



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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January 12, 2007

IBM Corporation
3039 Cornwallis Dr.
Research Triangle Park, NC 27709

Dear John Hibbard,

Enclosed is the EMC test report for compliance testing of the IBM Corporation, 12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-03 ed.), Part 15, Subpart C.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jesse J. Trawinski
Documentation Department

Reference: (\\IBM Corporation\\EMC21359-FCC247)

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IBM Corporation
AnyPlace Kiosk

CFR Title 47, Part 15, Subpart C

Electromagnetic Compatibility Test Report

for the

**IBM Corporation
12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card**

Verified under
the FCC Certification Rules
contained in
Title 47 of the CFR, Part 15.247, Subpart C
for Intentional Radiators

MET Report: EMC21359-FCC247

January 12, 2007

Prepared For:

**IBM Corporation
3039 Cornwallis Dr.
Research Triangle Park, NC 27709**

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Avenue
Baltimore, Maryland 21230



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Dusmantha Tennakoon, Project Engineer
Electromagnetic Compatibility Lab

Jesse J. Trawinski
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15.407, of the FCC Rules under normal use and maintenance.

Kevin Mehaffey, Manager
Electromagnetic Compatibility Lab



IBM Corporation
AnyPlace Kiosk

CFR Title 47, Part 15, Subpart C

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	January 12, 2007	Initial Issue.



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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB μ A	Decibels above one microamp
dB μ V	Decibels above one microvolt
dB μ A/m	Decibels above one microamp per meter
dB μ V/m	Decibels above one microvolt per meter
DC	Direct Current μ
E	Electric Field
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μ H	microhenry
μ	microfarad
μ s	microseconds
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane



I. Executive Summary



A. Purpose of Test

An EMC evaluation was performed to determine compliance of the IBM Corporation, 12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card, with the requirements of Part 15, §15.247. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the 12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card. IBM Corporation should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the 12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card, has been **permanently** discontinued

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.247, in accordance with IBM Corporation, purchase order number PO-NP2519864. All tests were conducted using measurement procedure ANSI C63.4-2003.

Reference	Description	Results
Title 47 of the CFR, Part 15, Subpart C, §15.207	AC Power Line Conducted Emissions	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.203/15.247(b)(c)	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.205(d)	Band Edge Emissions	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.247(a)(2)	6dB Occupied Bandwidth	Not Tested/ Evaluated at MET
Title 47 of the CFR, Part 15, Subpart C, §15.247(b)(3)	Maximum Peak Conducted Output Power	Not Tested/ Evaluated at MET
Title 47 of the CFR, Part 15, Subpart C, §15.247(d)	Spurious Radiated Emissions	Compliant
Title 47 of the CFR, Part 15, Subpart C, §15.247(e)	Peak Power Spectral Density	Not Tested/ Evaluated at MET

Table 1 Executive Summary of EMC Part 15.247 Compliance Testing



II. Equipment Configuration



A. Overview

MET Laboratories, Inc. was contracted by IBM Corporation to perform testing on the 12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card, under IBM Corporation's purchase order number PO-NP2519864.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the IBM Corporation, 12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card.

The results obtained relate only to the item(s) tested.

Type of Submission	Class 11 Permissive change	
Model(s) Tested:	12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card	
Model(s) Covered:	12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card	
EUT Specifications:	Primary Power: 120VAC, 60Hz	
	FCC ID:	
	Type of Modulations:	802.11b/g (DSSS, OFDM)
	Equipment Code:	DTS
	EUT TX Frequency Ranges:	2.412 – 2.462 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Evaluated by:	Dusmantha Tennakoon	
Date(s):	January 12, 2007	

Note 1: The GIGABYTE wireless card is a pre-approved module (FCC ID: JCK-GN-WIAG02) and it is being inserted into a 12", 15" and 17" touchscreen monitor host. Also, there is a change of antenna. The new antenna has a lower gain than what was originally approved.

Note 2: MET labs was not tasked to test the digital portion (FCC Subpart B) of these devices.



Channel Number	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

Table 2. Frequency Allocation for 802.11/b/g

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a semi-anechoic chamber. In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories. In accordance with §2.948(d), MET Laboratories has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0).

D. Description of Test Sample

The 12", 15" and 17" 4838 AnyPlace Kiosk with Gigabyte GN-WIAG02 WLAN Card, Equipment Under Test (EUT), is an 802.11 Access Point. The system supports 802.11 b/g via an Atheros AP30 chipset.



IBM Corporation
AnyPlace Kiosk

Equipment Configuration
CFR Title 47, Part 15, Subpart C



Photograph 1. Front View of 12" Model



Photograph 2. Front View of 15" Model



Photograph 3. Front View of 17" Model



E. Equipment Configuration

All cards, etc., incorporated as part of the EUT is included in the following list.

Name / Description	S/N	Manufacturer	Model Number
12" AnyPlace Kiosk	41-B0960	IBM	M/T 4838
15" AnyPlace Kiosk	41-B1100	IBM	M/T 4838
17" AnyPlace Kiosk	41-A1220	IBM	M/T 4838

Table 3. Equipment Configuration

Note: All of the above units had the 802.11 b/g Gigabyte wireless card installed in them.

F. Mode of Operation

The WLAN transmitter is being operated using the Atheros Radio Transmitter (ART) software program. This program allows operation in both 802.11b, 802.11g, and 802.11g turbo modes at all data rates for any of the 11 channels. A USB keyboard is attached to allow interaction with the program options.

The 802.11b mode is set to transmit at 22dBm by the ART software.

The 802.11g mode is set to transmit at 19dBm.

These are the highest settings that IBM is going to be using

G. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

H. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to IBM Corporation upon completion of testing.



III. Electromagnetic Compatibility Criteria for Intentional Radiators



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement:

§ 15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results:

The EUT as tested meets the criteria of this rule by virtue of being professionally installed. The EUT is therefore compliant with §15.203.

Name / Description	Gain (Peak)
12" unit, Inverted F Type Antenna	1.45 dBi
15" unit, Inverted F Type Antenna	1.45 dBi
17" unit, Inverted F Type Antenna	1.45 dBi

Note: The antenna are identical on all three units. Also, the gain of the antenna is less than what was originally certified.

Test Engineer(s):

Dusmantha Tennakoon

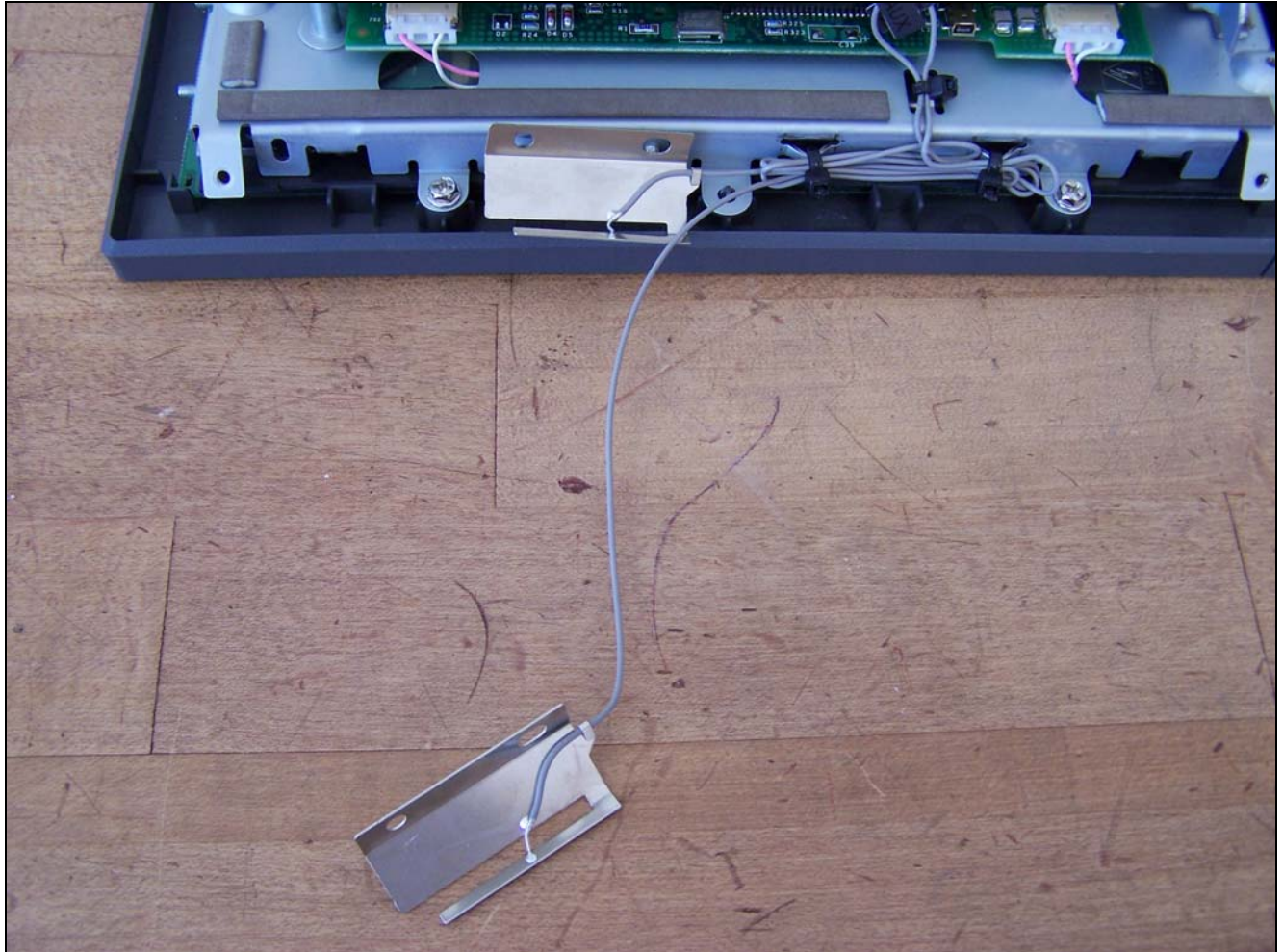
Test Date(s):

January 4, 2007



IBM Corporation
AnyPlace Kiosk

Electromagnetic Compatibility
CFR Title 47, Part 15, Subpart C



Photograph 4. View of Inverted F Type Antenna



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.205 Band Edge Emissions

Test Requirement(s): § 15.205 (a): Except as shown in paragraph (d) of **15.205 Restricted bands of operation**, only spurious emissions are permitted in any of the frequency bands specified in Table 4:

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
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	Note
13.36–13.41.			
Note : Above 38.6			

Table 4. Restricted Bands of Operation from FCC Part 15, § 15.205

Test Procedure: The EUT was set up at maximum power, first on Channel 1, then on Channel 11. It was verified that the first channel and the last channel were within the band 2400-2480 MHz and not infringing upon the restricted bands. The EUT was tested in 802.11b , 802.11g and turbo modes of operation. For turbo mode channel 6 was tested.

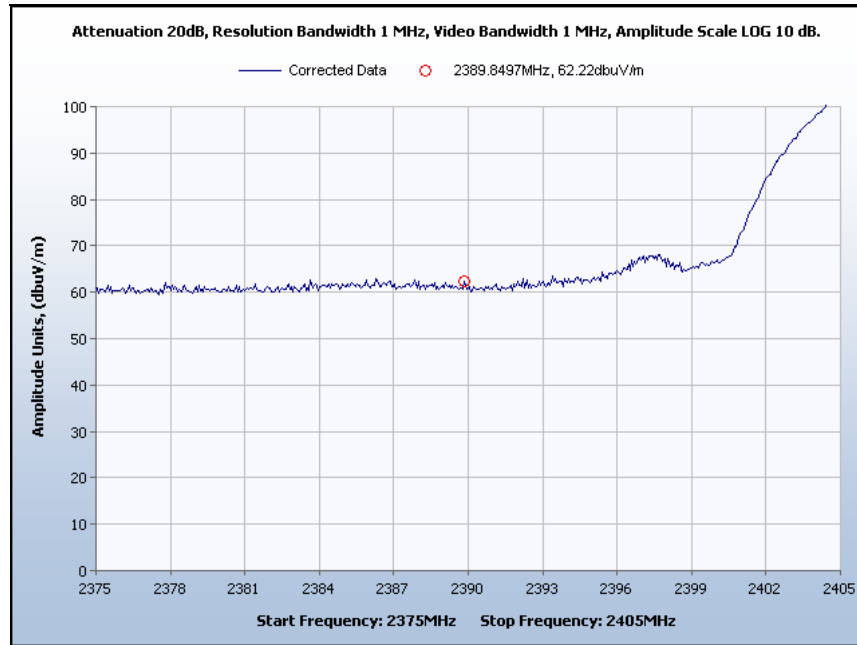
Test Results: The EUT was found compliant with the requirements of this section.
All corrections are incorporated in to the plot.

Test Engineer: Dusmantha Tennakoon

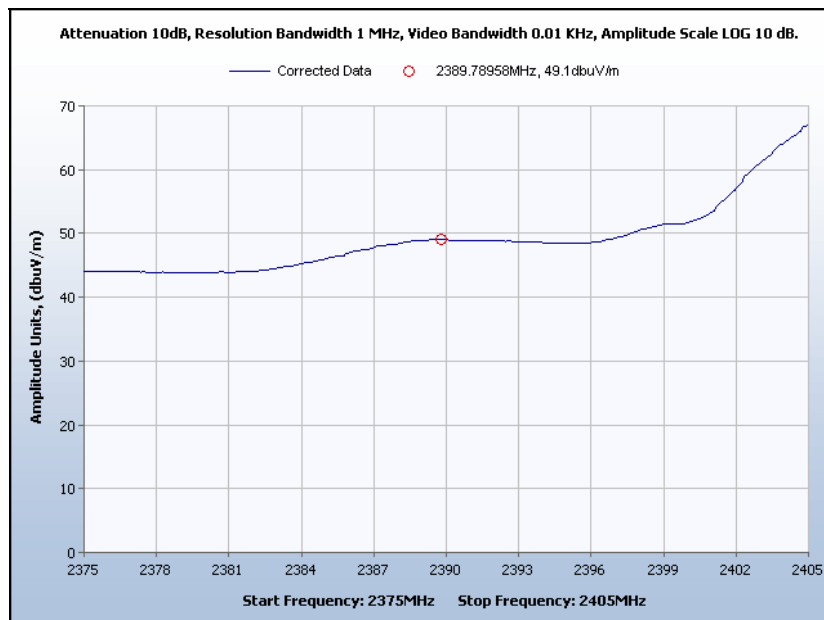
Test Date: January 9, 2006



Band Edge Emissions – Test Results (12” Model)



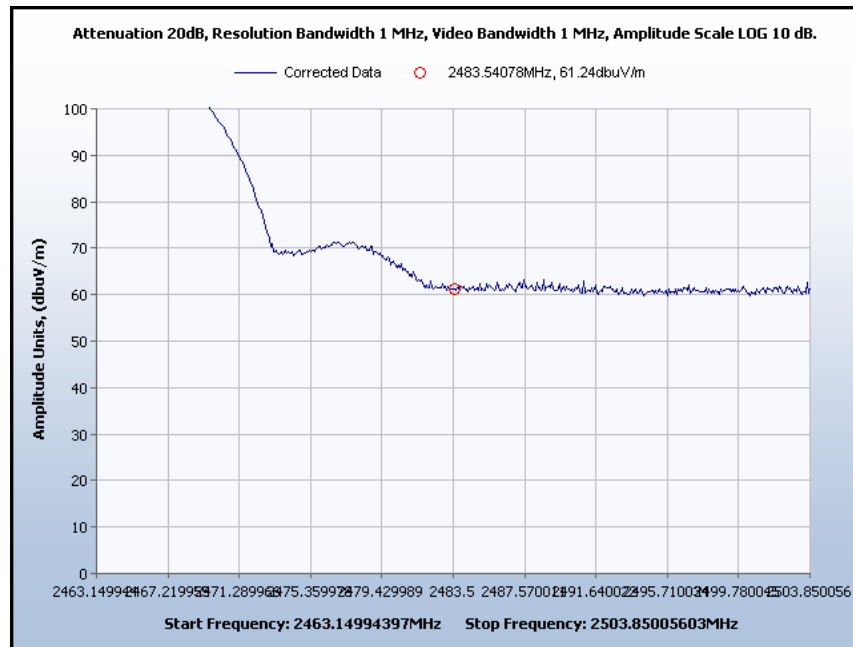
Plot 1. Band Edge Emissions, 12” Model, Channel 1 Peak, 802.11 b



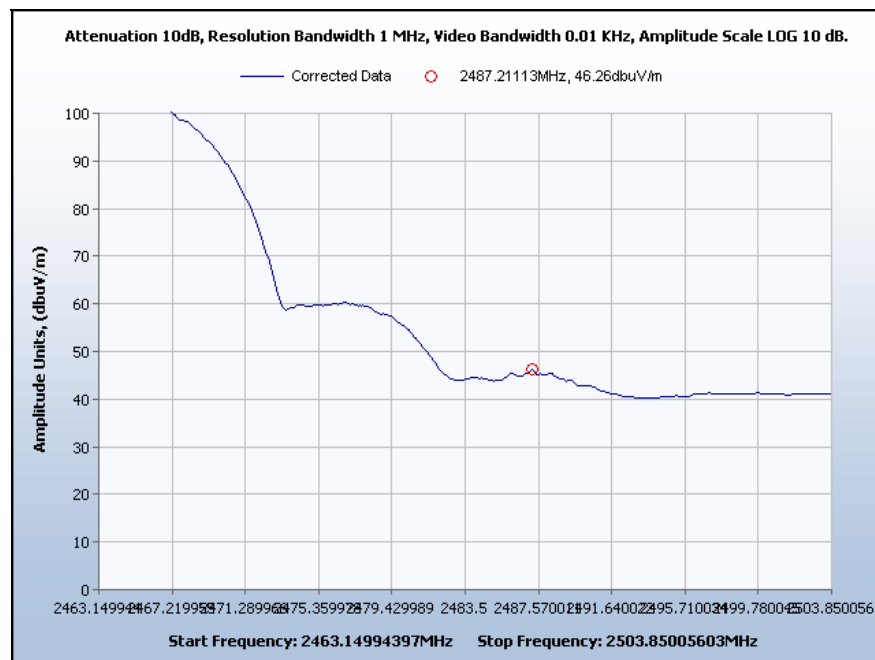
Plot 2. Band Edge Emissions, 12” Model, Channel 1 Average, 802.11 b



Band Edge Emissions – Test Results (12" Model)



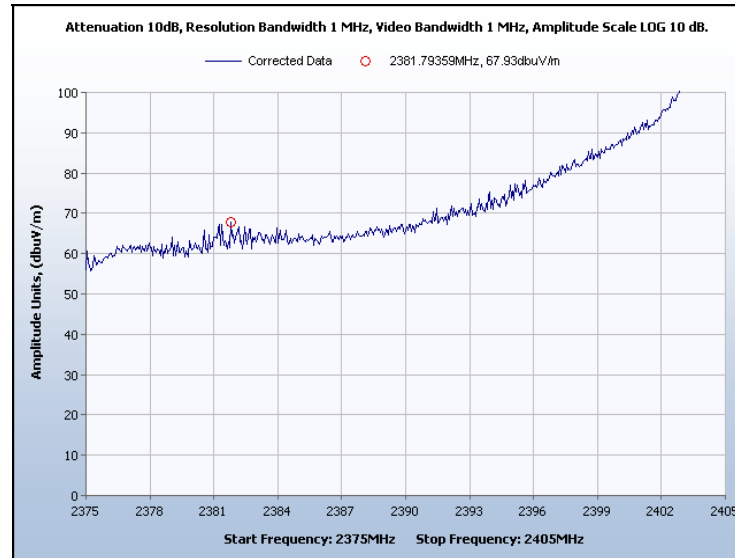
Plot 3. Band Edge Emissions, 12" Model, Channel 11 Peak, 802.11 b



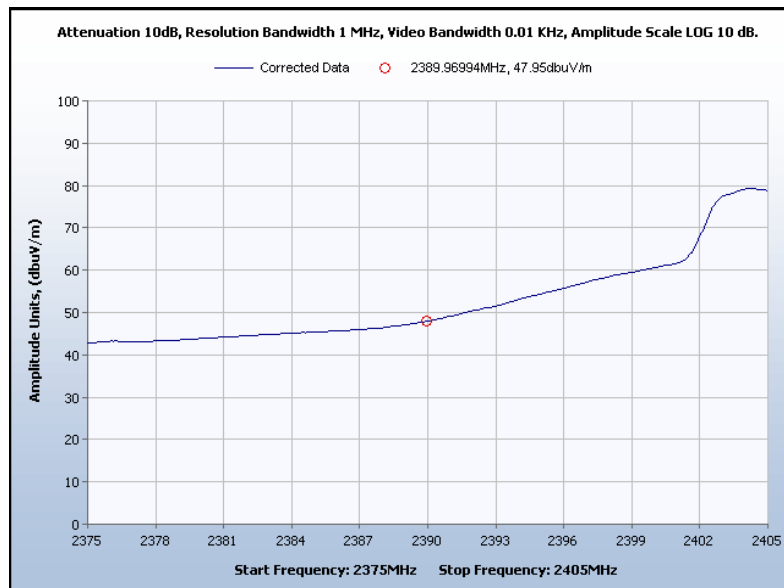
Plot 4. Band Edge Emissions, 12" Model, Channel 11 Average, 802.11 b



Band Edge Emissions – Test Results (12” Model)



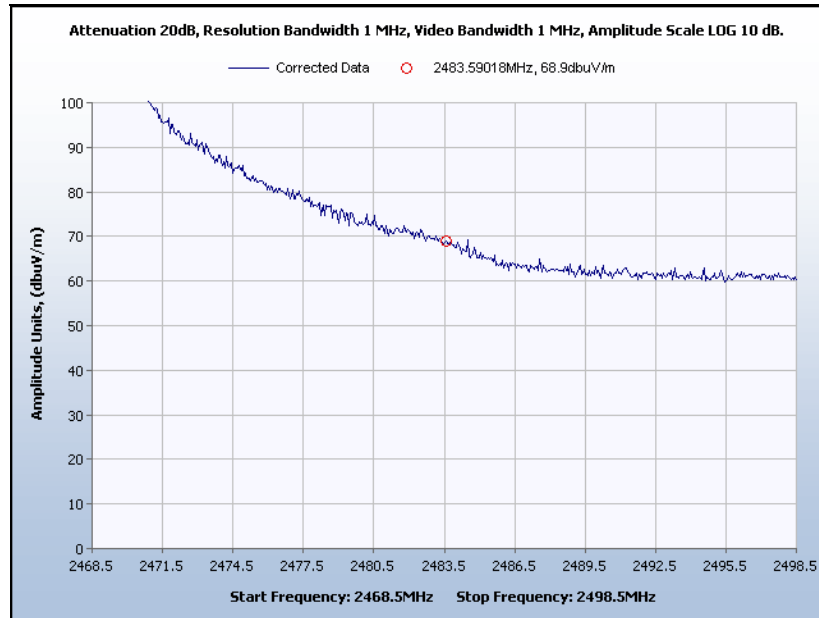
Plot 5. Band Edge Emissions, 12” Model, Channel 1 Peak, 802.11 g



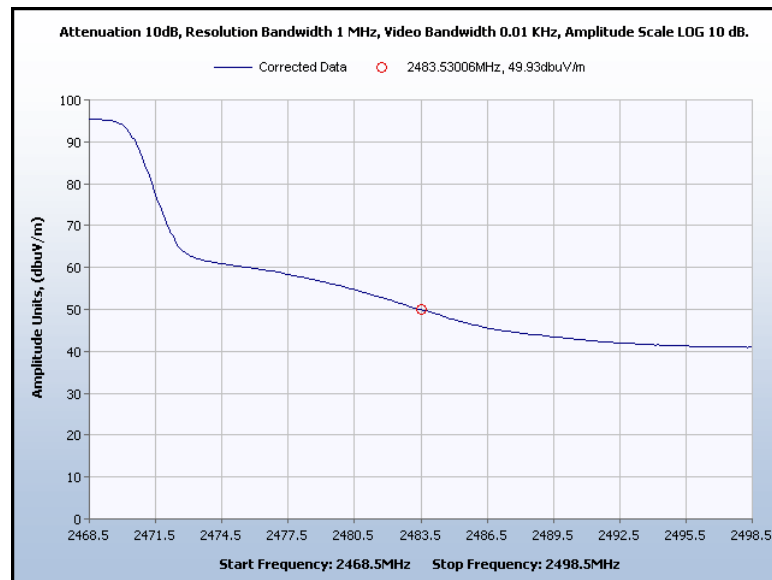
Plot 6. Band Edge Emissions, 12” Model, Channel 1 Average, 802.11 g



Band Edge Emissions – Test Results (12” Model)



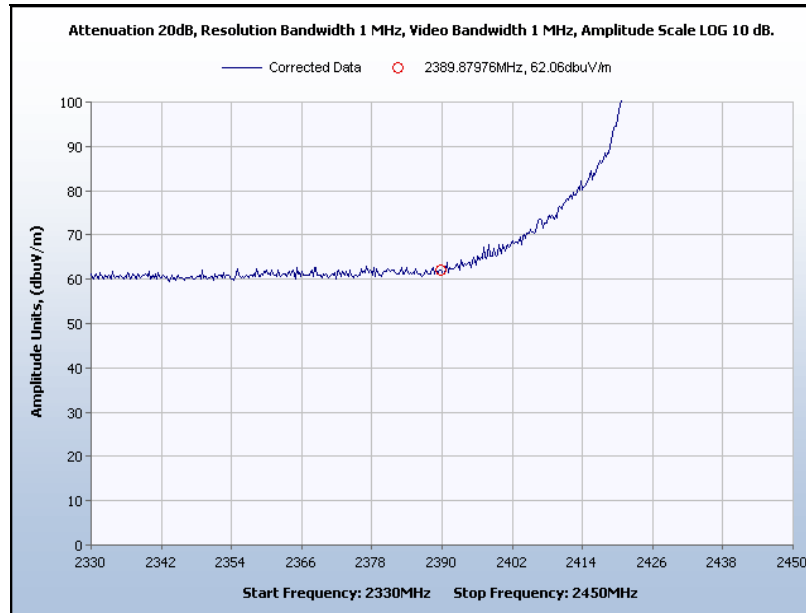
Plot 7. Band Edge Emissions, 12” Model, Channel 11 Peak, 802.11 g



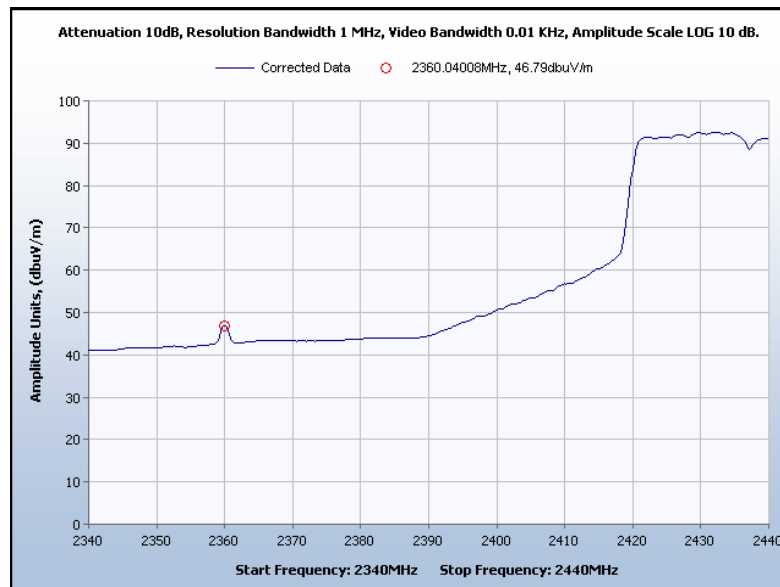
Plot 8. Band Edge Emissions, 12” Model, Channel 11 Average, 802.11 g



Band Edge Emissions – Test Results (12" Model)



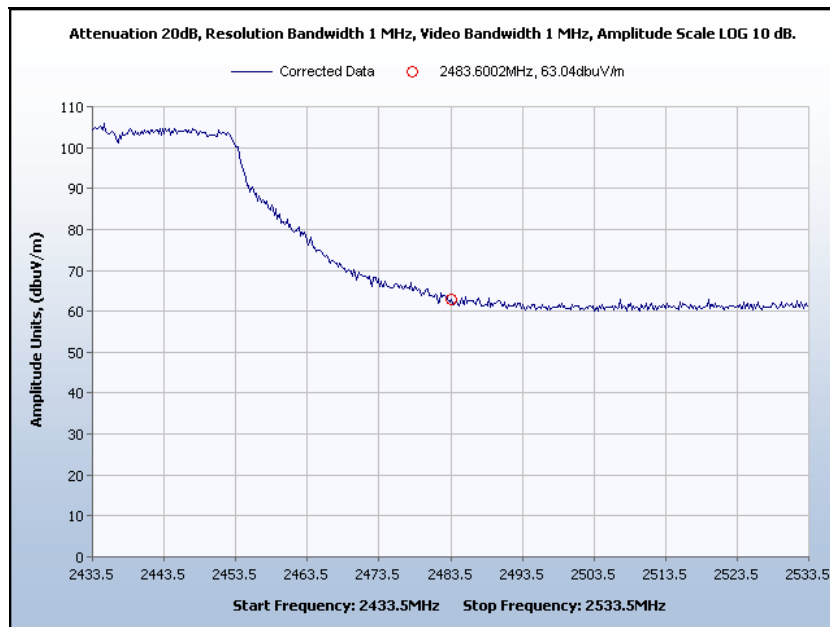
Plot 9. Band Edge Emissions, 12" Model, Peak Low, Turbo Mode



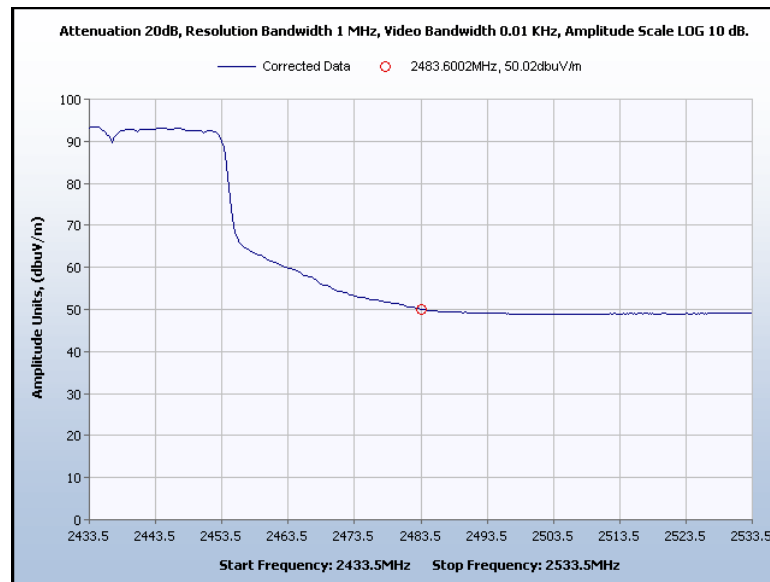
Plot 10. Band Edge Emissions, 12" Model, Average Low, Turbo Mode



Band Edge Emissions – Test Results (12" Model)



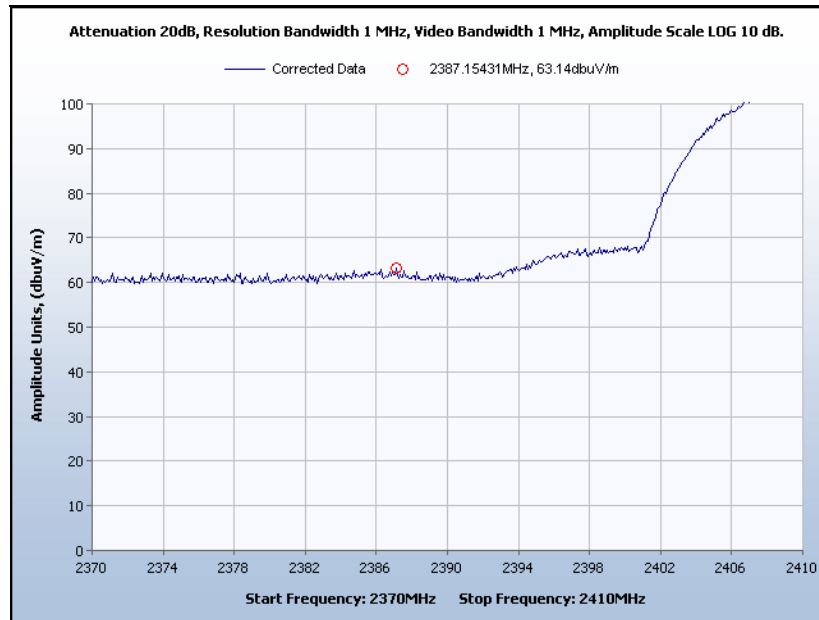
Plot 11. Band Edge Emissions, 12" Model, Peak High, Turbo Mode



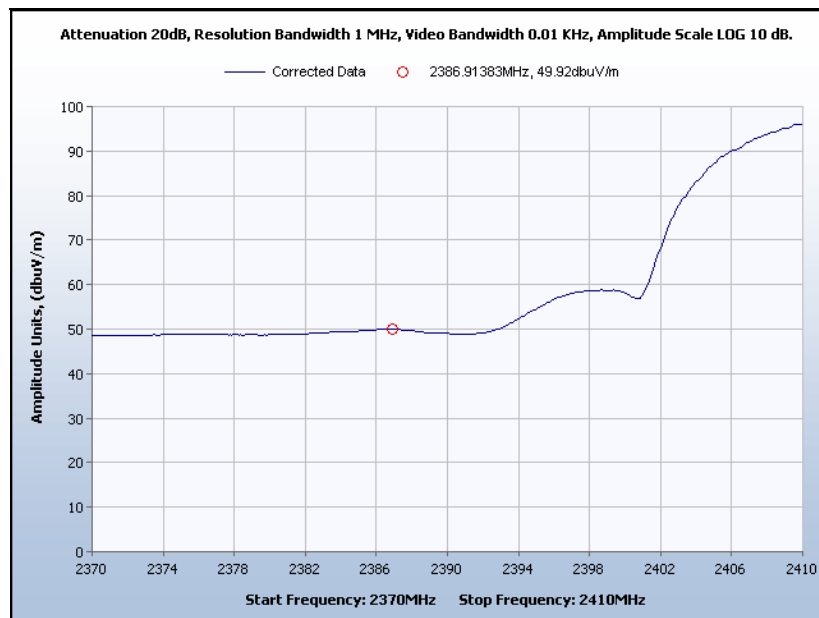
Plot 12. Band Edge Emissions, 12" Model, Average High, Turbo Mode



Band Edge Emissions – Test Results (15” Model)



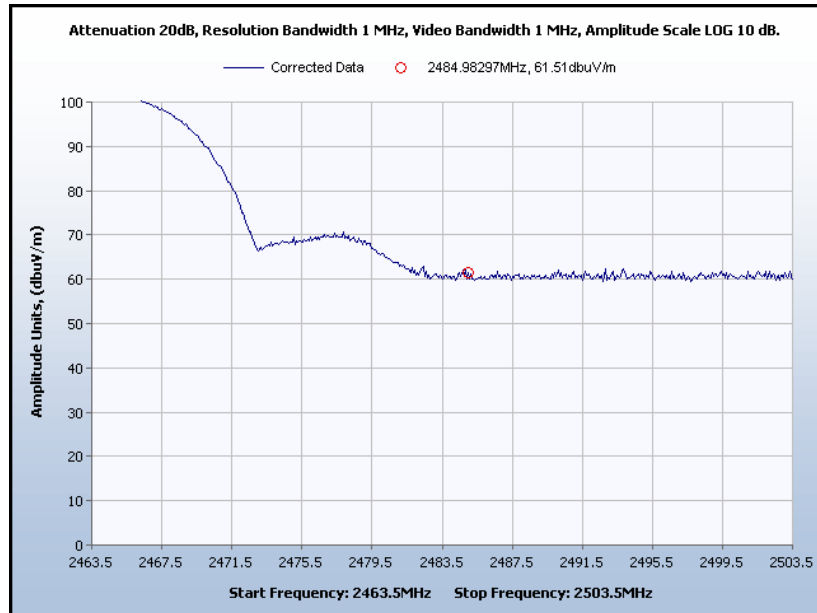
Plot 13. Band Edge Emissions, 15” Model, Channel 1 Peak, 802.11 b



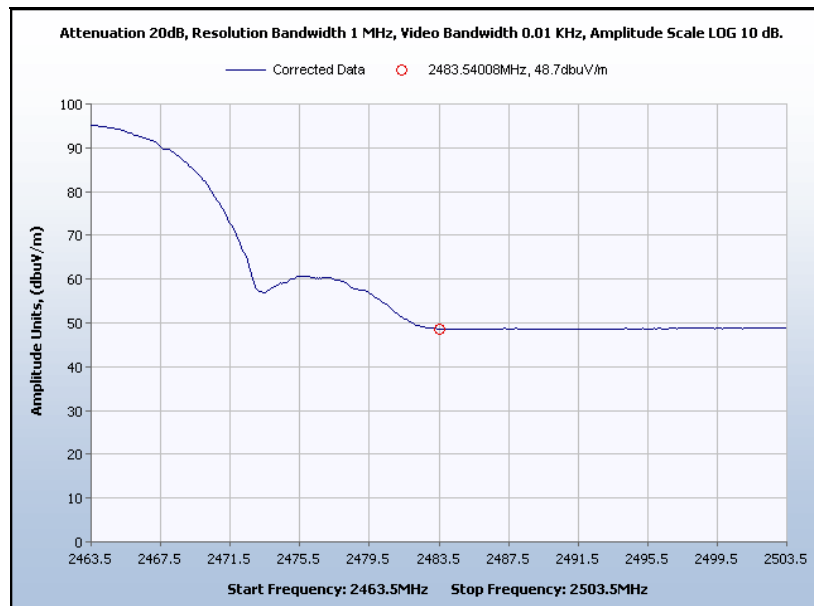
Plot 14. Band Edge Emissions, 15” Model, Channel 1 Average, 802.11 b



Band Edge Emissions – Test Results (15" Model)



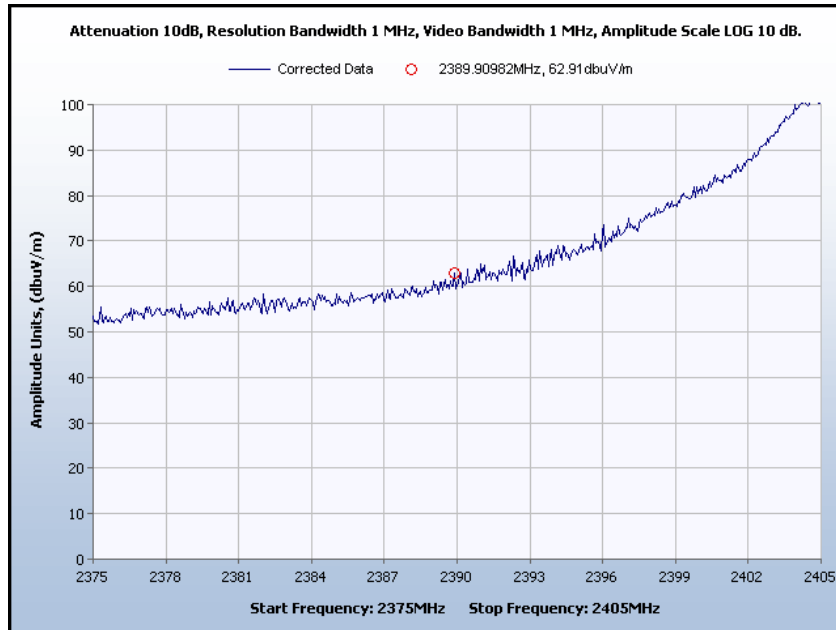
Plot 15. Band Edge Emissions, 15" Model, Channel 11 Peak, 802.11 b



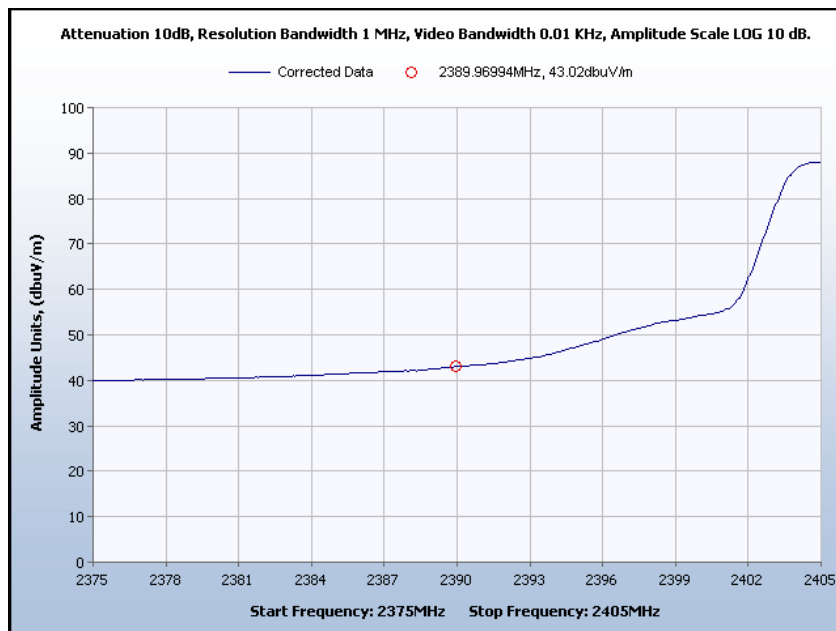
Plot 16. Band Edge Emissions, 15" Model, Channel 11 Average, 802.11 b



Band Edge Emissions – Test Results (15” Model)



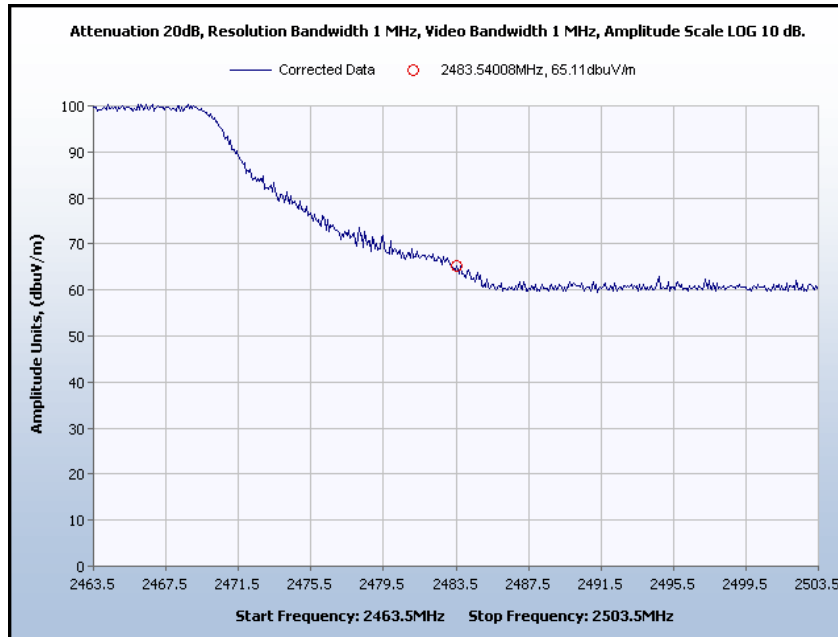
Plot 17. Band Edge Emissions, 15” Model, Channel 1 Peak, 802.11 g



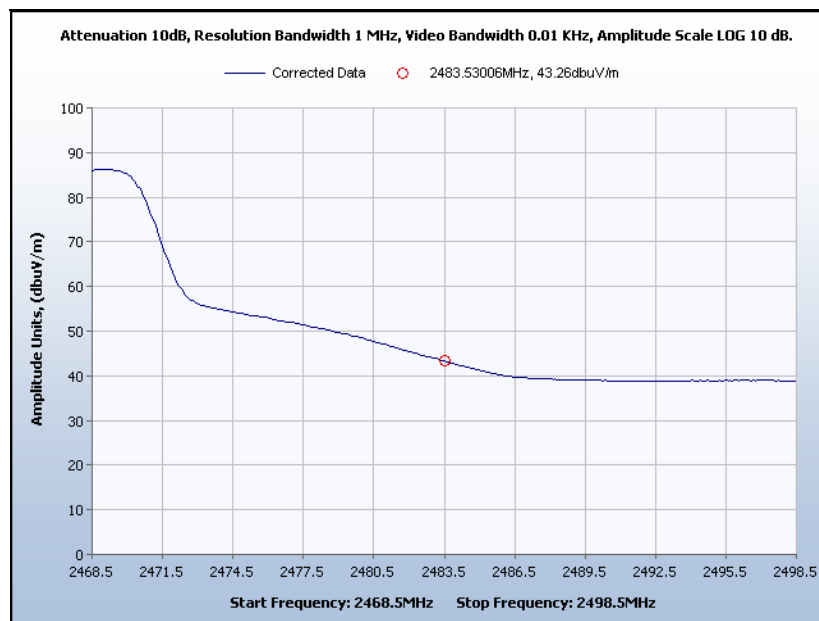
Plot 18. Band Edge Emissions, 15” Model, Channel 1 Average, 802.11 g



Band Edge Emissions – Test Results (15” Model)



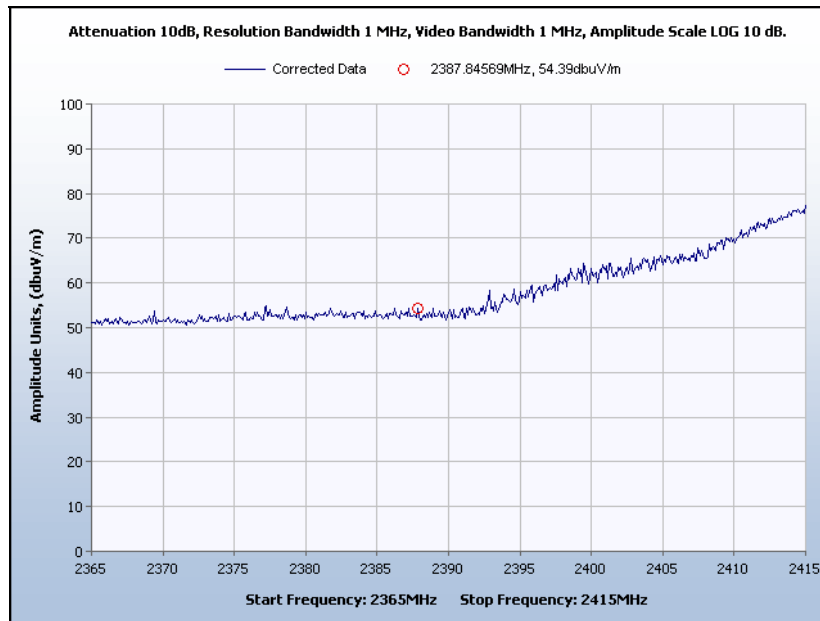
Plot 19. Band Edge Emissions, 15” Model, Channel 11 Peak, 802.11 g



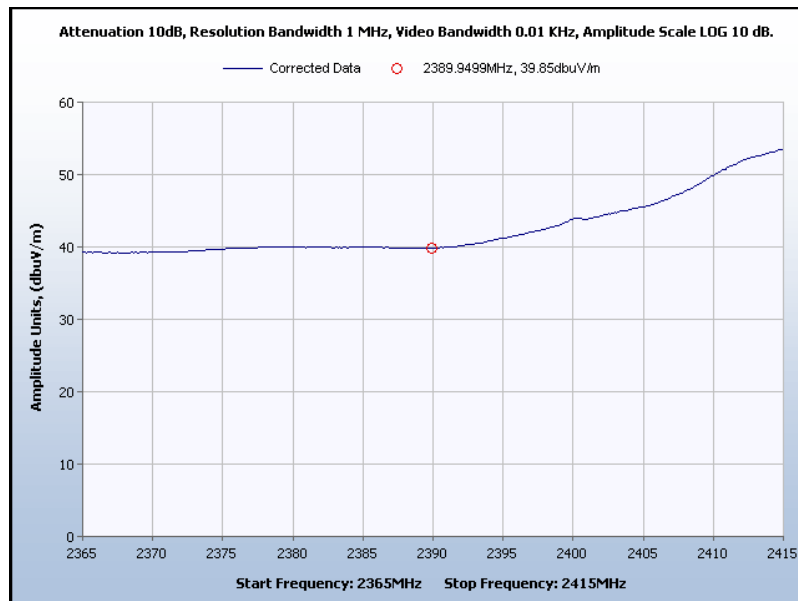
Plot 20. Band Edge Emissions, 15” Model, Channel 11 Average, 802.11 g



Band Edge Emissions – Test Results (15” Model)



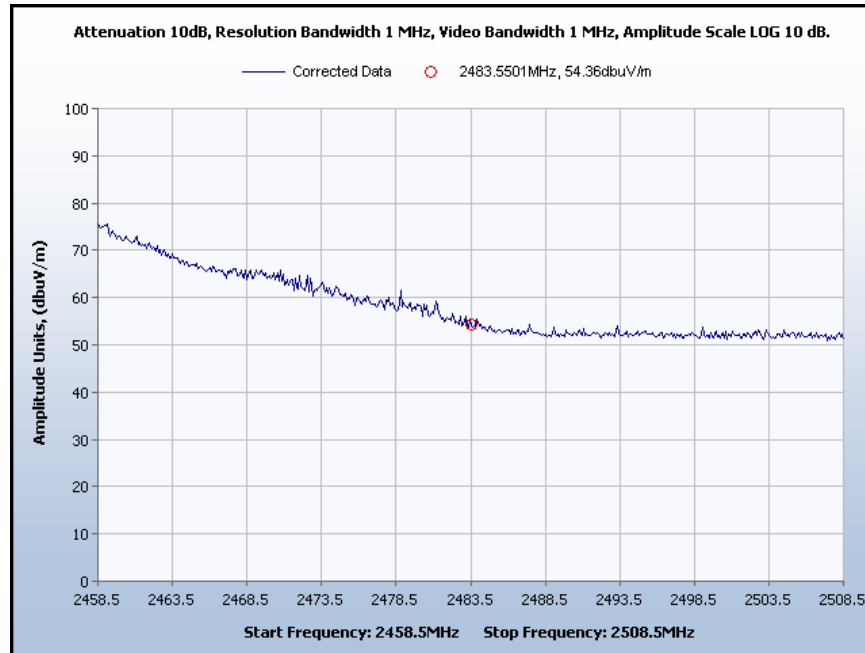
Plot 21. Band Edge Emissions, 15” Model, Peak Low, Turbo Mode



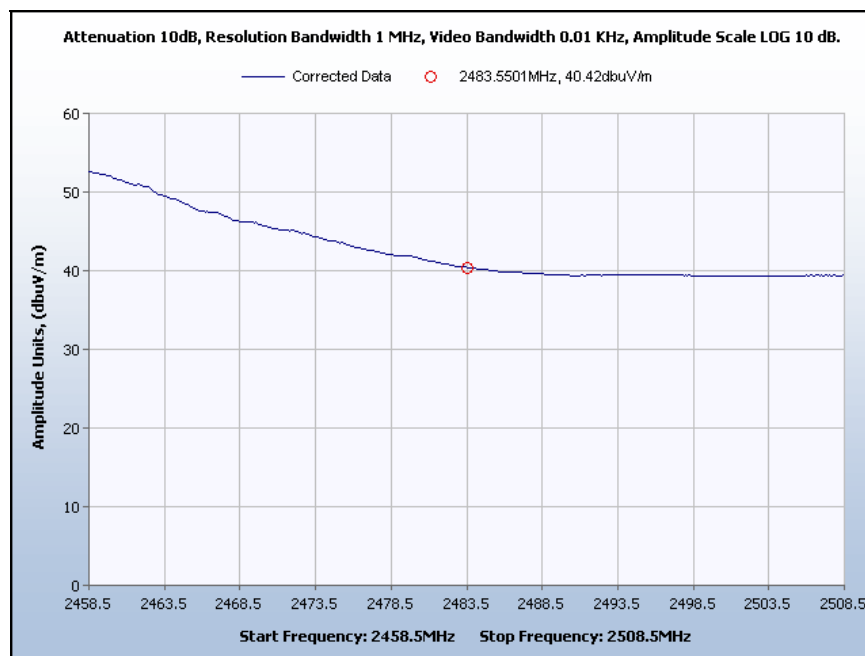
Plot 22. Band Edge Emissions, 15” Model, Average Low, Turbo Mode



Band Edge Emissions – Test Results (15” Model)



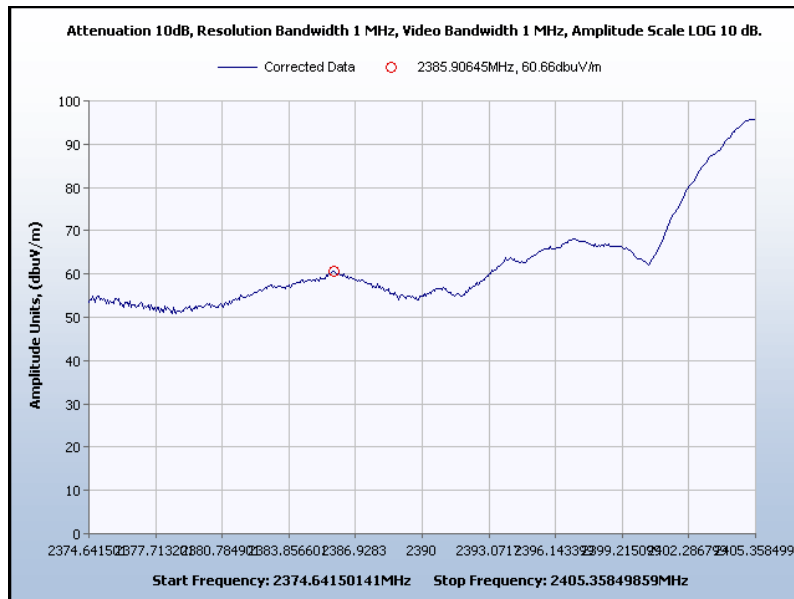
Plot 23. Band Edge Emissions, 15” Model, Peak High, Turbo Mode



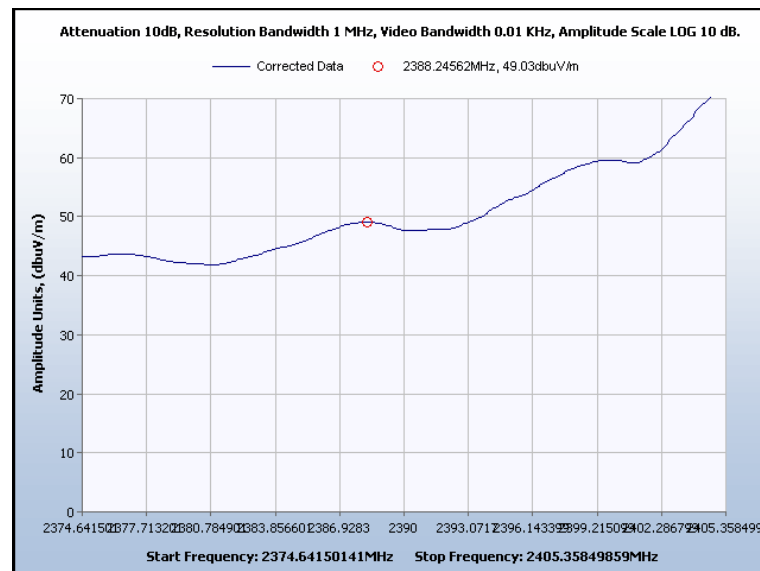
Plot 24. Band Edge Emissions, 15” Model, Average High, Turbo Mode



Band Edge Emissions – Test Results (17” Model)



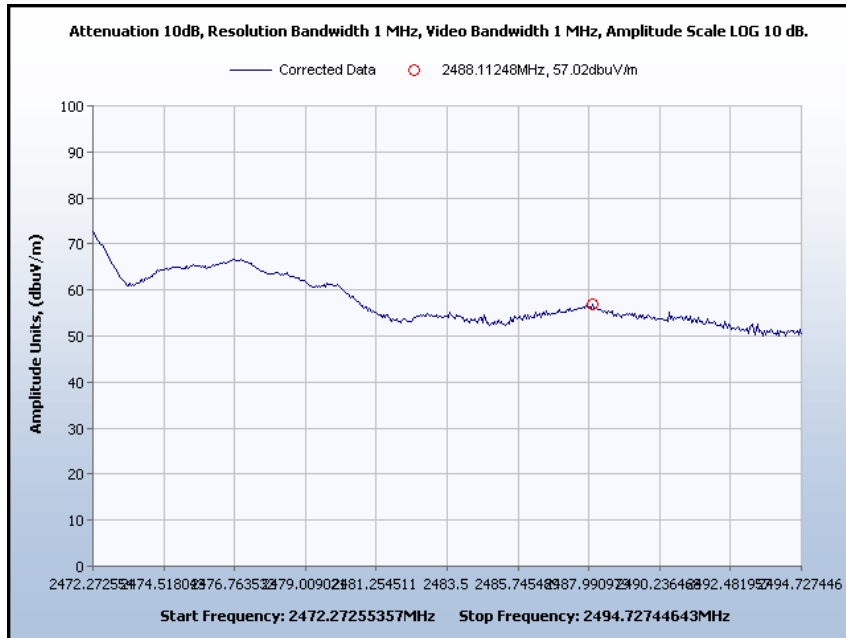
Plot 25. Band Edge Emissions, 17” Model, Channel 1 Peak, 802.11 b



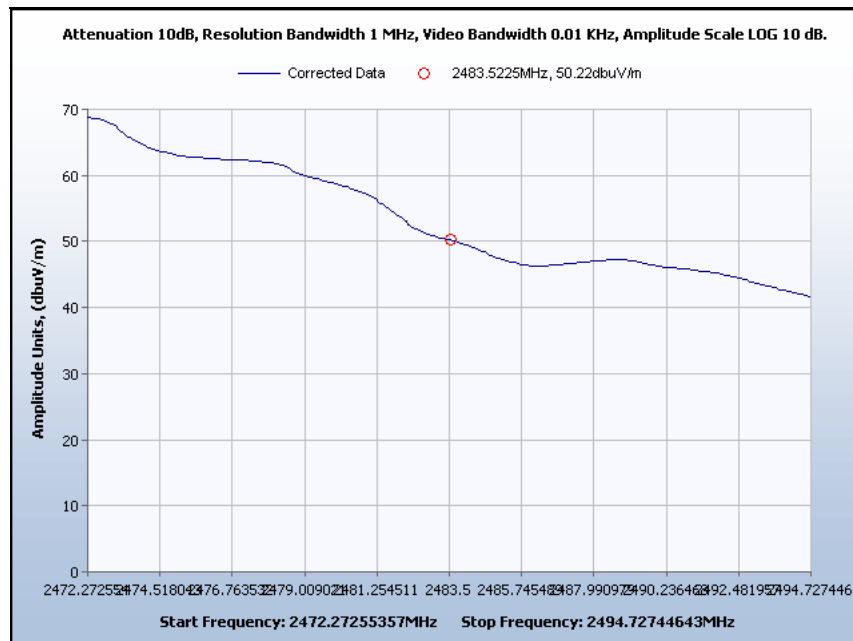
Plot 26. Band Edge Emissions, 17” Model, Channel 1 Average, 802.11 b



Band Edge Emissions – Test Results (17” Model)



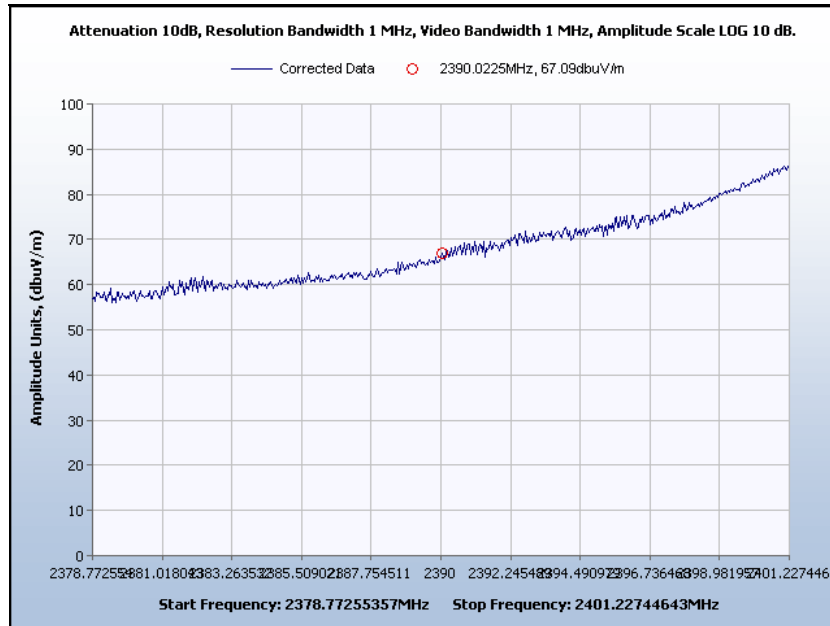
Plot 27. Band Edge Emissions, 17” Model, Channel 11 Peak, 802.11 b



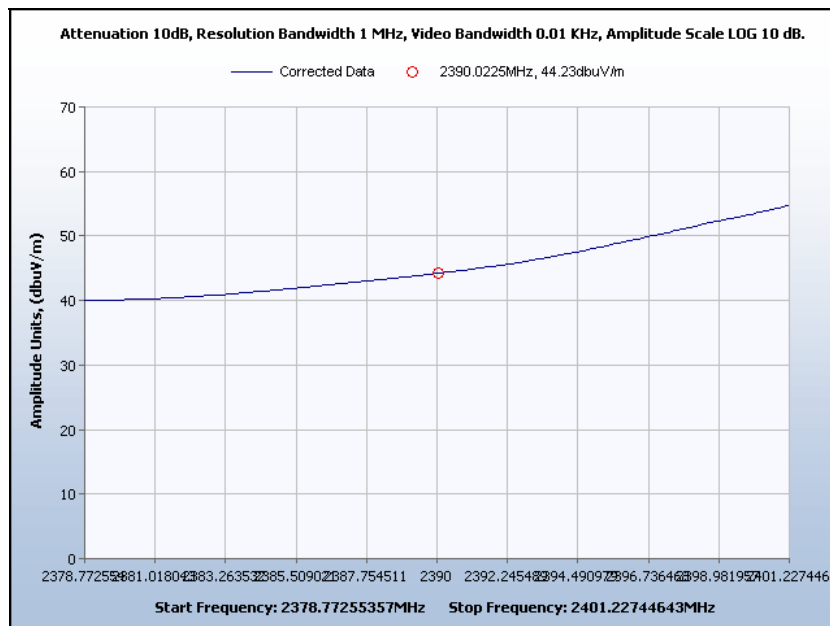
Plot 28. Band Edge Emissions, 17” Model, Channel 11 Average, 802.11 b



Band Edge Emissions – Test Results (17” Model)



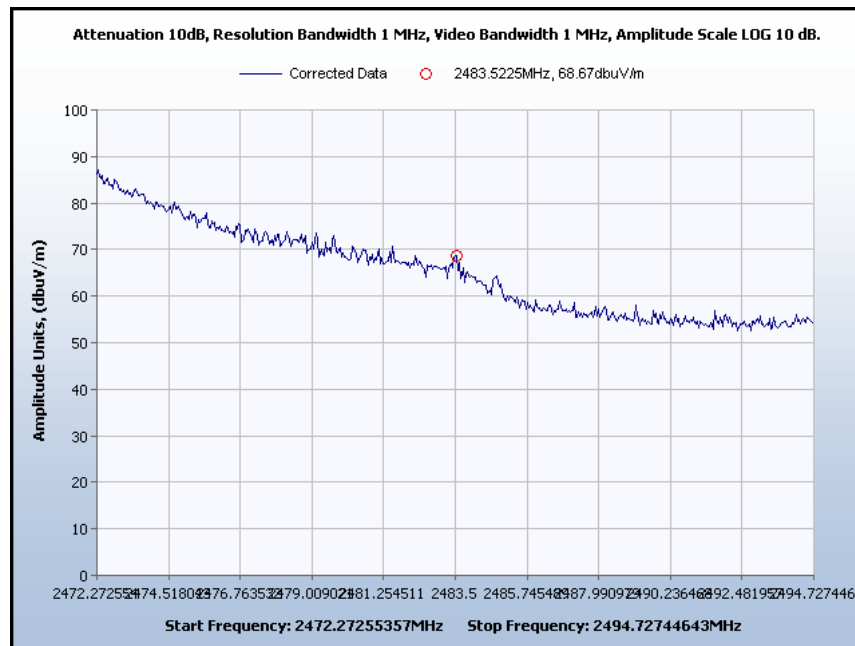
Plot 29. Band Edge Emissions, 17” Model, Channel 1 Peak, 802.11 g



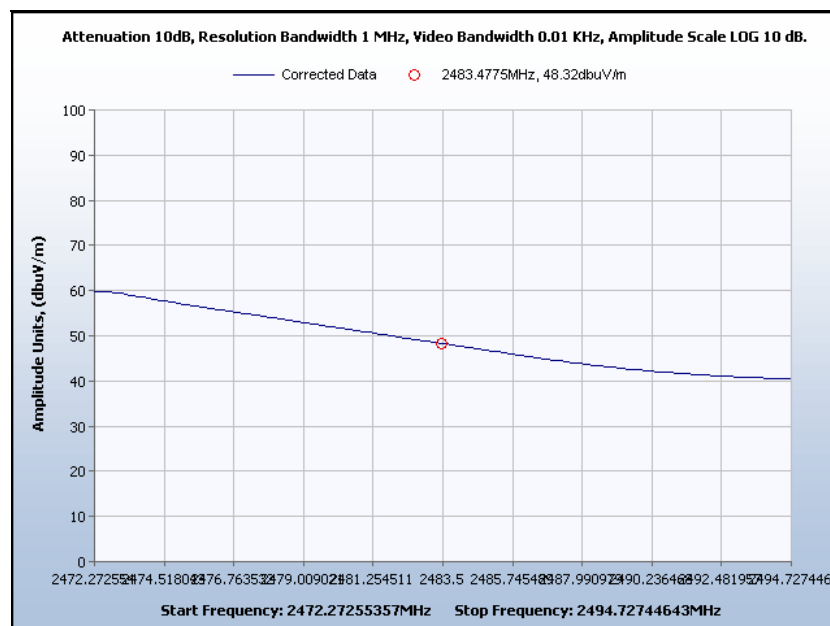
Plot 30. Band Edge Emissions, 17” Model, Channel 1 Average, 802.11 g



Band Edge Emissions – Test Results (17" Model)



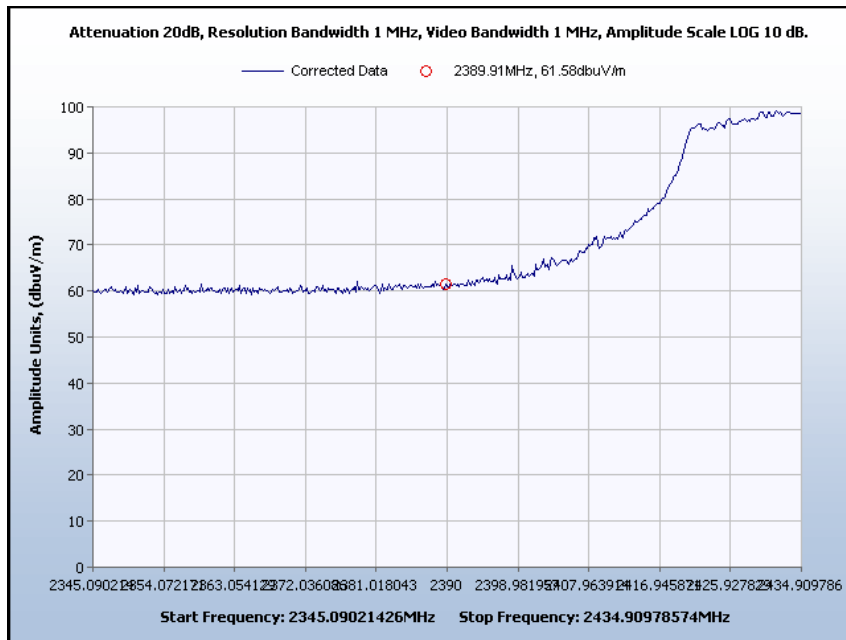
Plot 31. Band Edge Emissions, 17" Model, Channel 11 Peak, 802.11 g



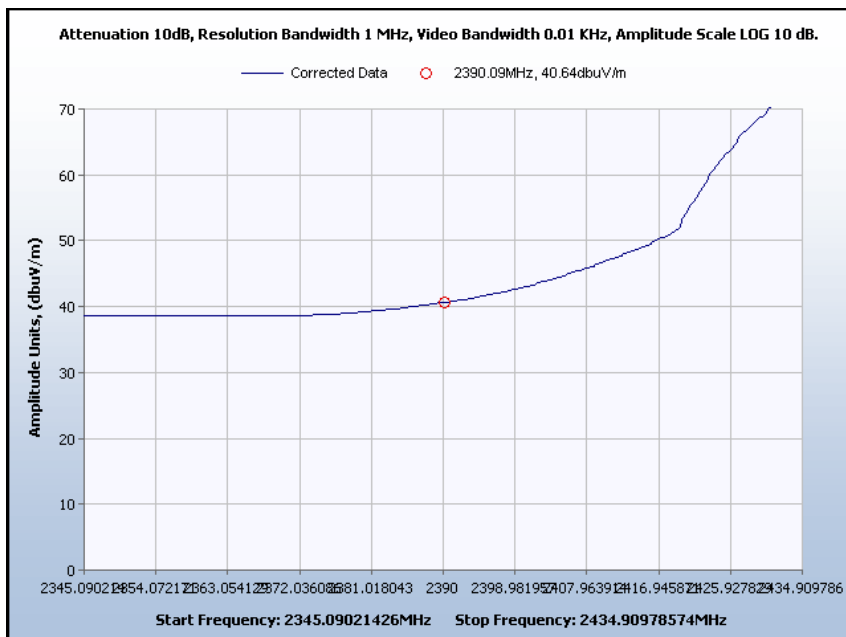
Plot 32. Band Edge Emissions, 17" Model, Channel 11 Average, 802.11 g



Band Edge Emissions – Test Results (17” Model)



Plot 33. Band Edge Emissions, 17” Model, Peak, Turbo Mode



Plot 34. Band Edge Emissions, 17” Model, Average, Turbo Mode



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Test Requirement(s): § 15.207 (a): 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 30MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω 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 range (MHz)	§ 15.207(a), Conducted Limit (dB μ V)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 5. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω /50 μ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with ANSI C63.4-1992 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz". The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω /50 μ H LISN as the input transducer to an EMC/field intensity meter. The tests were conducted in a RF-shielded enclosure.

Test Results: The EUT was found compliant with the Conducted Emission limits of §15.207(a) for Intentional Radiators. See following pages for detailed test results.
Note: The highest emissions were observed in the 802.11 g mode.

Test Engineer(s): Jeff Hazen

Test Date(s): January 3 – 8, 2007



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

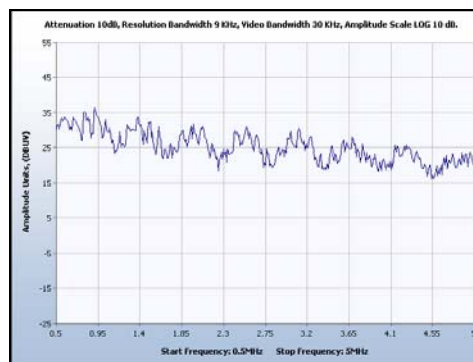
Conducted Emissions - Voltage, 12" Model, Phase Line (120VAC, 60Hz), Channel 1, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.347	35.9	0.17	36.07	59.03	-23.13	21.1	0.17	21.27	49.03	-27.76
0.585	30.5	0.17	30.67	56	-25.5	17.4	0.17	17.57	46	-28.43
0.827	28.3	0.17	28.47	56	-27.7	14.9	0.17	15.07	46	-30.93
0.841	28.7	0.17	28.87	56	-27.3	17.3	0.17	17.47	46	-28.53
0.909	33.5	0.17	33.67	56	-22.5	16	0.17	16.17	46	-29.83
0.919	32.6	0.17	32.77	56	-23.4	16.8	0.17	16.97	46	-29.03

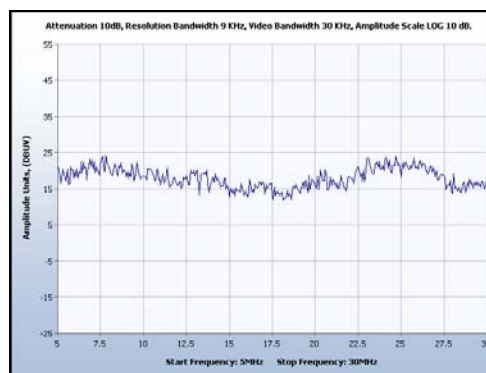
Table 6. Conducted Emissions - Voltage, 12" Model, Phase Line (120VAC, 60Hz), Channel 1, 802.11 g



Plot 35. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 36. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.5 MHz – 5 MHz



Plot 37. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 5 MHz – 30 MHz



IBM Corporation
AnyPlace Kiosk

Electromagnetic Compatibility
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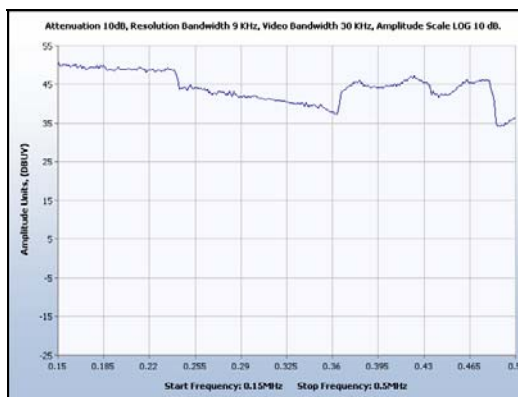
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

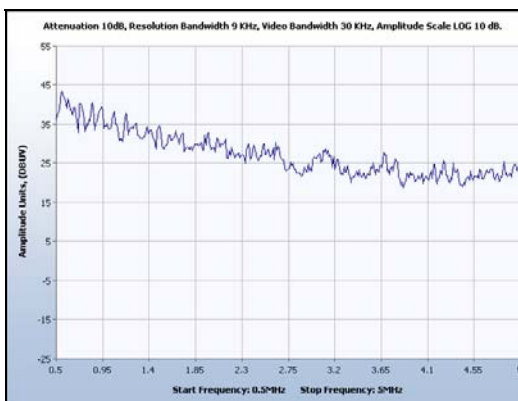
Conducted Emissions - Voltage, 12" Model, Neutral Line (120VAC, 60Hz), Channel 1, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.377	43.3	0.17	43.47	58.35	-15.05	28.9	0.17	29.07	48.35	-19.28
0.422	43	0.17	43.17	57.41	-14.41	30.7	0.17	30.87	47.41	-16.54
0.473	44.2	0.17	44.37	56.46	-12.26	22	0.17	22.17	46.46	-24.29
0.556	42.8	0.17	42.97	56	-13.2	27.4	0.17	27.57	46	-18.43
0.746	38.9	0.17	39.07	56	-17.1	24.4	0.17	24.57	46	-21.43
0.857	39	0.17	39.17	56	-17	19.8	0.17	19.97	46	-26.03

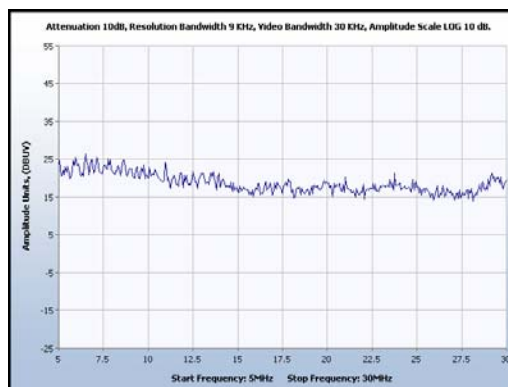
Table 7. Conducted Emissions - Voltage, 12" Model, Neutral Line (120VAC, 60Hz), Channel 1, 802.11 g



Plot 38. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 39. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.5 MHz – 5 MHz



Plot 40. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 5 MHz – 30 MHz



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

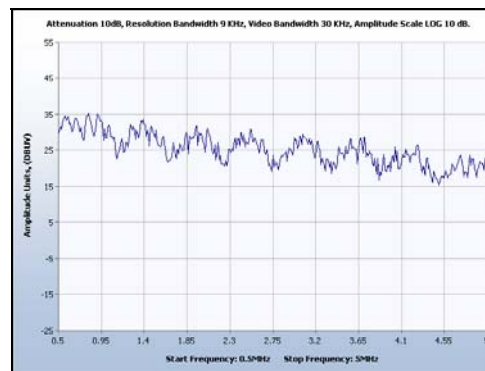
Conducted Emissions - Voltage, 12" Model, Phase Line (120VAC, 60Hz), Channel 6, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.341	36.5	0.17	36.67	59.18	-22.68	22.2	0.17	22.37	49.18	-26.81
0.421	33.2	0.17	33.37	57.43	-24.23	21.8	0.17	21.97	47.43	-25.46
0.699	28.8	0.17	28.97	56	-27.2	13.4	0.17	13.57	46	-32.43
0.802	32.1	0.17	32.27	56	-23.9	14.6	0.17	14.77	46	-31.23
0.912	33.1	0.17	33.27	56	-22.9	17.2	0.17	17.37	46	-28.63
1.02	29.9	0.17	30.07	56	-26.1	14	0.17	14.17	46	-31.83

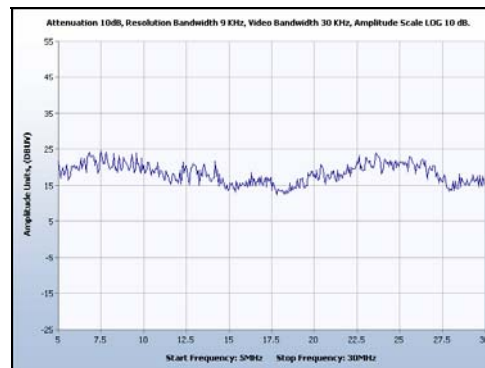
Table 8. Conducted Emissions - Voltage, 12" Model, Phase Line (120VAC, 60Hz), Channel 6, 802.11 g



Plot 41. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 42. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.5 MHz – 5 MHz



Plot 43. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 5 MHz – 30 MHz



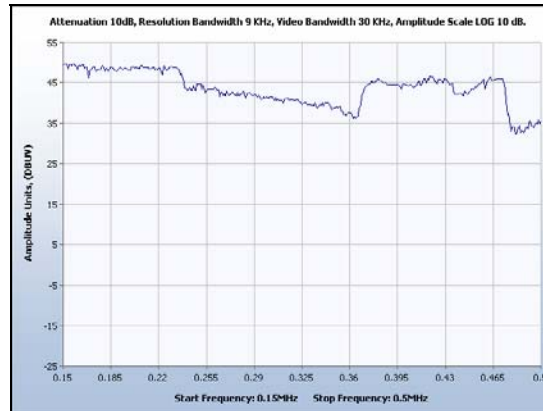
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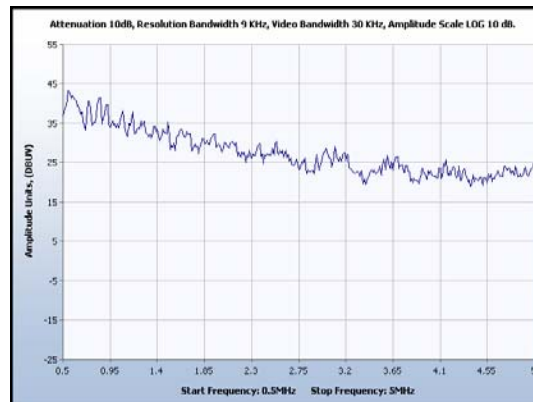
Conducted Emissions - Voltage, 12" Model, Neutral Line (120VAC, 60Hz), Channel 6, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.46	41.7	0.17	41.87	56.69	-14.99	26.8	0.17	26.97	46.69	-19.72
0.562	42.2	0.17	42.37	56	-13.8	25.8	0.17	25.97	46	-20.03
0.752	37.8	0.17	37.97	56	-18.2	27	0.17	27.17	46	-18.83
0.862	39.2	0.17	39.37	56	-16.8	21.2	0.17	21.37	46	-24.63
0.933	37.2	0.17	37.37	56	-18.8	22.1	0.17	22.27	46	-23.73
1.081	35.6	0.17	35.77	56	-20.4	21.8	0.17	21.97	46	-24.03

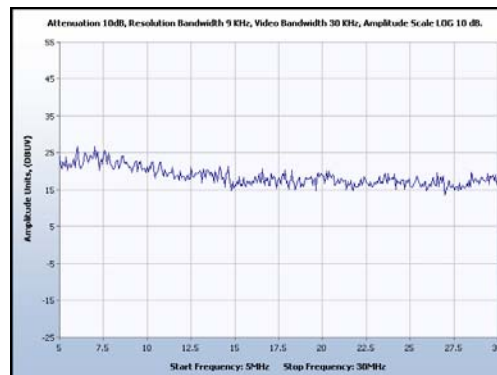
Table 9. Conducted Emissions - Voltage, 12" Model, Neutral Line (120VAC, 60Hz), Channel 6, 802.11 g



Plot 44. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 45. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.5 MHz – 5 MHz



Plot 46. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 5 MHz – 30 MHz



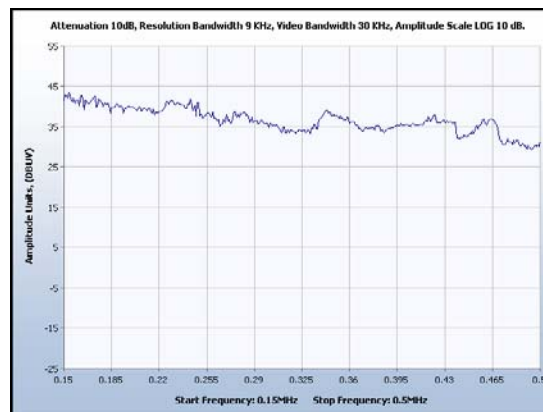
Electromagnetic Compatibility Criteria for Intentional Radiators

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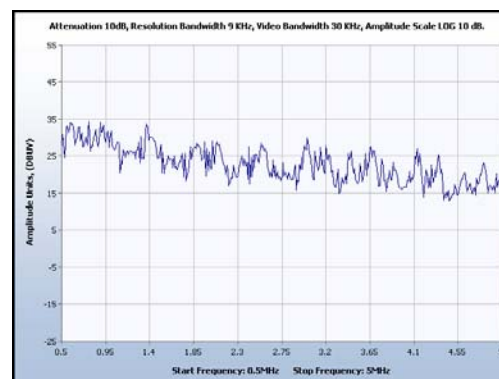
Conducted Emissions - Voltage, 12" Model, Phase Line (120VAC, 60Hz), Channel 11, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.345	36.7	0.17	36.87	59.08	-22.38	22.2	0.17	22.37	49.08	-26.71
0.58	31.56	0.17	31.73	56	-24.44	17.78	0.17	17.95	46	-28.05
0.614	29.5	0.17	29.67	56	-26.5	16.1	0.17	16.27	46	-29.73
0.814	30.7	0.17	30.87	56	-25.3	14.8	0.17	14.97	46	-31.03
0.922	32.2	0.17	32.37	56	-23.8	18.3	0.17	18.47	46	-27.53
1.023	31.03	0.17	31.2	56	-24.97	13.84	0.17	14.01	46	-31.99

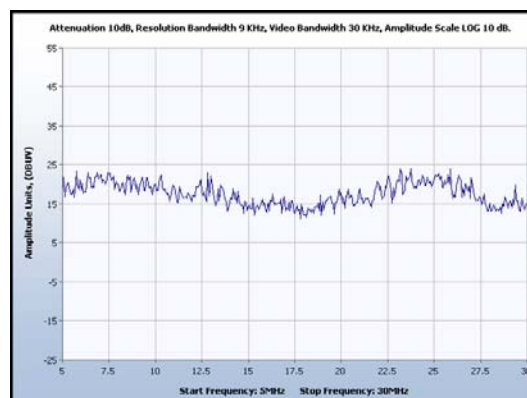
Table 10. Conducted Emissions - Voltage, 12" Model, Phase Line (120VAC, 60Hz), Channel 11, 802.11 g



Plot 47. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 48. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.5 MHz – 5 MHz



Plot 49. Conducted Emissions - Voltage, 12" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 5 MHz – 30 MHz



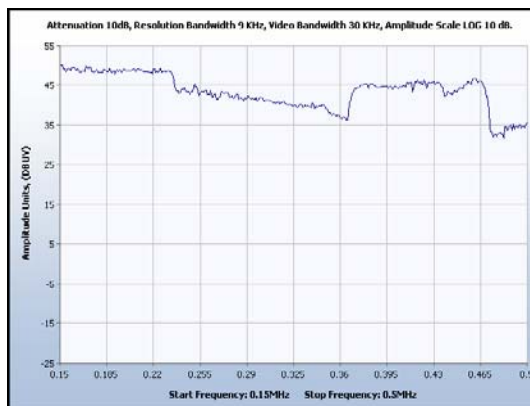
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

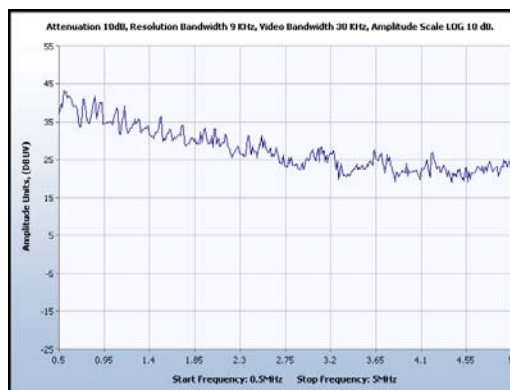
Conducted Emissions - Voltage, 12" Model, Neutral Line (120VAC, 60Hz), Channel 11, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.421	42.3	0.17	42.47	57.43	-15.13	30.2	0.17	30.37	47.43	-17.06
0.459	43.9	0.17	44.07	56.71	-12.81	27.6	0.17	27.77	46.71	-18.94
0.562	42.1	0.17	42.27	56	-13.9	25.9	0.17	26.07	46	-19.93
0.746	39.2	0.17	39.37	56	-16.8	24	0.17	24.17	46	-21.83
0.863	39.7	0.17	39.87	56	-16.3	22.1	0.17	22.27	46	-23.73
0.917	36.2	0.17	36.37	56	-19.8	20.8	0.17	20.97	46	-25.03

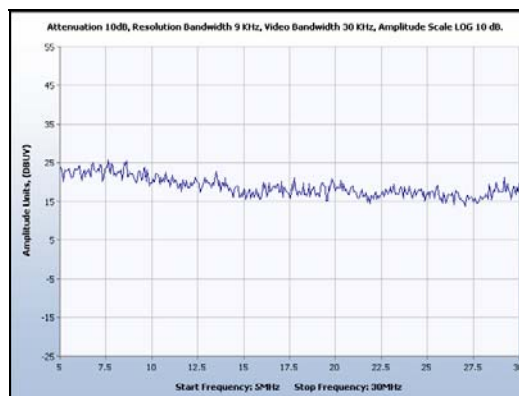
Table 11. Conducted Emissions - Voltage, 12" Model, Neutral Line (120VAC, 60Hz), Channel 11, 802.11 g



Plot 50. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11g, 0.15 MHz – 0.5 MHz



Plot 51. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.5 MHz – 5 MHz



Plot 52. Conducted Emissions - Voltage, 12" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 5 MHz – 30 MHz



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Conducted Emission Limits, 12" Model, Test Setup



Photograph 5. Conducted Emissions, 12" Model, Test Setup



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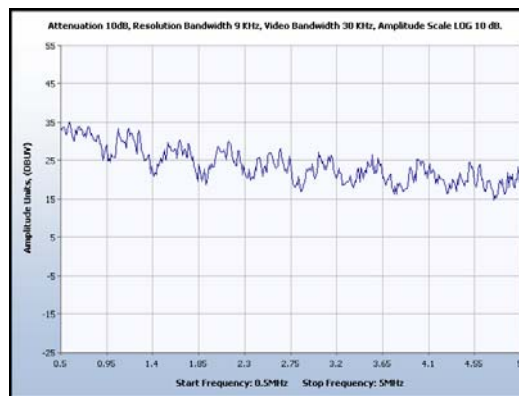
Conducted Emissions - Voltage, 15" Model, Phase Line (120VAC, 60Hz), Channel 1, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.332	43	0.17	43.17	59.4	-16.4	26.7	0.17	26.87	49.4	-22.53
0.385	44.6	0.17	44.77	58.17	-13.57	23.4	0.17	23.57	48.17	-24.6
0.437	45	0.17	45.17	57.12	-12.12	21.9	0.17	22.07	47.12	-25.05
0.49	42.8	0.17	42.97	56.17	-13.37	25.6	0.17	25.77	46.17	-20.4
0.659	40.4	0.17	40.57	56	-15.6	22.9	0.17	23.07	46	-22.93
0.768	39.2	0.17	39.37	56	-16.8	19.7	0.17	19.87	46	-26.13
0.858	34.4	0.17	34.57	56	-21.6	18.1	0.17	18.27	46	-27.73
0.963	36.5	0.17	36.67	56	-19.5	17.3	0.17	17.47	46	-28.53

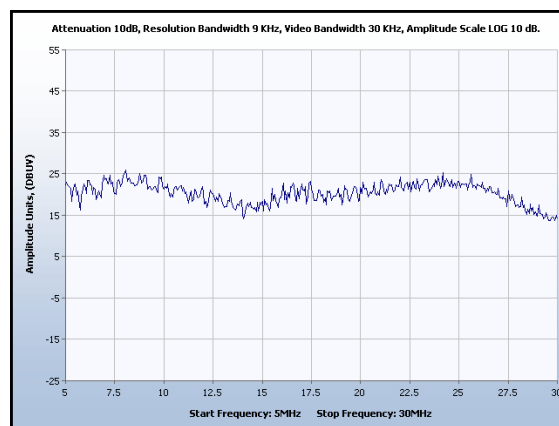
Table 12. Conducted Emissions - Voltage, 15" Model, Phase Line (120VAC, 60Hz), Channel 1, 802.11 g



Plot 53. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 54. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.5 MHz – 5 MHz



Plot 55. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 5 MHz – 30 MHz



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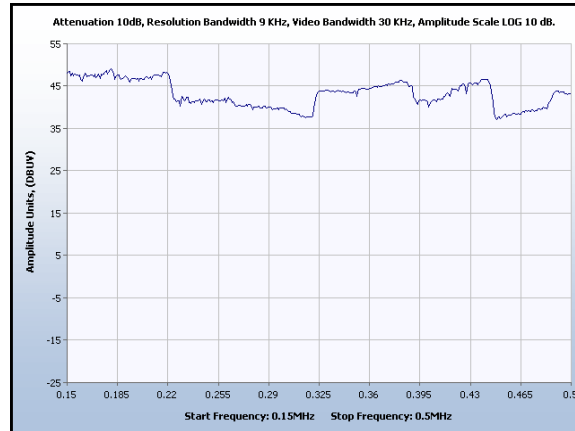
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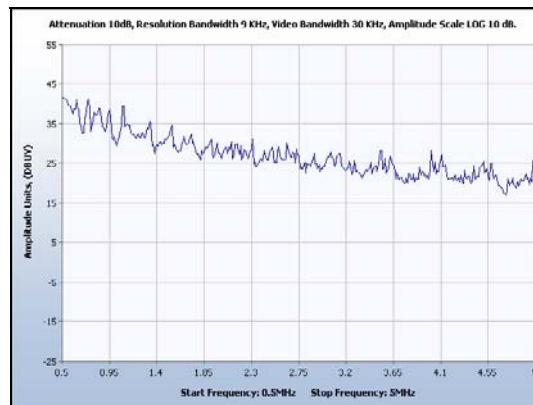
Conducted Emissions - Voltage, 15" Model, Neutral Line (120VAC, 60Hz), Channel 1, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.389	44.7	0.17	44.87	58.09	-13.39	24.8	0.17	24.97	48.09	-23.12
0.431	45.1	0.17	45.27	57.23	-12.13	21.7	0.17	21.87	47.23	-25.36
0.496	38.7	0.17	38.87	56.07	-17.37	23.8	0.17	23.97	46.07	-22.1
0.669	40.9	0.17	41.07	56	-15.1	23.9	0.17	24.07	46	-21.93
0.776	38.3	0.17	38.47	56	-17.7	21.3	0.17	21.47	46	-24.53
0.85	34.7	0.17	34.87	56	-21.3	18.6	0.17	18.77	46	-27.23
1.068	32.4	0.17	32.57	56	-23.6	20.5	0.17	20.67	46	-25.33

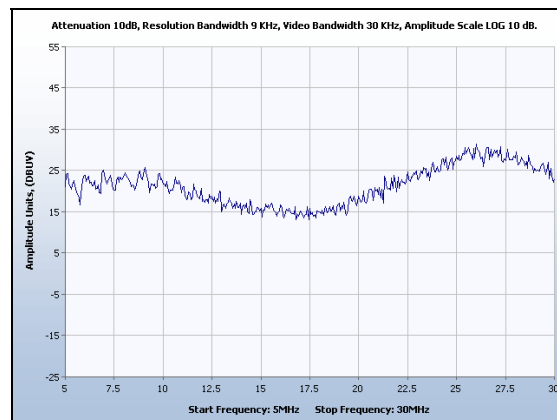
Table 13. Conducted Emissions - Voltage, 15" Model, Neutral Line (120VAC, 60Hz), Channel 1, 802.11 g



Plot 56. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 57. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 0.5 MHz – 5 MHz



Plot 58. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 g, 5 MHz – 30 MHz



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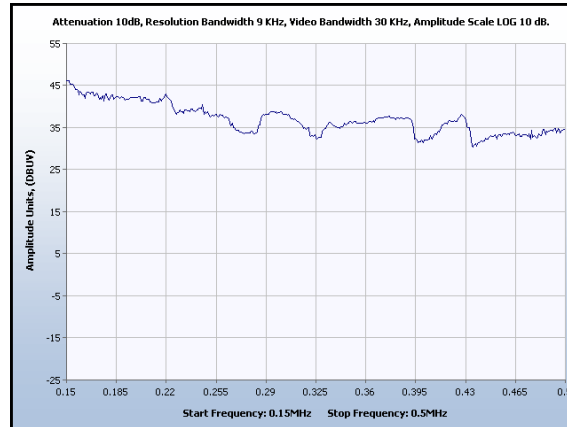
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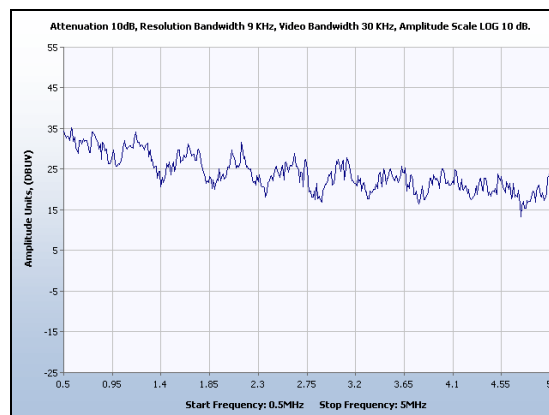
Conducted Emissions - Voltage, 15" Model, Phase Line (120VAC, 60Hz), Channel 6, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.39	35.5	0.17	35.67	58.06	-22.56	18.8	0.17	18.97	48.06	-29.09
0.425	36.3	0.17	36.47	57.35	-21.05	16.4	0.17	16.57	47.35	-30.78
0.579	32.89	0.17	33.06	56	-23.11	17.97	0.17	18.14	46	-27.86
0.58	32.8	0.17	32.97	56	-23.2	18.4	0.17	18.57	46	-27.43
0.679	32.7	0.17	32.87	56	-23.3	17.7	0.17	17.87	46	-28.13
0.777	32.85	0.17	33.02	56	-23.15	17.56	0.17	17.73	46	-28.27
1.07	29.64	0.17	29.81	56	-26.36	15.39	0.17	15.56	46	-30.44

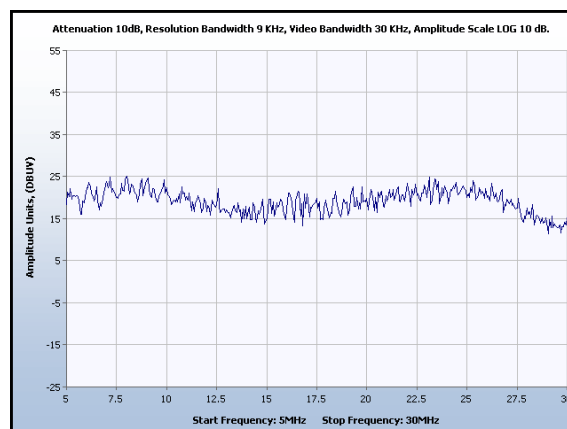
Table 14. Conducted Emissions - Voltage, 15" Model, Phase Line (120VAC, 60Hz), Channel 6, 802.11 g



Plot 59. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 60. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.5 MHz – 5 MHz



Plot 61. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 5 MHz – 30 MHz



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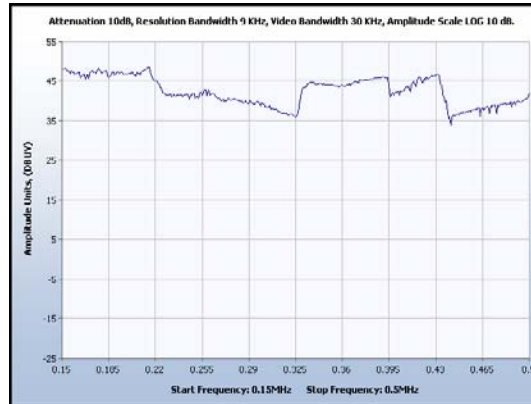
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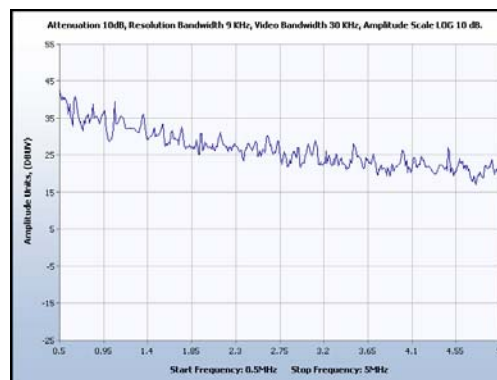
Conducted Emissions - Voltage, 15" Model, Neutral Line (120VAC, 60Hz), Channel 6, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.386	44.6	0.17	44.77	58.15	-13.55	24.5	0.17	24.67	48.15	-23.48
0.426	45.3	0.17	45.47	57.33	-12.03	22.7	0.17	22.87	47.33	-24.46
0.507	41.1	0.17	41.27	56	-14.9	26.2	0.17	26.37	46	-19.63
0.668	40.3	0.17	40.47	56	-15.7	24.1	0.17	24.27	46	-21.73
0.776	39.3	0.17	39.47	56	-16.7	21.2	0.17	21.37	46	-24.63
0.971	36.8	0.17	36.97	56	-19.2	18.1	0.17	18.27	46	-27.73
1.069	36.2	0.17	36.37	56	-19.8	20.5	0.17	20.67	46	-25.33

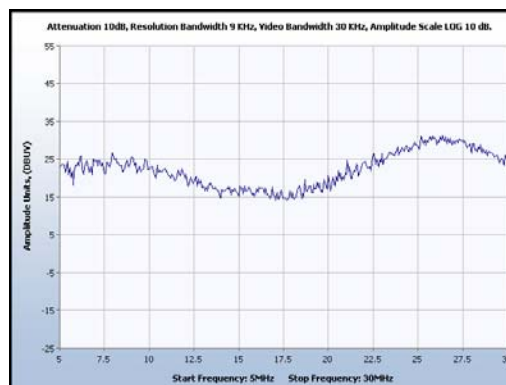
Table 15. Conducted Emissions - Voltage, 15" Model, Neutral Line (120VAC, 60Hz), Channel 6, 802.11 g



Plot 62. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 63. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.5 MHz – 5 MHz



Plot 64. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 5 MHz – 30 MHz



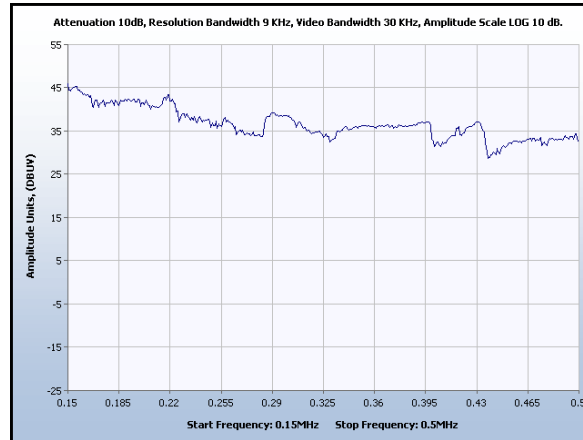
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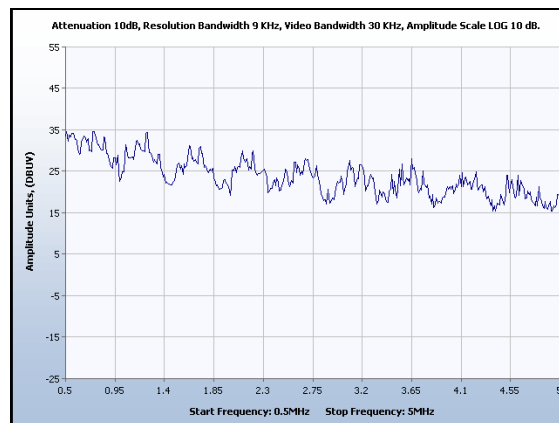
Conducted Emissions - Voltage, 15" Model, Phase Line (120VAC, 60Hz), Channel 11, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.22	39.44	0.17	39.61	62.82	-23.38	32.67	0.17	32.84	52.82	-19.98
0.288	37.85	0.17	38.02	60.58	-22.73	19.53	0.17	19.7	50.58	-30.88
0.425	35.61	0.17	35.78	57.35	-21.74	16.02	0.17	16.19	47.35	-31.16
0.471	29.1	0.17	29.27	56.5	-27.4	13.4	0.17	13.57	46.5	-32.93
0.504	34.08	0.17	34.25	56	-21.92	20.55	0.17	20.72	46	-25.28
0.678	32.3	0.17	32.47	56	-23.7	19.3	0.17	19.47	46	-26.53

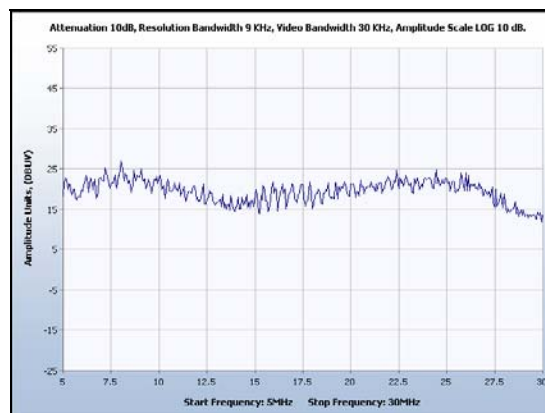
Table 16. Conducted Emissions - Voltage, 15" Model, Phase Line (120VAC, 60Hz), Channel 11, 802.11 g



Plot 65. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 66. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.5 MHz – 5 MHz



Plot 67. Conducted Emissions - Voltage, 15" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 5 MHz – 30 MHz



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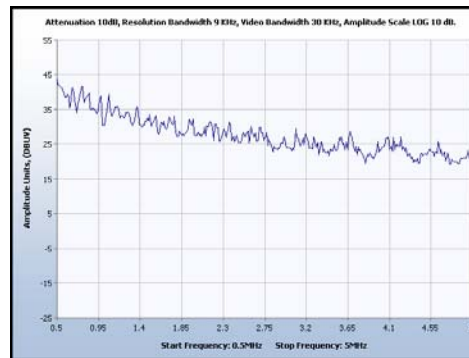
Conducted Emissions - Voltage, 15" Model, Neutral Line (120VAC, 60Hz), Channel 11, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.342	43.2	0.17	43.37	59.15	-15.95	26.5	0.17	26.67	49.15	-22.48
0.392	44.4	0.17	44.57	58.02	-13.62	24.5	0.17	24.67	48.02	-23.35
0.425	44.6	0.17	44.77	57.35	-12.75	22.6	0.17	22.77	47.35	-24.58
0.505	43.3	0.17	43.47	56	-12.7	28	0.17	28.17	46	-17.83
0.677	40	0.17	40.17	56	-16	24.5	0.17	24.67	46	-21.33
0.785	38.6	0.17	38.77	56	-17.4	20	0.17	20.17	46	-25.83
1.073	33.8	0.17	33.97	56	-22.2	19.8	0.17	19.97	46	-26.03

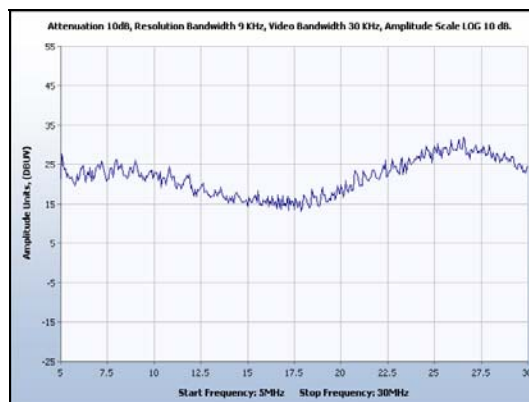
Table 17. Conducted Emissions - Voltage, 15" Model, Neutral Line (120VAC, 60Hz), Channel 11, 802.11 g



Plot 68. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11g, 0.15 MHz – 0.5 MHz



Plot 69. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.5 MHz – 5 MHz



Plot 70. Conducted Emissions - Voltage, 15" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 5 MHz – 30 MHz



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Conducted Emission Limits, 15" Model, Test Setup



Photograph 6. Conducted Emissions, 15" Model, Test Setup



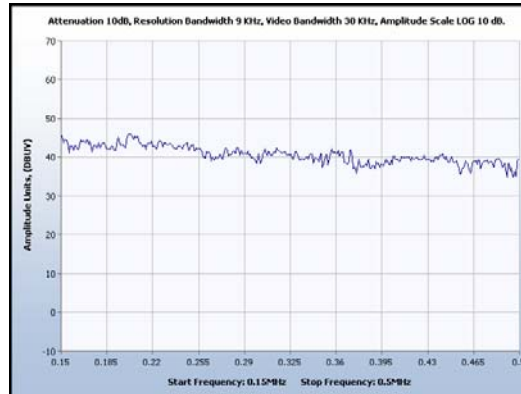
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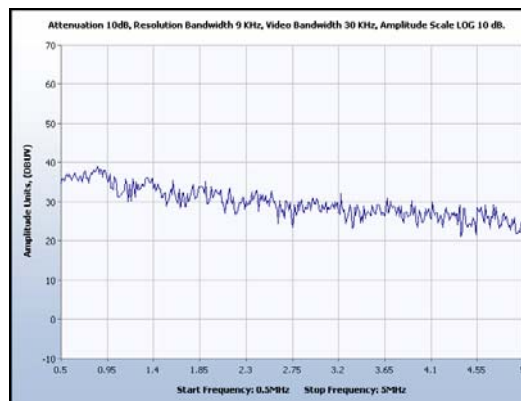
Conducted Emissions - Voltage, 17" Model, Phase Line (120VAC, 60Hz), Channel 1, 802.11 b

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.191	39.7	0.1547	39.8547	63.99	-24.29	25.5	0.1547	25.6547	53.99	-28.3353
0.274	36.2	0.17	36.37	61	-24.8	20.6	0.17	20.77	51	-30.23
0.291	36.8	0.17	36.97	60.5	-23.7	23.3	0.17	23.47	50.5	-27.03
0.438	37	0.17	37.17	57.1	-20.1	25.9	0.17	26.07	47.1	-21.03
0.508	32.2	0.17	32.37	56	-23.8	18.1	0.17	18.27	46	-27.73
0.74	32	0.17	32.17	56	-24	17.3	0.17	17.47	46	-28.53

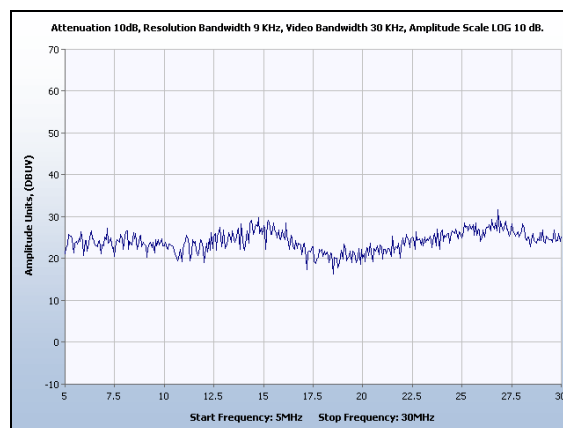
Table 18. Conducted Emissions - Voltage, 17" Model, Phase Line (120VAC, 60Hz), Channel 1, 802.11 b



Plot 71. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 b, 0.15 MHz – 0.5 MHz



Plot 72. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 b, 0.5 MHz – 5 MHz



Plot 73. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 1, 802.11 b, 5 MHz – 30 MHz



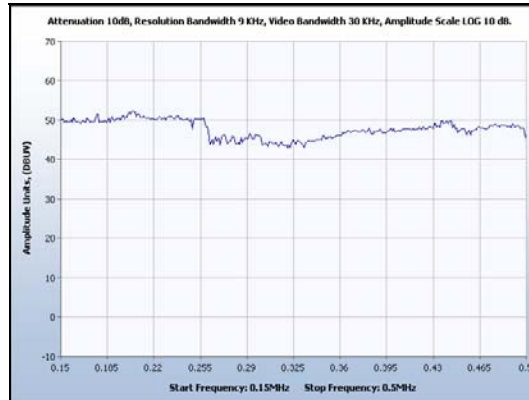
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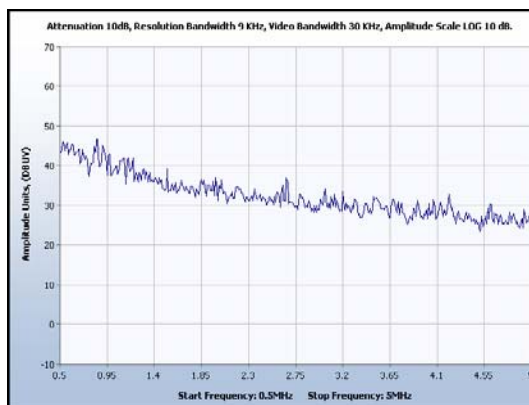
Conducted Emissions - Voltage, 17" Model, Neutral Line (120VAC, 60Hz), Channel 1, 802.11 b

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.199	47.3	0.1683	47.4683	63.65	-16.35	34.6	0.1683	34.7683	53.65	-18.8817
0.434	44.9	0.17	45.07	57.18	-12.28	30.4	0.17	30.57	47.18	-16.61
0.623	41	0.17	41.17	56	-15	25.6	0.17	25.77	46	-20.23
0.736	40.9	0.17	41.07	56	-15.1	26.4	0.17	26.57	46	-19.43
0.841	36.9	0.17	37.07	56	-19.1	21.3	0.17	21.47	46	-24.53
0.984	35	0.17	35.17	56	-21	21.8	0.17	21.97	46	-24.03

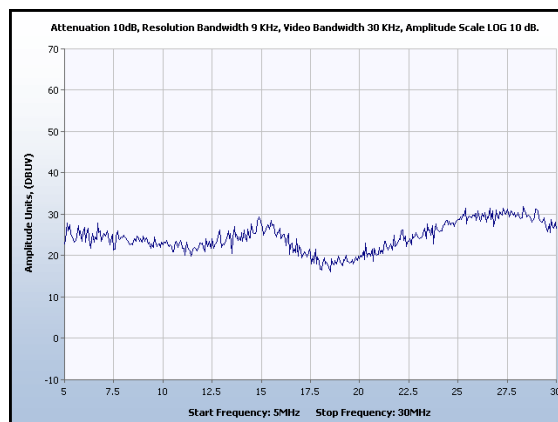
Table 19. Conducted Emissions - Voltage, 17" Model, Neutral Line (120VAC, 60Hz), Channel 1, 802.11 b



Plot 74. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 b, 0.15 MHz – 0.5 MHz



Plot 75. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 b, 0.5 MHz – 5 MHz



Plot 76. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 1, 802.11 b, 5 MHz – 30 MHz



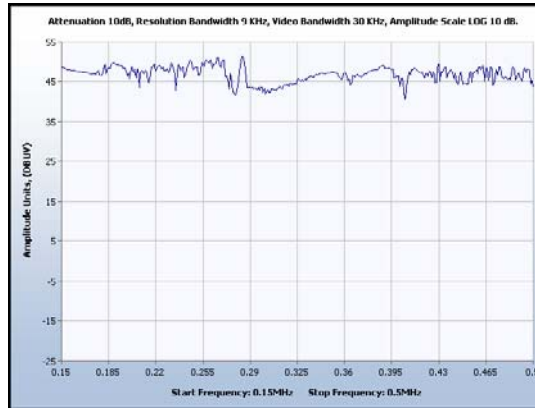
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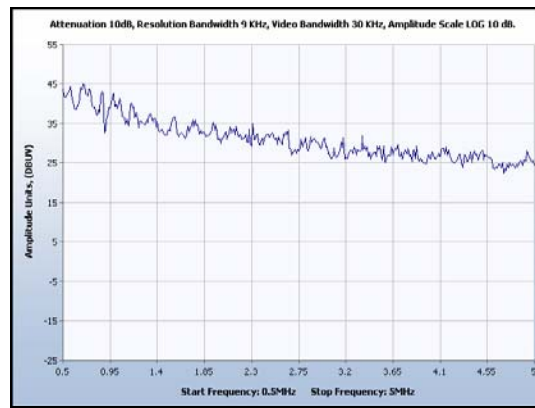
Conducted Emissions - Voltage, 17" Model, Phase Line (120VAC, 60Hz), Channel 6, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.2165	37.5	0.17	37.67	62.95	-25.45	15.2	0.17	15.37	52.95	-37.58
0.228488	36.8	0.17	36.97	62.5	-25.7	15.1	0.17	15.27	52.5	-37.23
0.407994	36.7	0.17	36.87	57.69	-20.99	19.9	0.17	20.07	47.69	-27.62
0.579793	43.5	0.17	43.67	56	-12.5	29.9	0.17	30.07	46	-15.93
0.581733	43.4	0.17	43.57	56	-12.6	29.6	0.17	29.77	46	-16.23
0.58302	43.1	0.17	43.27	56	-12.9	29.5	0.17	29.67	46	-16.33
0.70468	41.3	0.17	41.47	56	-14.7	23.1	0.17	23.27	46	-22.73

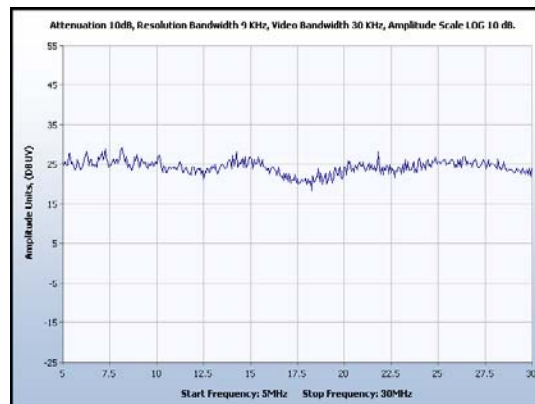
Table 20. Conducted Emissions - Voltage, 17" Model, Phase Line (120VAC, 60Hz), Channel 6, 802.11 g



Plot 77. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 78. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.5 MHz – 5 MHz



Plot 79. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 5 MHz – 30 MHz



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Conducted Emissions - Voltage, 17" Model, Neutral Line (120VAC, 60Hz), Channel 6, 802.11 g

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.232	38.3	0.17	38.47	62.38	-24.08	20.8	0.17	20.97	52.38	-31.41
0.335	36.2	0.17	36.37	59.33	-23.13	17	0.17	17.17	49.33	-32.16
0.343	37.7	0.17	37.87	59.13	-21.43	18.9	0.17	19.07	49.13	-30.06
0.469	36.7	0.17	36.87	56.53	-19.83	27.1	0.17	27.27	46.53	-19.26
0.691	32.4	0.17	32.57	56	-23.6	15.9	0.17	16.07	46	-29.93
0.759	31.9	0.17	32.07	56	-24.1	23	0.17	23.17	46	-22.83
0.853	31	0.17	31.17	56	-25	21	0.17	21.17	46	-24.83
0.959	32.7	0.17	32.87	56	-23.3	21.4	0.17	21.57	46	-24.43

Table 21. Conducted Emissions - Voltage, 17" Model, Neutral Line (120VAC, 60Hz), Channel 6, 802.11 g



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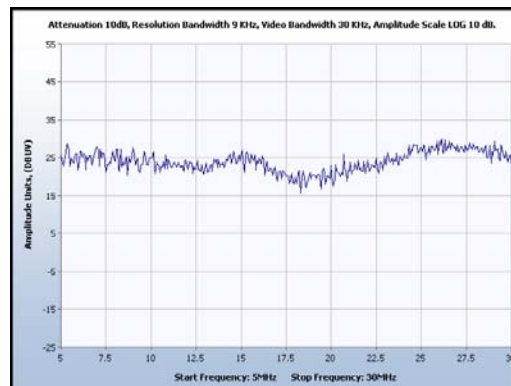
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Plot 80. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 81. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 0.5 MHz – 5 MHz



Plot 82. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 6, 802.11 g, 5 MHz – 30 MHz



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§ 15.207 Conducted Emissions Limits

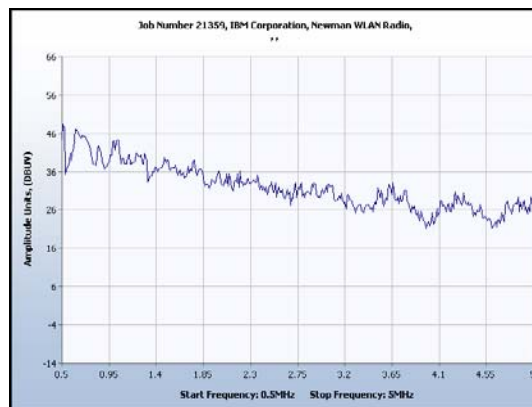
Conducted Emissions - Voltage, 17" Model, Phase Line (120VAC, 60Hz), Channel 11, 802.11 g,

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.250931	49.2	0.17	49.37	61.73	-12.53	34.5	0.17	34.67	51.73	-17.06
0.238988	47.3	0.17	47.47	62.13	-14.83	32.8	0.17	32.97	52.13	-19.16
0.426806	46.8	0.17	46.97	57.31	-10.51	30.7	0.17	30.87	47.31	-16.44
0.431181	46.6	0.17	46.77	57.23	-10.63	35.6	0.17	35.77	47.23	-11.46
0.527223	46.4	0.17	46.57	56	-9.6	24.5	0.17	24.67	46	-21.33
0.642668	44.9	0.17	45.07	56	-11.1	28.4	0.17	28.57	46	-17.43
0.787865	38	0.17	38.17	56	-18	30.9	0.17	31.07	46	-14.93

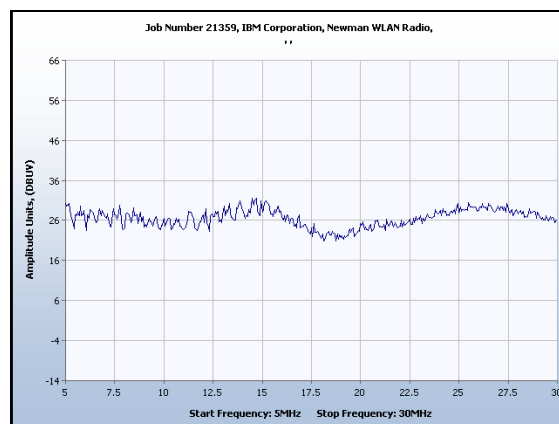
Table 22. Conducted Emissions - Voltage, 17" Model, Phase Line (120VAC, 60Hz), Channel 11, 802.11 g,



Plot 83. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.15 MHz – 0.5 MHz



Plot 84. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.5 MHz – 5 MHz



Plot 85. Conducted Emissions - Voltage, 17" Model, Phase Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 5 MHz – 30 MHz



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§ 15.207 Conducted Emissions Limits

Conducted Emissions - Voltage, 17" Model, Neutral Line (120VAC, 60Hz), Channel 11, 802.11 g,

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.164044	44	0.1088748	44.1088748	65.26	-21.26	28.1	0.1088748	28.2088748	55.26	-27.0511
0.245288	43.9	0.17	44.07	61.92	-18.02	29.7	0.17	29.87	51.92	-22.05
0.441725	37.5	0.17	37.67	57.03	-19.53	30.8	0.17	30.97	47.03	-16.06
0.526558	38.6	0.17	38.77	56	-17.4	18.7	0.17	18.87	46	-27.13
0.647963	36.3	0.17	36.47	56	-19.7	23.2	0.17	23.37	46	-22.63
0.726785	34.3	0.17	34.47	56	-21.7	24.1	0.17	24.27	46	-21.73
0.80457	32.8	0.17	32.97	56	-23.2	23.8	0.17	23.97	46	-22.03

Table 23. Conducted Emissions - Voltage, 17" Model, Neutral Line (120VAC, 60Hz), Channel 11, 802.11 g



Plot 86. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11g, 0.15 MHz – 0.5 MHz



Plot 87. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 0.5 MHz – 5 MHz



Plot 88. Conducted Emissions - Voltage, 17" Model, Neutral Line Plot (120VAC, 60Hz), Channel 11, 802.11 g, 5 MHz – 30 MHz



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Conducted Emission Limits, 17" Model, Test Setup



Photograph 7. Conducted Emissions, 17" Model, Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Emissions Limits

Test Requirement(s): § 15.205 (a): Except as shown in paragraph (d) of 15.205 **Restricted bands of operation**, only spurious emissions are permitted in any of the frequency bands specified in Table 24:

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
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	Note
13.36–13.41.			
Note: Above 38.6			

Table 24. Restricted Bands of Operation from FCC Part 15, § 15.205

§ 15.205 (b): (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.

§ 15.35 (b): ...When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to



20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules...

Frequency (MHz)	Field Strength (Microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 – 30.0	30	30
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.

Table 25. Radiated Emissions Limits from § 15.209 (a)

Test Procedure: For frequencies from 30 MHz to 1 GHz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

The transmitter was set to the mid channel at the highest output power and placed on a 0.8 m high wooden table inside a semi-anechoic chamber. Measurements were performed with the EUT rotated 360° and varying the adjustable antenna mast with 1 m to 4 m height to determine the worst case orientation for maximum emissions. Measurement were repeated the measurement at the low and highest channels.

For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

In accordance with §15.35 (b) the limit on the radio frequency emissions as measured using instrumentation with a peak detector function shall be 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

EUT Field Strength Final Amplitude = Raw Amplitude – Preamp gain + Antenna Factor + Cable Loss.

Test Results: The EUT was found compliant with the requirements of this section.
No emissions from the transmitter were found below 1 GHz.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): December 21, 2006



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Radiated Emissions Limits Test Results, 15.209 (a) – 12” Model, 802.11b

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.82385	225	H	34.12	21.52	32.8	-23.83	33.55	20.95	74	54	-40.45	-33.05
4.82389	225	V	41.12	25.77	32.7	-23.83	40.45	25.1	74	54	-33.55	-28.9
7.236	0	V	37.24	25.88	36.2	-22.33	41.57	30.21	74	54	-32.43	-23.79
9.64785	225	H	39.29	33.65	38.5	-19.83	48.42	42.78	74	54	-25.58	-11.22
9.64785	225	V	35.71	27.55	38.5	-19.83	44.84	36.68	74	54	-29.16	-17.32

Table 26. Radiated Emissions Test Results, 12” Model, 802.11b, Channel 1

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.87378	225	H	34.74	21.46	32.8	-23.83	34.17	20.89	74	54	-39.83	-33.11
4.87393	225	V	39.56	24.28	32.8	-23.83	38.99	23.71	74	54	-35.01	-30.29
7.3095	0	V	37.21	26.29	36.2	-22.33	41.54	30.62	74	54	-32.46	-23.38
9.74781	225	H	37.94	31.88	38.5	-20	46.9	40.84	74	54	-27.1	-13.16
9.74785	225	V	32.82	22.83	38.5	-20	41.78	31.79	74	54	-32.22	-22.21

Table 27. Radiated Emissions Test Results, 12” Model, 802.11b, Channel 6

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.92392	225	H	38.89	24.17	33	-23	39.35	24.63	74	54	-34.65	-29.37
4.92396	225	V	41.43	26.2	33	-23	41.89	26.66	74	54	-32.11	-27.34
7.3855	0	V	36.04	24.85	36.2	-22.33	40.37	29.18	74	54	-33.63	-24.82
9.84777	225	H	37.46	32.26	38.7	-20.83	45.79	40.59	74	54	-28.21	-13.41
9.84781	225	V	38.81	33.93	38.7	-20.83	47.14	42.26	74	54	-26.86	-11.74

Table 28. Radiated Emissions Test Results, 12” Model, 802.11b, Channel 11

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



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Radiated Emissions Limits Test Results, 15.209 (a) – 12” Model, 802.11g

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.8233	225	V	36.27	22.55	32.7	-23.83	35.6	21.88	74	54	-38.4	-32.12
4.8253	200	H	36.93	24.7	32.8	-23.83	36.36	24.13	74	54	-37.64	-29.87
7.236	0	V	37.17	23.87	36.2	-22.33	41.5	28.2	74	54	-32.5	-25.8
9.647	200	H	36.46	23.38	38.5	-19.83	45.59	32.51	74	54	-28.41	-21.49
9.6475	225	V	36.04	22.04	38.5	-19.83	45.17	31.17	74	54	-28.83	-22.83

Table 29. Radiated Emissions Test Results, 12” Model, 802.11g, Channel 1

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.
Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.8702	225	V	35.32	23.64	32.8	-23.83	34.75	23.07	74	54	-39.25	-30.93
4.8764	200	H	36.33	24.07	32.8	-23.83	35.76	23.5	74	54	-38.24	-30.5
7.308	0	V	37.02	23.81	36.2	-22.33	41.35	28.14	74	54	-32.65	-25.86
9.7422	225	V	33.78	22.85	38.5	-20	42.74	31.81	74	54	-31.26	-22.19
9.7433	200	H	33.71	21.18	38.5	-20	42.67	30.14	74	54	-31.33	-23.86

Table 30. Radiated Emissions Test Results, 12” Model, 802.11g, Channel 6

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.
Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.9235	225	V	37.05	25.75	33	-23	37.51	26.21	74	54	-36.49	-27.79
4.92392	225	H	40.89	24.17	33	-23	41.35	24.63	74	54	-32.65	-29.37
7.3825	0	V	35.62	23.14	36.2	-22.33	39.95	27.47	74	54	-34.05	-26.53
9.8475	225	V	32.54	21.1	38.7	-20.83	40.87	29.43	74	54	-33.13	-24.57
9.84777	225	H	39.46	24.26	38.7	-20.83	47.79	32.59	74	54	-26.21	-21.41

Table 31. Radiated Emissions Test Results, 12” Model, 802.11g, Channel 11

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.
Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



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Radiated Emissions Limits Test Results, 15.209 (a) – 12” Model, 802.11g, Turbo

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.8705	135	H	37.9	25.77	32.8	-23.83	37.33	25.2	74	54	-36.67	-28.8
4.8715	45	V	35.99	22.01	32.8	-23.83	35.42	21.44	74	54	-38.58	-32.56
7.309	90	V	34.47	23.4	36.2	-22.33	38.8	27.73	74	54	-35.2	-26.27
9.741	45	V	32.33	21.47	38.5	-19.83	41.46	30.6	74	54	-32.54	-23.4
9.741	45	H	36.2	24.32	38.5	-19.83	45.33	33.45	74	54	-28.67	-20.55

Table 32. Radiated Emissions Test Results, 12” Model, 802.11g, Turbo

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



Photograph 8. Radiated Emissions, 12" Model, Test Setup



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Radiated Emissions Limits Test Results, 15.209 (a) – 15” Model, 802.11b

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.824	45	H	41.02	25.97	34	-21.2	44.28	29.23	74	54	-29.72	-24.77
4.824	45	V	42.02	27.99	34.7	-21.2	45.98	31.95	74	54	-28.02	-22.05
7.234	180	V	50.36	40.64	36.8	-19.3	58.32	48.6	74	54	-15.68	-5.4
7.2363	160	H	52.62	43	37	-19.3	60.78	51.16	74	54	-13.22	-2.84
9.6479	225	H	46.44	43.83	38.7	-16.8	58.8	56.19	74	54	-15.2	2.19
9.64795	90	V	48.1	45.68	38.2	-16.8	59.96	57.54	74	54	-14.04	3.54

Table 33. Radiated Emissions Test Results, 15” Model, 802.11b, Channel 1

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Note 3: The emissions at 9.6 GHz are above the limit as can be seen in Table 33 but this frequency is not in the restrictive band and therefore only has to be at least 20 dBc below the fundamental. Measured at 3m, the fundamental peak amplitude is 110.9 dBuV. Therefore the 9.6 GHz spurious emission (4th harmonic) is well below 20 dBc.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.874	45	V	41	25.82	34.7	-21.2	44.96	29.78	74	54	-29.04	-24.22
4.874	45	H	43.89	28.99	34	-21.2	47.15	32.25	74	54	-26.85	-21.75
7.311	180	V	48.64	39.07	36.8	-19.3	56.6	47.03	74	54	-17.4	-6.97
7.311	180	H	48.96	39.27	37	-19.3	57.12	47.43	74	54	-16.88	-6.57
9.74788	135	H	42.68	39.79	38.7	-16.8	55.04	52.15	74	54	-18.96	-1.85
9.74798	90	V	45.57	42.94	38.2	-16.8	57.43	54.8	74	54	-16.57	0.8

Table 34. Radiated Emissions Test Results, 15” Model, 802.11b, Channel 6

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Note 3: The emissions at 9.7 GHz are above the limit as can be seen in Table 34 but this frequency is not in the restrictive band and therefore only has to be at least 20 dBc below the fundamental. Measured at 3m, the fundamental peak amplitude is 110.0 dBuV. Therefore the 9.7 GHz spurious emission (4th harmonic) is well below 20 dBc.



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Radiated Emissions Limits Test Results, 15.209 (a) – 15” Model, 802.11b

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre- amp System Gain Correction Factor(dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.924	45	V	43.48	28.71	34.3	-21.2	47.04	32.27	74	54	-26.96	-21.73
4.924	90	H	45	29.45	34.7	-21.2	48.96	33.41	74	54	-25.04	-20.59
7.3845	160	V	41.67	32.01	37	-19.3	49.83	40.17	74	54	-24.17	-13.83
7.3854	135	H	43.41	32.77	37	-19.3	51.57	40.93	74	54	-22.43	-13.07
9.8478	90	V	40.21	36.48	38.5	-16.8	52.37	48.64	74	54	-21.63	-5.36
9.84785	180	H	39.1	35.58	38.9	-16.8	51.66	48.14	74	54	-22.34	-5.86

Table 35. Radiated Emissions Test Results, 15” Model, 802.11b, Channel 11

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



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Radiated Emissions Limits Test Results, 15.209 (a) – 15” Model, 802.11g

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.8223	135	V	35.87	23.45	34.7	-21.2	39.83	27.41	74	54	-34.17	-26.59
4.8258	135	H	39.22	27.3	34.1	-21.2	42.58	30.66	74	54	-31.42	-23.34
7.2335	180	V	48.39	35.68	36.9	-19.3	56.45	43.74	74	54	-17.55	-10.26
7.2335	180	H	49.5	36.17	37.5	-19.3	58.16	44.83	74	54	-15.84	-9.17
9.6425	180	H	40.32	26.75	38.7	-16.8	52.68	39.11	74	54	-21.32	-14.89
9.6425	90	V	42.23	28.02	38.2	-16.8	54.09	39.88	74	54	-19.91	-14.12

Table 36. Radiated Emissions Test Results, 15” Model, 802.11g, Channel 1

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.867	135	H	37.67	26.7	34.1	-21.2	41.03	30.06	74	54	-32.97	-23.94
4.8733	200	V	36.86	25.77	34.7	-21.2	40.82	29.73	74	54	-33.18	-24.27
7.31	180	H	47.08	34.62	37.5	-19.3	55.74	43.28	74	54	-18.26	-10.72
7.314	180	V	44.97	33.4	36.9	-19.3	53.03	41.46	74	54	-20.97	-12.54
9.742	90	V	41.9	27.13	38.2	-16.8	53.76	38.99	74	54	-20.24	-15.01
9.753	45	H	35.74	22.58	38.7	-16.8	48.1	34.94	74	54	-25.9	-19.06

Table 37. Radiated Emissions Test Results, 15” Model, 802.11g, Channel 6

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.926	180	V	38.65	26.43	34.3	-21.2	42.21	29.99	74	54	-31.79	-24.01
4.926	180	H	39.36	27.64	34.7	-21.2	43.32	31.6	74	54	-30.68	-22.4
7.3825	180	H	42.59	31.02	37.5	-19.3	51.25	39.68	74	54	-22.75	-14.32
7.388	180	V	38.39	25.38	36.9	-19.3	46.45	33.44	74	54	-27.55	-20.56
9.8425	90	V	34.88	21.03	38.2	-16.8	46.74	32.89	74	54	-27.26	-21.11
9.843	45	H	34.8	20.09	38.7	-16.8	47.16	32.45	74	54	-26.84	-21.55

Table 38. Radiated Emissions Test Results, 15” Model, 802.11g, Channel 11

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



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Radiated Emissions Limits Test Results, 15.209 (a) – 15" Model, 802.11g, Turbo

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.868	45	V	33.73	23.54	34.7	-21.2	37.69	27.5	74	54	-36.31	-26.5
4.875	90	H	35.99	24.76	34.1	-21.2	39.35	28.12	74	54	-34.65	-25.88
7.2965	315	V	38	27.5	36.9	-19.3	46.06	35.56	74	54	-27.94	-18.44
7.303	90	H	38.44	28.49	37.5	-19.3	47.1	37.15	74	54	-26.9	-16.85
9.732	90	V	37.6	24.56	38.2	-16.8	49.46	36.42	74	54	-24.54	-17.58
9.733	90	H	33.31	22.45	38.7	-16.8	45.67	34.81	74	54	-28.33	-19.19

Table 39. Radiated Emissions Test Results, 15" Model, 802.11g, Turbo

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



Photograph 9. Radiated Emissions, 15" Model, Test Setup



Radiated Emissions Limits Test Results, 15.209 (a) – 17” Model, 802.11b

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.824	45	V	48.9	33.57	33.7	-23.83	49.23	33.9	74	54	-24.77	-20.1
7.235	25	V	52.5	40.12	36.8	-22.33	57.43	45.05	74	54	-16.57	-8.95
9.648	45	V	49	35.68	38.3	-20	57.76	44.44	74	54	-16.24	-9.56

Table 40. Radiated Emissions Test Results, 17” Model, 802.11b, Channel 1

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.8738	45	V	49.48	38.53	33.7	-23.83	49.81	38.86	74	54	-24.19	-15.14
7.314	270	V	49.86	35.84	36.8	-22.33	54.79	40.77	74	54	-19.21	-13.23
9.7477	45	V	46.68	30.89	38.3	-20	55.44	39.65	74	54	-18.56	-14.35

Table 41. Radiated Emissions Test Results, 17” Model, 802.11b, Channel 6

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.924	45	V	49.6	30.52	33.7	-23.83	49.93	30.85	74	54	-24.07	-23.15
7.3823	90	V	47.03	35.49	36.8	-22.33	51.96	40.42	74	54	-22.04	-13.58
9.848	45	V	46.09	28.54	38.3	-20	54.85	37.3	74	54	-19.15	-16.7

Table 42. Radiated Emissions Test Results, 17” Model, 802.11b, Channel 11

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.

Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



Radiated Emissions Limits Test Results, 15.209 (a) – 17” Model, 802.11g

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.8232	225	V	42.19	29.85	33.7	-23.83	42.52	30.18	74	54	-31.48	-23.82
7.2365	135	H	53.74	38.21	36.8	-22.33	58.67	43.14	74	54	-15.33	-10.86
7.2368	100	V	51.01	33.96	38.3	-20	59.77	42.72	74	54	-14.23	-11.28

Table 43. Radiated Emissions Test Results, 17” Model, 802.11g, Channel 1

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.
Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.8717	180	V	44.02	33.65	33.7	-23.83	44.35	33.98	74	54	-29.65	-20.02
7.3105	100	V	51.4	32.56	38.3	-20	60.16	41.32	74	54	-13.84	-12.68
7.3093	225	H	50.19	34.25	36.8	-22.33	55.12	39.18	74	54	-18.88	-14.82

Table 44. Radiated Emissions Test Results, 17” Model, 802.11g, Channel 6

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.
Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.

Frequency (GHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Spectrum Analyzer Measurement (dBuV) @ 1m		Antenna Correction Factor (dB)	Cable Loss/Pre-amp System Gain Correction Factor (dB)	Corrected Measurement (dBuV/m)		Emissions Limit @ 3m (dBuV/m)		Margin (dB)	
			Peak	Average			Peak	Average	Peak	Average	Peak	Average
4.9205	135	V	42.77	28.63	33.7	-23.83	43.1	28.96	74	54	-30.9	-25.04
7.3847	135	V	45.71	29.87	38.3	-20	54.47	38.63	74	54	-19.53	-15.37
7.3868	135	H	44.95	27.18	36.8	-22.33	49.88	32.11	74	54	-24.12	-21.89

Table 45. Radiated Emissions Test Results, 17” Model, 802.11g, Channel 11

Note 1: The Antenna height used for testing Radiated Emissions was 1 meter.
Note 2: The Measurement Distance Correction Factor at 1 meter is – 9.54 db.



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Photograph 10. Radiated Emissions, 17" Model, Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output and RF Exposure

Test Requirements: §15.247(b): The maximum peak output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit (Watts)
902-928	1.000
2400-2483.5	1.000
5725- 5850	1.000

Table 46. Output Power Requirements from §15.247

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in the Table 46, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Fixed, point-to-point operation excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output and RF Exposure

RF Exposure Requirements: §1.1307(b)(1) and §1.1307(b)(2): 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.

RF Radiation Exposure Limit: §1.1310: As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
30-300	61.4	0.163	1.0	6
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
30-300	27.5	0.073	0.2	30
300-1,500	--	--	F/1,500	30
1,500-100,000	--	--	1.0	30

Table 47. Limits for Maximum Permissible Exposure

Note: F=Frequency in MHz

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 2412 - 2462 MHz; As per the original test report the highest power is in 802.11b mode, channel 11. The conducted power = 26.08 dBm (peak) with maximum peak antenna gain of 1.45 dBi. Therefore, maximum limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2$$

P = Power Input to antenna (0.406 Watts)

G = Antenna Gain (1.4 numeric)

R = distance to the center of radiation of antenna (in meter) = 0.20 m

$$S = (0.406 * 1.4) / (4\pi * 0.2^2) = 1.13 \text{ W/m}^2$$

Therefore, at 20 cm the spectral power density is less than the 10 W/m² limit for uncontrolled exposure.

Test Engineer: Dusmantha Tennakoon,

Test Date: February 23, 2006



IV. Test Equipment



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Test Equipment
CFR Title 47, Part 15, Subpart C

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

Test Name: Conducted Emissions					
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4156	SPECTRUM ANALYZER; EMC	HEWLETT PACKARD	8594EM	10/06/2006	10/06/2007
1T4502	COMB GENERATOR	COM-POWER	CGC-255	08/22/2006	08/22/2007
1T4212	LISN; SWITCH	SOLAR ELECTRONICS CO	9252-R-24-BNC	12/18/2006	12/18/2007
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	01/23/2006	01/23/2007
1T4405	EMC TEST ROOM 2	MET	N/A	N/A	N/A
1T4577	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	09/24/2006	09/24/2008
1T4516	DIGITAL MULTIMETER	METERMAN	35XP	10/24/2006	10/24/2007
Test Name: Radiated Emissions					
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4351	SPECTRUM ANALYZER	AGILENT	E7405A	10/13/2006	10/13/2007
1T2665	ANTENNA; HORN	EMCO	3115	4/4/2006	4/4/2007
1T4442	PRE-AMP	MITEQ	AFS42-01001800-30-IQP	SEE NOTE	
1T4300	SEMI-ANECHOIC CHAMBER #1	EMC TEST SYSTEM	NONE	2/17/2006	1/17/2009
1T2511	ANTENNA; HORN	EMCO	3115	7/13/2006	7/13/2007
1T4553	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	3/3/2006	3/3/2008
N/A	PSA	AGIENT	E4448A(US42070103)	1/12/2006	1/12/2007
1T4480	MILITARY CHAMBER 20X20X12	ETS LINDGREN	SERIES 80	NOT REQUIRED	NOT REQUIRED

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.



V. Certification & User's Manual Information



Certification & User's Manual Information

A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) *The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
 - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
 - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.



- (e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:
- (i) *Compliance testing;*
 - (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
 - (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.
- (e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.
- (f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.



Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.¹ *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.*
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

¹ In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.



Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
 - (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
 - (i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*
 - (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.
 - (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.



Certification & User's Manual Information

Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

- (3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

- (a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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Exhibits
CFR Title 47, Part 15, Subpart C

VI. Exhibits



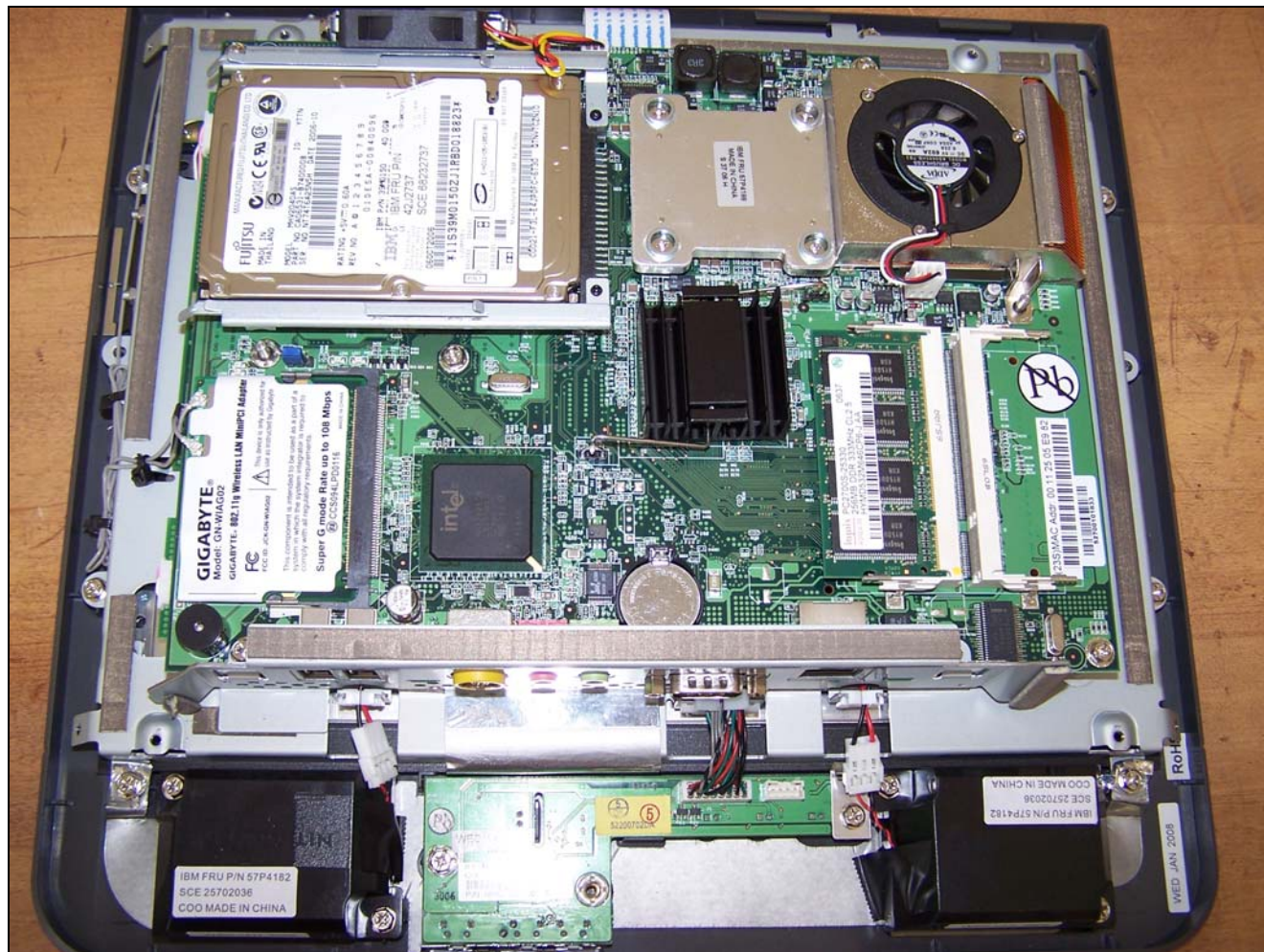
VII. Photographs



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Photographs
CFR Title 47, Part 15, Subpart C

Photographs of the 12" Model – Internal



Photograph 11. 12" Model, Internal View 1



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Photographs
CFR Title 47, Part 15, Subpart C

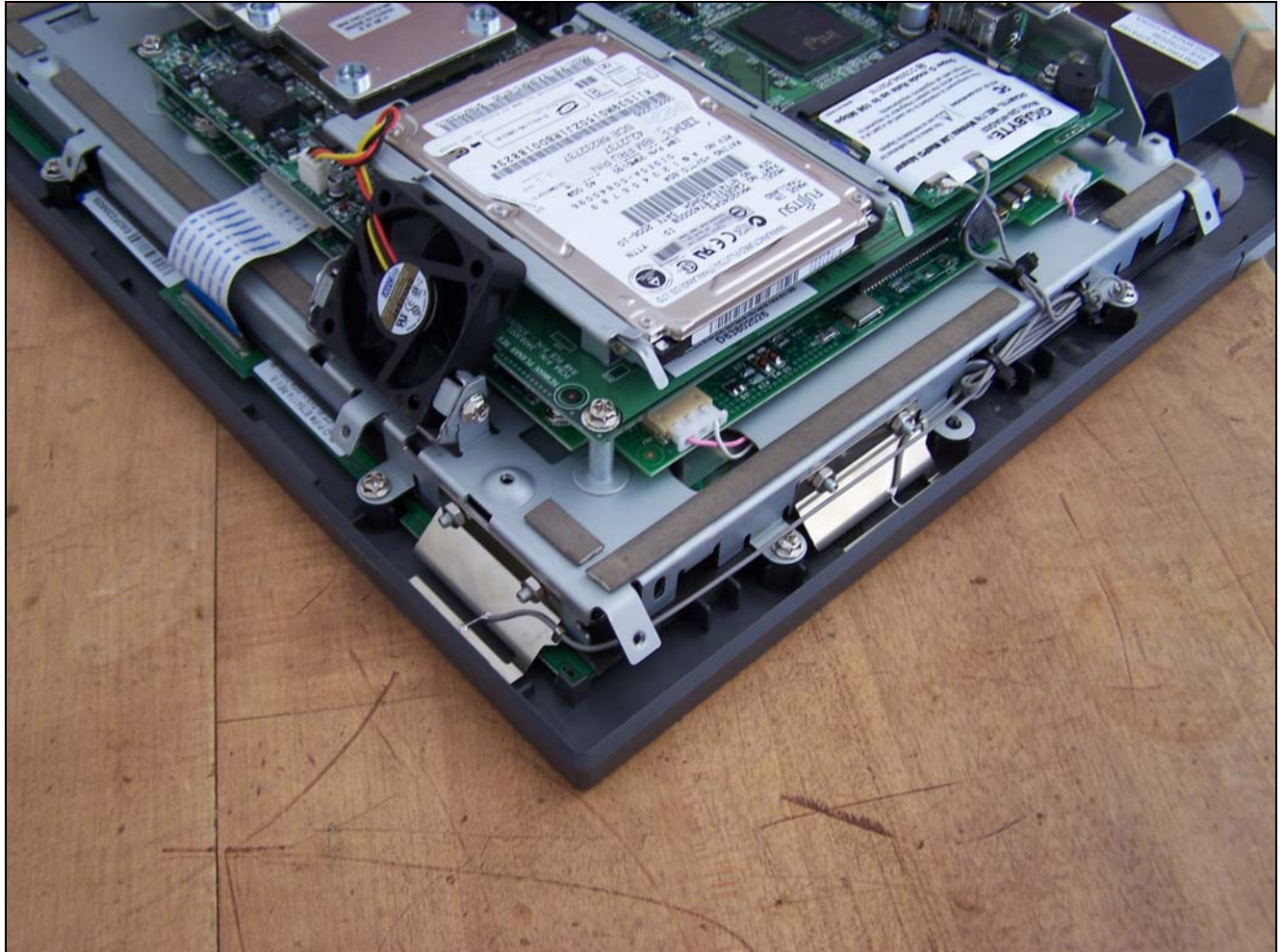


Photograph 12. 12" Model, Internal View 2



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Photographs
CFR Title 47, Part 15, Subpart C

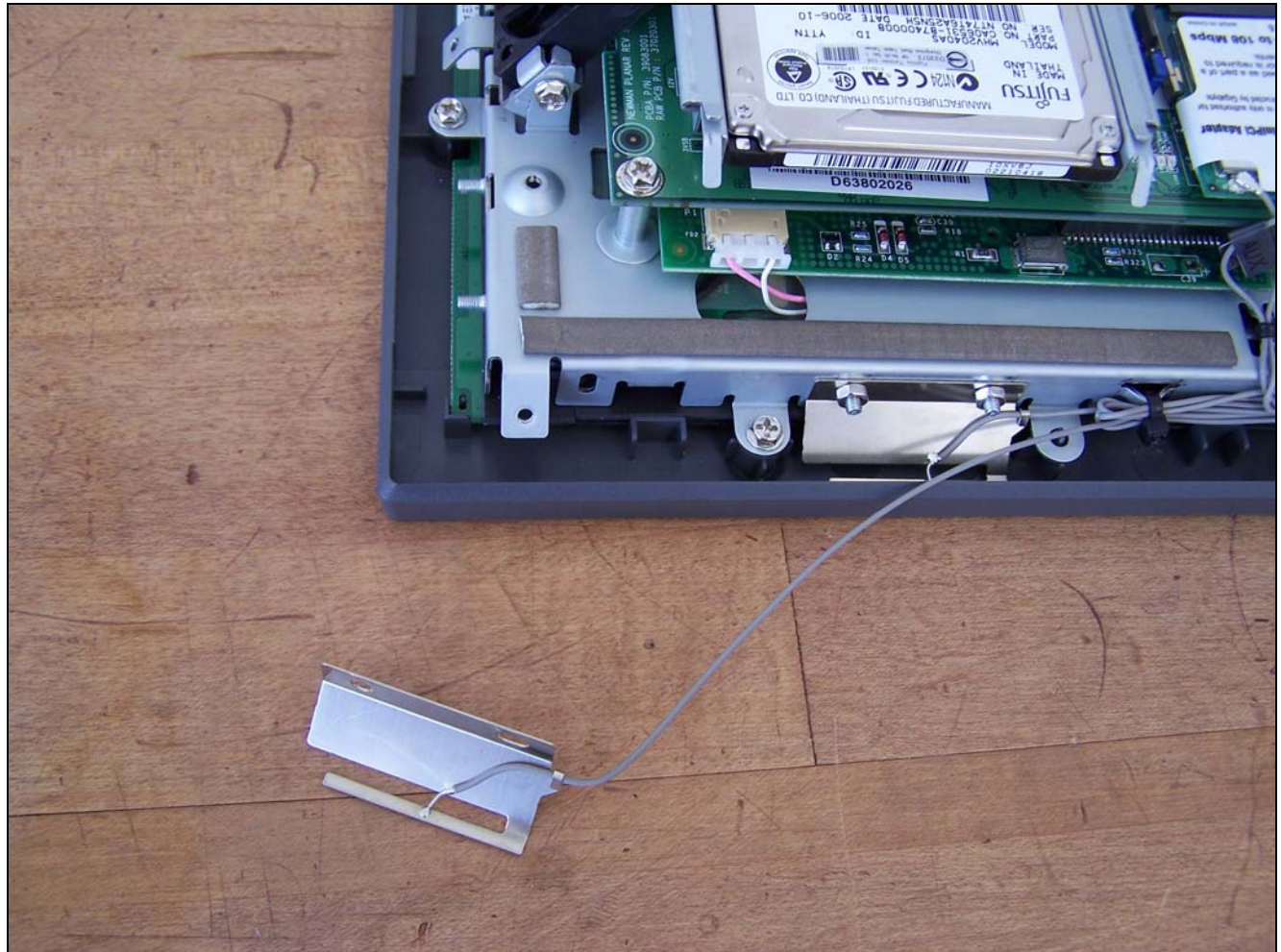


Photograph 13. 12" Model, Internal View 3



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Photographs
CFR Title 47, Part 15, Subpart C

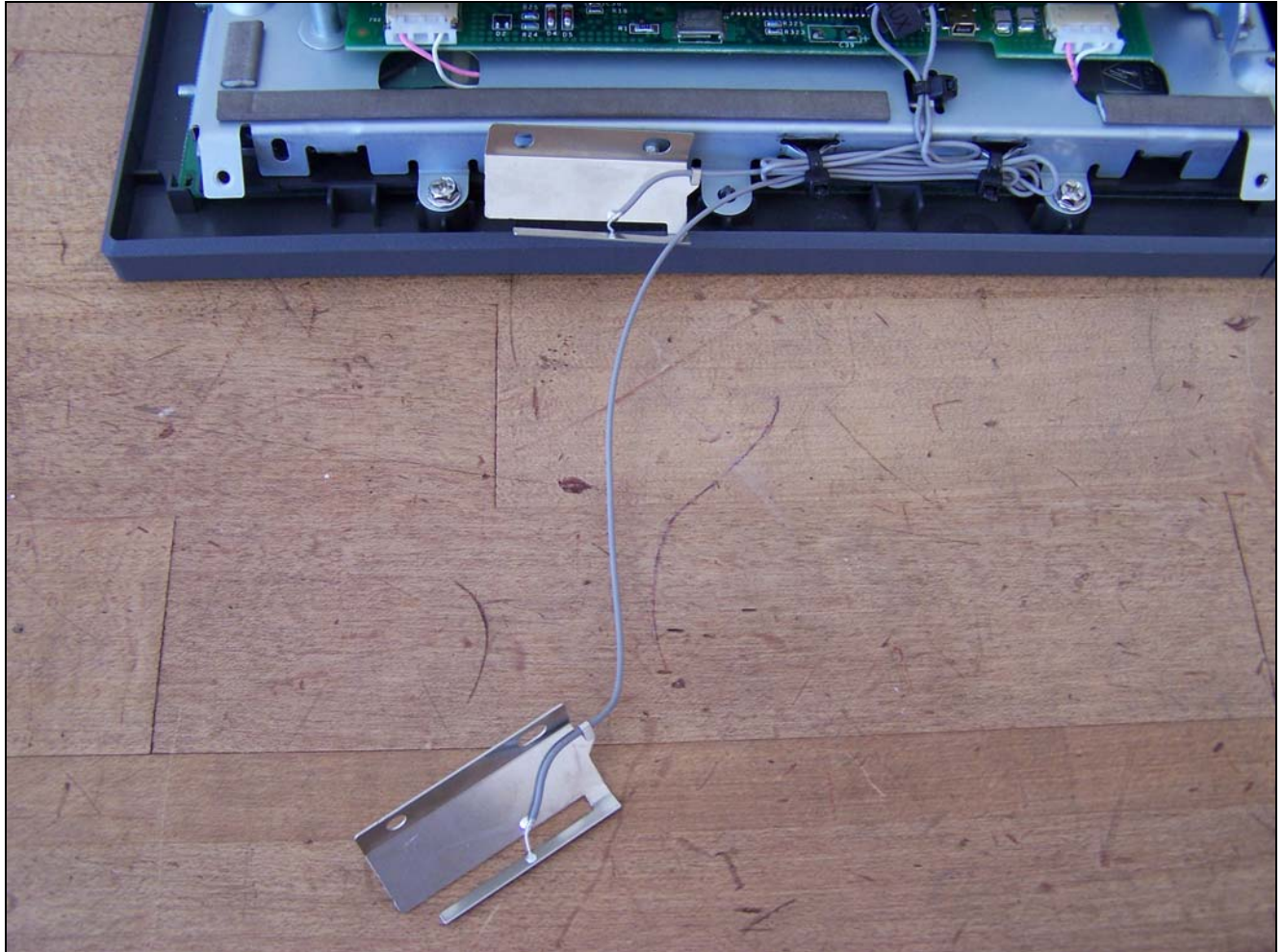


Photograph 14. 12" Model, Internal View 4



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Photograph 15. 12" Model, Internal View 5



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Photographs of the 12" Model – External



Photograph 16. 12" Model, Rear View



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Photographs
CFR Title 47, Part 15, Subpart C



Photograph 17. 12" Model, View of Bottom Connector Panel



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Photographs
CFR Title 47, Part 15, Subpart C



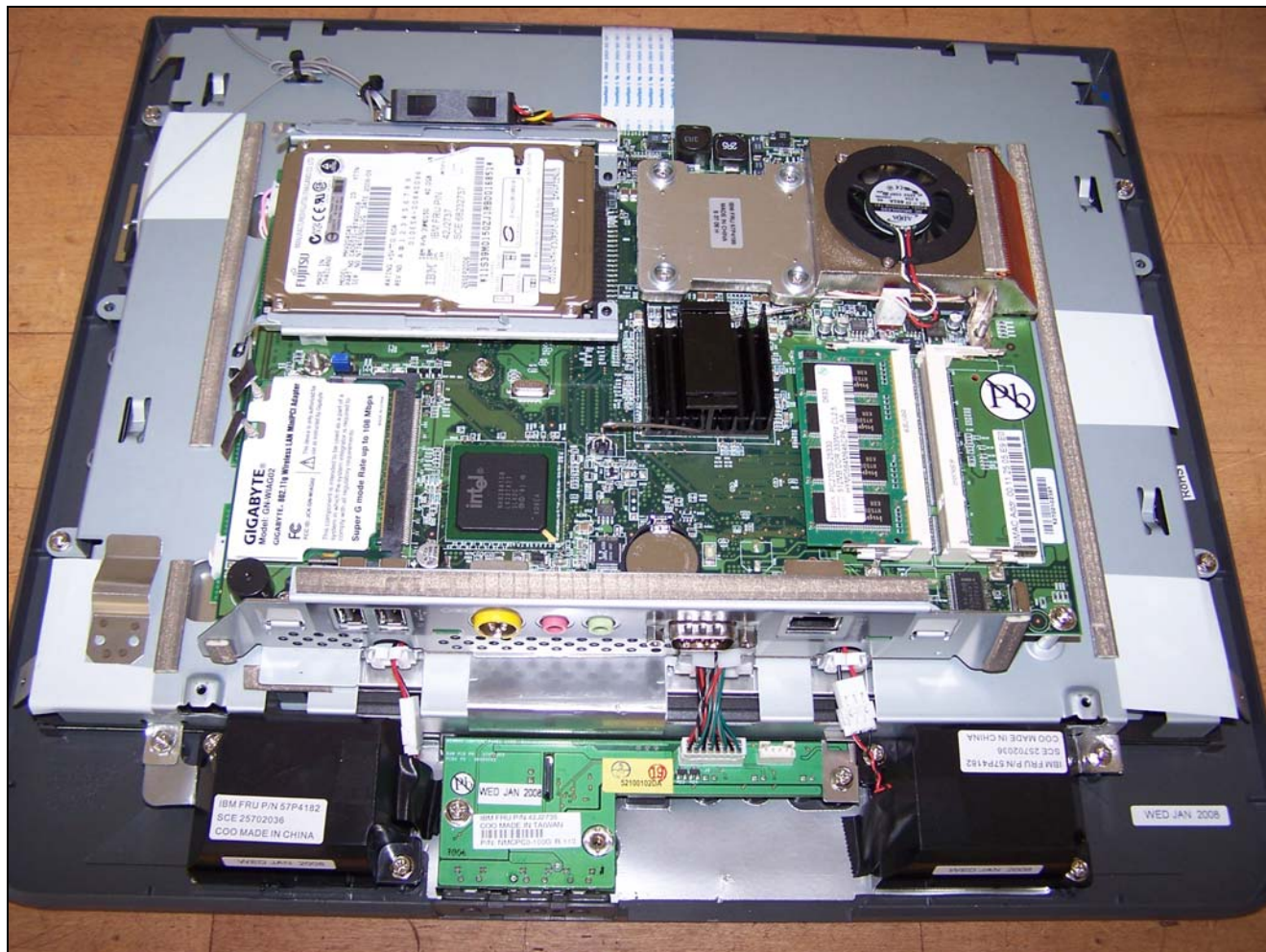
Photograph 18. 12" Model, Front View



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CFR Title 47, Part 15, Subpart C

Photographs of the 15" Model – Internal

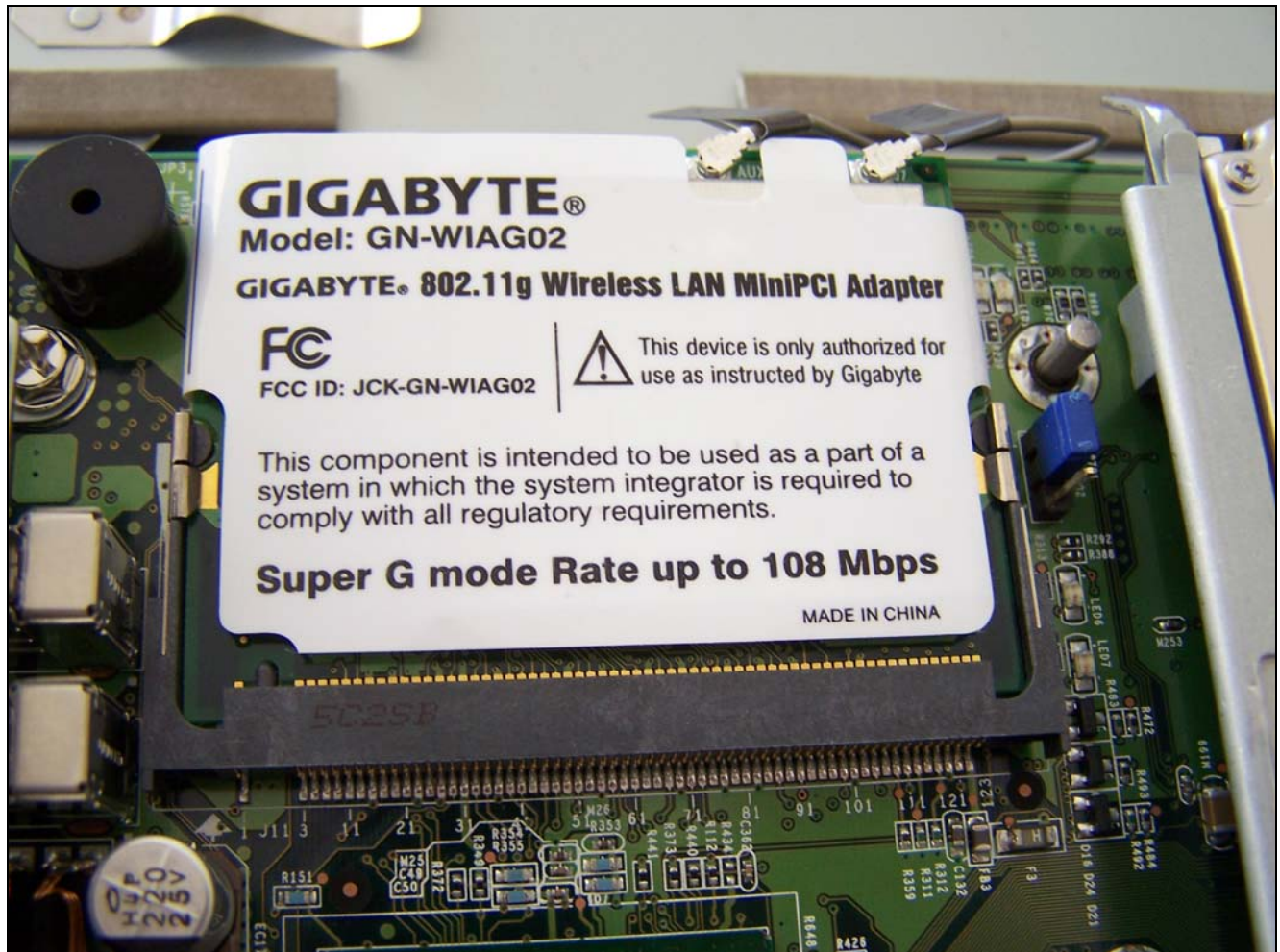


Photograph 19. 15" Model, Internal View 1



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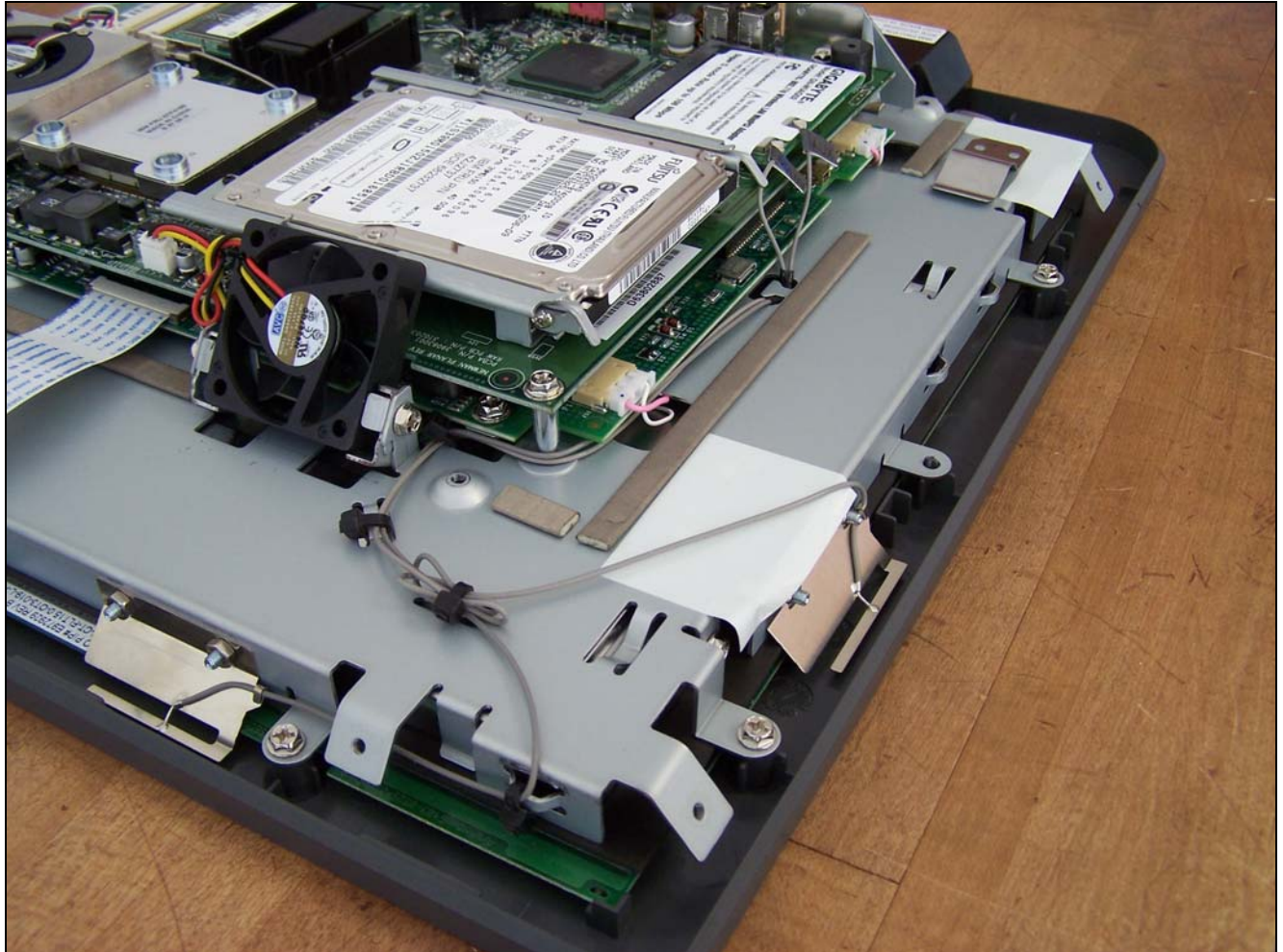


Photograph 20. 15" Model, Internal View 2



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Photograph 21. 15" Model, Internal View 3



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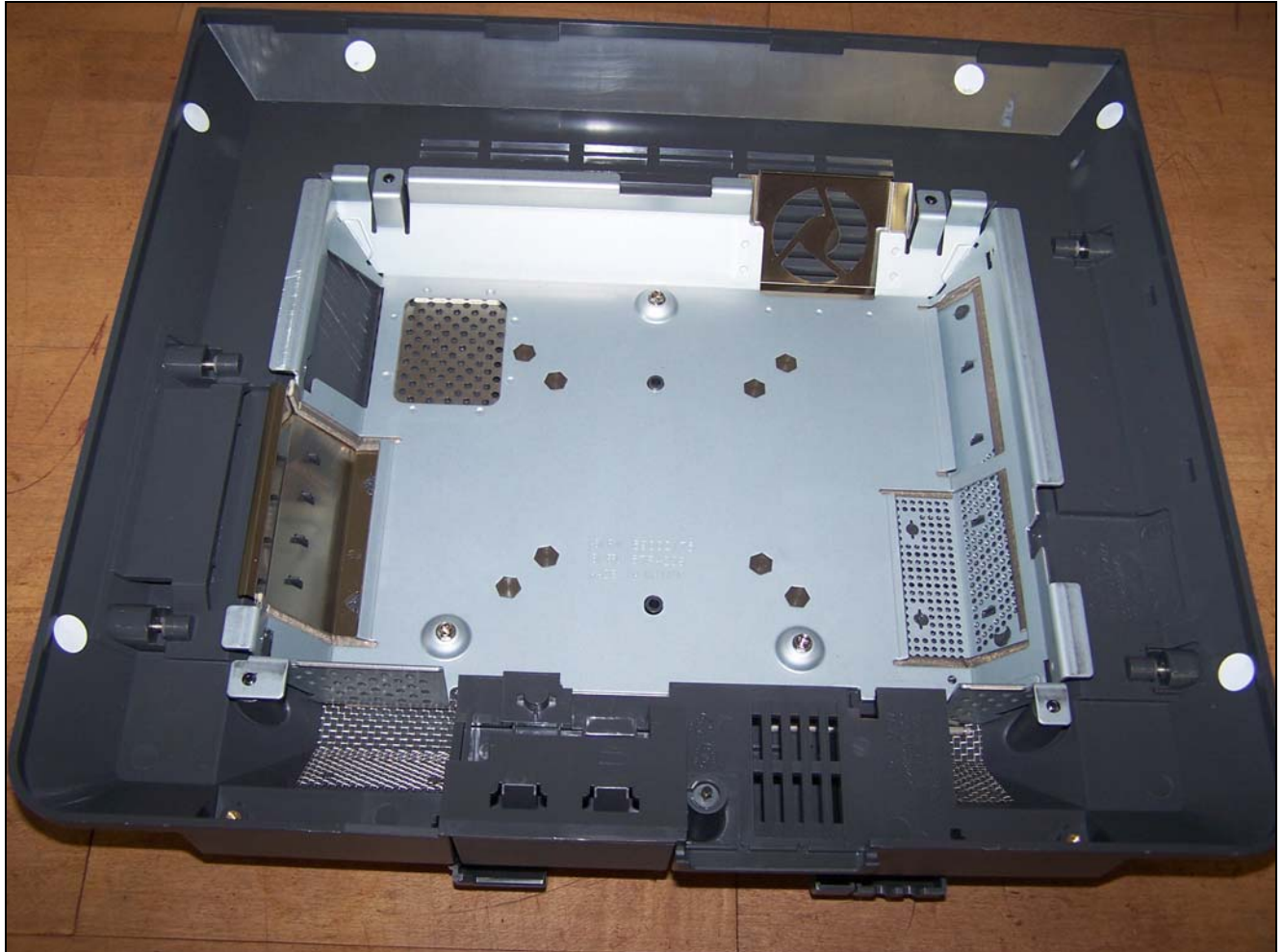


Photograph 22. 15" Model, Internal View 4



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Photograph 23. 15" Model, Internal View 5



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Photographs of the 15" Model – External



Photograph 24. 15" Model, Rear View



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Photograph 25. 15" Model, View of Bottom Connector Panel



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Photographs
CFR Title 47, Part 15, Subpart C



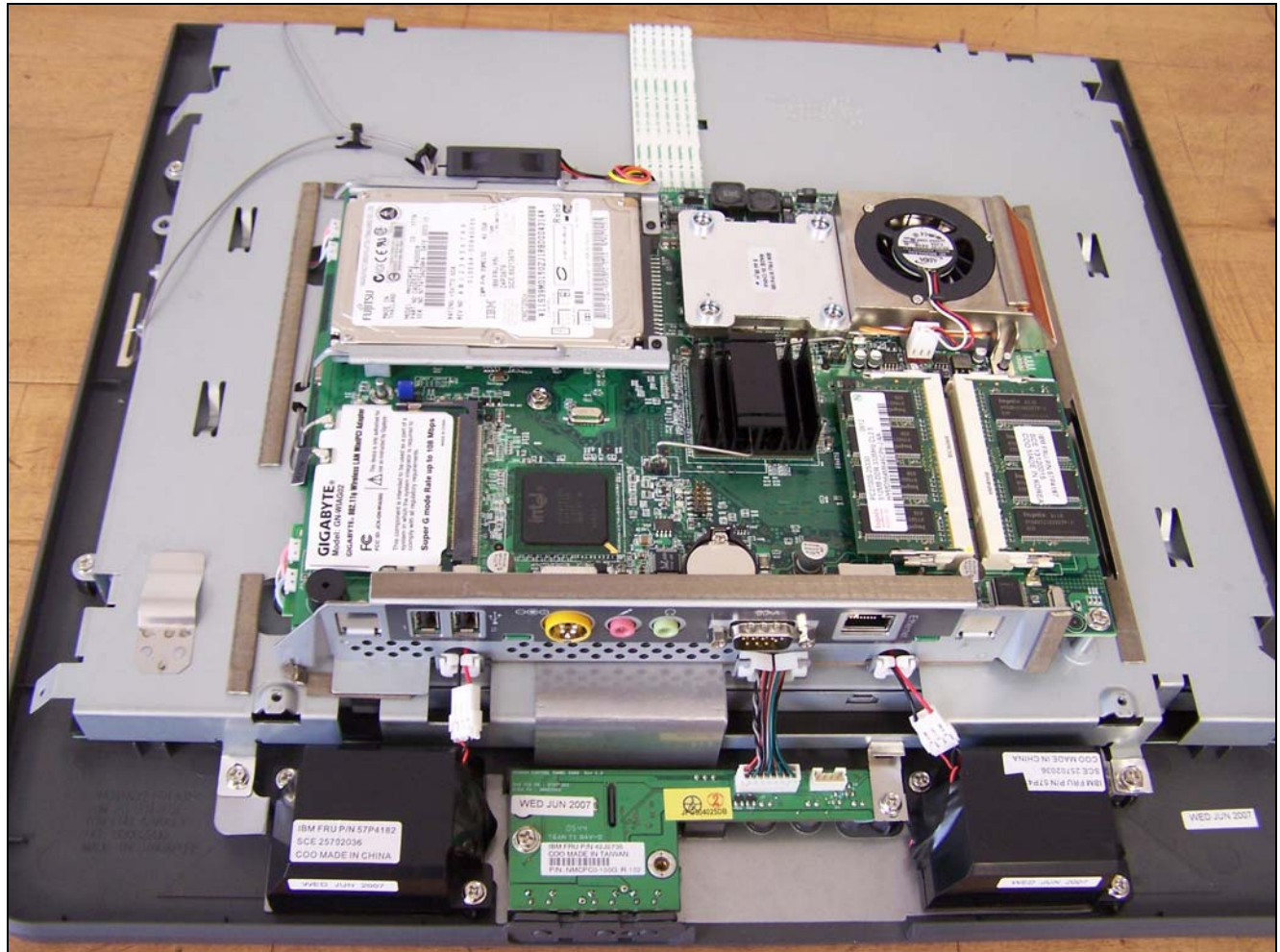
Photograph 26. 15" Model, Front View



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Photographs
CFR Title 47, Part 15, Subpart C

Photographs of the 17" Model – Internal



Photograph 27. 17" Model, Internal View 1



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Photographs
CFR Title 47, Part 15, Subpart C

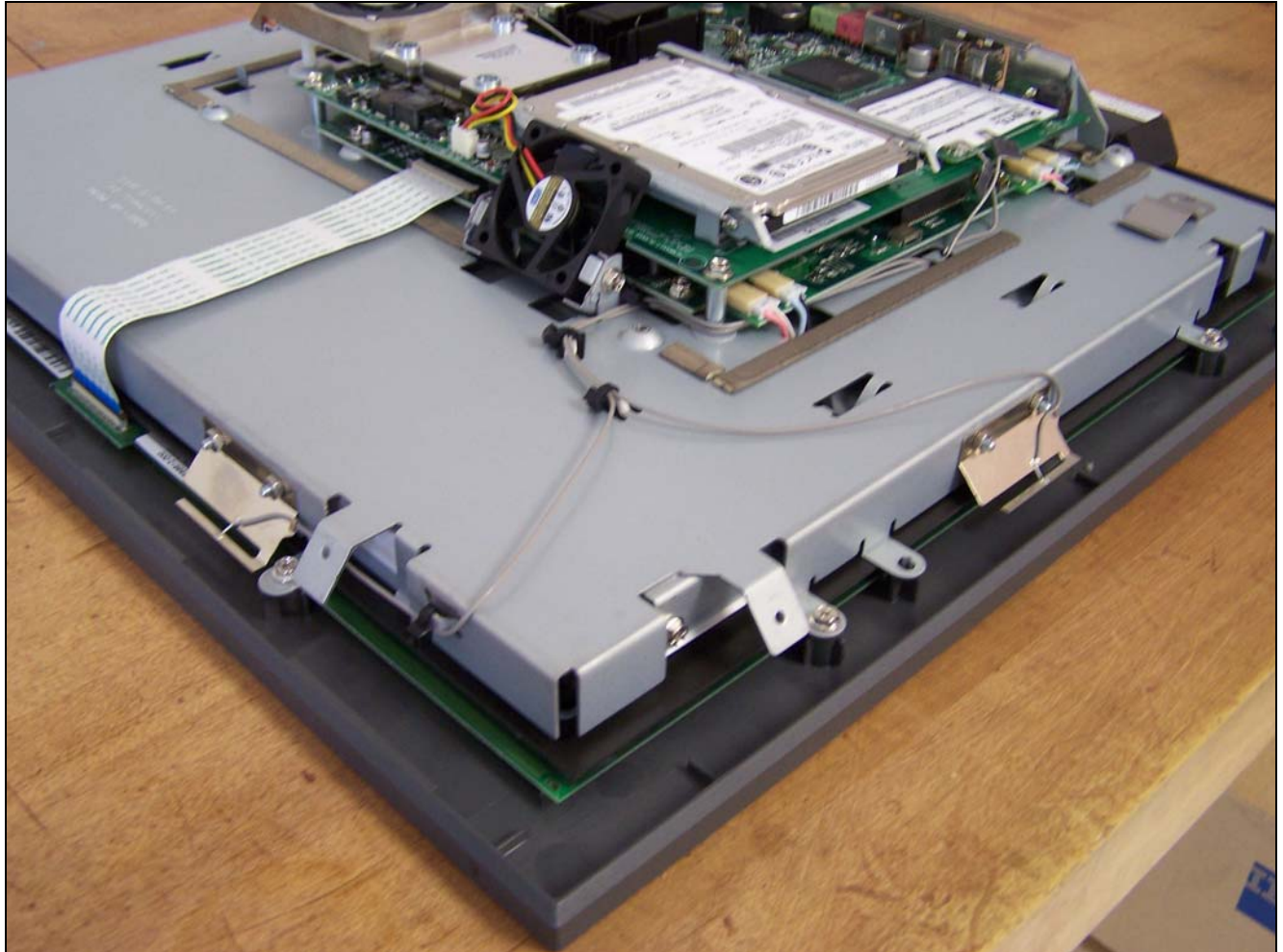


Photograph 28. 17" Model, Internal View 2



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CFR Title 47, Part 15, Subpart C



Photograph 29. 17" Model, Internal View 3



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Photographs
CFR Title 47, Part 15, Subpart C

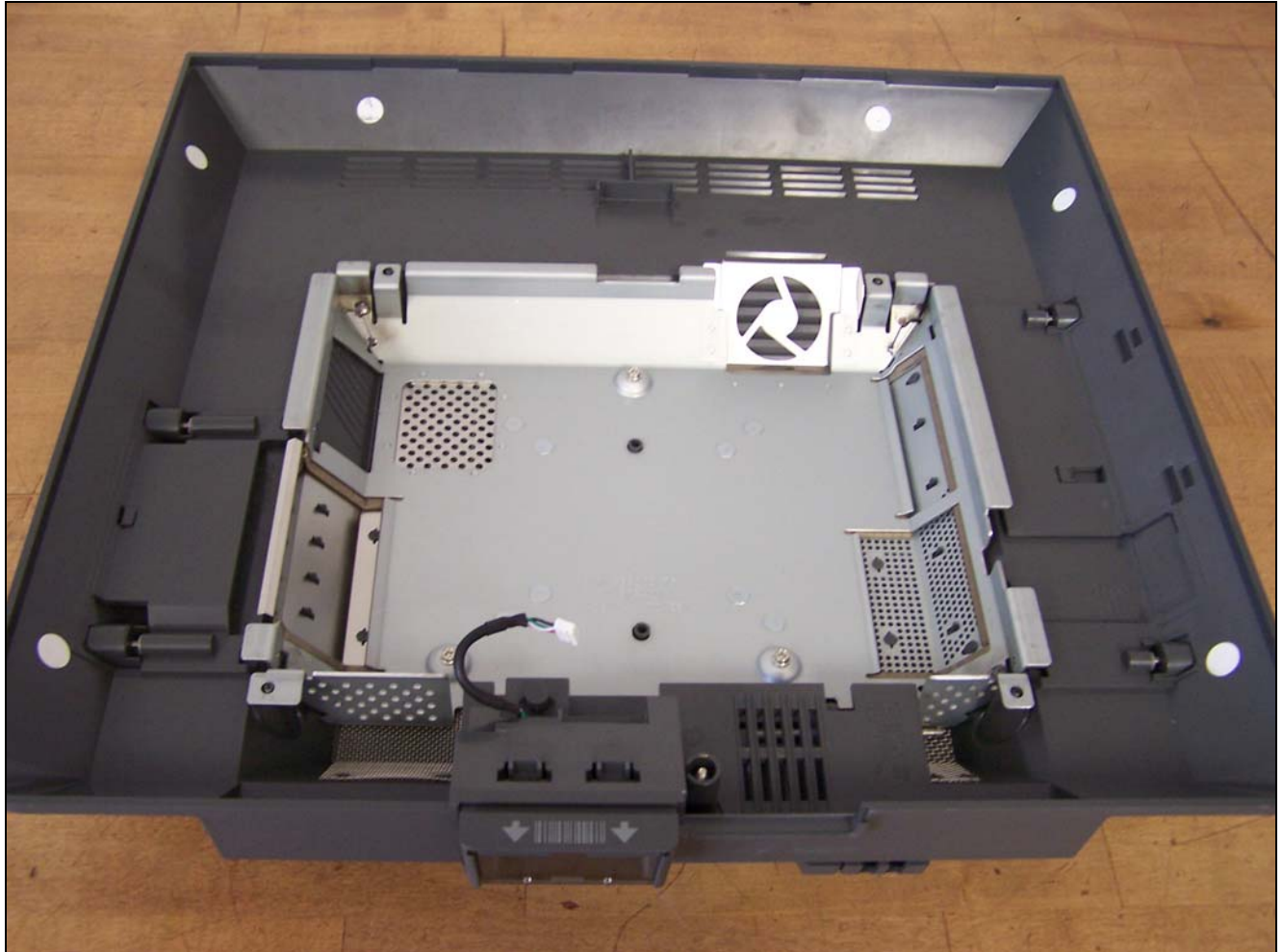


Photograph 30. 17" Model, Internal View 4



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CFR Title 47, Part 15, Subpart C



Photograph 31. 17" Model, Internal View 5



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Photographs
CFR Title 47, Part 15, Subpart C

Photographs of the 17" Model – External



Photograph 32. 17" Model, Rear View



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Photographs
CFR Title 47, Part 15, Subpart C



Photograph 33. 17" Model, View of Bottom Connector Panel



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Photographs
CFR Title 47, Part 15, Subpart C



Photograph 34. 17" Model, Front View



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End of Report
CFR Title 47, Part 15, Subpart C

End of Report