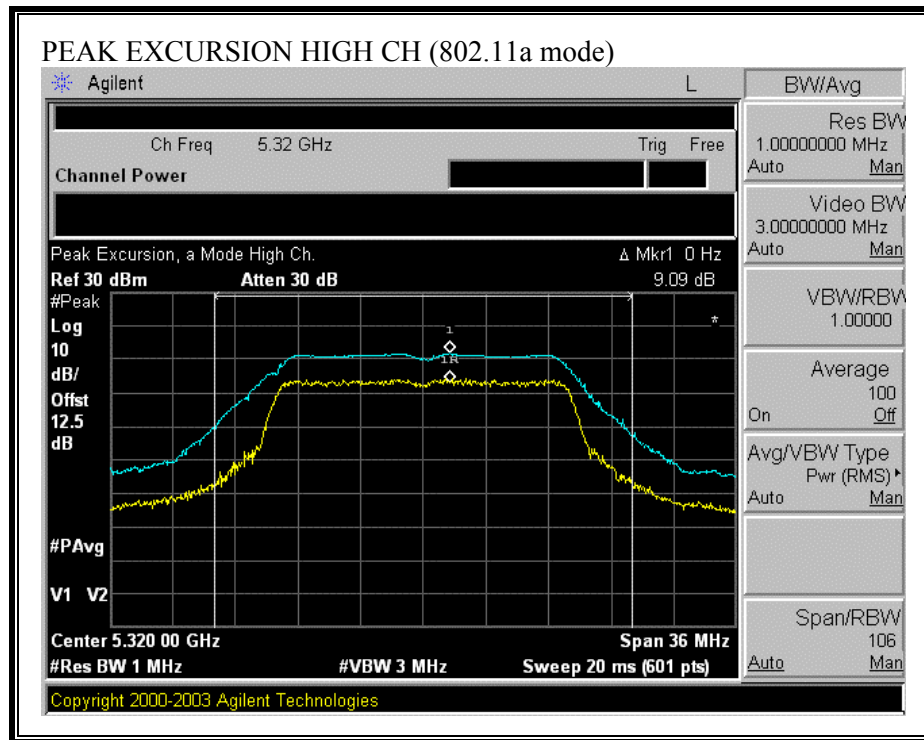
802.11a Mode

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.18	13	-4.82
Middle	5200	7.58	13	-5.42
High	5240	9.29	13	-3.71

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.

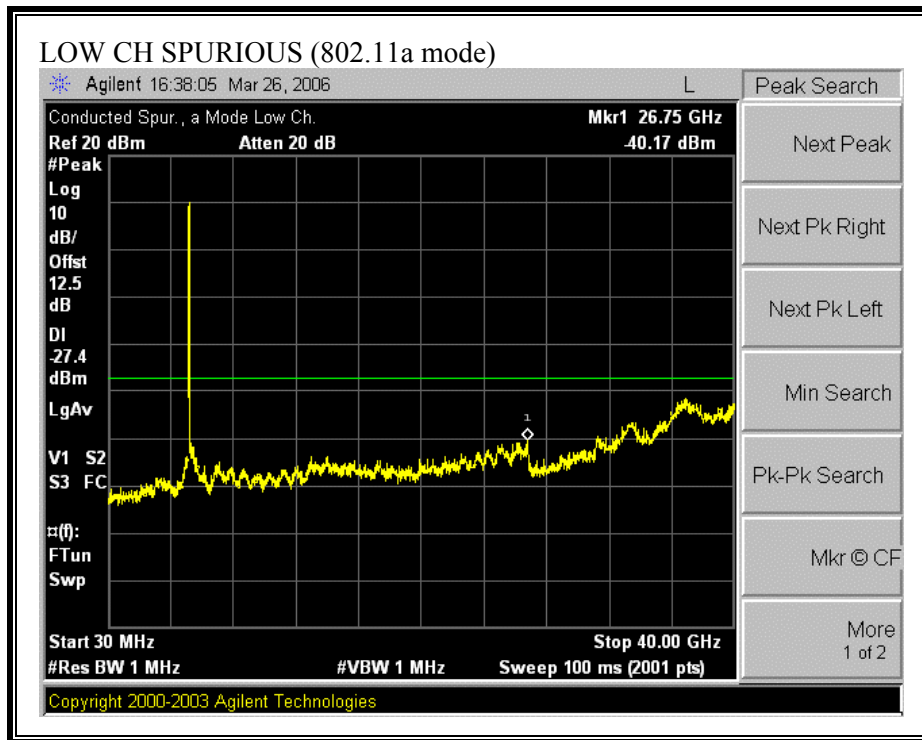
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

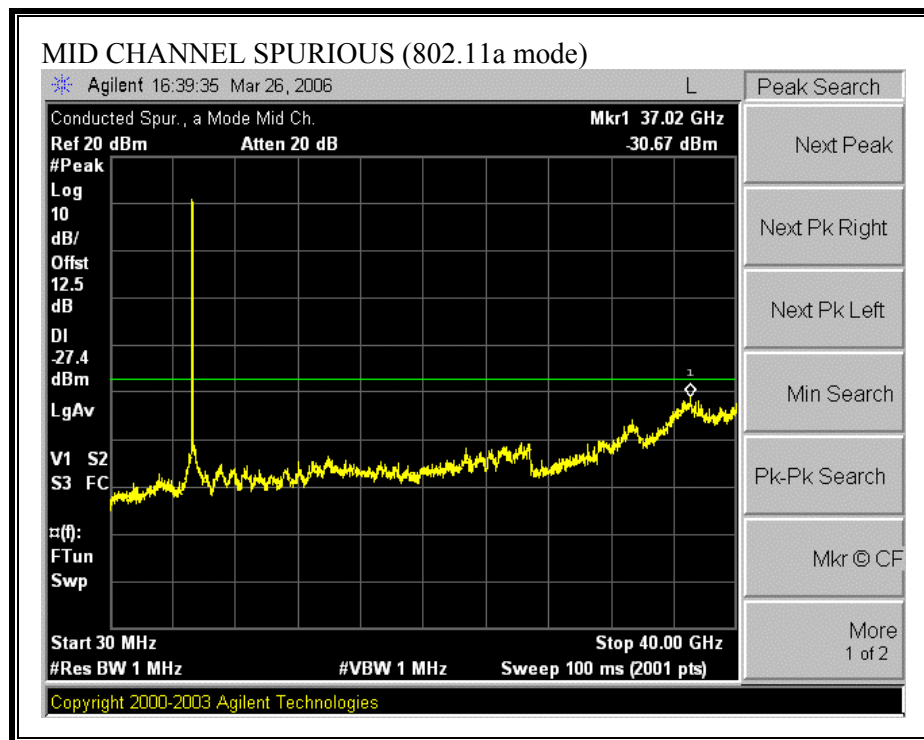
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

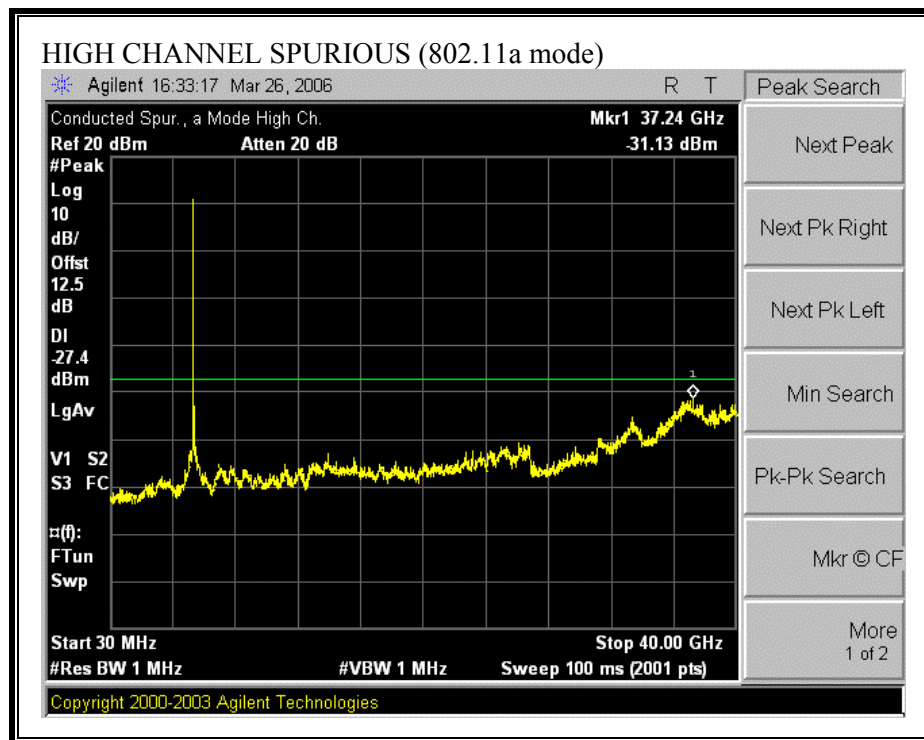
RESULTS

No non-compliance noted:

SPURIOUS EMISSIONS (802.11a MODE)







7.1.8. FREQUENCY STABILITY

LIMIT

§15.407 (g) Manufacturers of UNII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation as specified in the user manual.

TEST PROCEDURE

Frequency stability versus environmental temperature

The Host Desktop PC and equipment under test (EUT) were connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuator. The Host Desktop PC and EUT were placed inside the temperature chamber, after the temperature stabilized for approximately 20 minutes; the frequency of the output signal was recorded from the counter.

Frequency Stability versus Input Voltage

At room temperature ($20\pm5^{\circ}\text{C}$), an external variable AC power supply was connected to the Host Desktop PC and equipment under test (EUT). The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

RESULTS

No non-compliance noted.

1) **Transmit High channel 5320MHz**

Reference Frequency: High Channel 5.31999625GHz					
Limit: Within the band of operation (or +/- 10 ppm) = 53.199963 kHz					
Power Supply (Vac)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse			
		(GHz)	Delta (ppm)	Limit (ppm)	Delta (kHz)
115.00	50	5.319996160	0.017	+/- 10	-0.090
115.00	40	5.319996660	-0.077	+/- 10	0.410
115.00	30	5.319999170	-0.549	+/- 10	2.920
115.00	25	5.319996250	0.000	+/- 10	0.000
115.00	20	5.320005250	-1.692	+/- 10	9.000
115.00	10	5.320013920	-3.321	+/- 10	17.670
115.00	0	5.320022920	-5.013	+/- 10	26.670
115.00	-10	5.320025420	-5.483	+/- 10	29.170
115.00	-20	5.320023300	-5.085	+/- 10	27.050
115.00	-30	5.320011300	-2.829	+/- 10	15.050
97.75	20	5.320006500	-1.927	+/- 10	10.250
132.25	20	5.320006750	-1.974	+/- 10	10.500

2) **Transmit Low channel 5180MHz**

Reference Frequency: Low Channel 5.17999625GHz					
Limit: Within the band of operation (or +- 10 ppm) = 51.799963 kHz					
Power Supply (Vac)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse			
		(GHz)	Delta (ppm)	Limit (ppm)	Delta (kHz)
115.00	50	5.179997080	-0.160	+- 10	0.830
115.00	40	5.179995250	0.193	+- 10	-1.000
115.00	30	5.179999000	-0.531	+- 10	2.750
115.00	25	5.179996250	0.000	+- 10	0.000
115.00	20	5.180006420	-1.963	+- 10	10.170
115.00	10	5.1800155100	-3.718	+- 10	19.260
115.00	0	5.1800215400	-4.882	+- 10	25.290
115.00	-10	5.1800252100	-5.591	+- 10	28.960
115.00	-20	5.1800227000	-5.106	+- 10	26.450
115.00	-30	5.1800103000	-2.712	+- 10	14.050
97.75	20	5.180007840	-2.237	+- 10	11.590
132.25	20	5.180006840	-2.044	+- 10	10.590

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.

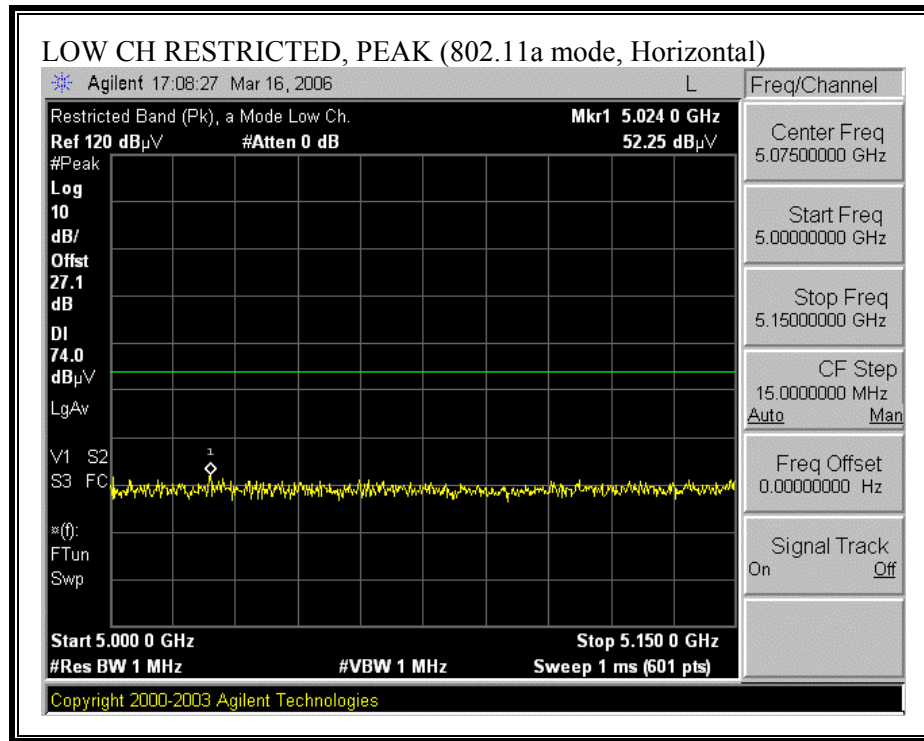
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

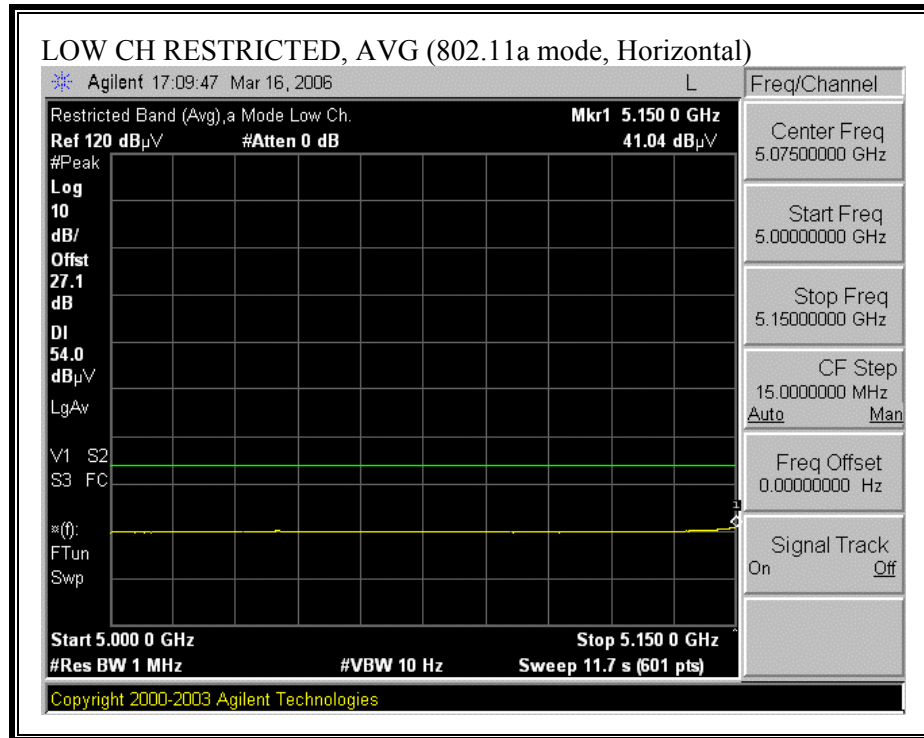
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each band.

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.

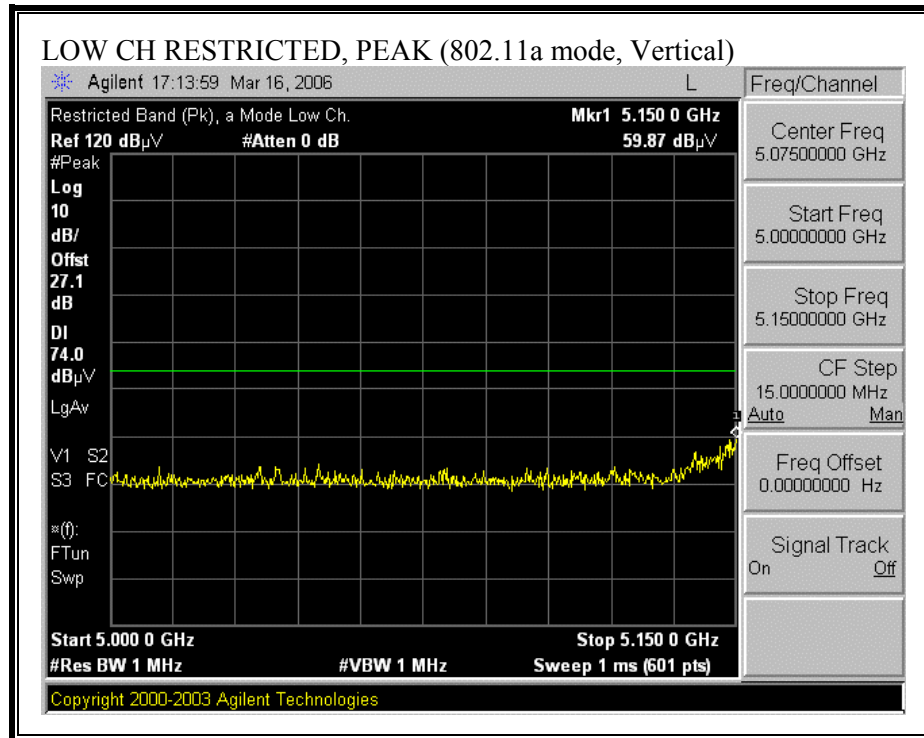
7.2.2. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5350 MHz BAND

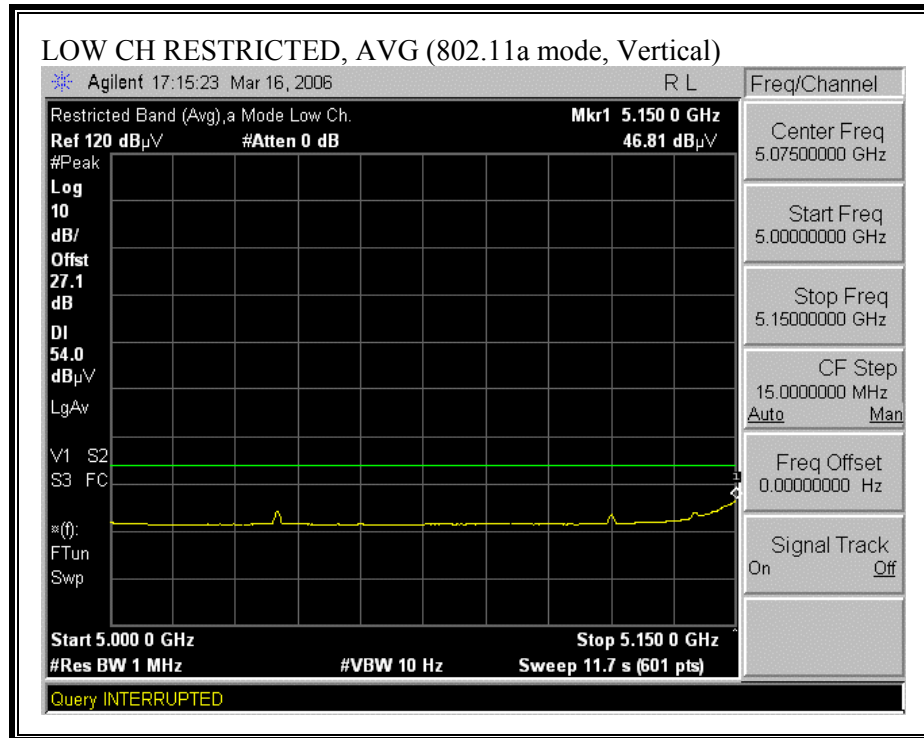
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)



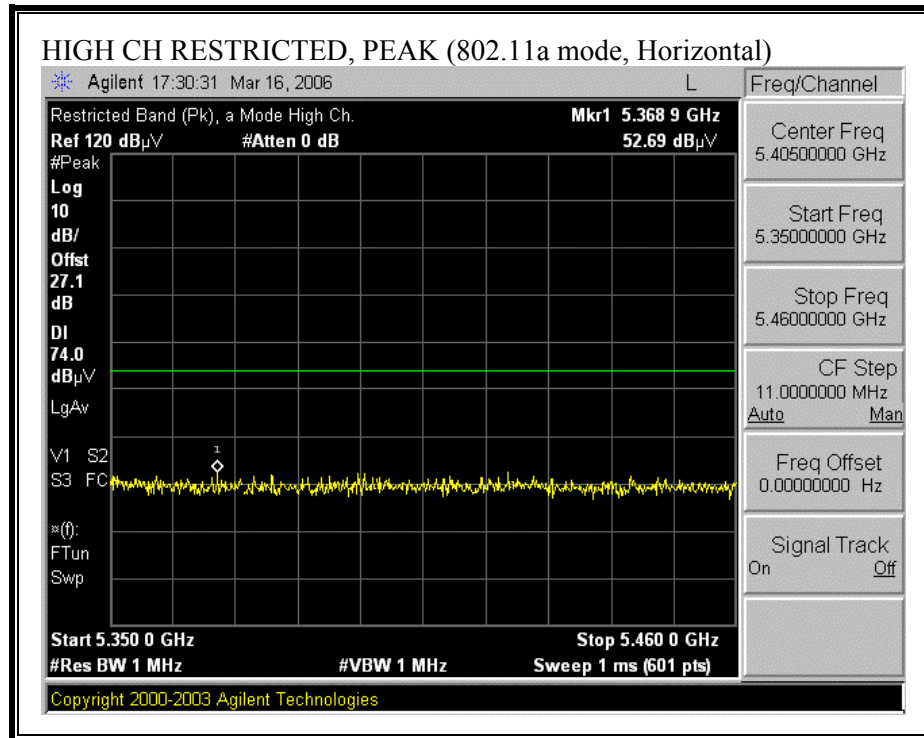


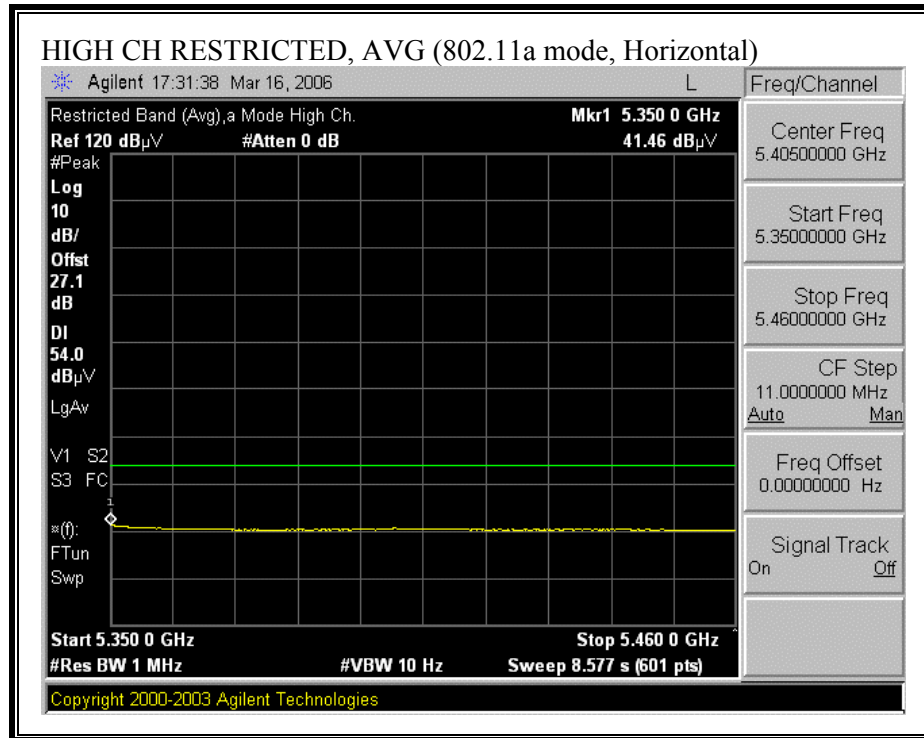
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)



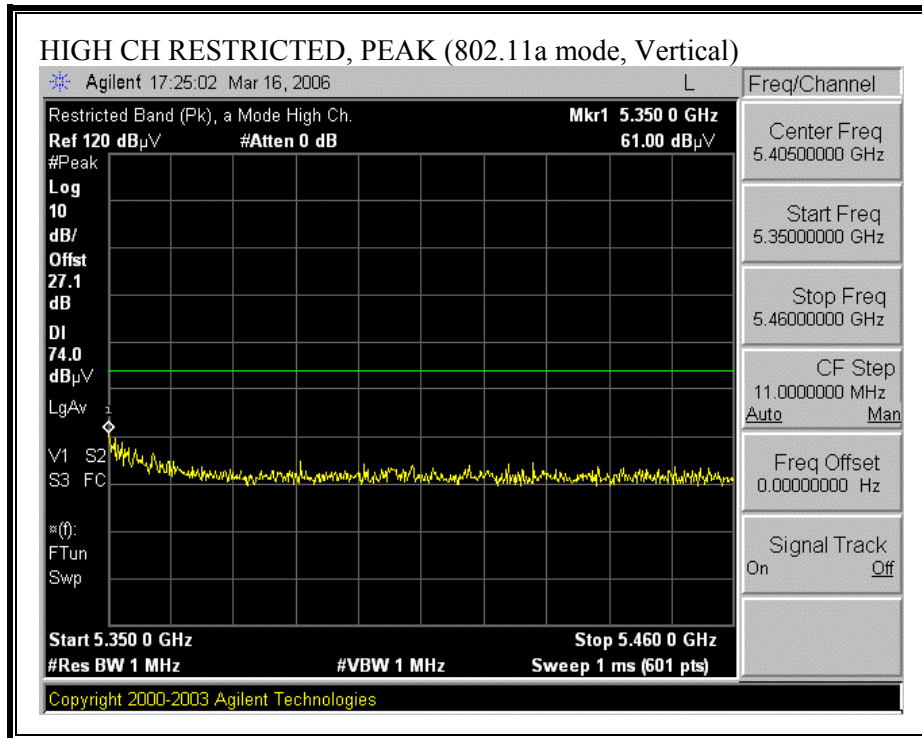


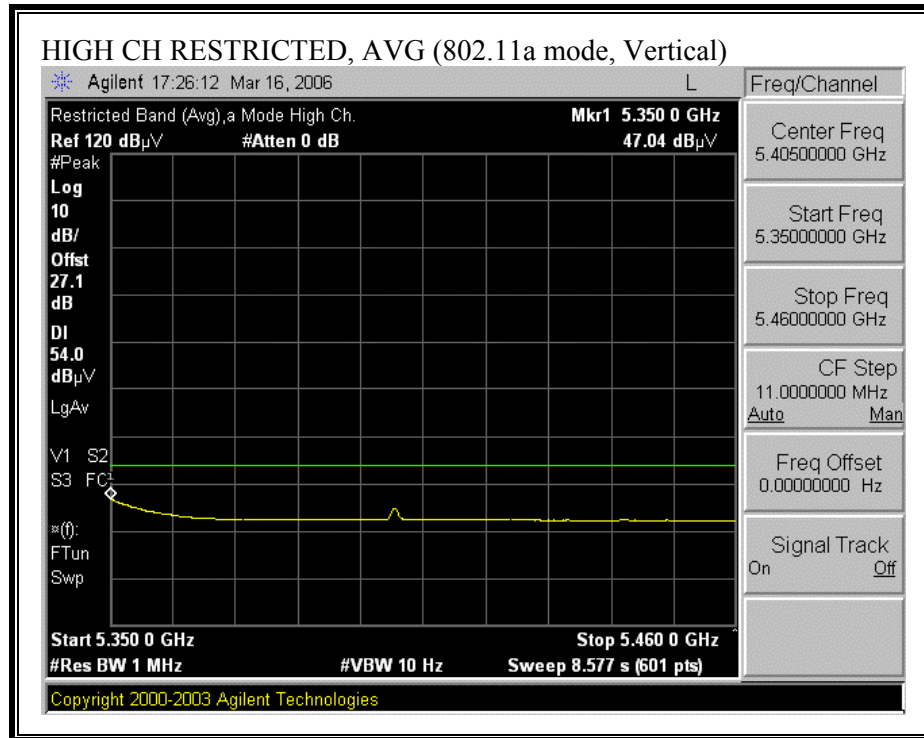
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)





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





HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

03/11/06 High Frequency Measurement																
Compliance Certification Services, Morgan Hill Open Field Site																
Test Engineer: Thanh Nguyen																
Project #: 06U10130																
Company: Intel																
EUT Description: 802.11 a/b/g Mini PCI type 3 card																
EUT M/N: Kirtland																
EUT S/N: 000547096(Card #4)																
Test Target: FCC UNII WLAN																
Mode Of Operation: Tx a mode																
Average Power Meter: Low = 15.5 dBm, Mid = 15.5 dBm, High = 15.5 dBm																
Test Equipment:																
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit								
T119; S/N: 29301 @3m		T145 Agilent 3008A005t						FCC 15.209								
Hi Frequency Cables																
2 foot cable		3 foot cable		12 foot cable		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz						
Thanh 177079008				Thanh 208946003		HPF_7.6GHz										
f	Dist	Read Pk	Read Avg	AF	CL	Amp	D Corr	Fldr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes	
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)	
Tx Ch 64, 5320MHz																
10.640	3.0	47.38	36.25	37.6	4.0	-34.2	0.0	0.8	55.5	44.3	74	54	-18.5	-9.7	V	
15.960	3.0	44.52	30.44	40.3	4.8	-32.2	0.0	0.7	58.2	44.1	74	54	-15.8	-9.9	V	
21.280	3.0	44.22	30.97	33.5	5.9	-32.2	0.0	0.0	51.4	38.1	74	54	-22.6	-15.9	Noise floor	
10.640	3.0	46.28	35.58	37.6	4.0	-34.2	0.0	0.8	54.4	43.7	74	54	-19.6	-10.3	H	
15.960	3.0	40.30	30.43	40.3	4.8	-32.2	0.0	0.7	54.0	44.1	74	54	-20.0	-9.9	H	
21.280	3.0	42.75	31.27	33.5	5.9	-32.2	0.0	0.0	49.9	38.4	74	54	-24.1	-15.6	Noise floor	
Tx ch 52, 5260MHz																
10.520	3.0	46.57	36.86	37.6	3.9	-34.4	0.0	0.8	54.5	44.8	74	54	-19.5	-9.2	V	
15.780	3.0	43.68	31.22	40.3	4.8	-32.2	0.0	0.7	57.2	44.7	74	54	-16.8	-9.3	V	
21.040	3.0	42.16	30.76	33.5	5.8	-32.2	0.0	0.0	49.3	37.9	74	54	-24.7	-16.1	Noise floor	
10.520	3.0	47.34	32.43	37.6	3.9	-34.4	0.0	0.8	55.3	40.3	74	54	-18.7	-13.7	H	
15.780	3.0	38.66	30.26	40.3	4.8	-32.2	0.0	0.7	52.2	43.8	74	54	-21.8	-10.2	H	
21.040	3.0	42.86	31.78	33.5	5.8	-32.2	0.0	0.0	50.0	38.9	74	54	-24.0	-15.1	Noise floor	
Tx ch 36, 5180MHz																
10.360	3.0	51.84	39.86	37.6	3.9	-34.6	0.0	0.8	59.5	47.6	74	54	-14.5	-6.4	V	
15.540	3.0	45.73	30.27	40.1	4.7	-32.3	0.0	0.7	59.0	43.6	74	54	-15.0	-10.4	V	
20.720	3.0	44.00	30.79	33.5	5.8	-32.2	0.0	0.1	51.2	38.0	74	54	-22.8	-16.0	Noise floor	
10.340	3.0	49.55	37.40	37.6	3.9	-34.6	0.0	0.8	57.2	45.1	74	54	-16.8	-8.9	H	
15.510	3.0	39.48	30.35	40.1	4.7	-32.3	0.0	0.7	52.8	43.6	74	54	-21.2	-10.4	H	
20.680	3.0	43.63	30.79	33.5	5.8	-32.2	0.0	0.1	50.8	38.0	74	54	-23.2	-16.0	Noise floor	
No other Harmonics emissions were detected above 3rd harmonic																
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

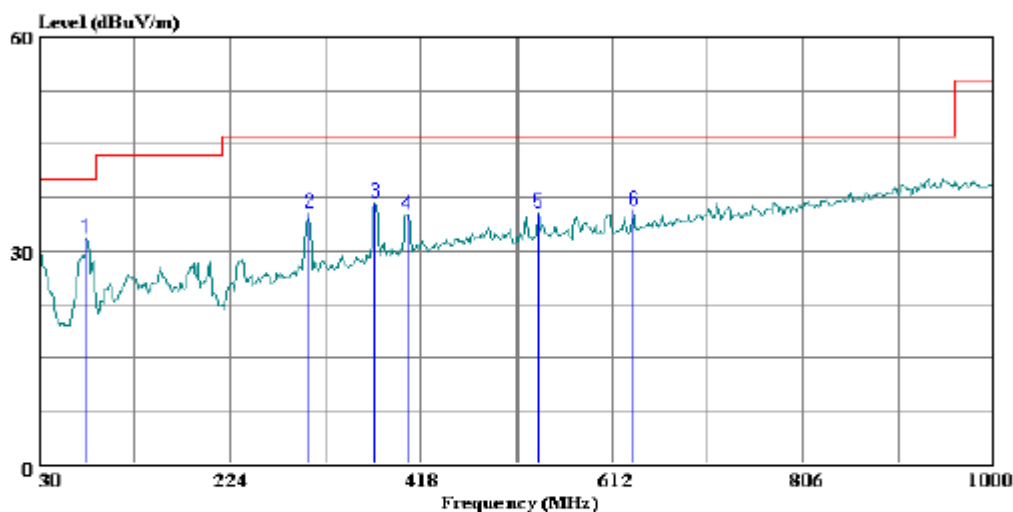
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 26 File#: EMIBelow1GHz.EMI Date: 03-29-2006 Time: 13:58:34



(Auxiliary ATC)

Trace: 25

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL

Test Operator : Thanh Nguyen

Project # : 06U10130

Company : Intel

EUT : 802.11a/b/g Mini PCI type 3B card for PC

Model No : KIRTLAND

Serial Number : 000529096

Configuration : EUT, PC, Monitor

Mode of operation: Transmit Worst case

Target of Test : FCC Class B

HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	77.530	22.76	9.03	31.79	40.00	-8.21	Peak
2	305.480	19.52	15.80	35.32	46.00	-10.68	Peak
3	372.410	19.21	17.45	36.66	46.00	-9.34	Peak
4	404.420	16.91	18.15	35.06	46.00	-10.94	Peak
5	536.340	14.59	20.73	35.32	46.00	-10.68	Peak
6	633.340	13.59	22.05	35.64	46.00	-10.36	Peak

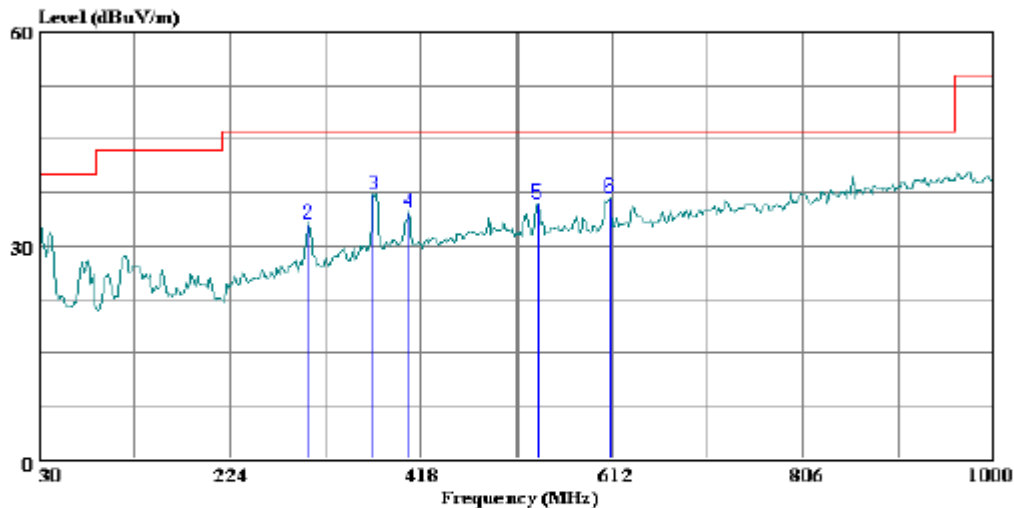
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 24 File#: EMIBelow1GHz.EMI Date: 03-29-2006 Time: 13:53:56



(Auxiliary ATC)

Trace: 22

Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator : Thanh Nguyen
Project # : 06U10130
Company : Intel
EUT : 802.11a/b/g Mini PCI type 3B card for PC
Model No : KIRTLAND
Serial Number : 000529096
Configuration : EUT, PC, Monitor
Mode of operation: Transmit Worst case
Target of Test : FCC Class B

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.970	12.21	20.45	32.66	40.00	-7.34	Peak
2	304.510	17.33	15.78	33.11	46.00	-12.89	Peak
3	370.470	19.76	17.40	37.16	46.00	-8.84	Peak
4	406.360	16.55	18.20	34.74	46.00	-11.26	Peak
5	535.370	15.19	20.71	35.90	46.00	-10.10	Peak
6	609.090	15.17	21.66	36.83	46.00	-9.17	Peak

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 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

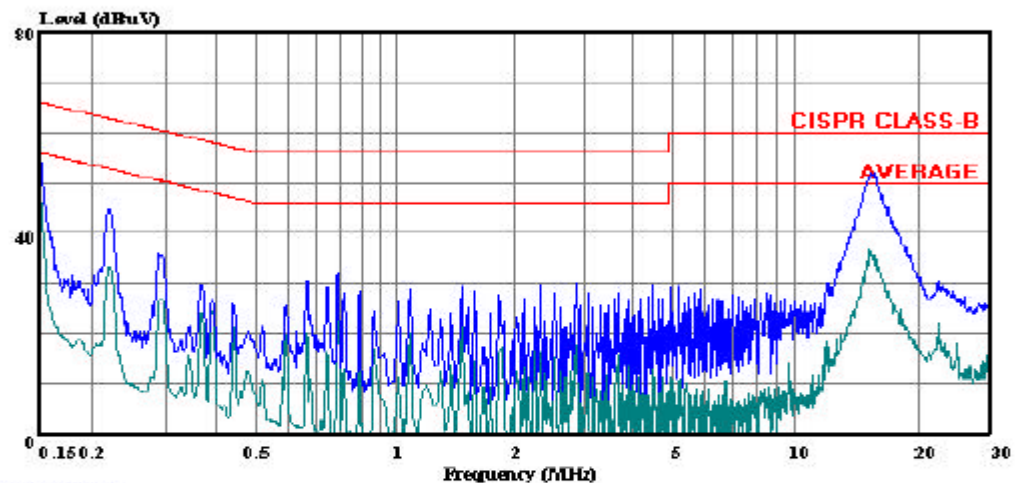
CONDUCTED EMISSIONS DATA (115VAC 60Hz) TX 5GHz									
Freq.	Reading			Closs	Limit	EN B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	59.44	--	51.36	0.00	66.00	56.00	-6.56	-4.64	L1
0.22	44.64	--	33.41	0.00	62.86	52.86	-18.22	-19.45	L1
15.47	51.86	--	36.37	0.00	60.00	50.00	-8.14	-13.63	L1
0.15	59.06	--	51.33	0.00	66.00	56.00	-6.94	-4.67	L2
0.22	46.96	--	37.35	0.00	62.78	52.78	-15.82	-15.43	L2
15.63	50.58	--	35.10	0.00	60.00	50.00	-9.42	-14.90	L2
6 Worst Data									

LINE 1 RESULTS



Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 42 File#: LC 06U10130.EMI Date: 03-15-2006 Time: 17:00:33



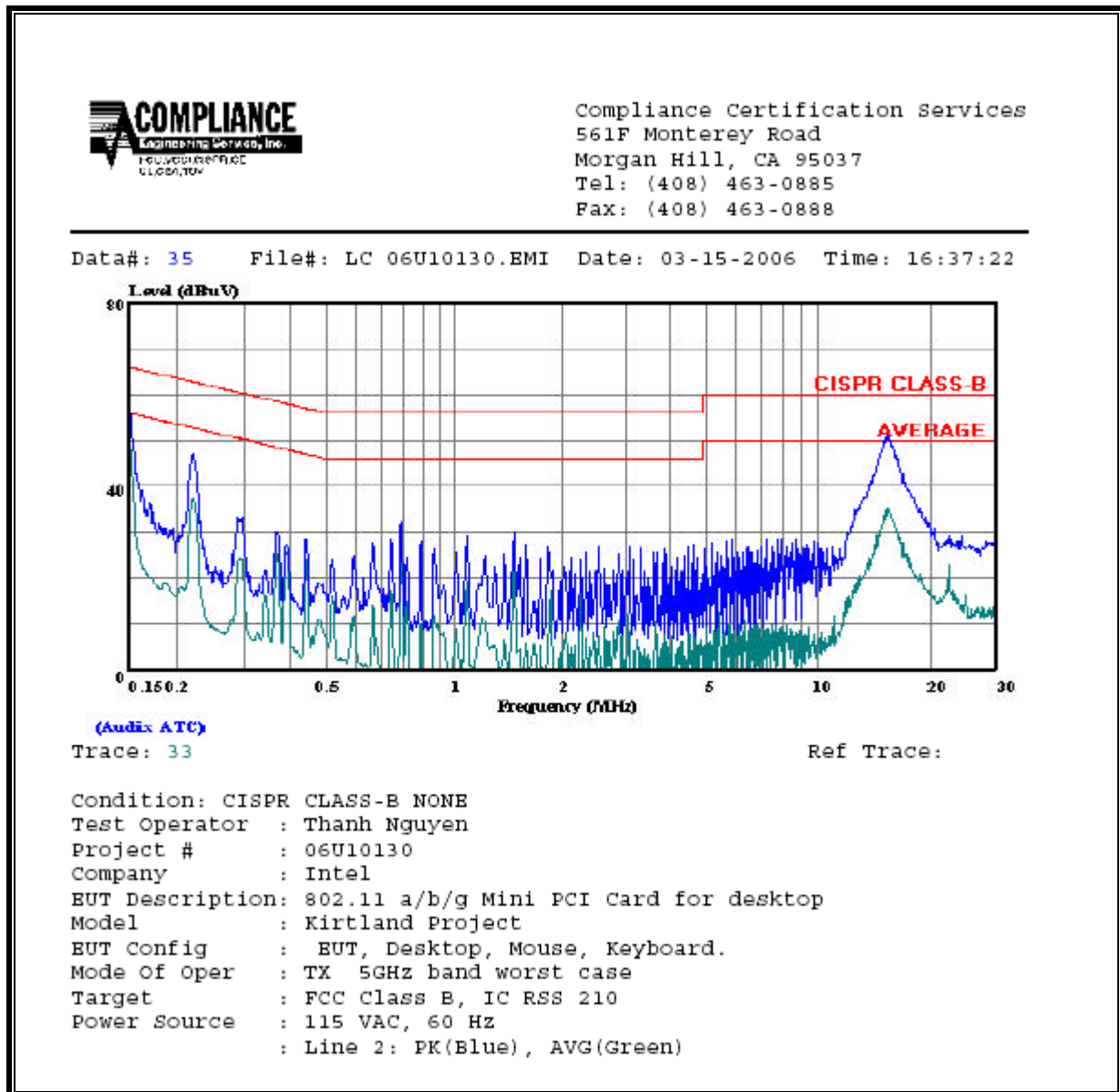
(Auxiliary ATC)

Trace: 40

Ref Trace:

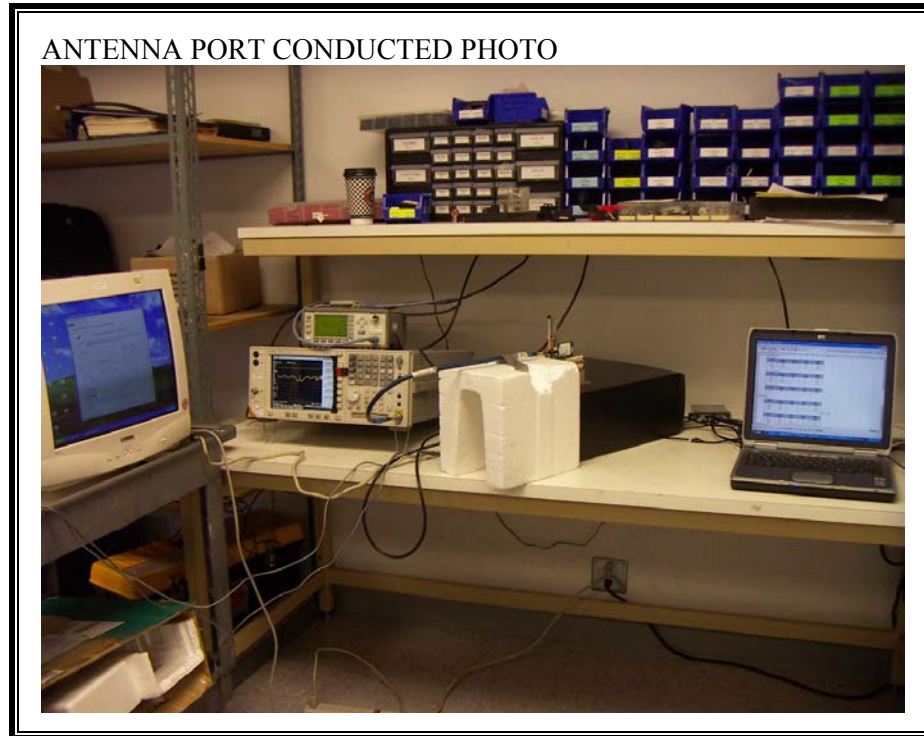
Condition: CISPR CLASS-B NONE
Test Operator : Thanh Nguyen
Project # : 06U10130
Company : Intel
EUT Description: 802.11 a/b/g Mini PCI Card for desktop
Model : Kirtland Project
EUT Config : EUT, Desktop, Mouse, Keyboard.
Mode Of Oper : TX 5GHz band worst case
Target : FCC Class B, IC RSS 210
Power Source : 115 VAC, 60 Hz
: Line 1: PK(Blue), AVG(Green)

LINE 2 RESULTS



8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO



RADIATED BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



LINE CONDUCTED BACK PHOTO



END OF REPORT