FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

WIRELESS ACCESS POINT

MODEL NUMBER: 70410-QAB

FCC ID: T4S-70410-QAB

REPORT NUMBER: 06J10176-2B

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Prepared for
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--	6/05/06	Initial Issue	Thu
B	6/07/06	Revised Sections 5.1, 5.4, and 5.7	Thu

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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. MODIFICATION 6

5.3. MAXIMUM OUTPUT POWER 6

5.4. DESCRIPTION OF AVAILABLE ANTENNAS 6

5.5. SOFTWARE AND FIRMWARE 7

5.6. WORST-CASE CONFIGURATION AND MODE 7

5.7. DESCRIPTION OF TEST SETUP 8

6. TEST AND MEASUREMENT EQUIPMENT 10

7. LIMITS AND RESULTS 11

7.1. CHANNEL TESTS FOR THE 5150 TO 5250 MHz BAND 11

7.1.1. EMISSION BANDWIDTH 11
7.1.2. PEAK POWER 15
7.1.3. MAXIMUM PERMISSIBLE EXPOSURE 20
7.1.4. AVERAGE POWER 23
7.1.5. PEAK POWER SPECTRAL DENSITY 24
7.1.6. PEAK EXCURSION 28
7.1.7. CONDUCTED SPURIOUS EMISSIONS 32
7.1.8. FREQUENCY STABILITY 36

7.2. RADIATED EMISSIONS 38

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS 38
7.2.2. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5250 MHz BANDWIDTH INTERNAL ANTENNA 41
7.2.3. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5250 MHz BANDWIDTH EXTERNAL ANTENNA 50
7.2.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz 59

7.3. POWERLINE CONDUCTED EMISSIONS 63

8. SETUP PHOTOS 67

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HONDA R&D CO., LTD.
8-1 HONCHO, WAKO-SHI
SAITAMA-KEN, 351-0114, JAPAN

EUT DESCRIPTION: WIRELESS ACCESS POINT

MODEL: 70410-QAB

SERIAL NUMBER: CCS# 1690 & CCS# 1728

DATE TESTED: April 3 – May 23, 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:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

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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%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is Dual Band Wireless Access Point operating in the 2412-2462 MHz band and 5180-5240 MHz band.

The radio module is manufactured by Atheors.

5.2. MODIFICATION

1. Adding absorber at the bottom of the main PCB.
2. Adding shielding case on the main PCB.
3. Connect antenna PCB to GND plate.
4. Add ferrite beads (BLM31P391S, MURATA) between 4-5 pins and 7-8 pins that are not used pins for Ethernet.

5.3. MAXIMUM OUTPUT POWER

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

5150 to 5250 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	14.59	28.77

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes of two 2.4GHz antennas used for diversity and also two 5GHz antennas used for diversity, with a maximum gain at each band as indicated in the table below:

Antenna Manufacturer / Model Number	Antenna Type	Maximum Peak Antenna Gain (dBi)	Operating Mode
DAC2450CT (2.4 GHz)	Monopole	1.6	☐ Point to Point ☒ Point to Multipoint
Flavus (5 GHz)	Monopole	4.9	☐ Point to Point ☒ Point to Multipoint
TMM1262 (2.4 GHz / 5 GHz)	Patch	1.4dBi @2.4GHz, 5.7dBi @5GHz	☐ Point to Point ☒ Point to Multipoint

The first two are internal antennas and the third one is an external antenna.

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5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was ART, rev. 5.3.

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power, based on the radio test reports for this product. The highest measured output power was at 5180 MHz in 11a mode.

The worst-case data rate for this channel is determined to be 6Mb/s, based on previous experience with Atheros 802.11 product design architectures.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Sony	PCG-VX88P	4-664-683-01	DOC
AC Adaptor for Laptop	Sony	PCGA-AC16V3	0204A0147727P	DOC
AC Adaptor for EUT	Kaga Components	S-8453	n/a	DOC

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	AC Power	Un-shielded	2	N/A
2	DC	2	DC Power	Un-shielded	2	N/A
3	Ethernet	1	RJ45	Un-shielded	1	EUT to host device

TEST SETUP

The EUT is connected with a host laptop computer via a RJ45. Test software exercised the EUT.

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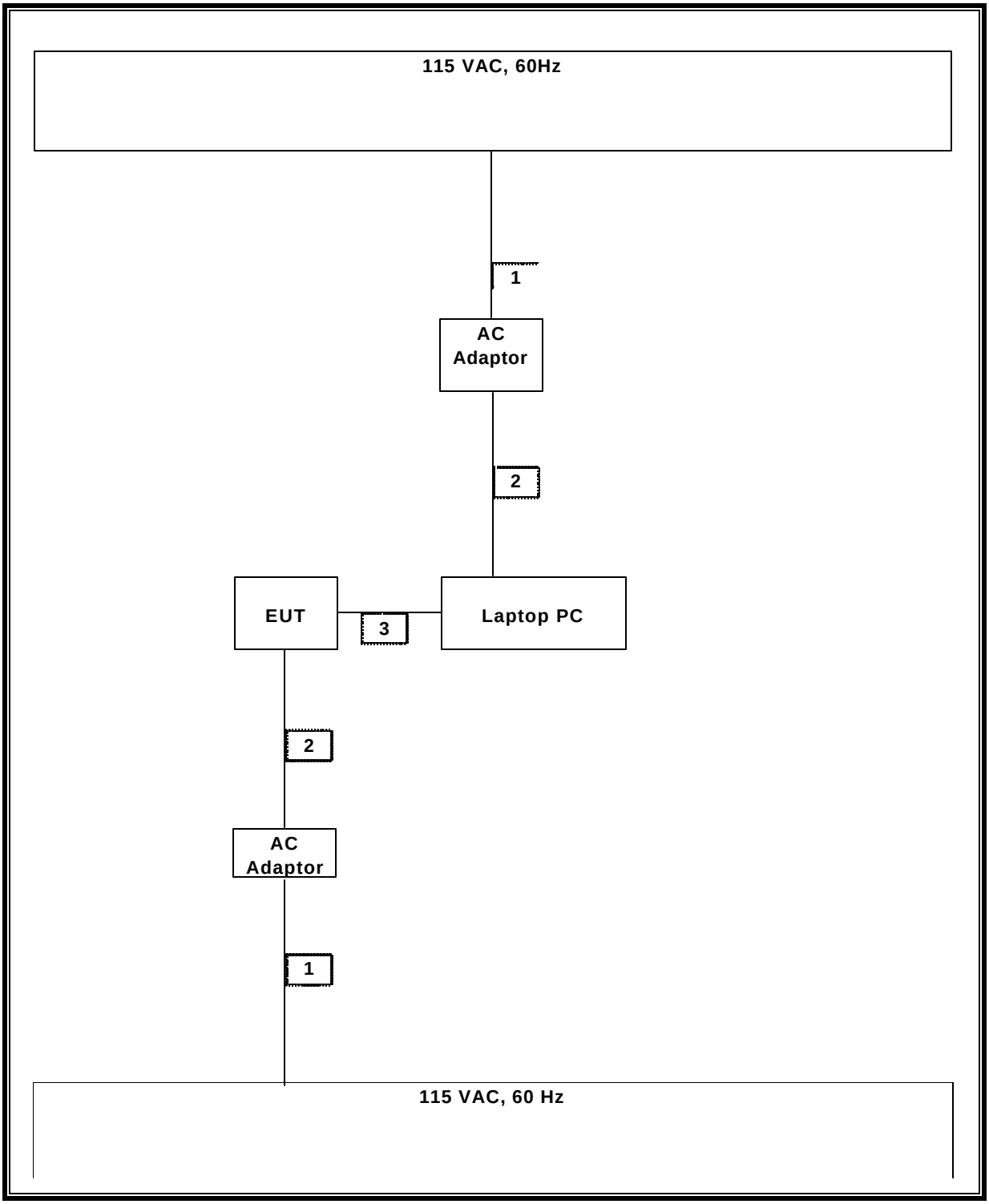
SETUP DIAGRAM FOR TESTS



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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**
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/2007
Antenna, Horn, 18 ~ 26 GHz	ARA	MWH-1826/B	1013	9/12/2006
Antenna, Horn 26 ~ 40 GHz	ARA	MWH-2640/B	1029	4/13/2007
Preamplifier, 1 ~ 26 GHz	HP	8449B	3008A00931	6/24/2006
Preamplifier, 26 ~ 40 GHz	Miteq	NSP4000-SP2	924343	8/18/2006
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42510266	10/19/2006
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	2/4/2007
RF Filter Section	HP	85420E	3705A00256	2/4/2007
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	9/3/2006
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	N.C.R.
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/07
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/07

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7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 5150 TO 5250 MHz BAND

7.1.1. EMISSION BANDWIDTH

LIMIT

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

TEST PROCEDURE

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

RESULTS

No non-compliance noted:

802.11a Mode

Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5180	26.97	14.31
Middle	5210	27.59	14.41
High	5240	26.06	14.16

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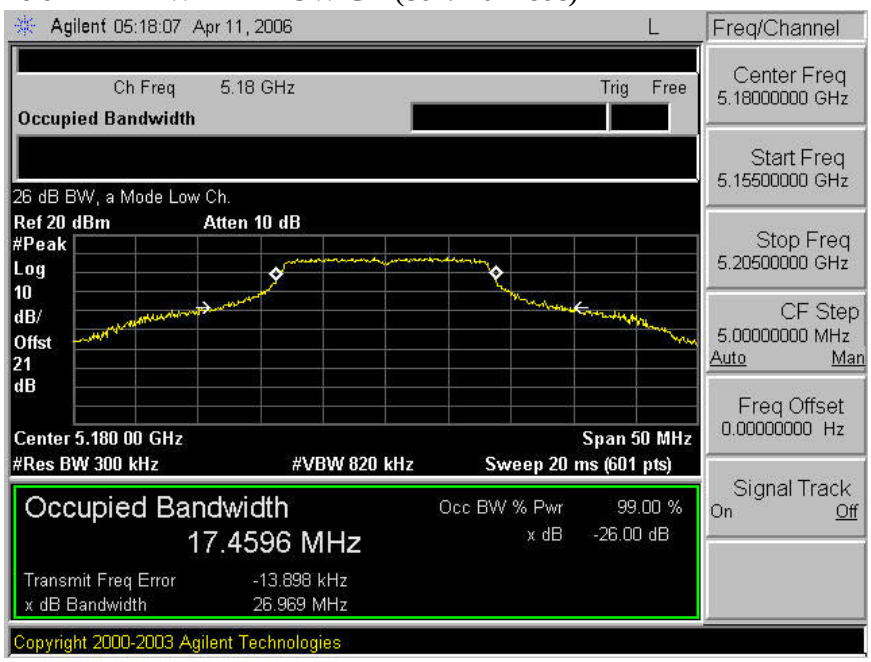
26 dB EMISSION BANDWIDTH (802.11a MODE)

26 dB BANDWIDTH LOW CH (802.11a mode)



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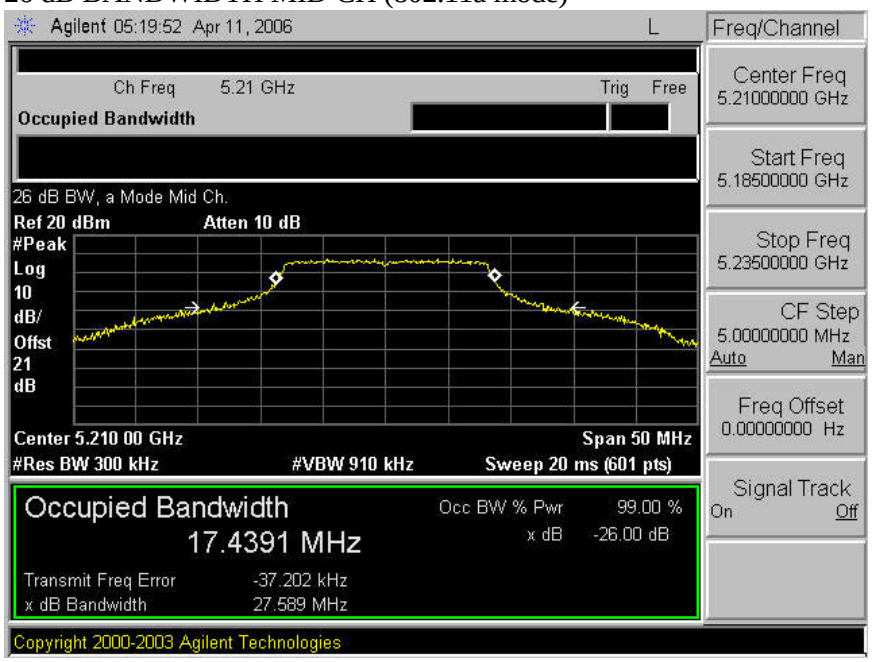
26 dB BANDWIDTH MID CH (802.11a mode)



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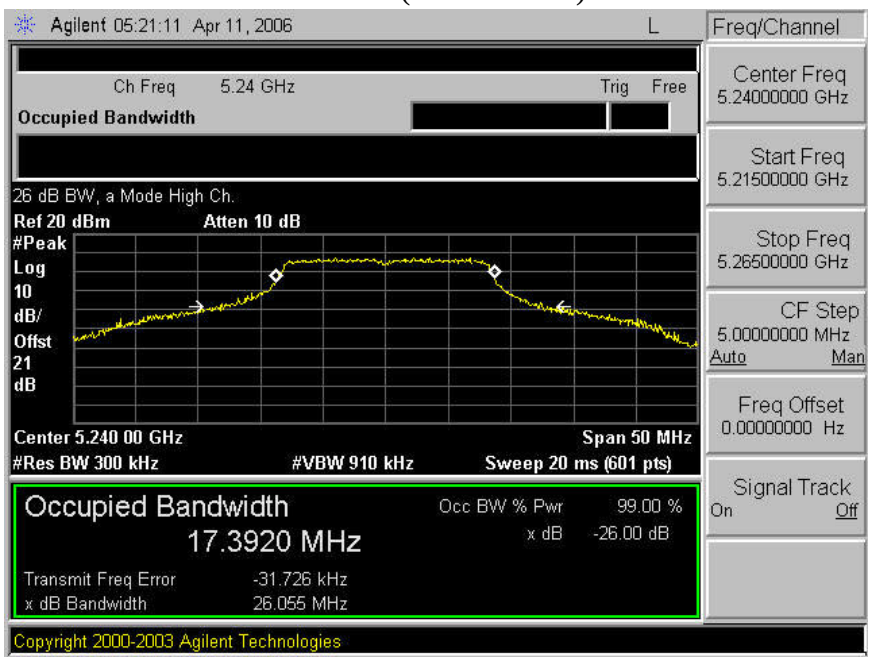
26 dB BANDWIDTH HIGH CH (802.11a mode)



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7.1.2. PEAK POWER

LIMIT

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

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.

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LIMITS AND RESULTS

No non-compliance noted:

Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	26.97	18.31	5.70	17.00
Mid	5210	17	27.59	18.41	5.70	17.00
High	5240	17	26.06	18.16	5.70	17.00

Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.59	17.00	-2.41
Mid	5210	14.12	17.00	-2.88
High	5240	13.56	17.00	-3.44

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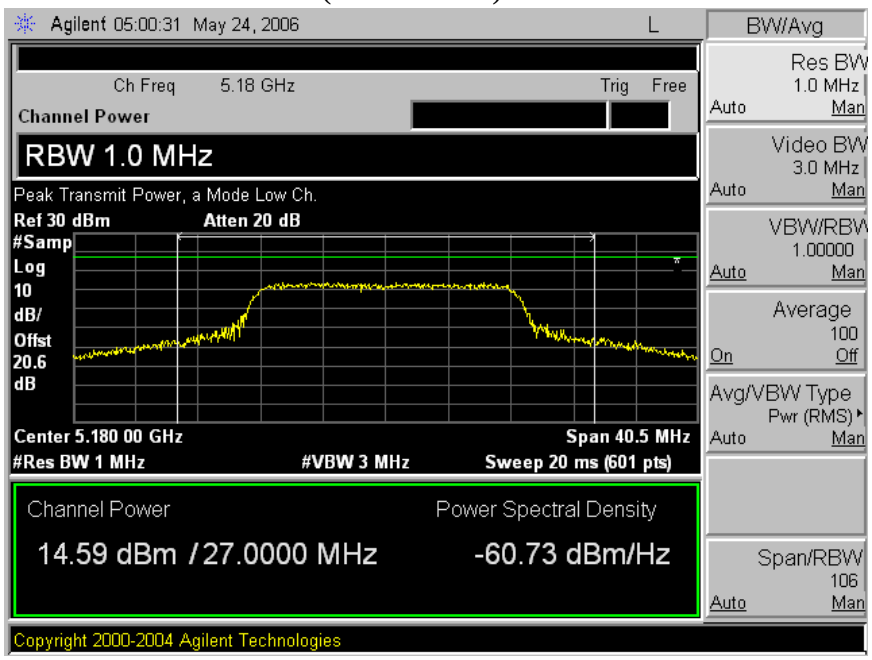
PEAK POWER (NORMAL MODE)

PEAK POWER LOW CH (Normal mode)



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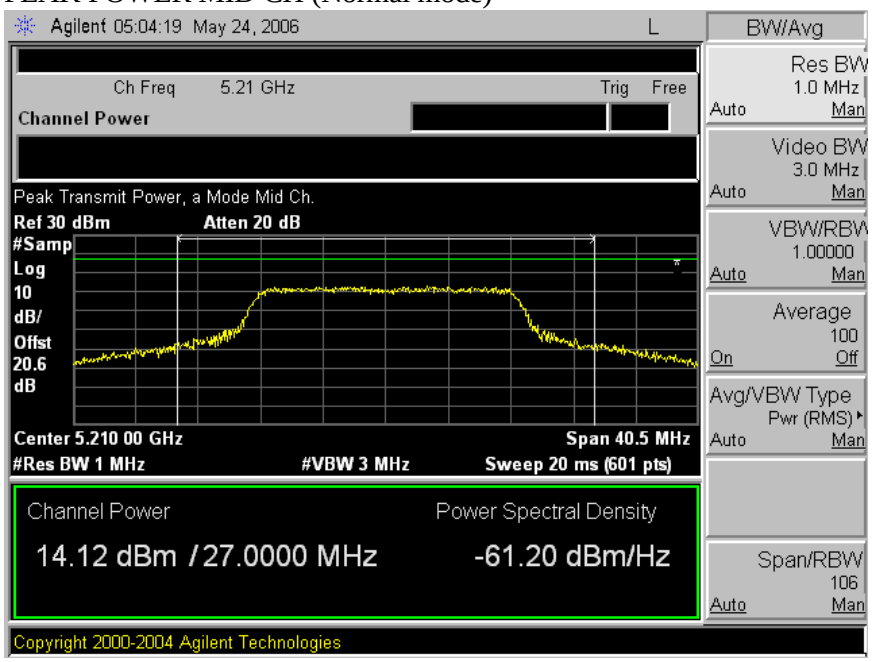
PEAK POWER MID CH (Normal mode)



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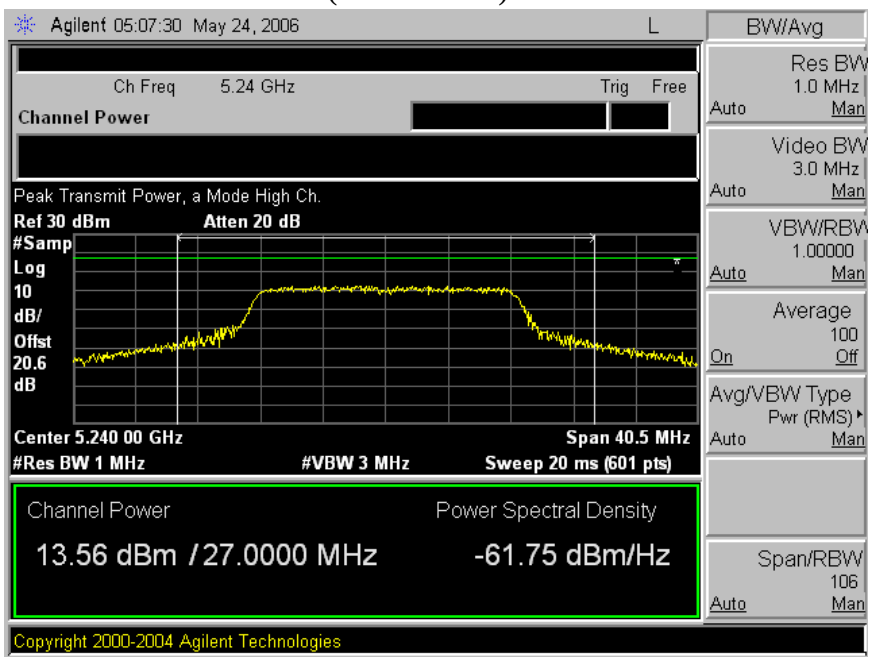
PEAK POWER HIGH CH (Normal mode)



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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.

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CALCULATIONS

Given

$E = \sqrt{(30 * P * G) / d}$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

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

where

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

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

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

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LIMITS

From §1.1310 Table 1 (B), the maximum value of S = 1.0 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/cm^2)
802.11a	20.0	14.59	5.70	0.02

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.

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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 30.95 dB (including 30 dB pad and 0.95 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	14.20
Middle	5210	13.90
High	5240	13.50

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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.

The maximum antenna gain = 5.7 dBi, therefore there is no reduction due to antenna gain.

TEST PROCEDURE

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

RESULTS

No non-compliance noted:

802.11a Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.84	4.00	-0.16
Middle	5210	3.65	4.00	-0.35
High	5240	3.61	4.00	-0.39

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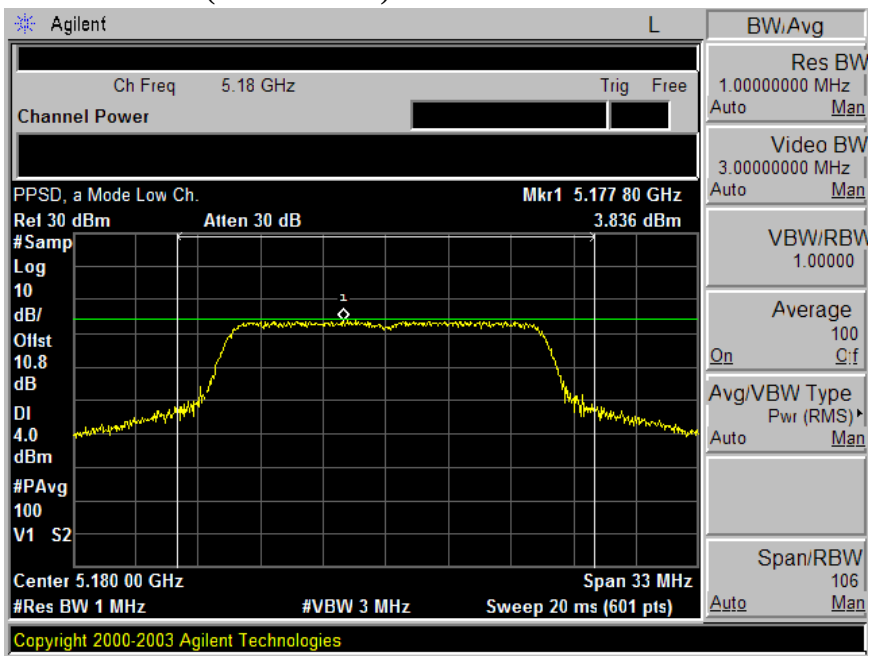
PEAK POWER SPECTRAL DENSITY (802.11a MODE)

PPSD LOW CH (802.11a mode)



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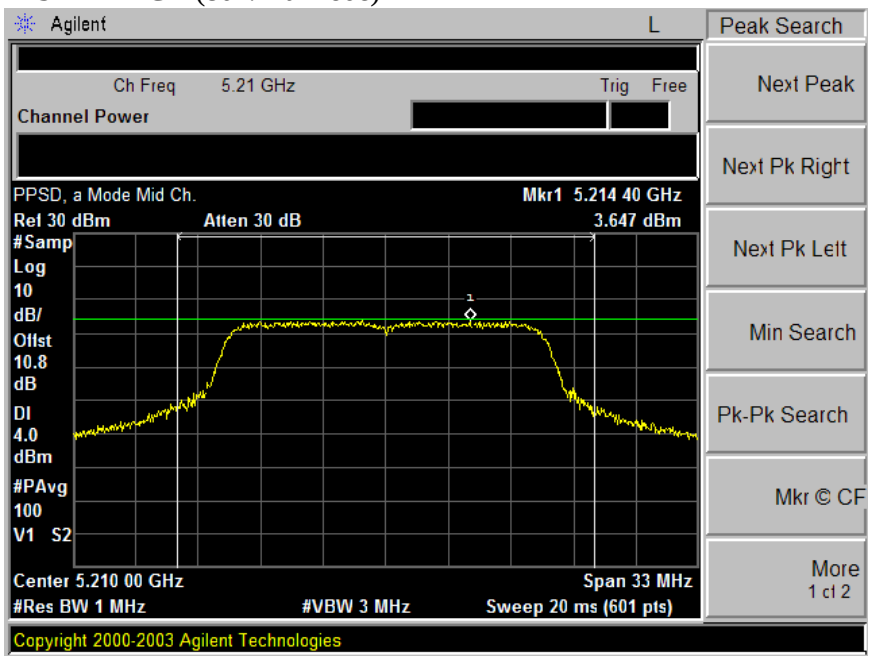
PPSD MID CH (802.11a mode)



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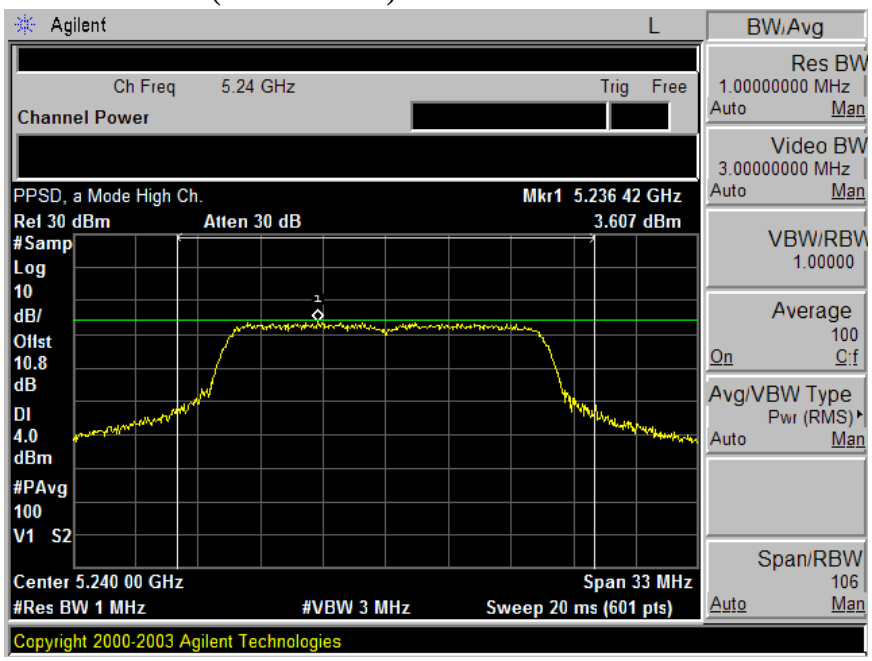
PPSD HIGH CH (802.11a mode)



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7.1.6. PEAK EXCURSION

LIMIT

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

TEST PROCEDURE

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

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

RESULTS

No non-compliance noted:

802.11a Mode

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.95	13	-4.05
Middle	5210	9.07	13	-3.93
High	5240	9.45	13	-3.55

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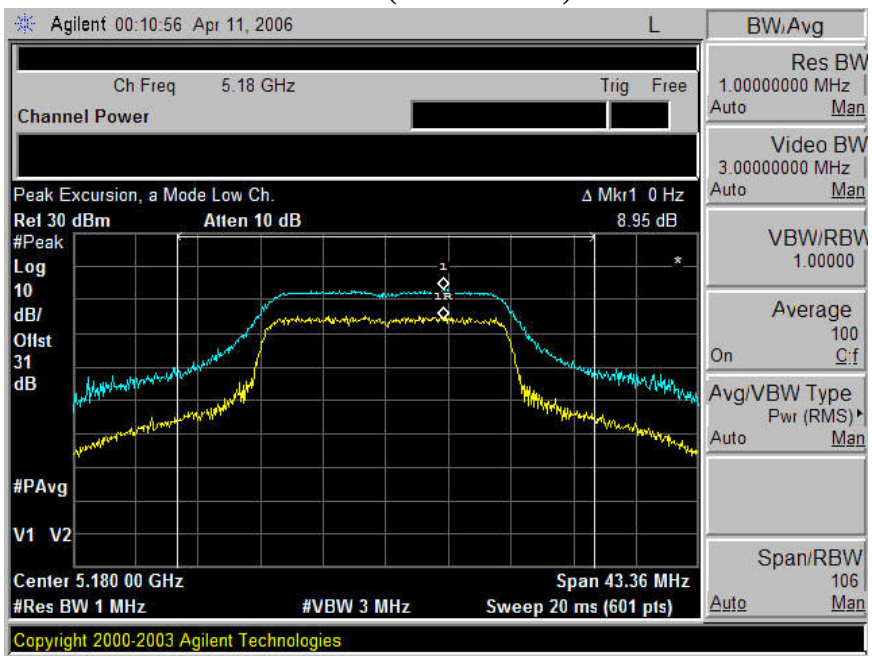
PEAK EXCURSION (802.11a MODE)

PEAK EXCURSION LOW CH (802.11a mode)



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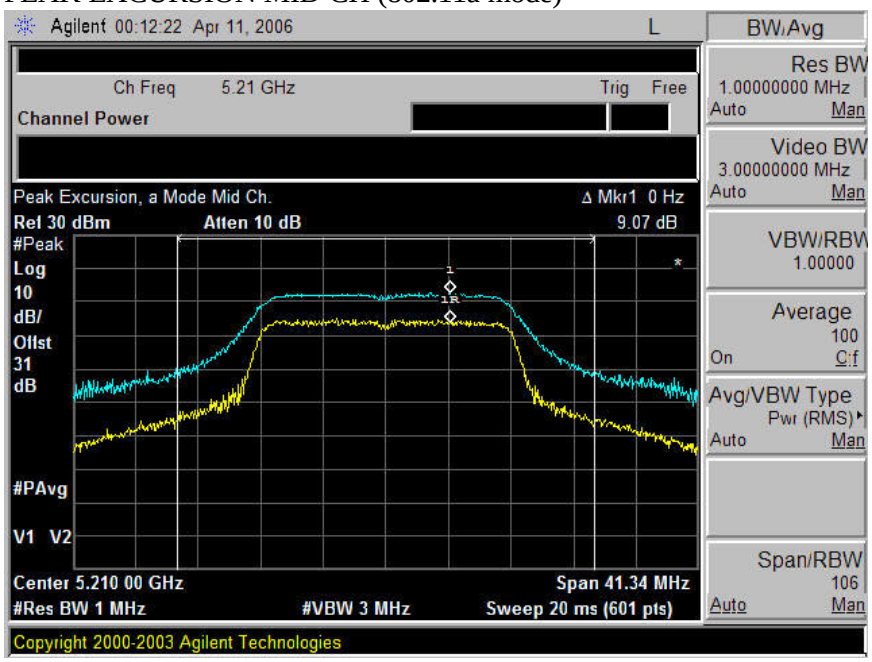
PEAK EXCURSION MID CH (802.11a mode)



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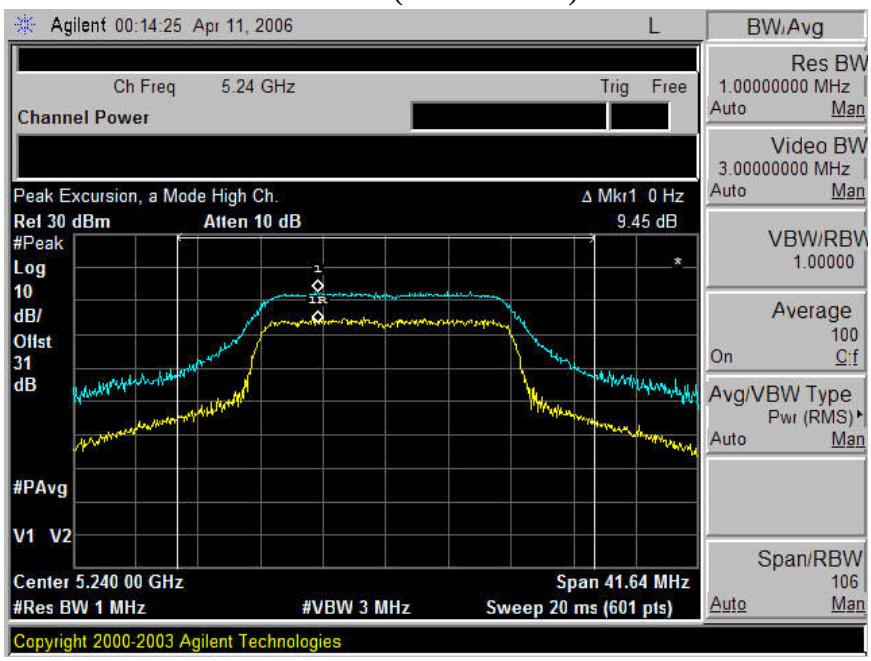
PEAK EXCURSION HIGH CH (802.11a mode)



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7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.407 (b) (1) For transmitters operating in the 5.15-5.25 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:

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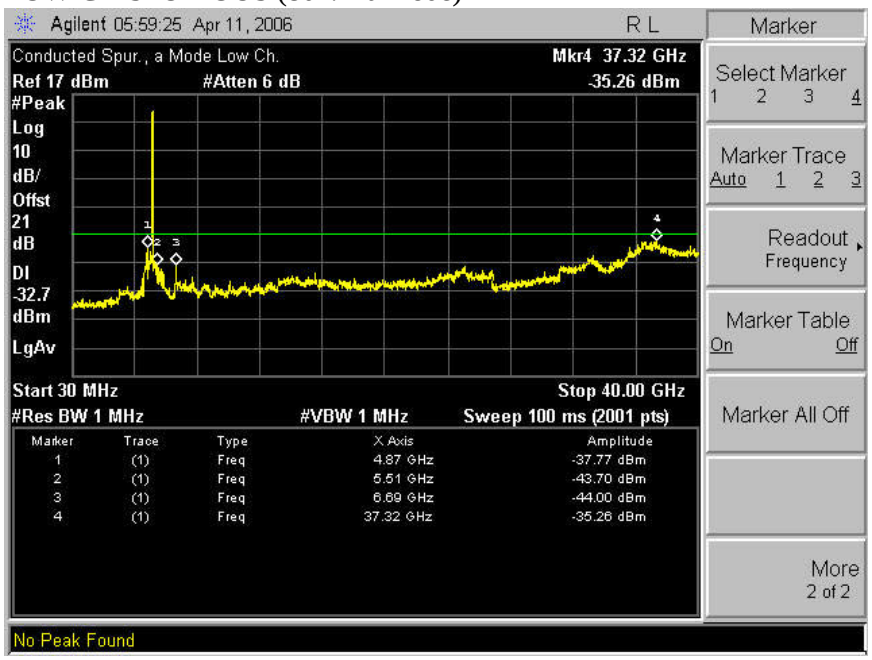
SPURIOUS EMISSIONS (802.11a MODE)

LOW CH SPURIOUS (802.11a mode)



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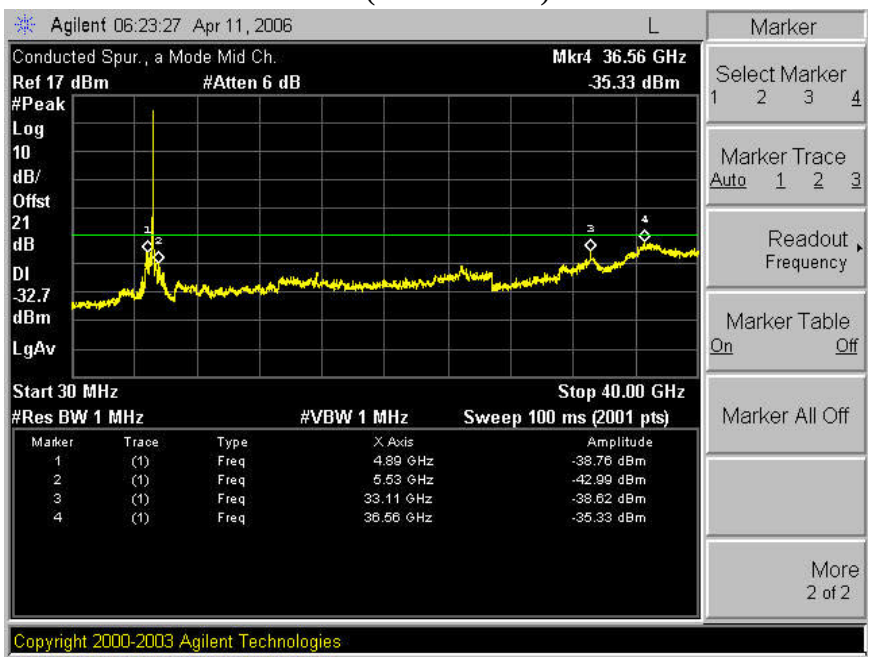
MID CHANNEL SPURIOUS (802.11a mode)



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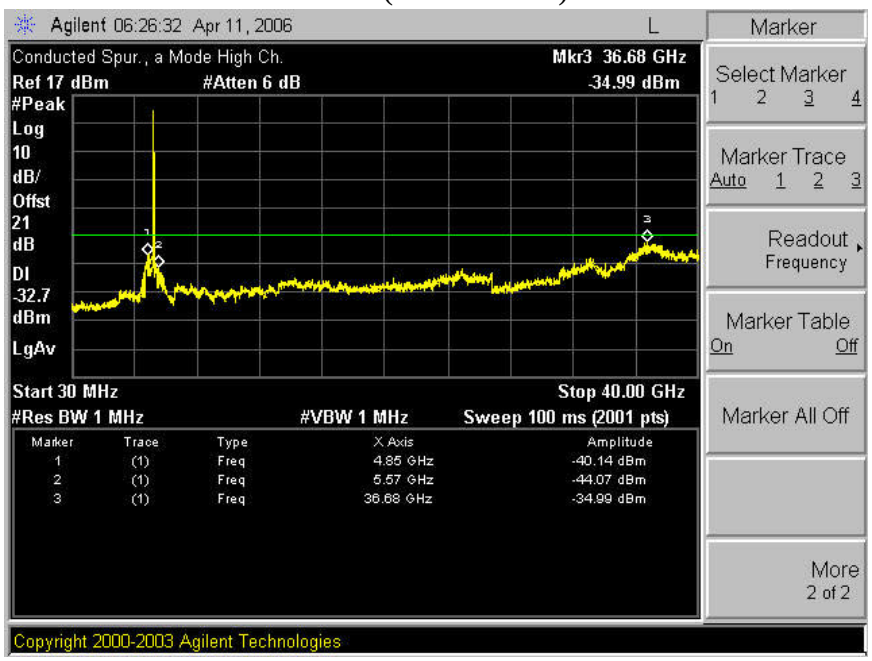
HIGH CHANNEL SPURIOUS (802.11a mode)



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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±5°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.

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Transmit Mid channel 5210MHz

Reference Frequency: a Mode Mid Channel 5210.00000MHz @ 25?C					
Limit: to stay ± 10 ppm = 52100.271 Hz					
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse			
(Vdc)	Temperature (?C)	(MHz)	Delta (ppm)	Limit (ppm)	Delta (KHz)
115.00	50	5210.072192000	-8.662	+- 10	45.128
115.00	40	5210.057040000	-5.754	+- 10	29.976
115.00	30	5210.042050000	-2.876	+- 10	14.986
115.00	**25**	5210.027064000	0.000	+- 10	0.000
115.00	20	5210.028109000	-0.201	+- 10	1.045
115.00	10	5210.029210000	-0.412	+- 10	2.146
115.00	0	5210.030304000	-0.622	+- 10	3.240
115.00	-10	5210.031403500	-0.833	+- 10	4.340
115.00	-20	5210.032512000	-1.046	+- 10	5.448
115.00	-30	5210.033507000	-1.237	+- 10	6.443
97.75	20	5210.027890000	-0.159	+- 10	0.826
132.25	20	5210.027507000	-0.085	+- 10	0.443

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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.

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§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.

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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 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz 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.

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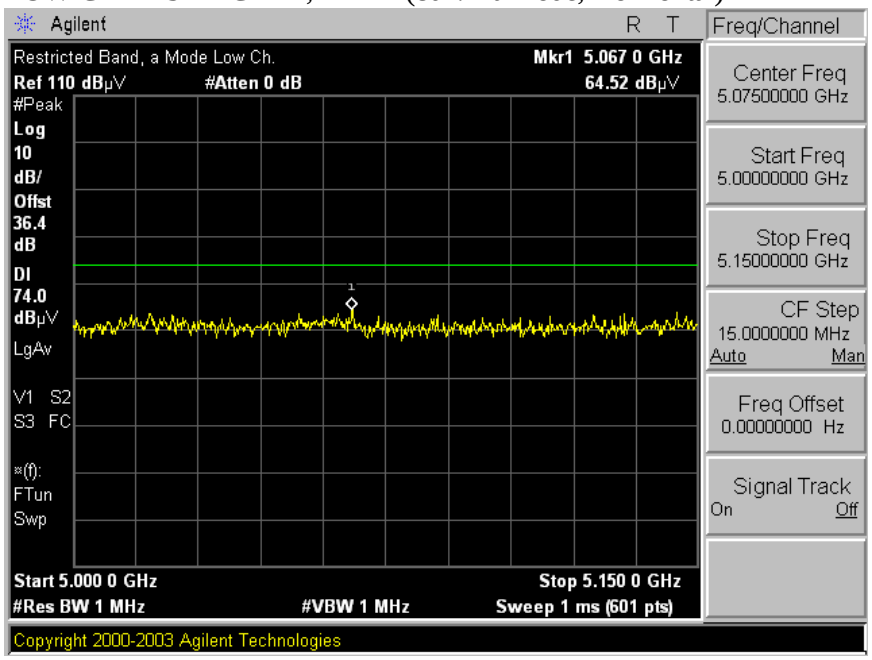
7.2.2. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5250 MHz BANDWIDTH INTERNAL ANTENNA

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

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



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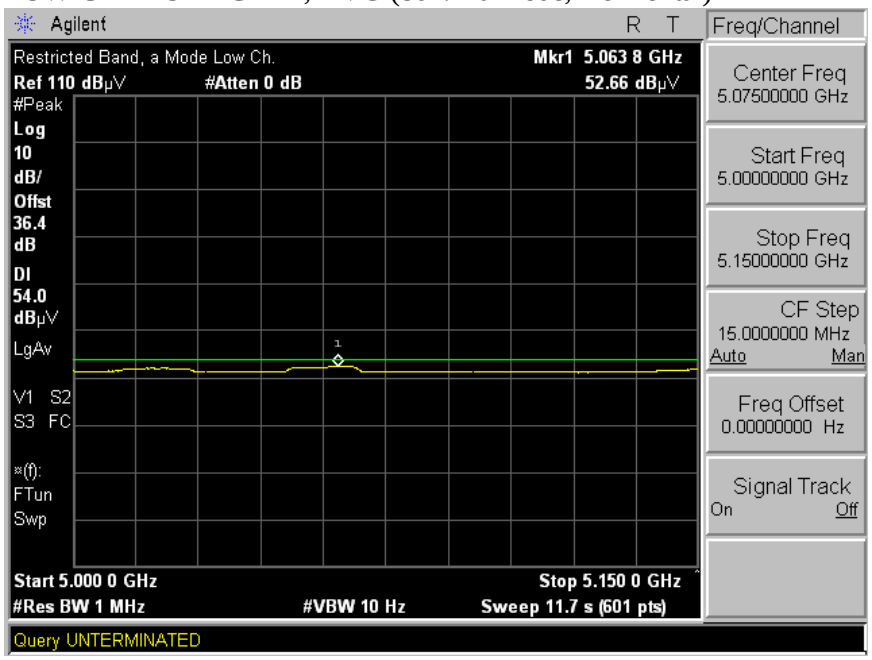
LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)



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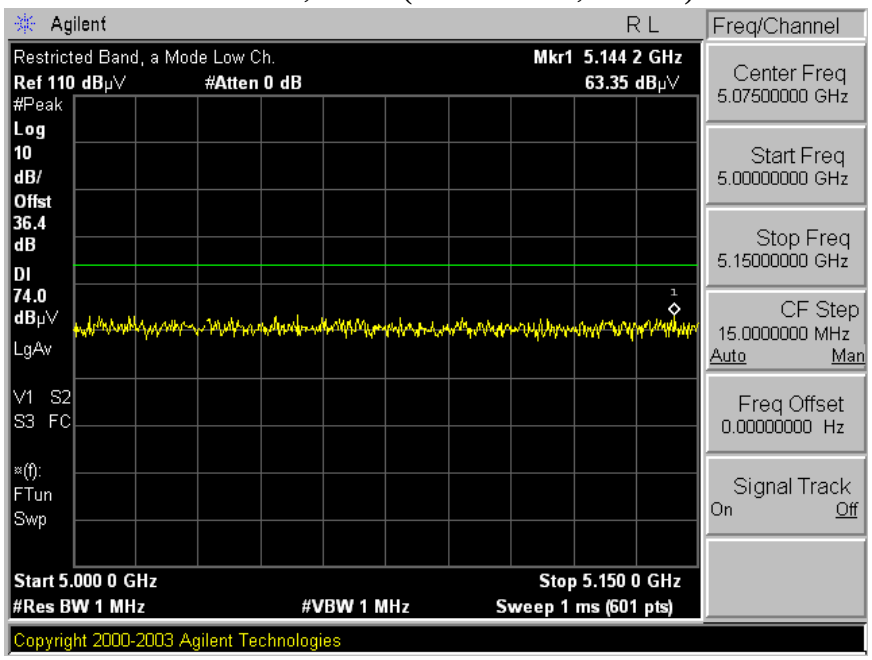
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

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



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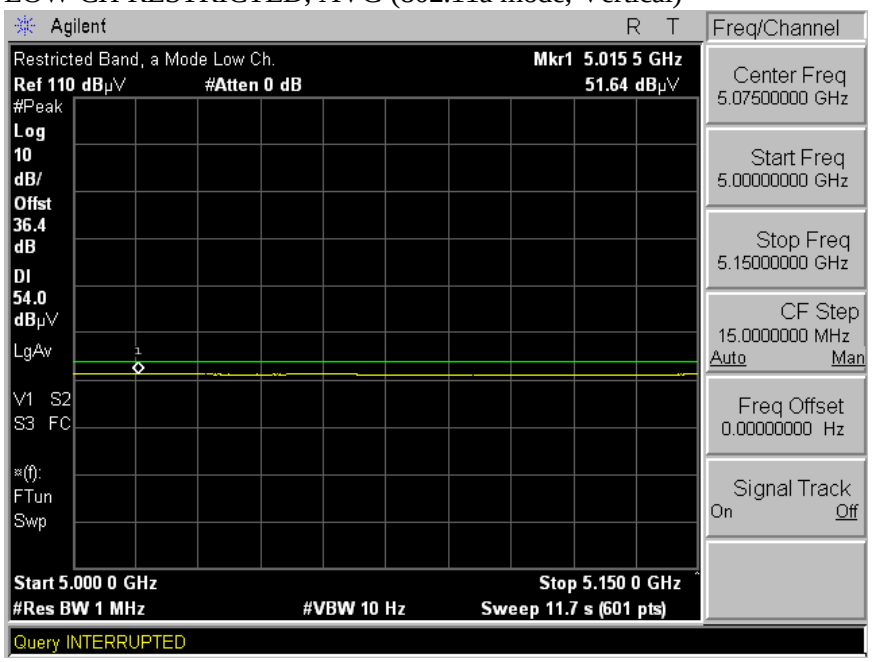
LOW CH RESTRICTED, AVG (802.11a mode, Vertical)



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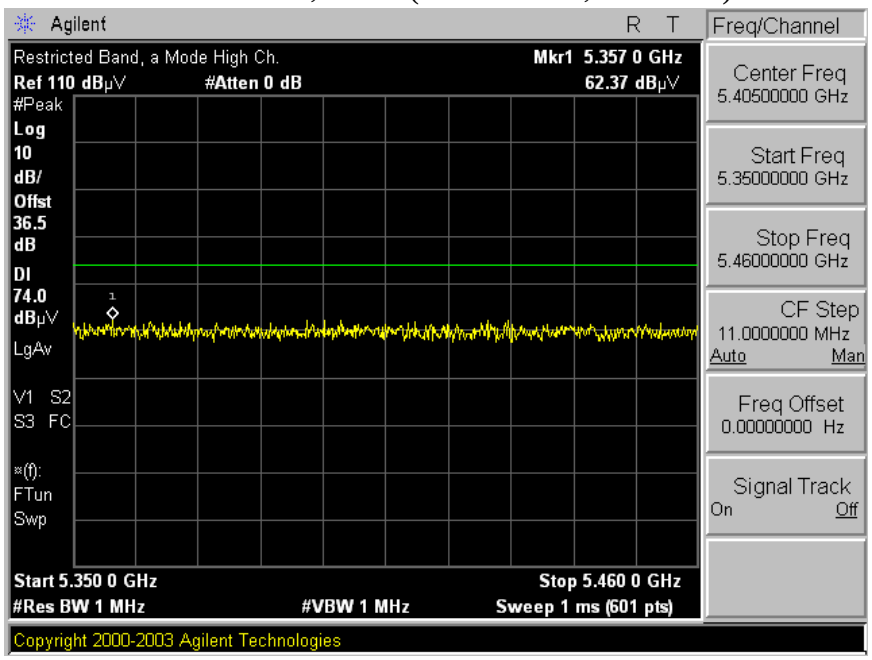
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

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



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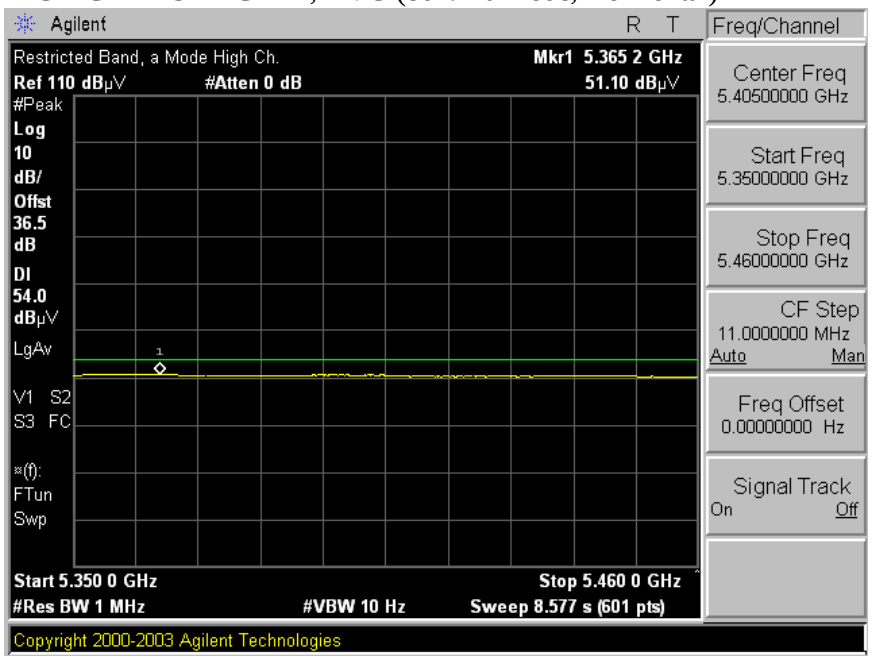
HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)



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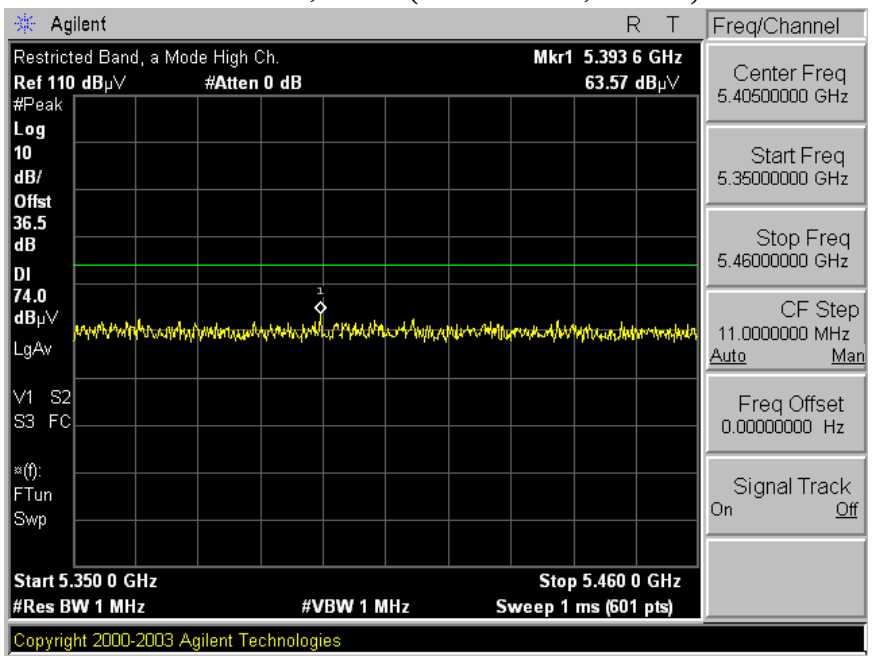
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)

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



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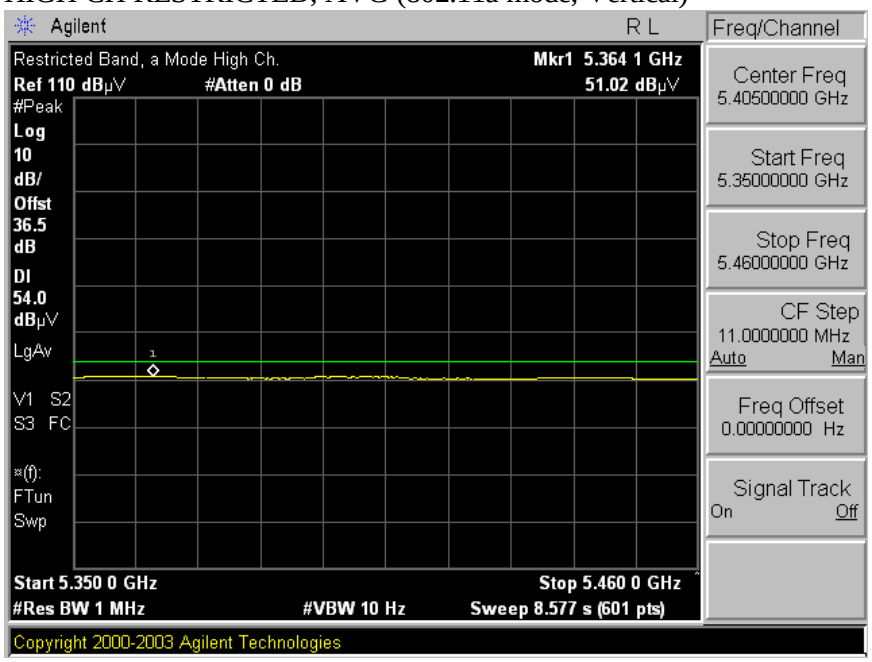
HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)



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HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

04/04/06 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engineer:
Project #: 06U10176-2
Company: HONA R&D Co. LTD
EUT Description: WIRELESS ACCESS POINT
EUT M/N: 70410-QAB
Test Target: FCC Part 15.247
Mode Of Operation: Transmit a mode with Internal Antenna

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Thanh 177079008		Thanh 208946003	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Tx Ch 5240MHz															
10.480	3.0	44.5	31.7	37.9	3.9	-36.7	0.0	0.8	50.4	37.5	74	54	-23.6	-16.5	V
15.720	3.0	44.6	31.3	39.3	4.8	-34.7	0.0	0.7	54.6	41.3	74	54	-19.4	-12.7	Noise floor
10.480	3.0	44.2	30.7	37.9	3.9	-36.7	0.0	0.8	50.1	36.5	74	54	-23.9	-17.5	H
15.720	3.0	44.0	31.3	39.3	4.8	-34.7	0.0	0.7	54.0	41.4	74	54	-20.0	-12.6	Noise floor
Tx mid ch 5210MHz															
10.420	3.0	44.1	30.1	37.9	3.9	-36.8	0.0	0.8	49.8	35.9	74	54	-24.2	-18.1	V
15.630	3.0	43.8	32.3	39.4	4.8	-34.8	0.0	0.7	53.9	42.4	74	54	-20.1	-11.6	Noise floor
10.420	3.0	42.6	29.9	37.9	3.9	-36.8	0.0	0.8	48.4	35.7	74	54	-25.6	-18.3	H
15.630	3.0	44.8	31.2	39.4	4.8	-34.8	0.0	0.7	55.0	41.3	74	54	-19.0	-12.7	Noise floor
Tx low ch 5180MHz															
10.360	3.0	43.4	30.7	37.9	3.9	-36.8	0.0	0.8	49.1	36.4	74	54	-24.9	-17.6	V
15.540	3.0	44.5	32.2	39.6	4.7	-34.8	0.0	0.7	54.6	42.4	74	54	-19.4	-11.6	Noise floor
10.360	3.0	43.2	30.7	37.9	3.9	-36.8	0.0	0.8	48.9	36.4	74	54	-25.1	-17.6	H
15.540	3.0	44.3	31.6	39.6	4.7	-34.8	0.0	0.7	54.5	41.7	74	54	-19.5	-12.3	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		

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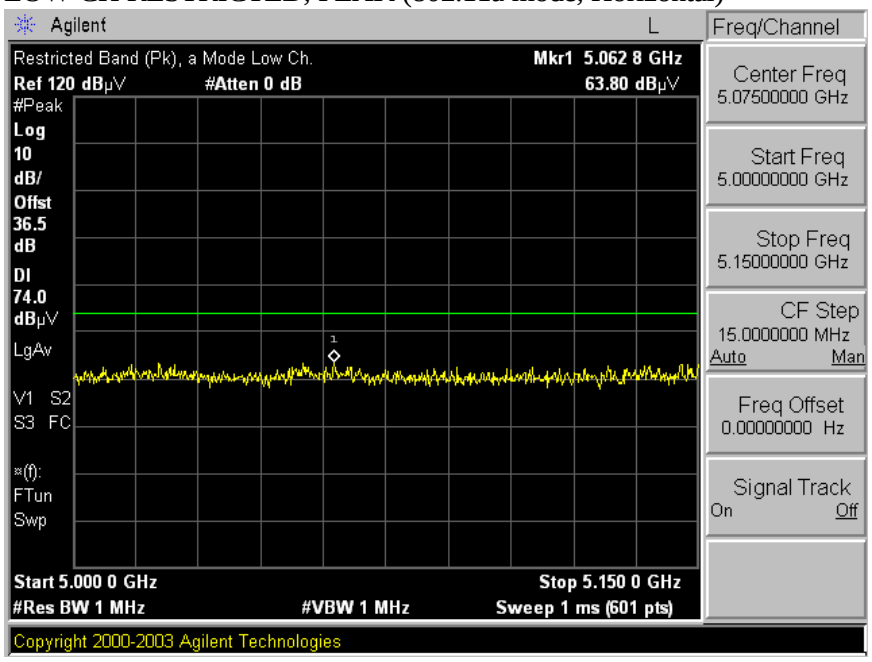
7.2.3. TRANSMITTER ABOVE 1 GHZ FOR 5150 TO 5250 MHz BANDWIDTH EXTERNAL ANTENNA

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

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



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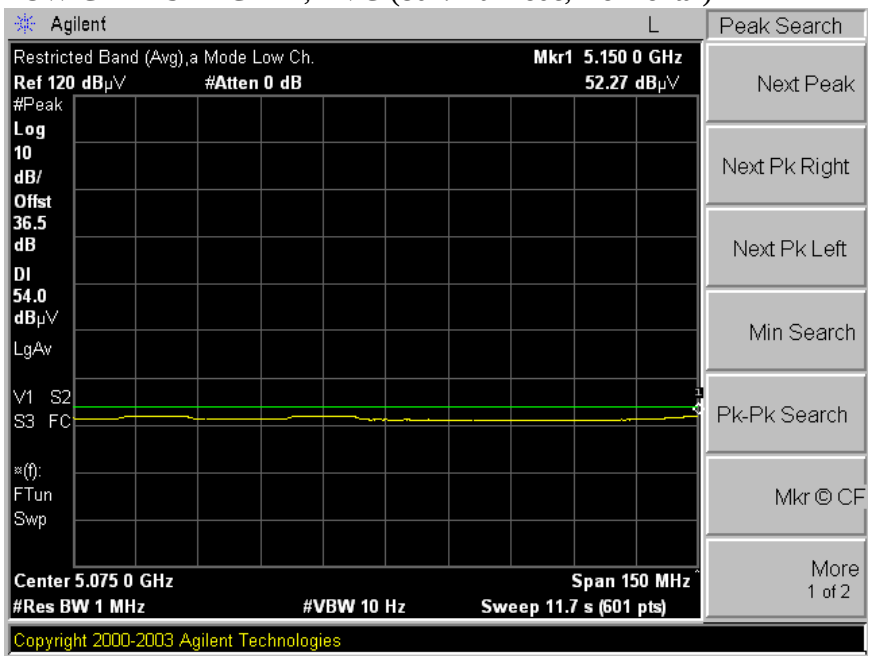
LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)



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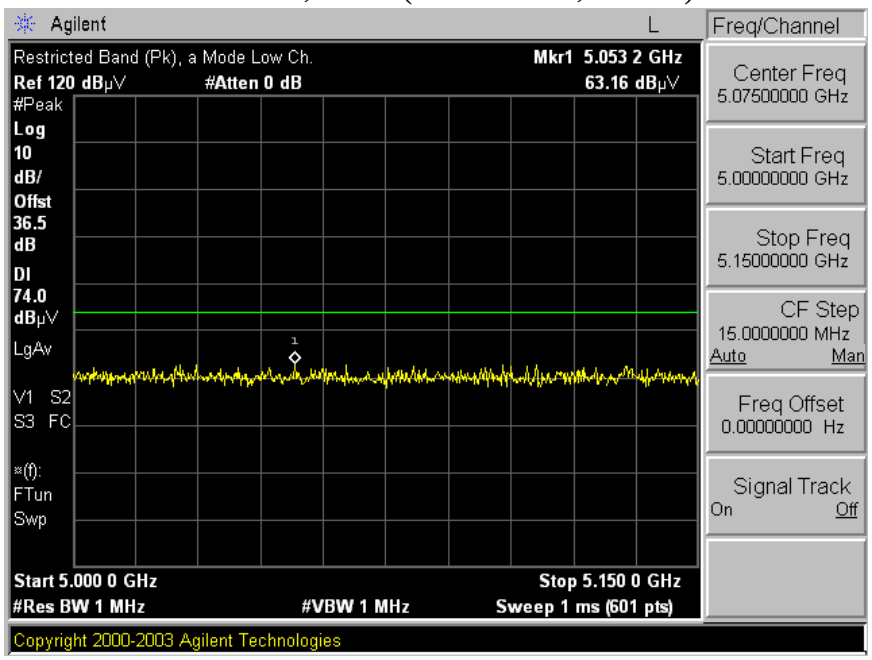
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

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



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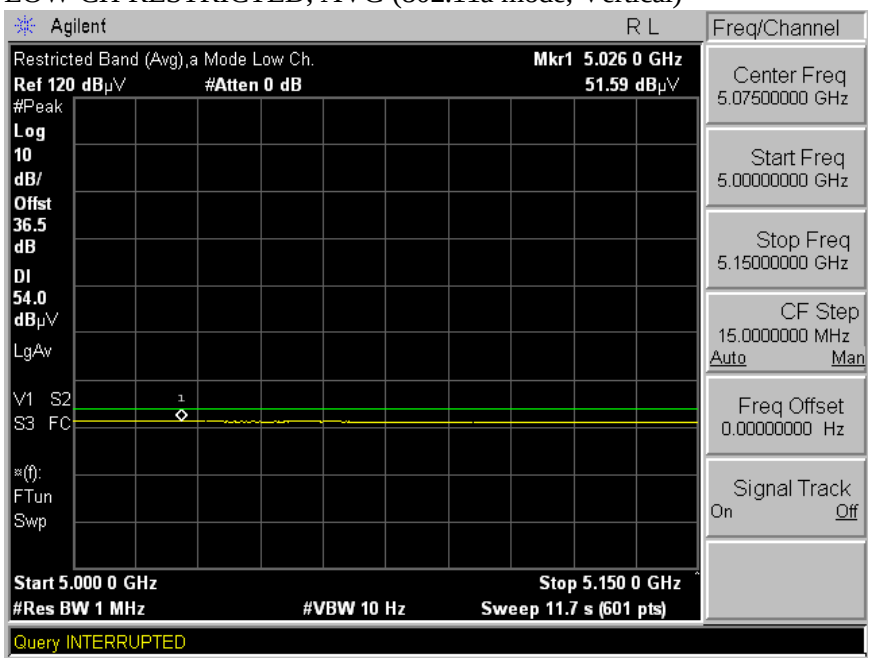
LOW CH RESTRICTED, AVG (802.11a mode, Vertical)



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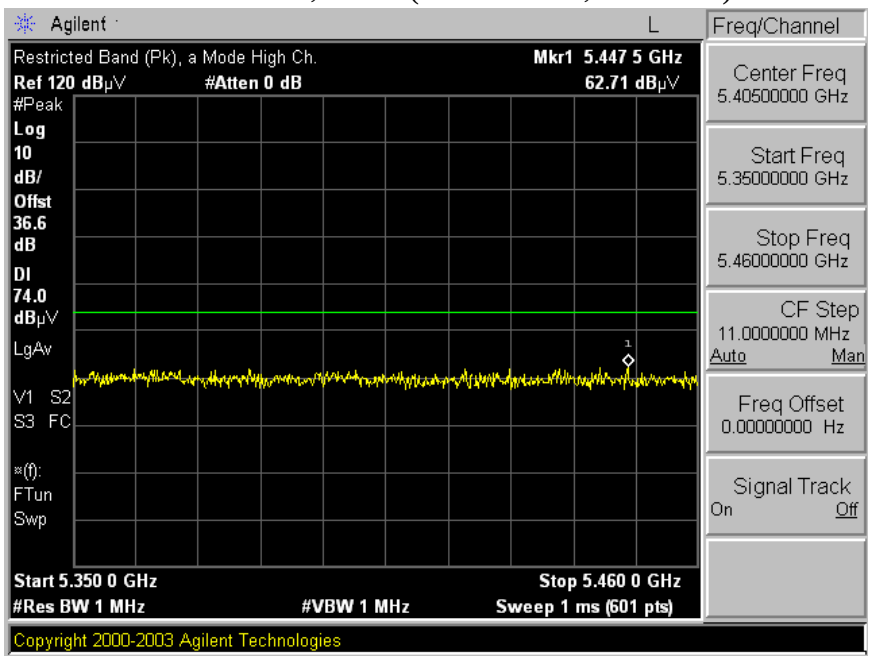
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

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



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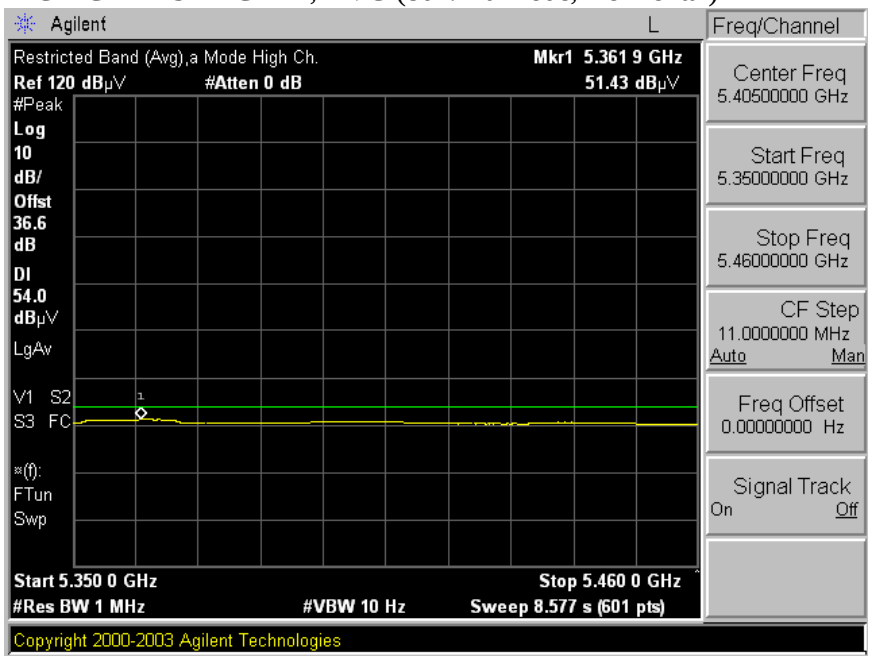
HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)



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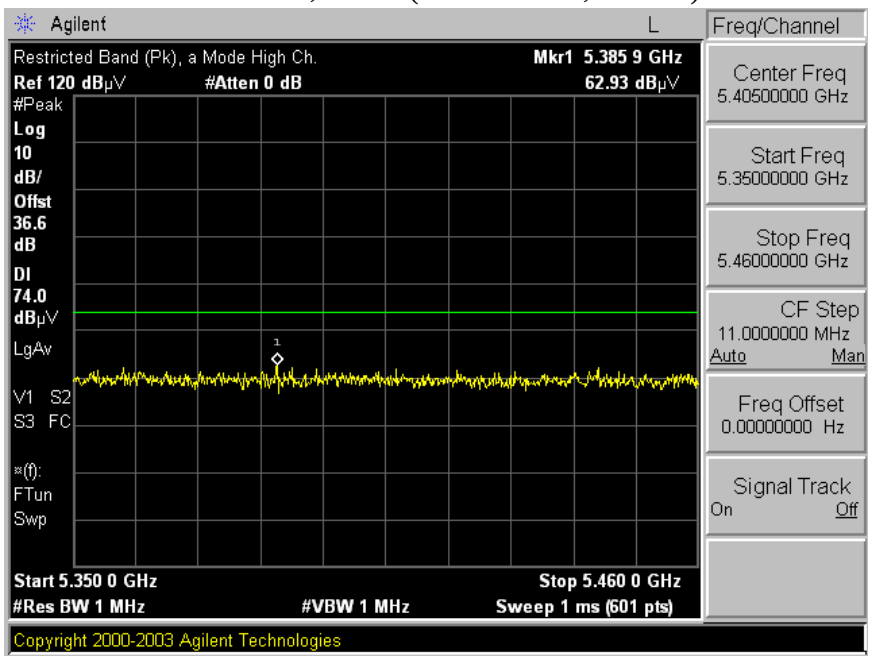
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)

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



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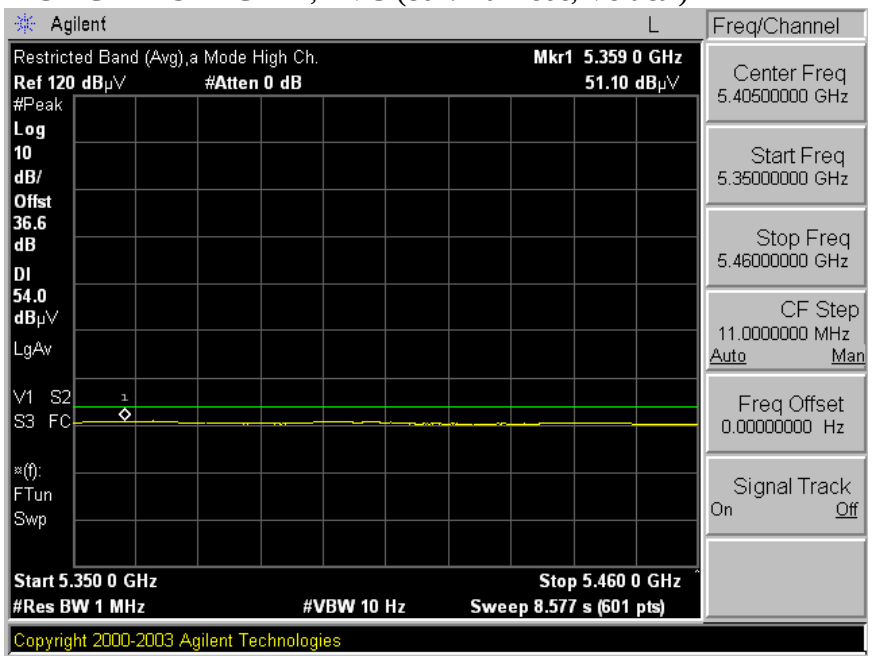
HIGH CH RESTRICTED, AVG (802.11a mode, Vertical)



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HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

04/04/06 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engineer: Thanh Nguyen
Project #: 06U10176-2
Company: HONA R&D Co. LTD
EUT Description: WIRELESS ACCESS POINT
EUT M/N: 70410-QAB
Test Target: FCC Part 15.247
Mode Of Operation: Transmit a mode with External Antenna

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Thanh 177079008		Thanh 208946003	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Tx Ch 5240MHz															
10.434	3.0	56.6	42.1	37.9	3.9	-36.8	0.0	0.8	62.4	48.0	74	54	-11.6	-6.0	V
15.720	3.0	48.6	35.6	39.3	4.8	-34.7	0.0	0.7	58.7	45.7	74	54	-15.3	-8.3	V
21.280	3.0	45.2	34.2	33.5	5.9	-35.1	0.0	0.0	49.4	38.5	74	54	-24.6	-15.5	Noise floor
10.434	3.0	52.2	40.0	37.9	3.9	-36.8	0.0	0.8	58.0	45.8	74	54	-16.0	-8.2	H
15.720	3.0	44.5	32.9	39.3	4.8	-34.7	0.0	0.7	54.5	43.0	74	54	-19.5	-11.0	H
21.280	3.0	44.2	32.9	33.5	5.9	-35.1	0.0	0.0	48.4	37.2	74	54	-25.6	-16.8	Noise floor
Tx mid ch 5210MHz															
10.420	3.0	56.3	44.3	37.9	3.9	-36.8	0.0	0.8	62.1	50.1	74	54	-11.9	-3.9	V
15.630	3.0	49.9	37.1	39.4	4.8	-34.8	0.0	0.7	60.0	47.2	74	54	-14.0	-6.8	V
20.840	3.0	45.0	32.1	33.5	5.8	-35.2	0.0	0.0	49.2	36.3	74	54	-24.8	-17.7	Noise floor
10.420	3.0	49.9	37.7	37.9	3.9	-36.8	0.0	0.8	55.7	43.5	74	54	-18.3	-10.5	H
15.630	3.0	48.4	34.5	39.4	4.8	-34.8	0.0	0.7	58.5	44.6	74	54	-15.5	-9.4	H
20.840	3.0	44.4	32.5	33.5	5.8	-35.2	0.0	0.0	48.5	36.6	74	54	-25.5	-17.4	Noise floor
Tx low ch 5180MHz															
10.360	3.0	53.5	42.2	37.9	3.9	-36.8	0.0	0.8	59.2	47.9	74	54	-14.8	-6.1	V
15.540	3.0	50.8	38.3	39.6	4.7	-34.8	0.0	0.7	61.0	48.4	74	54	-13.0	-5.6	V
20.720	3.0	45.7	33.0	33.5	5.8	-35.1	0.0	0.1	49.9	37.2	74	54	-24.1	-16.8	Noise floor
10.360	3.0	49.2	37.2	37.9	3.9	-36.8	0.0	0.8	54.9	42.9	74	54	-19.1	-11.1	H
15.540	3.0	44.3	32.7	39.6	4.7	-34.8	0.0	0.7	54.5	42.9	74	54	-19.5	-11.1	H
20.720	3.0	44.5	33.0	33.5	5.8	-35.1	0.0	0.1	48.7	37.2	74	54	-25.3	-16.8	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		

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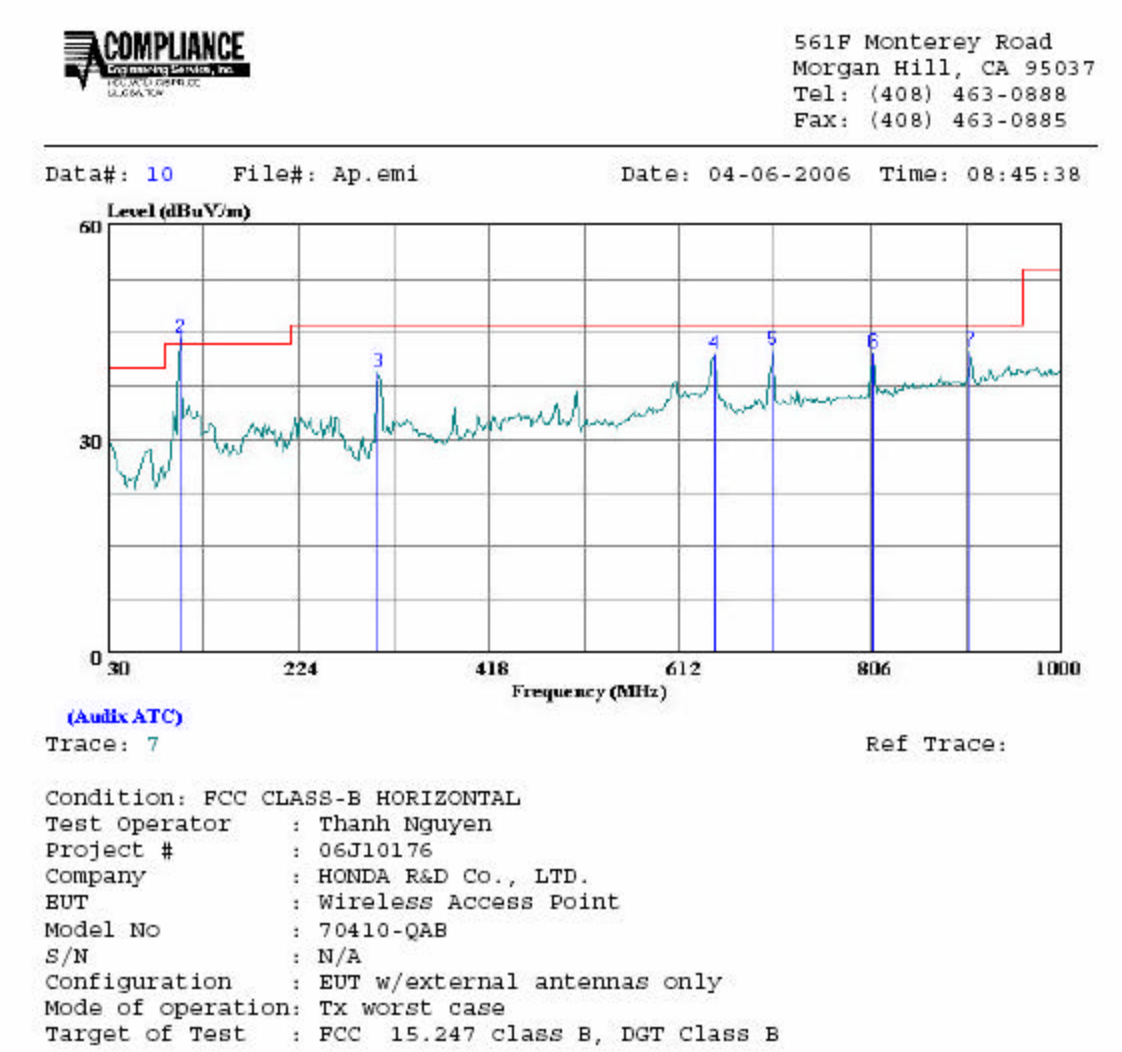
7.2.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

HORIZONTAL PLOT



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HORIZONTAL DATA

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1		104.690	30.40	12.38	42.78	43.50	-0.72	QP
2	*	104.690	31.94	12.38	44.32	43.50	0.82	Peak
3		305.480	23.70	15.80	39.50	46.00	-6.50	Peak
4		647.890	19.56	22.29	41.85	46.00	-4.15	Peak
5		708.030	19.41	23.23	42.64	46.00	-3.36	Peak
6		807.940	17.39	24.69	42.08	46.00	-3.92	Peak
7		906.880	16.41	26.01	42.42	46.00	-3.58	Peak

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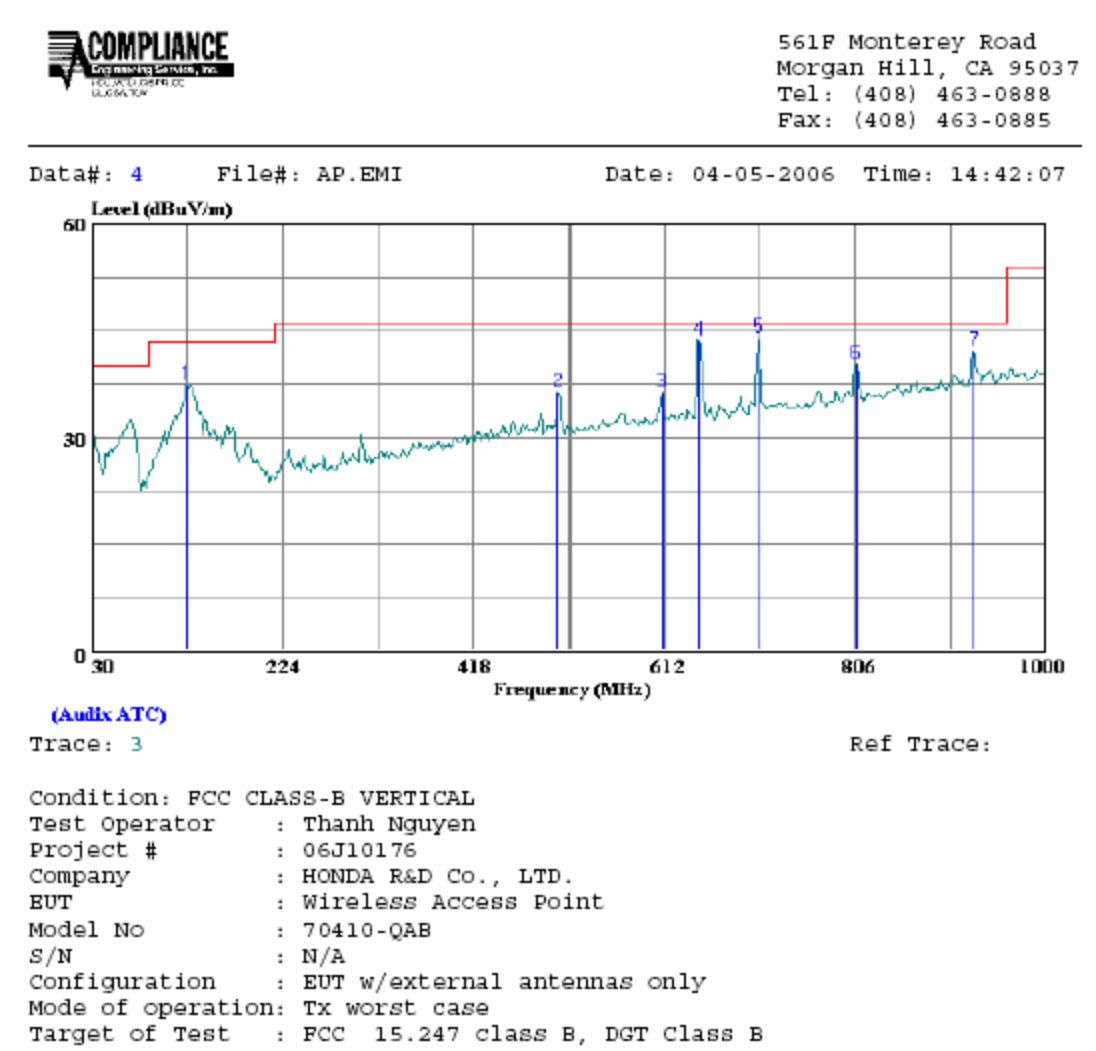
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



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VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	127.000	22.11	15.22	37.34	43.50	-6.16	Peak
2	504.330	16.17	20.26	36.43	46.00	-9.57	Peak
3	609.090	14.62	21.66	36.28	46.00	-9.72	Peak
4	645.950	21.28	22.25	43.53	46.00	-2.47	Peak
5	708.030	20.80	23.23	44.03	46.00	-1.97	Peak
6	806.970	15.67	24.66	40.33	46.00	-5.67	Peak
7	926.280	15.99	26.23	42.22	46.00	-3.78	Peak

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7.3. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

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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
0.21	50.72	--	--	0.00	63.41	53.41	-12.69	-2.69	L1
2.69	37.16	--	--	0.00	56.00	46.00	-18.84	-8.84	L1
12.12	41.00	--	--	0.00	60.00	50.00	-19.00	-9.00	L1
0.20	52.76	--	--	0.00	63.45	53.45	-10.69	-0.69	L2
2.46	38.36	--	--	0.00	56.00	46.00	-17.64	-7.64	L2
12.38	41.26	--	--	0.00	60.00	50.00	-18.74	-8.74	L2
6 Worst Data									

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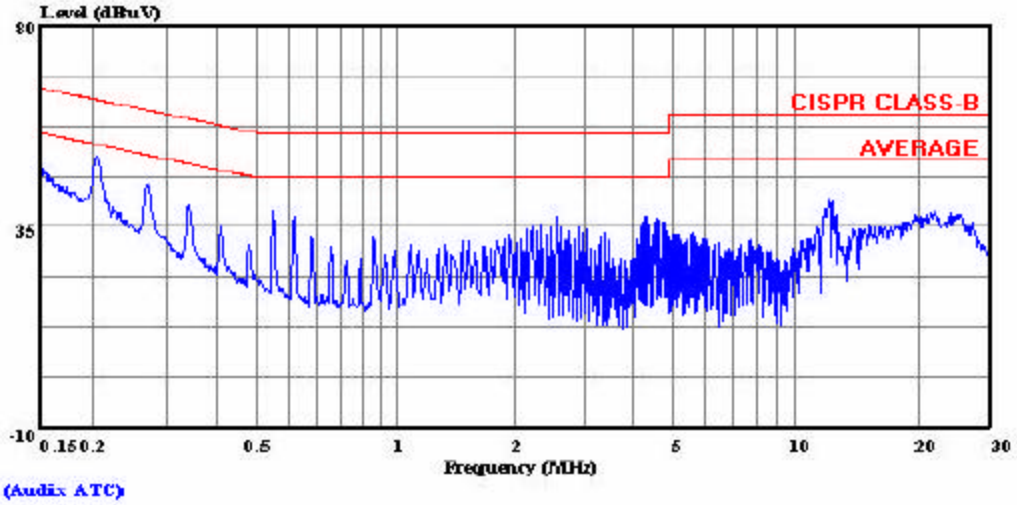
LINE 1 RESULTS

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

Data#: 32 File#: 176 fcc.emi Date: 04-15-2006 Time: 10:38:26



Trace: Ref Trace:

Condition: CISPR CLASS-B
Test Operator : Thanh Nguyen
Project # : 06U10176-1
Company : HONDA R&D
EUT Description : Wireless Access Point
Model : 70410-QAB
EUT Config : EUT connect to remote support Laptop
Mode Of Operation: TX worst case
Target : FCC CLASS B
Power Source : 115VAC, 60 Hz
: Line 1: Peak(Blue)

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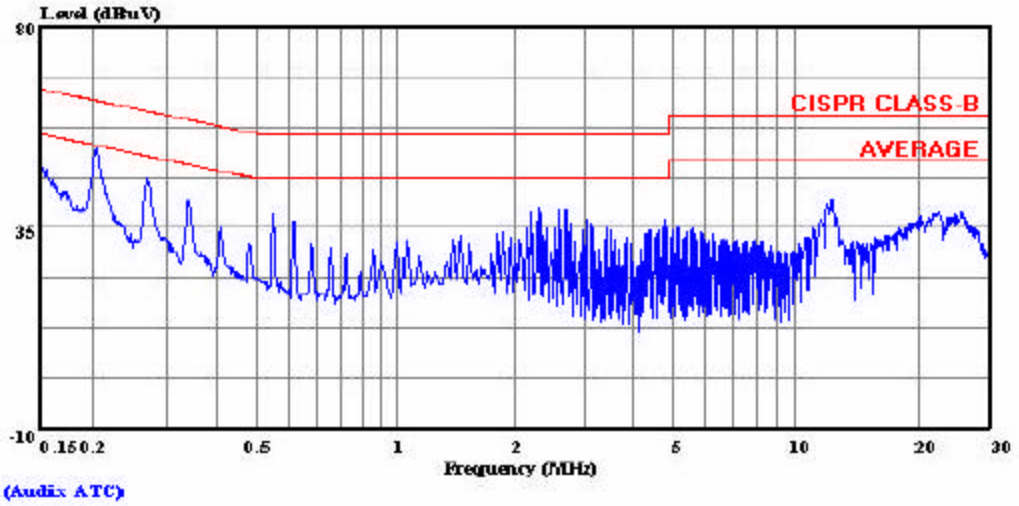
LINE 2 RESULTS

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

Data#: 17 File#: 176 fcc.emi Date: 04-15-2006 Time: 10:00:33



Trace: Ref Trace:

Condition: CISPR CLASS-B
Test Operator : Thanh Nguyen
Project # : 06U10176-1
Company : HONDA R&D
EUT Description : Wireless Access Point
Model : 70410-QAB
EUT Config : EUT connect to remote support Laptop
Mode Of Operation: TX worst case
Target : FCC CLASS B
Power Source : 115VAC, 60 Hz
: Line 2: Peak(Blue)

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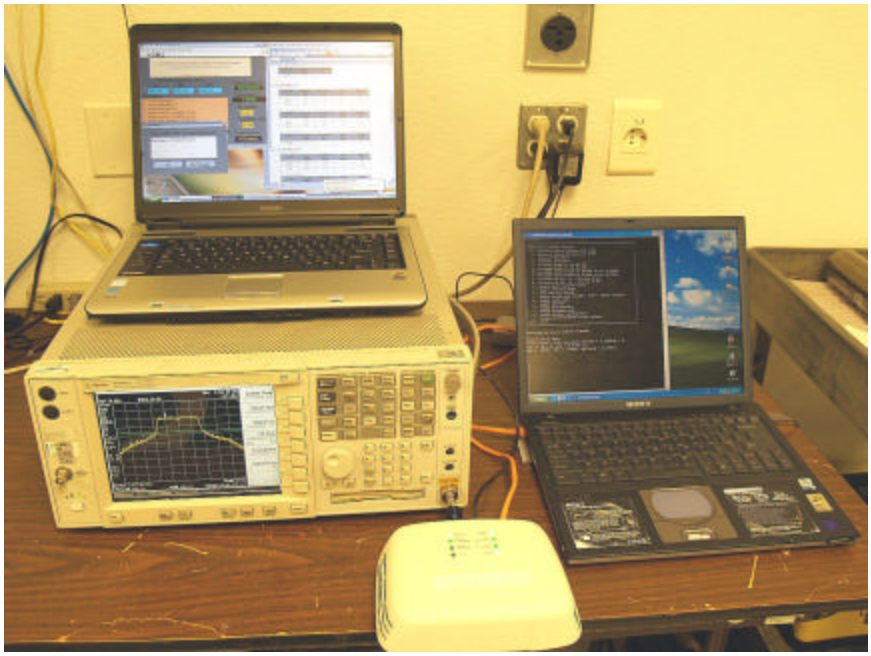
8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



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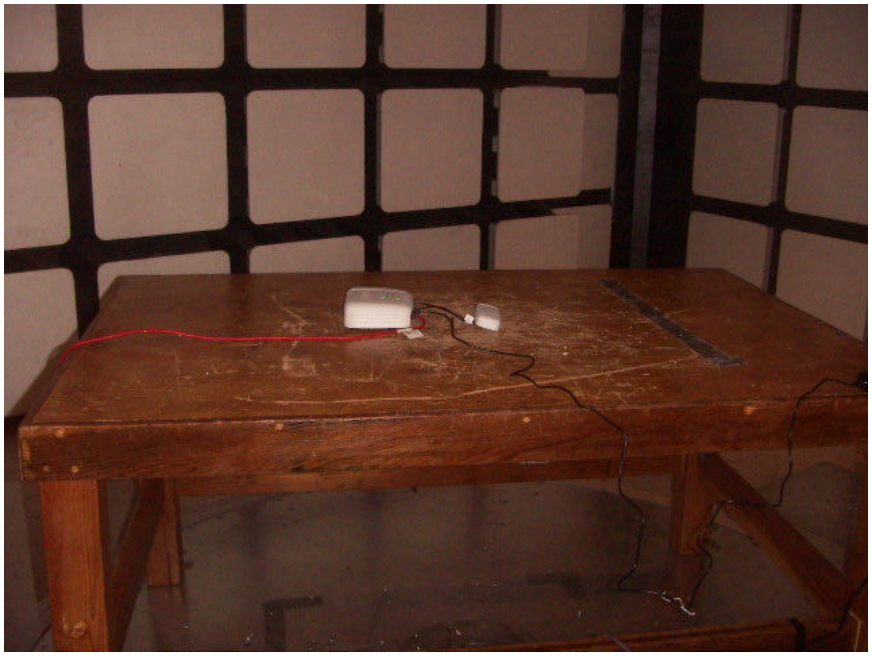
RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO



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RADIATED BACK PHOTO

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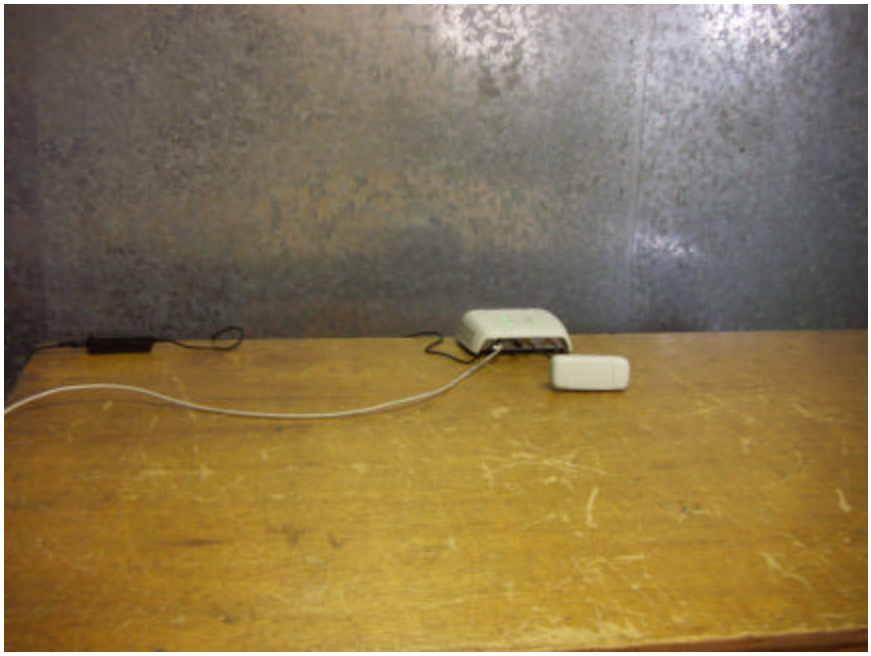
POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



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LINE CONDUCTED BACK PHOTO

END OF REPORT

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