



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

914 WEST PATAPSCO AVENUE ! BALTIMORE, MARYLAND 21230-3432 ! PHONE (410) 354-3300 ! FAX (410) 354-3313

June 21, 2007

Motorola, Inc.
1064 Greenwood Blvd. Suite 400
Lake Mary, FL 32746

Dear Bob Greenway,

Enclosed is the EMC test report for compliance testing of the Motorola, Inc., MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11) as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-03 ed.), Title 47 of the CFR, Part 15.407 for U-NII devices.

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 Trawinski
Documentation Department

Reference: (\\Motorola, Inc.\\EMC22037-FCC407 REV. 2)

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Electromagnetic Compatibility Criteria Test Report

for the

Motorola, Inc.
MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11)

Verified under
the FCC Certification Rules
contained in
Title 47 of the CFR, Part 15.407
For U-NII Devices

MET Report: EMC22037-FCC407 REV. 2

June 21, 2007

Prepared For:

Motorola, Inc.
1064 Greenwood Blvd. Suite 400
Lake Mary, FL 32746

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



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for U-NII Devices

Jeffrey Hazen, Project Engineer
Electromagnetic Compatibility Lab

Jesse 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.

Dusmantha Tennakoon, Wireless Coordinator
Electromagnetic Compatibility Lab



Motorola Inc.
MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11)

Electromagnetic Compatibility
Equipment Configuration
CFR Title 47, Part 15, Subpart E

Report Status Sheet

Revision	Report Date	Reason for Revision
0	June 20, 2007	Initial Issue
1	June 21, 2007	Editorial Changes
2	June 21, 2007	Editorial Changes



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Motorola Inc.
MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11)

Electromagnetic Compatibility
Equipment Configuration
CFR Title 47, Part 15, Subpart E

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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
E	Electric Field
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
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
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 Motorola, Inc., MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11), with the requirements of Part 15, §15.407. 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 Motorola, Inc., MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11). Motorola, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Motorola, Inc., MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11), 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, §15.407, in accordance with Motorola, Inc., purchase order number NP3251529. All tests were conducted using measurement procedure ANSI C63.4-2003.

Reference	Description	Results
15.403 (c)	26dB Occupied Bandwidth	Compliant
15.407 (a)(1), (2), (3)	Conducted Transmitter Output Power	Compliant
15.407 (a)(1), (2), (3), (5)	Power Spectral Density	Compliant
15.407	Temperature and Power Stability	Compliant
15.407 (a)(6)	Peak Excursion	Compliant
15.407 (b)(1), (2), (5), (6)	Undesirable Emissions	Compliant
15.205/15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Compliant
15.207	AC Conducted Emissions 150kHz – 30MHz	Compliant

Table 1. Executive Summary of EMC Part 15.407 Compliance Testing



II. Equipment Configuration



A. Overview

MET Laboratories, Inc. was contracted by Motorola, Inc. to perform testing on the Motorola, Inc., MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11), under Motorola, Inc.'s purchase order number NP3251529.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Motorola, Inc., MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11).

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

Model(s) Tested:	MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11)	
Model(s) Covered:	MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11)	
EUT Specifications:	Primary Power: 120 VAC	
	FCC ID: QJE-MM-4300-58	
	Type of Modulations:	Orthogonal Frequency Division Multiplexing (OFDM)
	Equipment Code:	NII
	Peak RF Conducted Output Power:	0.18W
	EUT TX Frequency Ranges:	5725 – 5825 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Evaluated by:	Jeffrey Hazen	
Date(s):	June 21, 2007	

* Note: The 2.4 GHz radio is addressed under a separate FCC Part 15.247 test report.



B. References

CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure 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 MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11), Equipment Under Test (EUT), is a dual radio unit. The system operates at 2.4 GHz (ISM band 802.11 b/g) and 5.X GHz using an Atheros AP30 chipset.

Note: The 2.4 GHz radio contained in this device is reported under a separate FCC Part 15.247 MET test report.

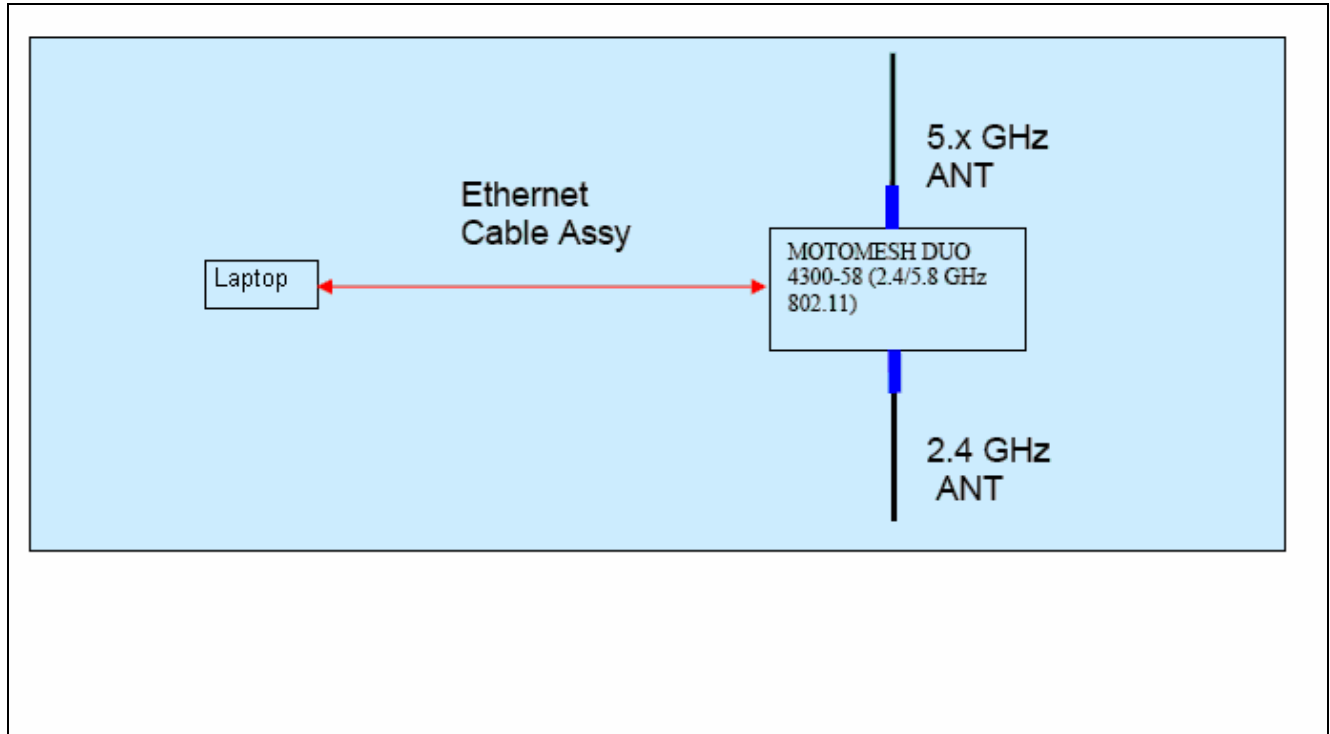


Figure 1. Block Diagram of Test Configuration



E. Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, etc., incorporated as part of the EUT is included in the following list.

Name / Description	Model Number	Serial Number
MOTOMESH Duo (2.4/5.x GHz 802.11)	4300-58	MAC: 00:05:12:0F:01:17

Table 2. Equipment Configuration

F. Support Equipment

Motorola, Inc. supplied support equipment necessary for the operation and testing of the Motorola, Inc., MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11). All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Model Number
1	Laptop Computer	Dell	Inspiron 3800
2	Laptop Computer	Toshiba	Satellite Pro M10-5405

Table 3. Support Equipment



G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded?	Termination Box ID & Port ID
1	ETH	8-pin / RJ45 ETH cat5 cable assembly	1	3	Y	ETH port of laptop
2	PWR	4-pin / pwr plug power cord cable assembly	1	2	N	Standard 120 VAC outlet
3	Antenna – AP30, 2.4 ghz	2.4 ghz 8 dbi Antenna	1	-	N/a	-
4	Antenna – AP30, 5.x ghz	5.x ghz 9 dbi Antenna	1	-	N/a	-

Table 4. Ports and Cabling Information

H. Method of Monitoring EUT Operation

AP30 – Mesh Atheros control through Atheros Radio Test (ART) for the wireless radio tests. For the wireless EMC tests, the support laptops are monitored for an interruption to the pings that were continuously occurring with the EUT. A failure would be considered where there is either a hardware error or a non-recoverable ping, since in the wireless environment, some delayed pings are acceptable performance.

I. Modifications

a) Modifications to EUT

4 things were changed on the EUT:

- 1.) RF cable on the 2.4G side due to excessive loss and bad VSWR.
- 2.) Wrong calibration on the 2.4 side due to poor RF Cable.
- 3.) RF cable on the 5.4/5.8G side due to excessive loss and bad VSWR.
- 4.) Wrong calibration on the 5.4/5.8 side due to poor RF Cable.

Note: After these changes were made measurements were re-taken to show that the unit complied with 15.407. The customer will incorporate all changes mentioned above in all production models.

b) Modifications to Test Standard

No modifications were made to the test standard.

J. Disposition of EUT

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



III. Electromagnetic Compatibility Criteria for Intentional Radiators



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 Σ 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

Test Engineer(s): Jeffrey Hazen

Test Date(s): April 3, 2007



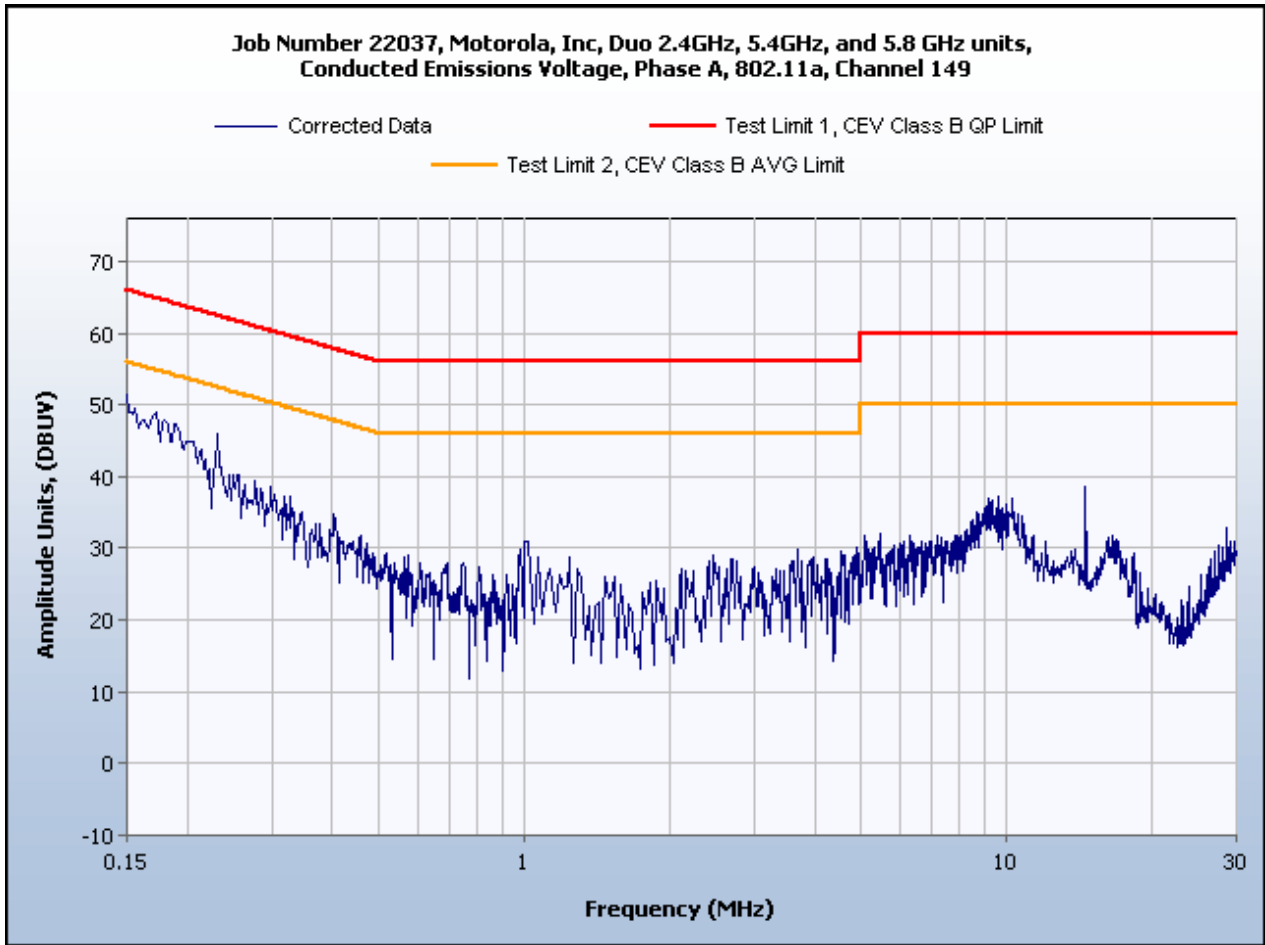
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Conducted Emissions - Voltage, AC Power, Ch 149, 5.745GHz Channel, 802.11 a mode, Phase Line (120 VAC)

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
0.161	39.2	0.1037	39.3037	65.41	-26.21	13.3	0.1037	13.4037	55.41	-42.0063
0.169	39.5	0.1173	39.6173	65.01	-25.51	27.9	0.1173	28.0173	55.01	-26.9927
0.17	40.2	0.119	40.319	64.96	-24.76	30.9	0.119	31.019	54.96	-23.941
0.188	35.6	0.1496	35.7496	64.12	-28.52	7.7	0.1496	7.8496	54.12	-46.2704
0.192	34.1	0.1564	34.2564	63.95	-29.85	7	0.1564	7.1564	53.95	-46.7936
0.207	34.3	0.17	34.47	63.33	-29.03	6	0.17	6.17	53.33	-47.16
0.232	34.3	0.17	34.47	62.38	-28.08	25	0.17	25.17	52.38	-27.21

Table 6. Conducted Emissions - Voltage, AC Power, Ch 149, 5.745GHz Channel, 802.11 a mode, Phase Line (120 VAC)



Plot 1. Conducted Emissions - Ch 149, 5.745GHz Channel, 802.11 a mode, Phase Line (120 VAC) Plot, Class B Limit



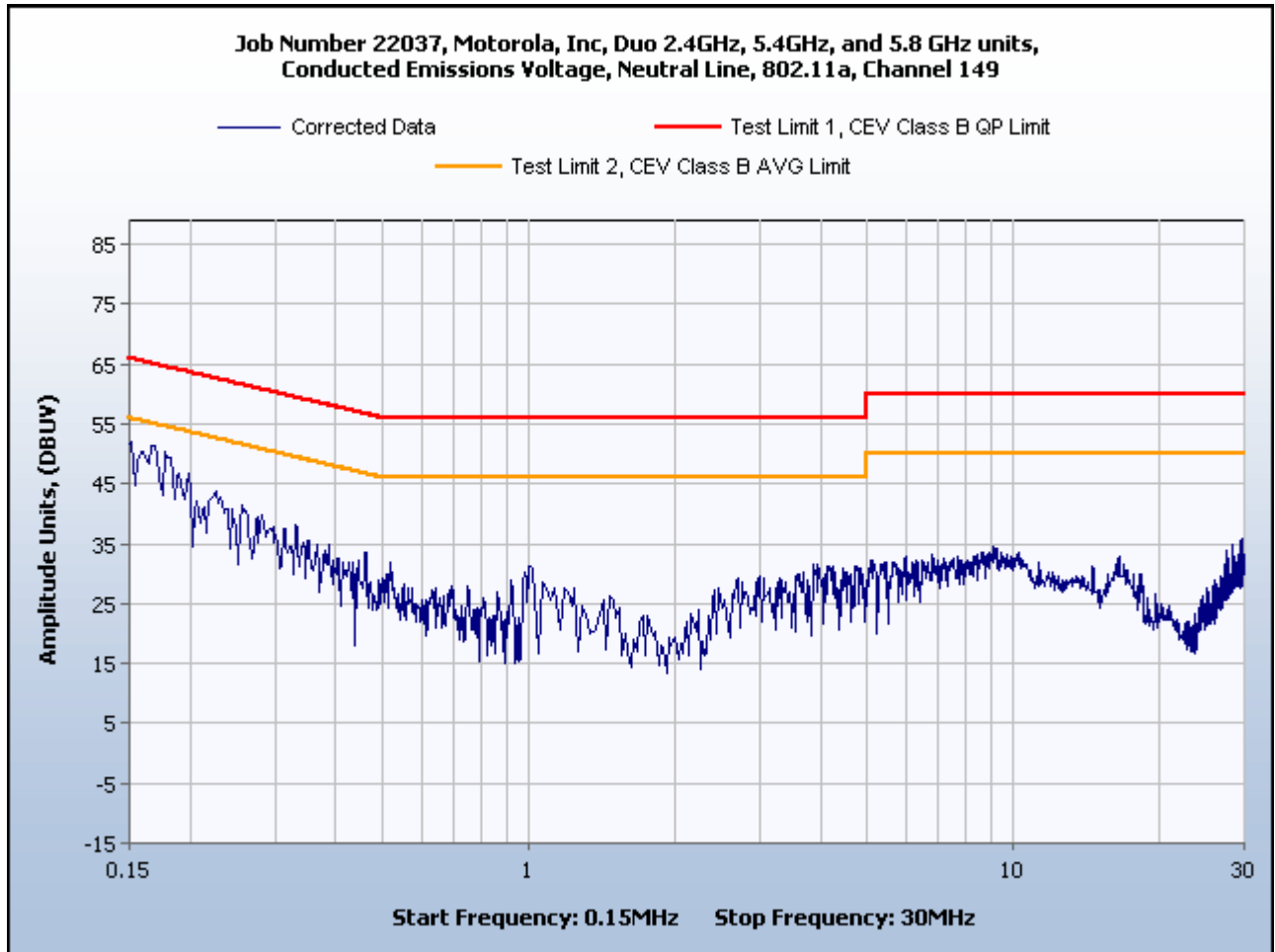
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Conducted Emissions - Voltage, AC Power, Ch 149, 5.745GHz Channel, 802.11 a mode, Neutral Line (120 VAC)

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
0.155	39.1	0.0935	39.1935	65.73	-26.63	11.3	0.0935	11.3935	55.73	-44.3365
0.162	37.4	0.1054	37.5054	65.36	-27.96	15.9	0.1054	16.0054	55.36	-39.3546
0.171	41.5	0.1207	41.6207	64.91	-23.41	34.5	0.1207	34.6207	54.91	-20.2893
0.187	35.3	0.1479	35.4479	64.17	-28.87	9.9	0.1479	10.0479	54.17	-44.1221
0.193	34.7	0.1581	34.8581	63.91	-29.21	9.3	0.1581	9.4581	53.91	-44.4519
0.202	34.7	0.17	34.87	63.53	-28.83	7.3	0.17	7.47	53.53	-46.06
0.23	35.3	0.17	35.47	62.45	-27.15	30	0.17	30.17	52.45	-22.28

Table 7. Conducted Emissions - Voltage, AC Power, Ch 149, 5.745GHz Channel, 802.11 a mode, Neutral Line (120 VAC)



Plot 2. Conducted Emissions - Ch 149, 5.745GHz Channel, 802.11 a mode, Neutral Line (120 VAC) Plot, Class B Limit



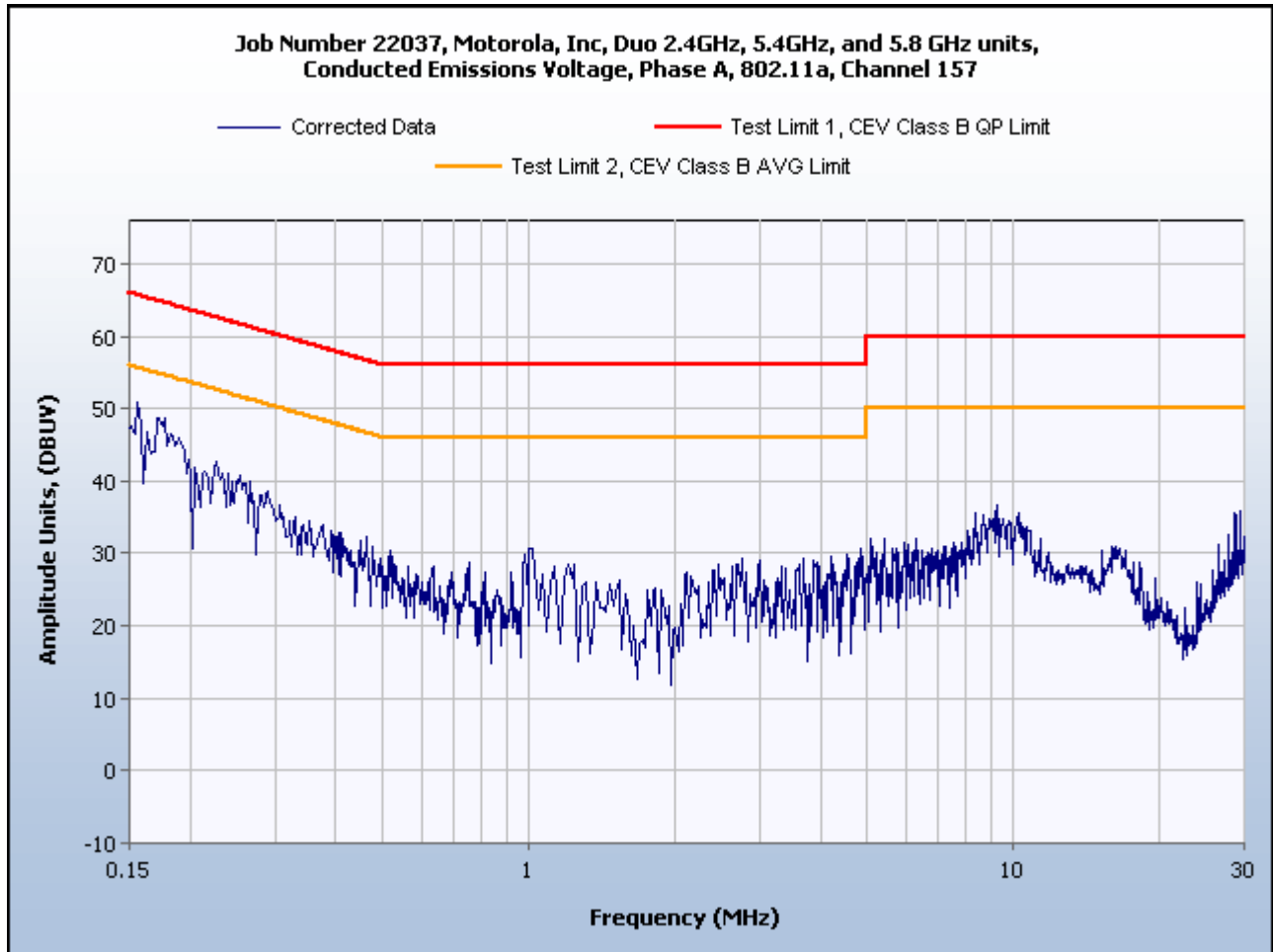
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Conducted Emissions - Voltage, AC Power, Ch 157, 5.785GHz Channel, 802.11 a mode, Phase Line (120 VAC)

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
0.158	37.2	0.0986	37.2986	65.57	-28.37	10.8	0.0986	10.8986	55.57	-44.6714
0.161	37.2	0.1037	37.3037	65.41	-28.21	12.1	0.1037	12.2037	55.41	-43.2063
0.174	42.4	0.1258	42.5258	64.77	-22.37	32.8	0.1258	32.9258	54.77	-21.8442
0.181	34.9	0.1377	35.0377	64.44	-29.54	16.9	0.1377	17.0377	54.44	-37.4023
0.19	33.4	0.153	33.553	64.04	-30.64	6.3	0.153	6.453	54.04	-47.587
0.228	34.2	0.17	34.37	62.52	-28.32	25.1	0.17	25.27	52.52	-27.25

Table 8. Conducted Emissions - Voltage, AC Power, Ch 157, 5.785GHz Channel, 802.11 a mode, Phase Line (120 VAC)



Plot 3. Conducted Emissions - Ch 157, 5.785GHz Channel, 802.11 a mode, Phase Line (120 VAC) Plot, Class B Limit



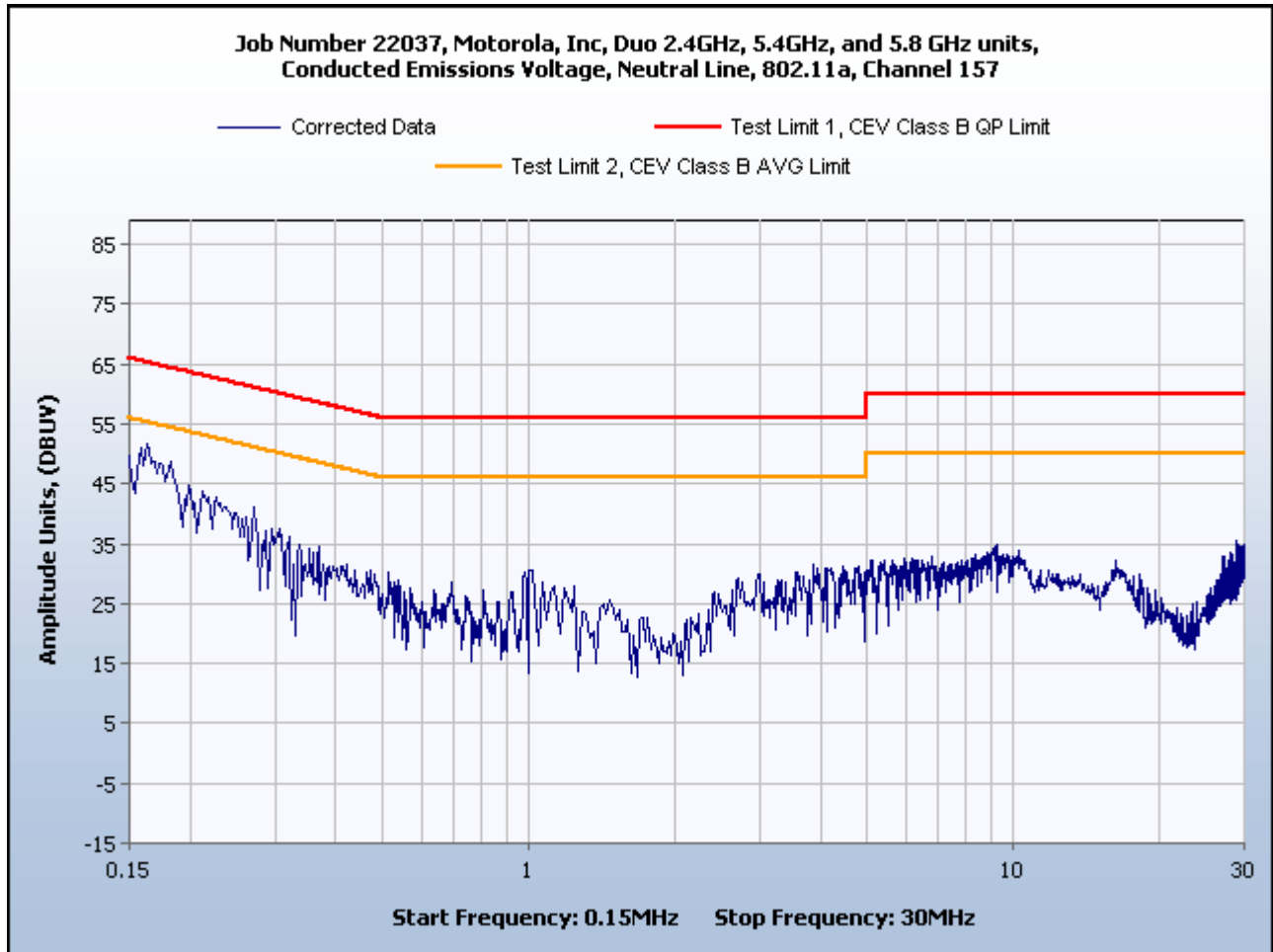
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Conducted Emissions - Voltage, AC Power, Ch 157, 5.785GHz Channel, 802.11 a mode, Neutral Line (120 VAC)

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
0.151	39.1	0.0867	39.1867	65.95	-26.85	9.3	0.0867	9.3867	55.95	-46.5633
0.161	38.1	0.1037	38.2037	65.41	-27.31	9.6	0.1037	9.7037	55.41	-45.7063
0.171	42.6	0.1207	42.7207	64.91	-22.31	35.7	0.1207	35.8207	54.91	-19.0893
0.176	39.3	0.1292	39.4292	64.67	-25.37	32.7	0.1292	32.8292	54.67	-21.8408
0.182	35.1	0.1394	35.2394	64.39	-29.29	18.8	0.1394	18.9394	54.39	-35.4506
0.195	33.8	0.1615	33.9615	63.82	-30.02	9.1	0.1615	9.2615	53.82	-44.5585
0.23	35.1	0.17	35.27	62.45	-27.35	30	0.17	30.17	52.45	-22.28

Table 9. Conducted Emissions - Voltage, AC Power, Ch 157, 5.785GHz Channel, 802.11 a mode, Neutral Line (120 VAC)



Plot 4. Conducted Emissions - Ch 157, 5.785GHz Channel, 802.11 a mode, Neutral Line (120 VAC) Plot, Class B Limit



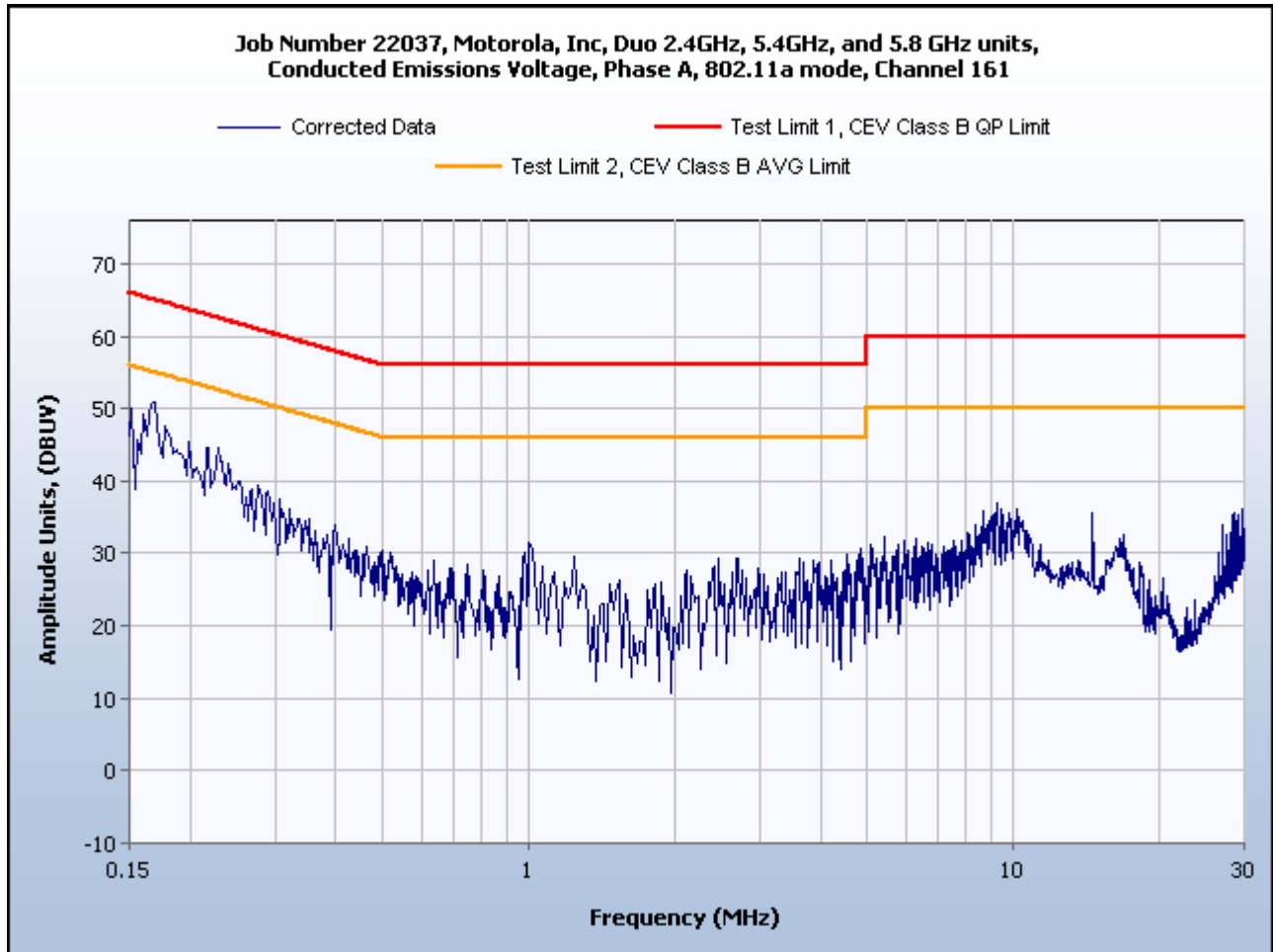
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Conducted Emissions - Voltage, AC Power, Ch 161, 5.805GHz Channel, 802.11 a mode, Phase Line (120 VAC)

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
0.157	38	0.0969	38.0969	65.62	-27.62	10.5	0.0969	10.5969	55.62	-45.0231
0.161	37.3	0.1037	37.4037	65.41	-28.11	12.9	0.1037	13.0037	55.41	-42.4063
0.169	39.9	0.1173	40.0173	65.01	-25.11	29.7	0.1173	29.8173	55.01	-25.1927
0.171	41.4	0.1207	41.5207	64.91	-23.51	31.6	0.1207	31.7207	54.91	-23.1893
0.181	35.4	0.1377	35.5377	64.44	-29.04	19.1	0.1377	19.2377	54.44	-35.2023
0.196	34	0.1632	34.1632	63.78	-29.78	6.7	0.1632	6.8632	53.78	-46.9168
0.229	34.8	0.17	34.97	62.49	-27.69	25.5	0.17	25.67	52.49	-26.82

Table 10. Conducted Emissions - Voltage, AC Power, Ch 161, 5.805GHz Channel, 802.11 a mode, Phase Line (120 VAC)



Plot 5. Conducted Emissions - Ch 161, 5.805GHz Channel, 802.11 a mode, Phase Line (120 VAC) Plot, Class B Limit



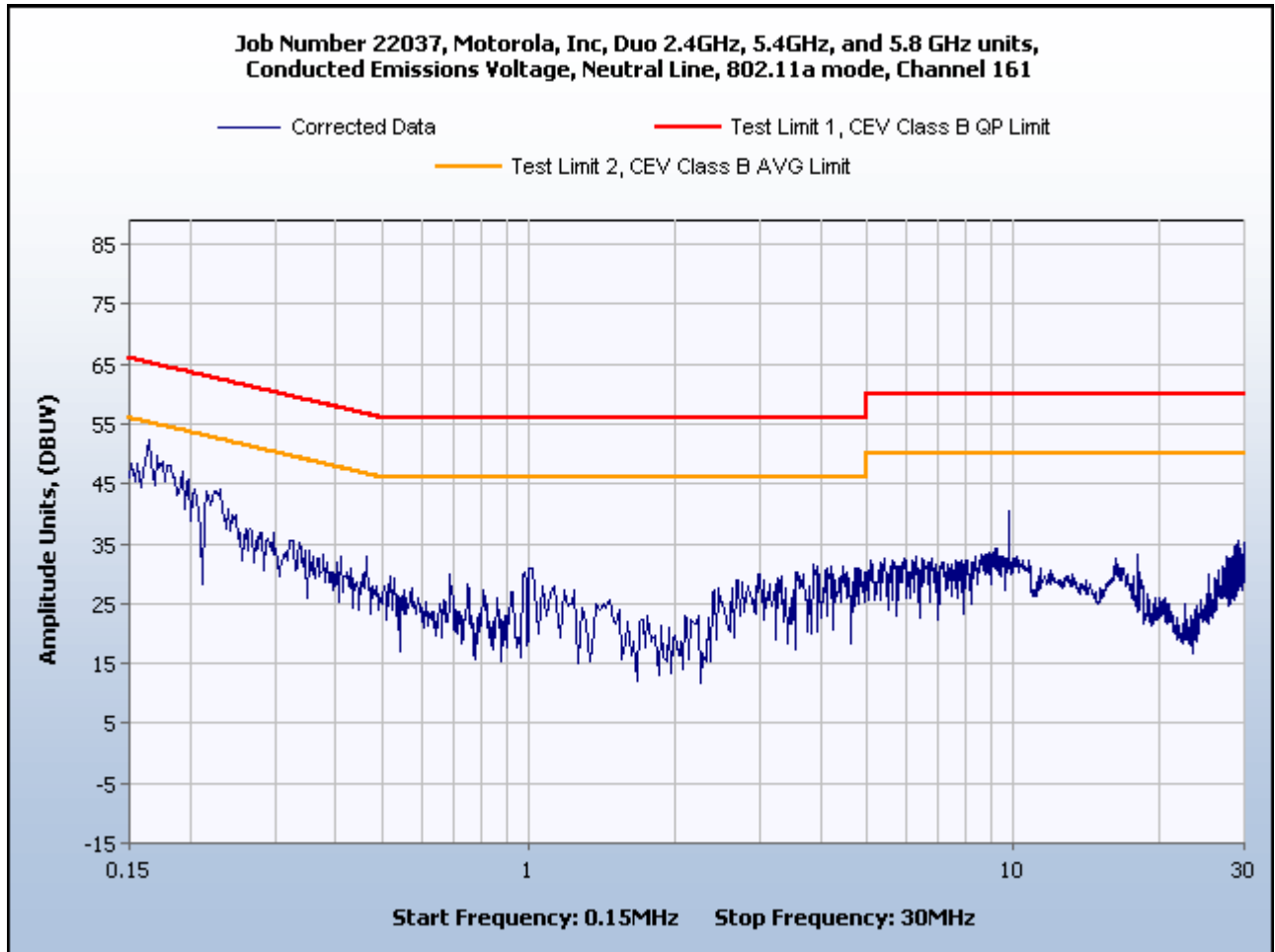
Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Conducted Emissions - Voltage, AC Power, Ch 161, 5.805GHz Channel, 802.11 a mode, Neutral Line (120 VAC)

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
0.159	38.2	0.1003	38.3003	65.52	-27.32	13.5	0.1003	13.6003	55.52	-41.9197
0.164	38.2	0.1088	38.3088	65.26	-27.06	19.7	0.1088	19.8088	55.26	-35.4512
0.174	42.6	0.1258	42.7258	64.77	-22.17	36.1	0.1258	36.2258	54.77	-18.5442
0.179	36.4	0.1343	36.5343	64.53	-28.13	24.4	0.1343	24.5343	54.53	-29.9957
0.185	35.4	0.1445	35.5445	64.26	-28.86	6.9	0.1445	7.0445	54.26	-47.2155
0.198	33.7	0.1666	33.8666	63.69	-29.99	8.7	0.1666	8.8666	53.69	-44.8234
0.203	33.1	0.17	33.27	63.49	-30.39	6.7	0.17	6.87	53.49	-46.62
0.232	34.4	0.17	34.57	62.38	-27.98	29.8	0.17	29.97	52.38	-22.41

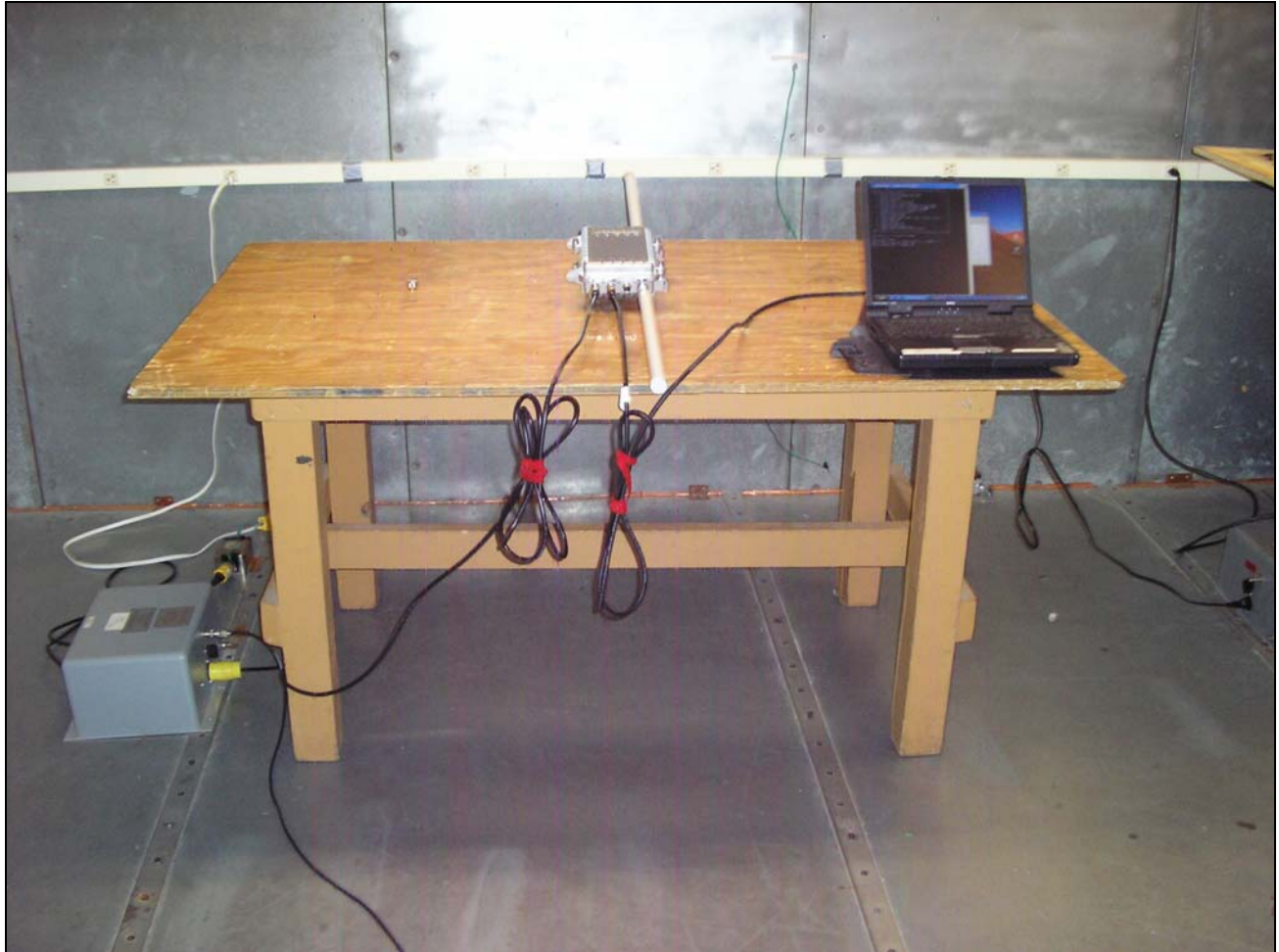
Table 11. Conducted Emissions - Voltage, AC Power, Ch 161, 5.805GHz Channel, 802.11 a mode, Neutral Line (120 VAC)



Plot 6. Conducted Emissions - Ch 161, 5.805GHz Channel, 802.11 a mode, Neutral Line (120 VAC) Plot, Class B Limit



Conducted Emission Limits Test Setup



Photograph 1. Conducted Emissions Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Emissions Limits

Test Requirement(s): § 15.209 (a): Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 12.

Frequency (MHz)	§ 15.209(a), Radiated Emission Limits (dB μ V) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 12. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedure: For frequencies from 30 MHz to 1 GHz, the transmitter was set to the mid channel at the highest output power and placed table inside in a semi-anechoic chamber. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast with 1 m to 4 m height to determine worst case orientation for maximum emissions.

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

Test Results: The EUT was found compliant with the Radiated Emission limits of §15.209(a) for Intentional Radiators. See following pages for detailed test results.

Test Engineer(s): Jeffrey Hazen

Test Date(s): June 1, 2007



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Emissions Limits

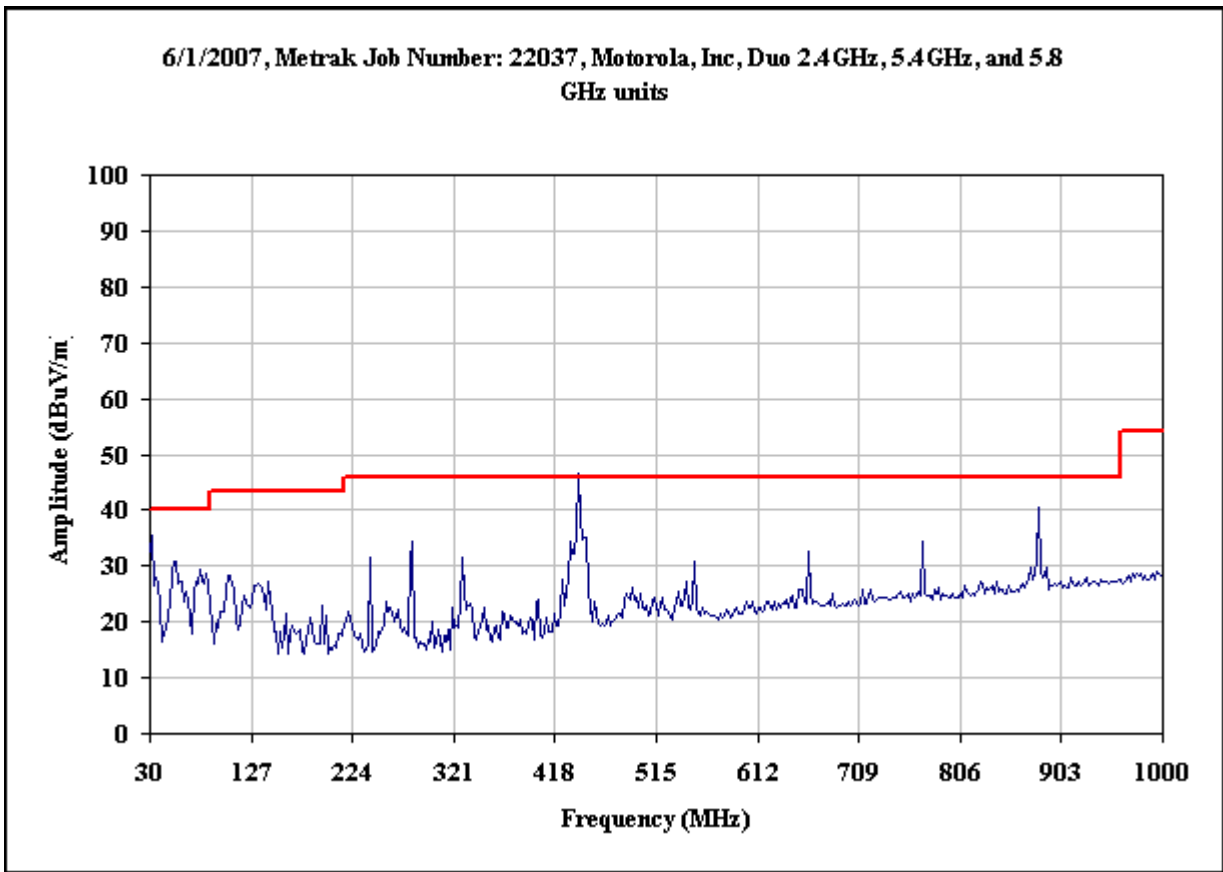
Radiated Emissions Limits Test Results – 30 MHz to 1 GHz, 802.11a

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuv)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuv)	Limit (dBuv)	Margin (dB)
32.011	113	H	3.21	17.88	5.69	0.38	0.00	23.94	40.00	-16.06
32.011	55	V	0.98	29.60	5.85	0.38	0.00	35.82	40.00	-4.18
280.016	0	H	1.92	19.95	12.40	1.42	0.00	33.77	46.00	-12.23
280.016	263	V	1.11	12.18	11.90	1.42	0.00	25.50	46.00	-20.50
330.002	288	H	1.98	15.94	13.80	1.57	0.00	31.31	46.00	-14.69
330.002	86	V	1.24	9.92	14.10	1.57	0.00	25.59	46.00	-20.41
330.006	284	H	1.86	15.66	13.80	1.57	0.00	31.03	46.00	-14.97
330.006	271	V	0.98	13.92	14.10	1.57	0.00	29.59	46.00	-16.41
*440.009	44	H	1.03	27.71	16.20	1.83	0.00	45.74	46.00	-0.26
440.009	90	V	2.33	20.71	16.70	1.83	0.00	39.24	46.00	-6.76
879.987	61	H	1.00	17.36	22.40	2.82	0.00	42.58	46.00	-3.42
879.987	86	V	2.01	16.56	21.80	2.82	0.00	41.18	46.00	-4.82

Table 13. Radiated Emissions Limits Test Results, 802.11a

Note 1: The EUT was tested at 3 m. .

Note 2: * - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3 dB below the specification limit. We recommend that every emission measured, have at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

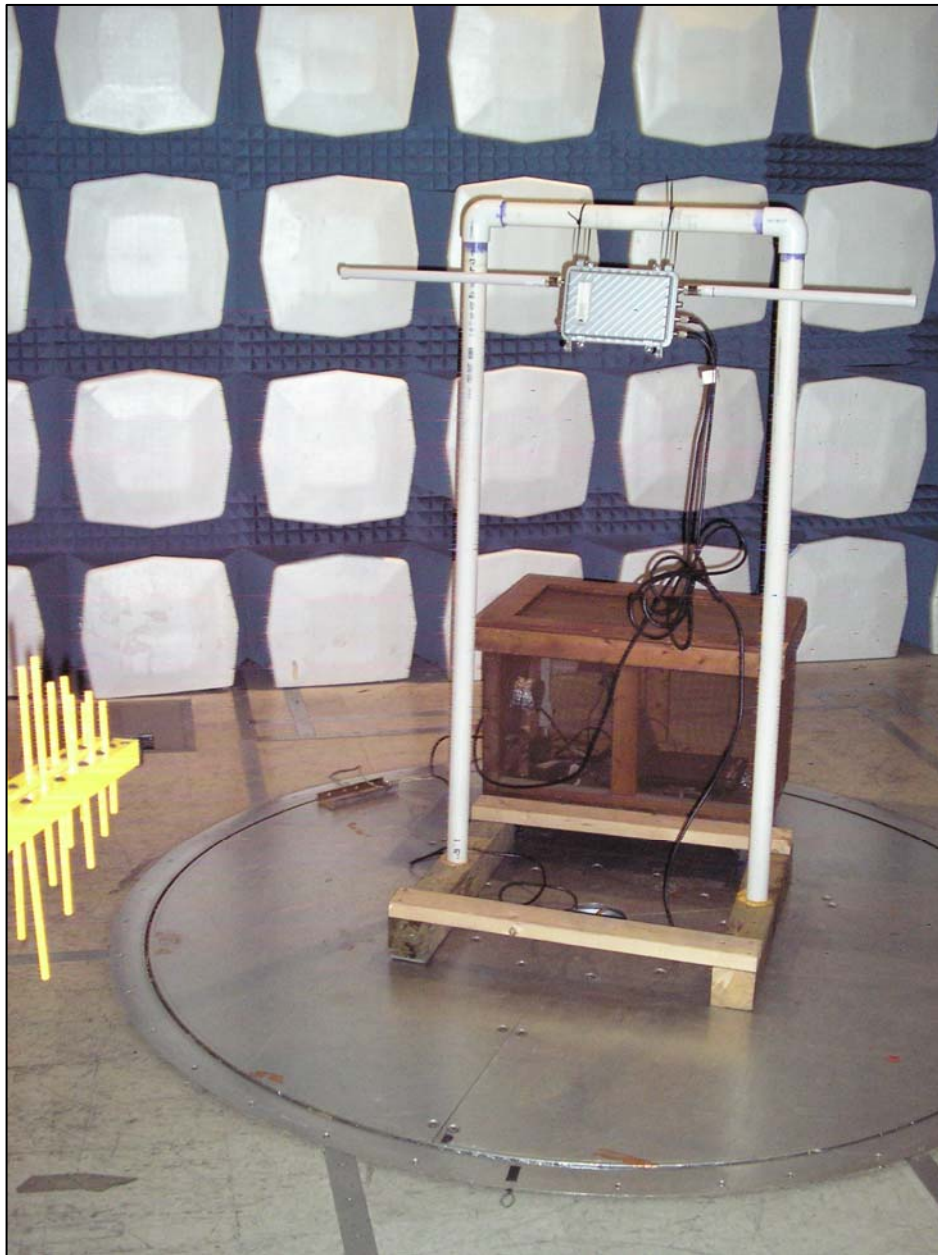


Plot 7. Radiated Emissions, Pre-Scan 30 MHz - 1000 MHz



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Emissions Limits



Photograph 2. Radiated Emission Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.403(c) 26dB Bandwidth

Test Requirements: § 15.403 (c): Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

Test Procedure: The transmitter was set to the highest output power and connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 26 dB Bandwidth was measured and recorded. The measurements were at the low and high channels and one of the two channels in between.

Test Results Equipment complies with § 15.407 (c). The 26 dB Bandwidth was determined from the plots on the following pages.

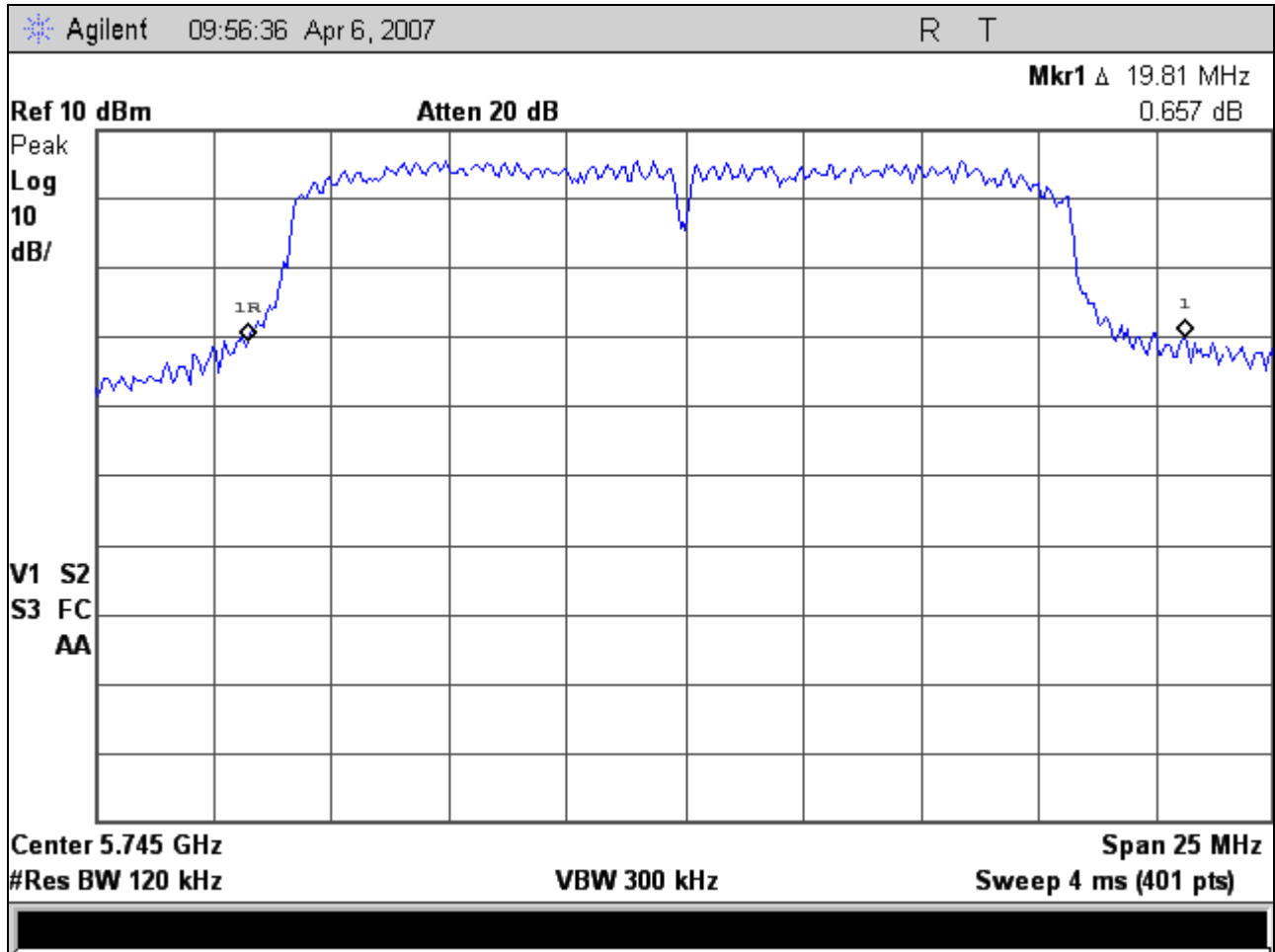
Frequency	Measured 26dB Bandwidth
5.745 GHz	19.81 MHz
5.785 GHz	18.38 MHz
5.805 GHz	19.81 MHz

Test Engineer: Jeffrey Hazen

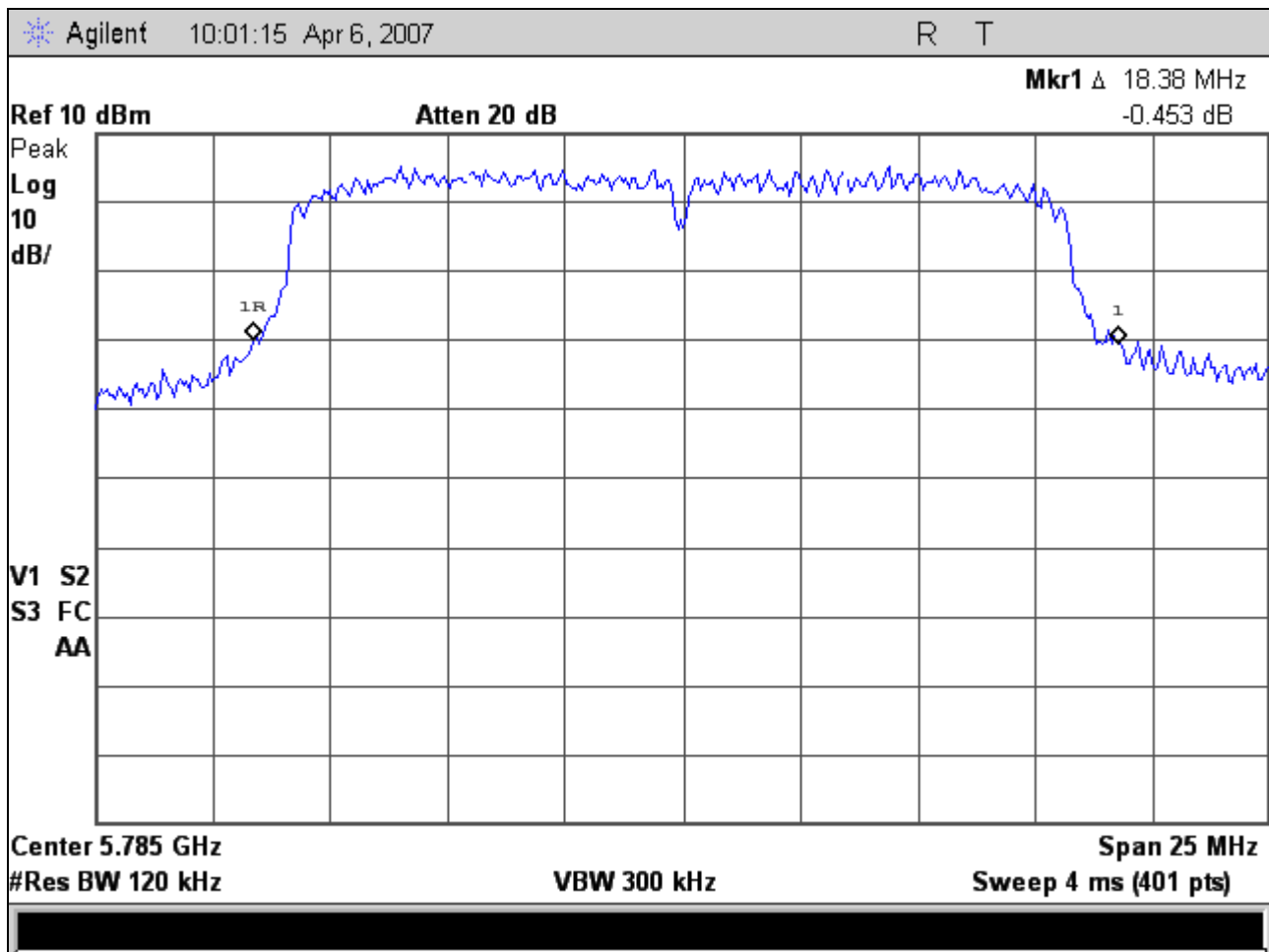
Test Date: February 20, 2007



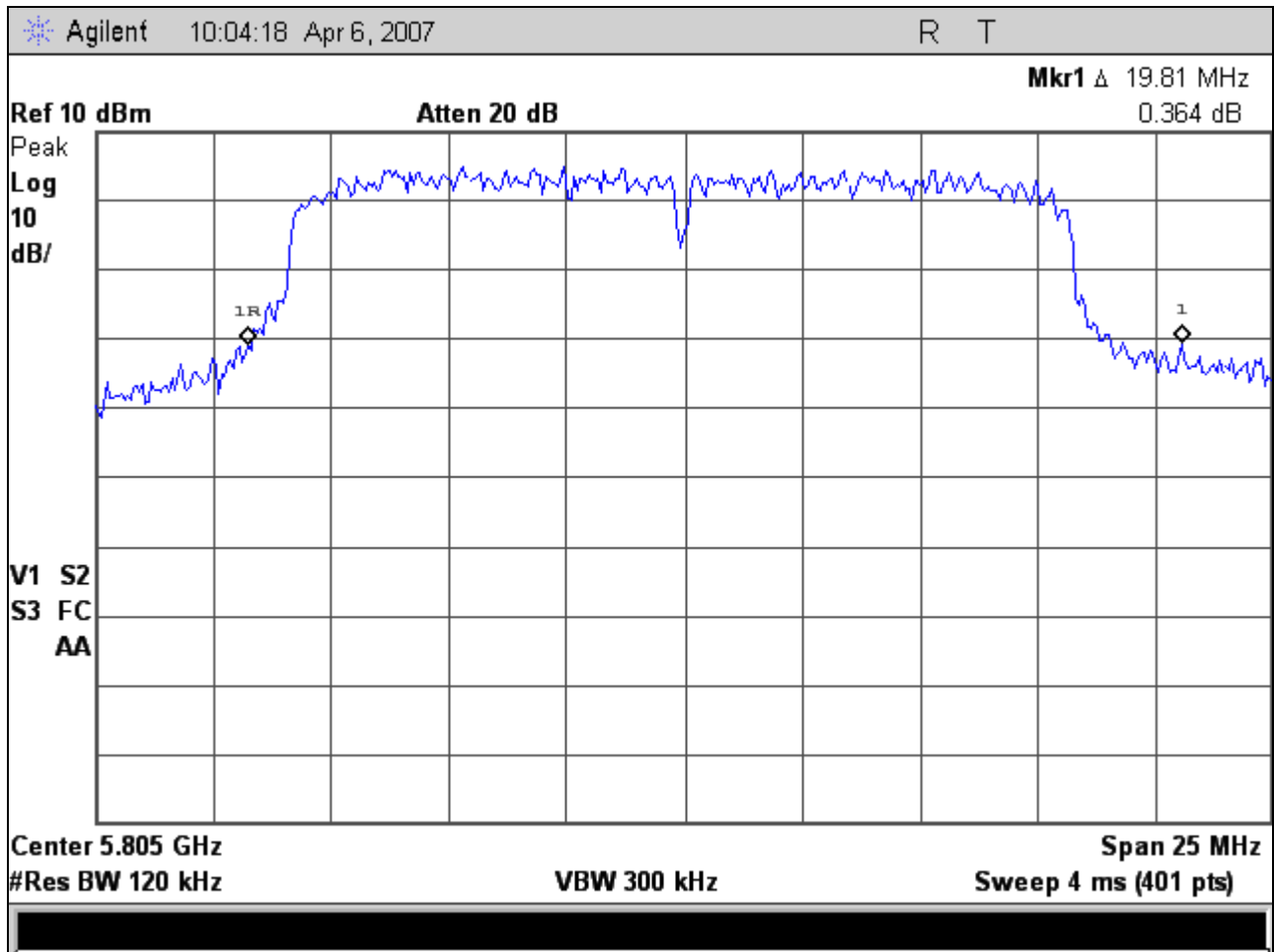
Electromagnetic Compatibility Criteria for Intentional Radiators



Plot 8. Ch 149, 5.745 GHz - Occupied Band Width



Plot 9. Ch 157, 5.785 GHz - Occupied Band Width



Plot 10. Ch 161, 5.085 GHz - Occupied Band Width



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 407(a) (1), (2): RF Power Output

Test Requirements: §15.407(a) (1), (2): The maximum output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit (mW)
5150-5250	50
5250-5350	250
5725-5825	1000

Table 14. Output Power Requirements from §15.407 and §15.247.

§15.407(a) (2): For the band 5.725-5.825GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1W or 17dBm + 10logB, where B is the 26-dB emission bandwidth in MHz.

Test Procedure: The transmitter was connected to a calibrated PSA Spectrum Analyzer. The EUT was measured at the low, mid and high channels.

Test Engineer: Jeffrey Hazen

Test Date: November 1, 2006

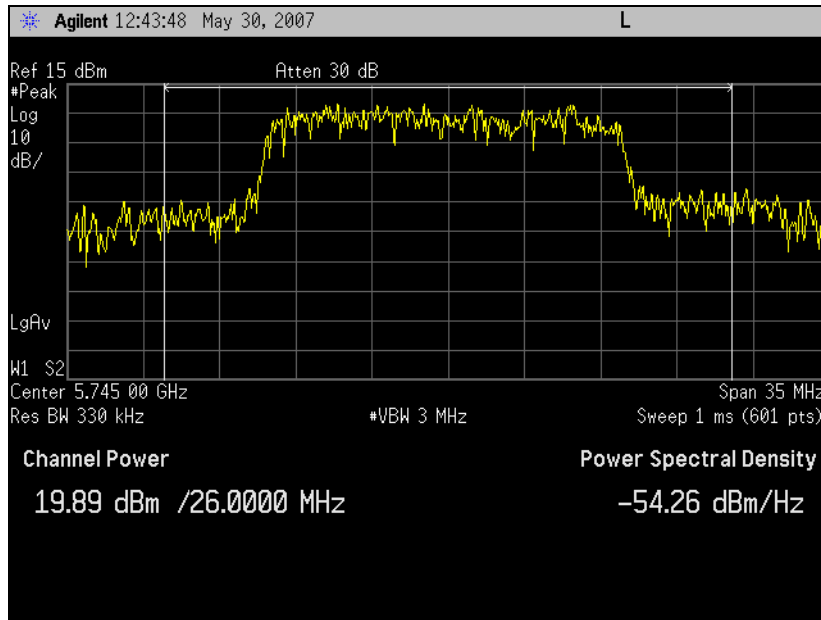
Test Limit (dBm)	Antenna Gain (dBi)	Adjusted test Limit (dBm)
30	9	27

Note: Since the antenna has a gain of 9 dBi, the test limit has been adjusted to 27 dBm.

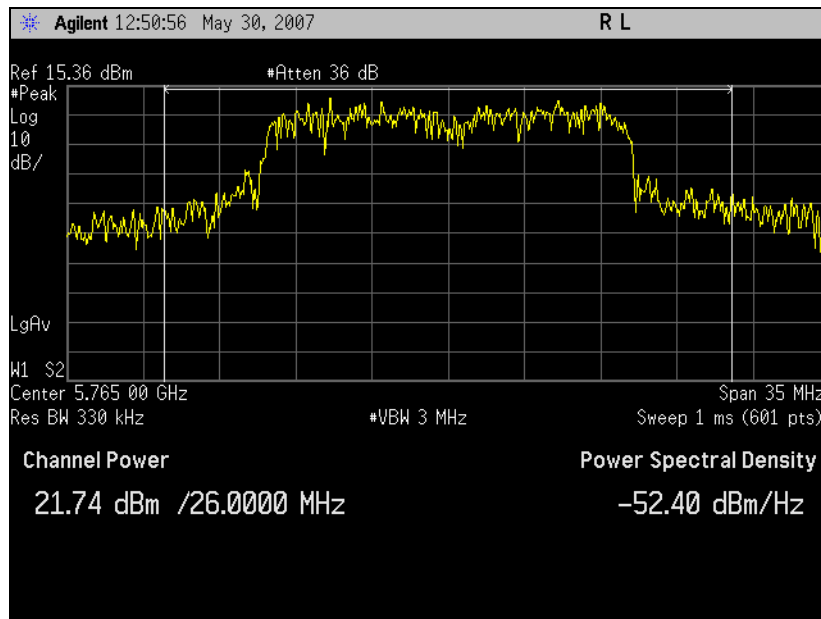


Channel	Freq	Data Rate	Power
149	5.745 GHz	54 MBps	19.89 dBm
153	5.765 GHz	54 MBps	21.74 dBm
157	5.785 GHz	54 MBps	22.56 dBm
161	5.805 GHz	54 MBps	21.37 dBm

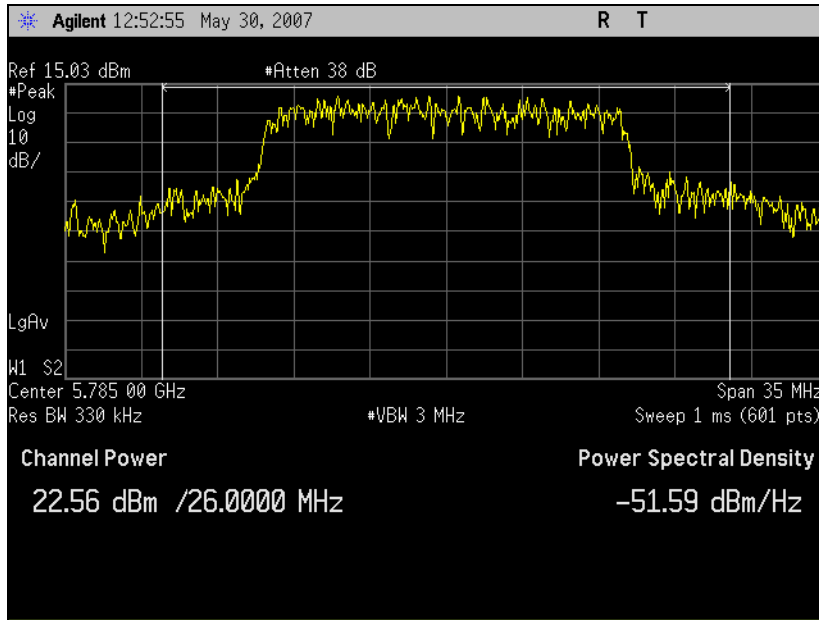
Table 15. Conducted Output Power, Low



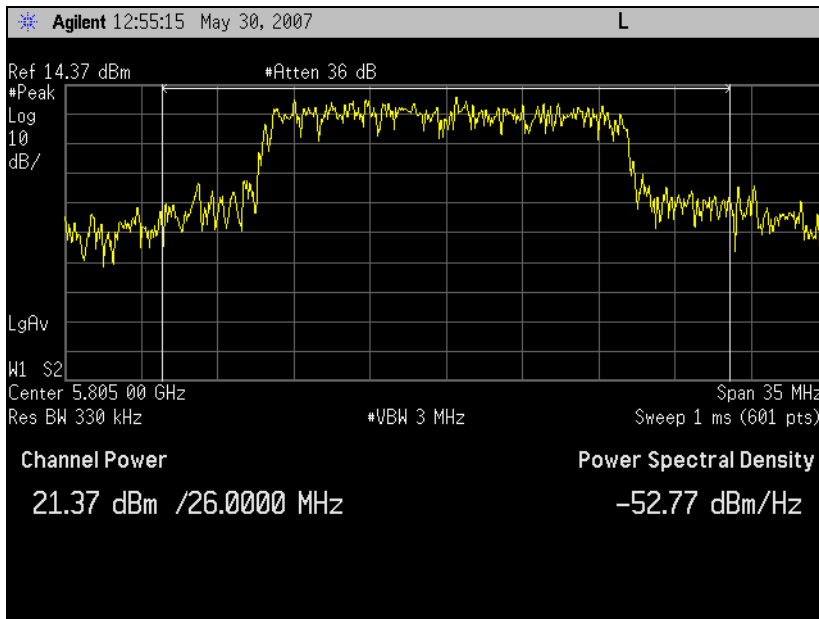
Plot 11. Conducted Power, Ch 149



Plot 12. Conducted Power, Ch 153



Plot 13. Conducted Power, Ch 157



Plot 14. Conducted Power, Ch 161



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(f), RF Exposure

RF Exposure Requirements: § 15.407(f) U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a ‘‘general population/uncontrolled’’ environment.

§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.

MPE Limit Calculation: EUT’s operating frequencies @ 5725-5825 MHz; highest conducted power = 22.56 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm²**.

EUT maximum antenna gain = 9 dBi.

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

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

where,

S = Power Density mW/m²

P = Power Input to antenna milliwatts

G = Numeric Antenna Gain

R = Distance to the center of radiation of the antenna (20 cm for Mobile minimum distance)

$$\text{Antenna Numeric Gain} = 10^{\text{dBi}/10}$$

$$\text{Power at antenna port} = 180.3 \text{ mW}$$

$$\text{Antenna Gain} = 9 \text{ dBi}$$

$$\text{Numeric antenna gain} = 10^{9/10} = 7.94$$

$$S = (180.3)(7.94) / 4(3.1416)(20)^2$$

$$S = 0.285 \text{ mW/cm}^2$$

Therefore, EUT meets the Uncontrolled Exposure limit.



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(a)(1), (a)(2) Peak Power Spectral Density

Test Requirements: § 15.407, (a)(3): For the band 5.725 – 5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer. The power level was set to the maximum level on the EUT. The RBW was set to 1MHz and the VBW was set to 3MHz. The method of measurement #2 from the FCC Public Notice CA 02-2138 was used.

Test Results: Equipment complies with the peak power spectral density limits of § 15.407(a)(1), (a)(2). The peak power spectral density was determined from plots on the following page(s).

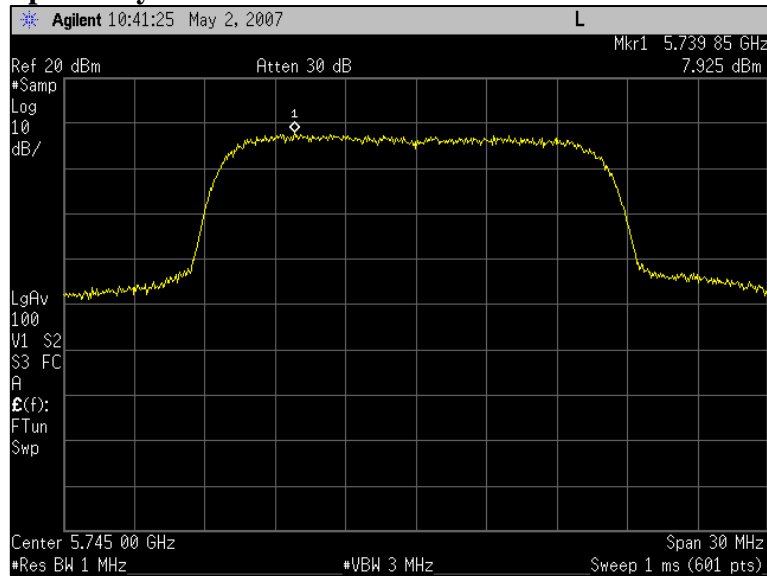
Channel	Frequency	Limit (dBm)	Adjusted Test Limit (dBm)	Measured PPSD (dBm)
149	5.745 GHz	17	14	7.925
153	5.765 GHz	17	14	7.898
157	5.785 GHz	17	14	7.404
161	5.805 GHz	17	14	7.832

Test Engineer: Jeffrey Hazen

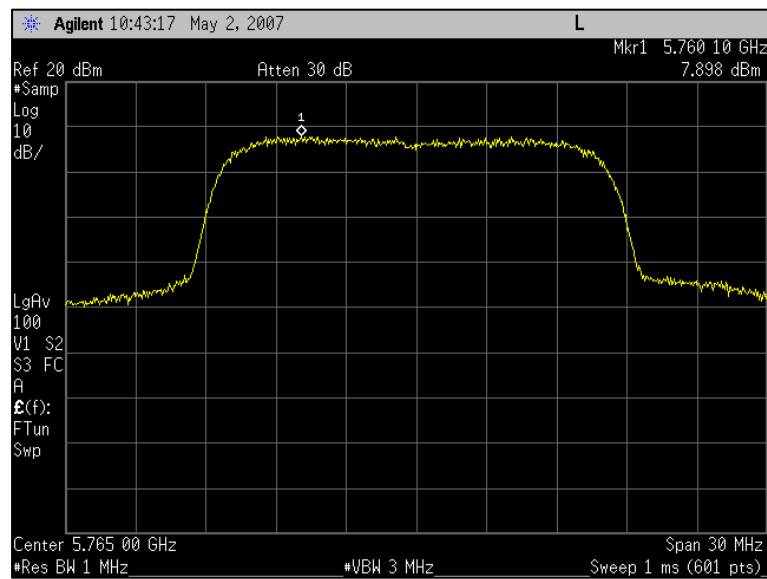
Test Date: February 20, 2007



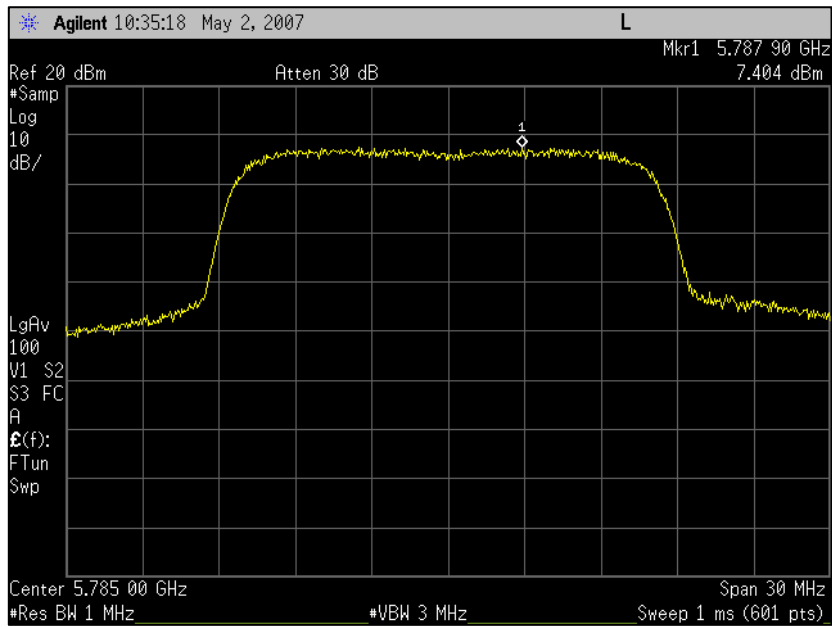
Electromagnetic Compatibility Criteria for Intentional Radiators



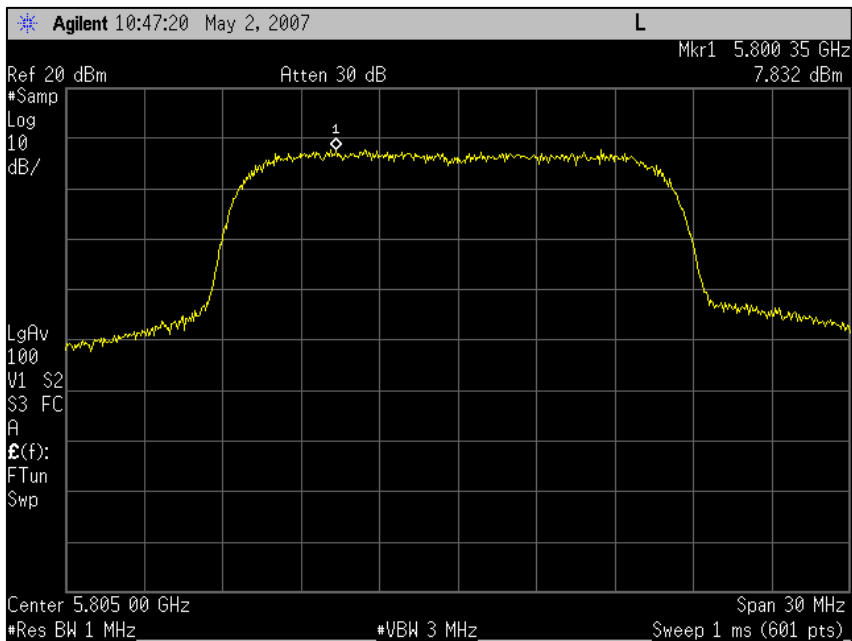
Plot 15. Channel 149, Peak Power Spectral Density



Plot 16. Channel 153, Peak Power Spectral Density



Plot 17. Channel 157, Peak Power Spectral Density



Plot 18. Channel 161, Peak Power Spectral Density



Photograph 3. Peak Power Spectral Density, Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(a)(6) Peak Excursion Ratio

Test Requirements: § 15.407(a)(6): For digitally modulated systems, the peak excursion of the modulation envelope to the peak transmit power shall not exceed 13dB across any 1MHz bandwidth of the emission bandwidth whichever is less.

Test Procedure: The method of measurement #2 from the FCC Public Notice CA 02-2138 was used. The EUT was connected directly to the spectrum analyzer through cabling and attenuation. The 1st trace on the spectrum analyzer was set to RBW=1MHz, VBW=3MHz. The peak detector mode was used and the trace max held. The 2nd trace on the spectrum analyzer was set to a RBW=1MHz, VBW=30 KHz. The detector mode was set to sample detector.

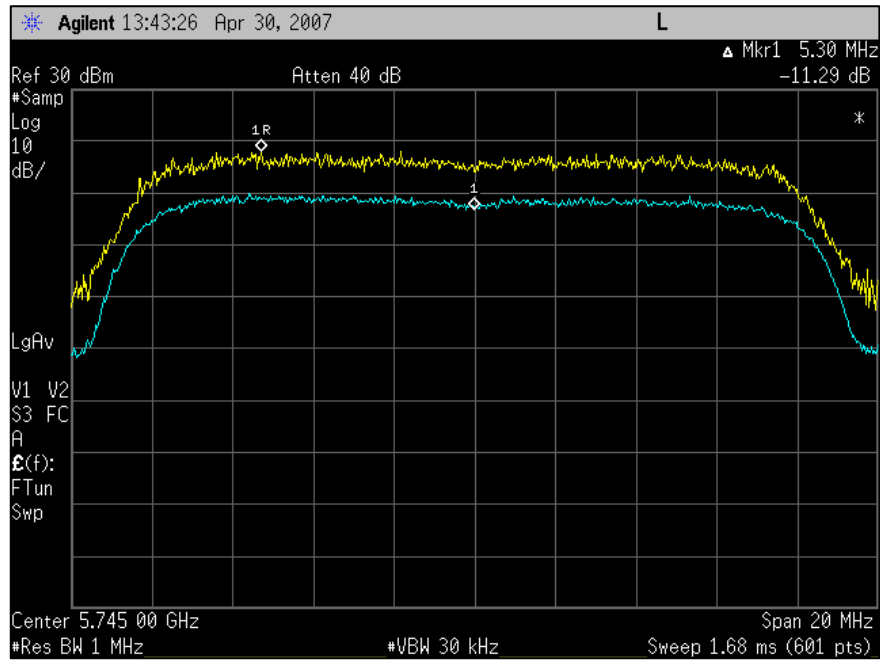
The Peak Excursion Ratio was determined from the difference between the maximum found in each trace.

Test Results: Equipment complies with the peak excursion ratio limits of § 15.407(a)(6). The peak excursion ratio was determined from plots on the following page(s).

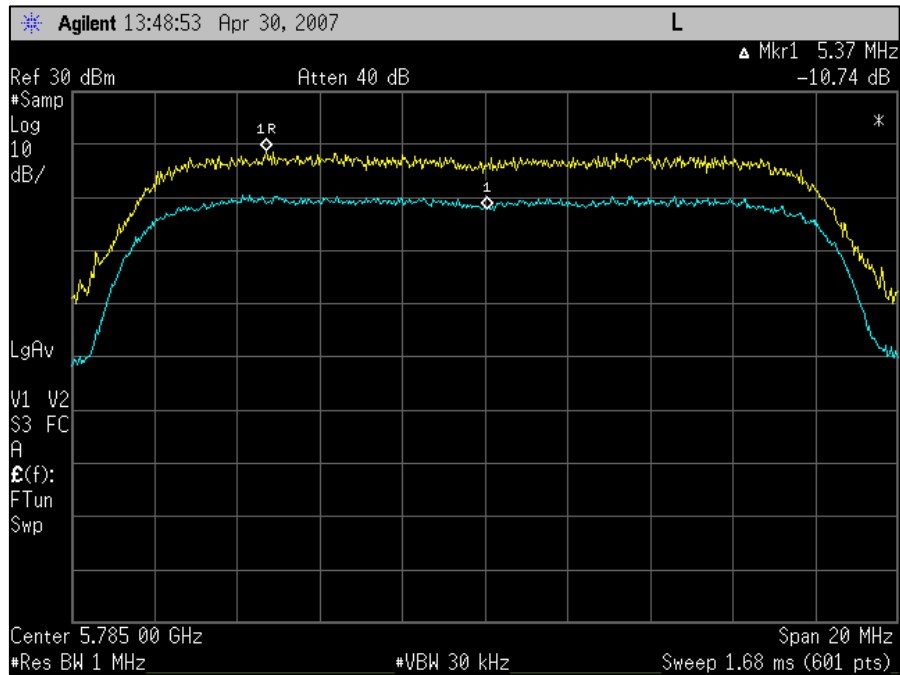
Channel	Frequency	Limit (dBm)	Excursion Ratio (dB)
149	5.745 GHz	13	11.29
157	5.785 GHz	13	10.74
161	5.805 GHz	13	11.47

Test Engineer: Jeffrey Hazen

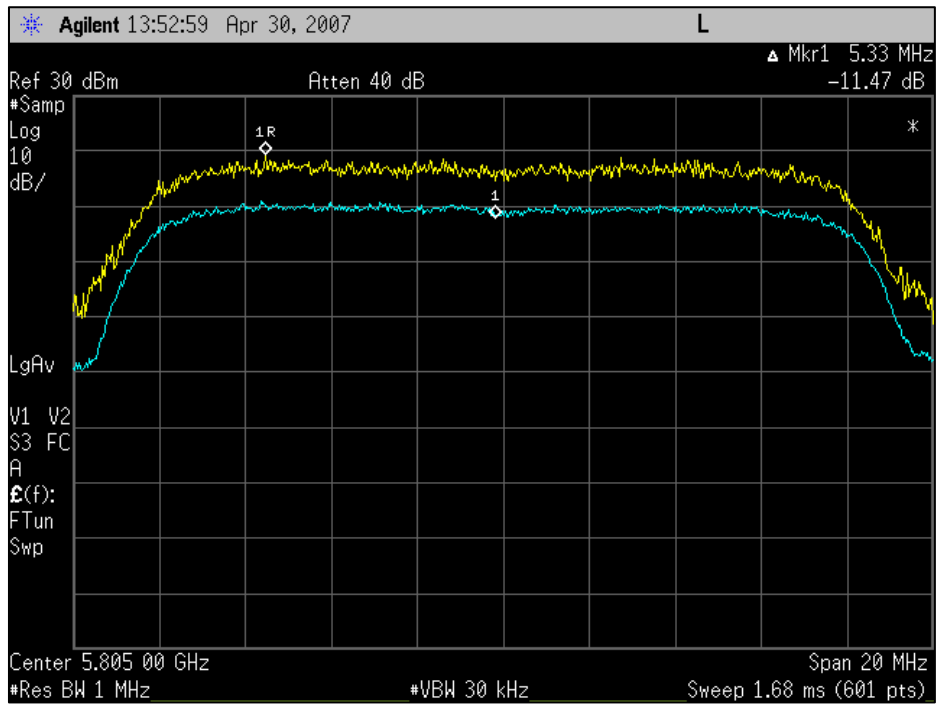
Test Date: April 30, 2007



Plot 19. Peak Excursion Ratio for Channel 149



Plot 20. Peak Excursion Ratio for Channel 157



Plot 21. Peak Excursion Ratio for Channel 161



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(b)(1),(2), (5), (6): Undesirable Emissions

Test Requirements: § 15.407(b)(1),(2), (5), (6); § 15.209 (a) §15.205: Emissions outside the frequency band.

§ 15.407(b)(4): For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed in EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

§ 15.407(b)(6): Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

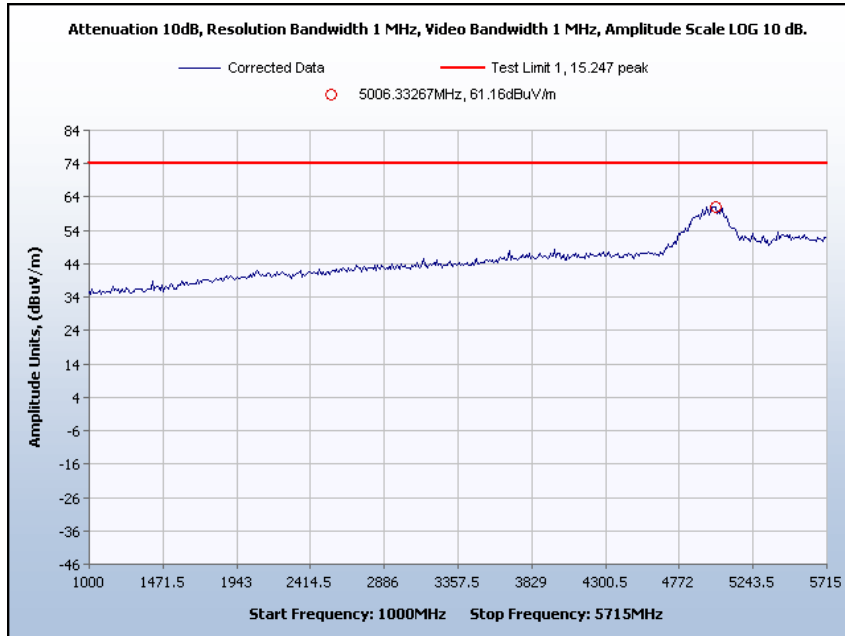
Test Procedure: The spurious emissions were measure outside the 5.725 – 5.825 GHz band and compared to the limits in § 15.209 (a). Furthermore, the field strength was measured at 1 m distance from the EUT and the plots were converted to EIRP strength using this equation:

$$ELdBmV(m) + 20\log d(m) - 104.8 = EIRP (dBm) = E (dBm) - SG + AF (im) + 2.2$$

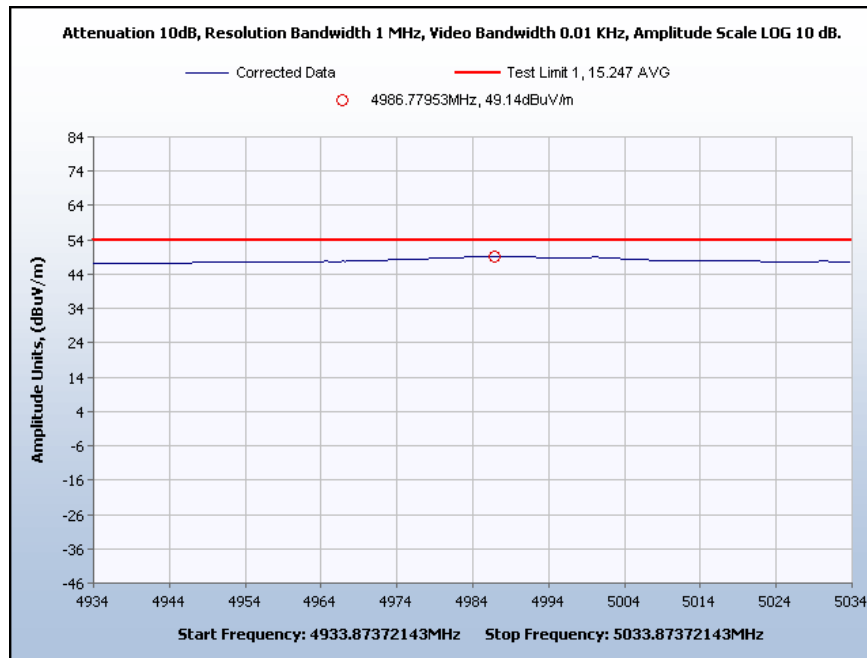
Where E is the measured field strength,
D is the distance to the EUT
SG is the system gain
And AF is the antenna factor at 1m

Test Engineer: Jeffrey Hazen

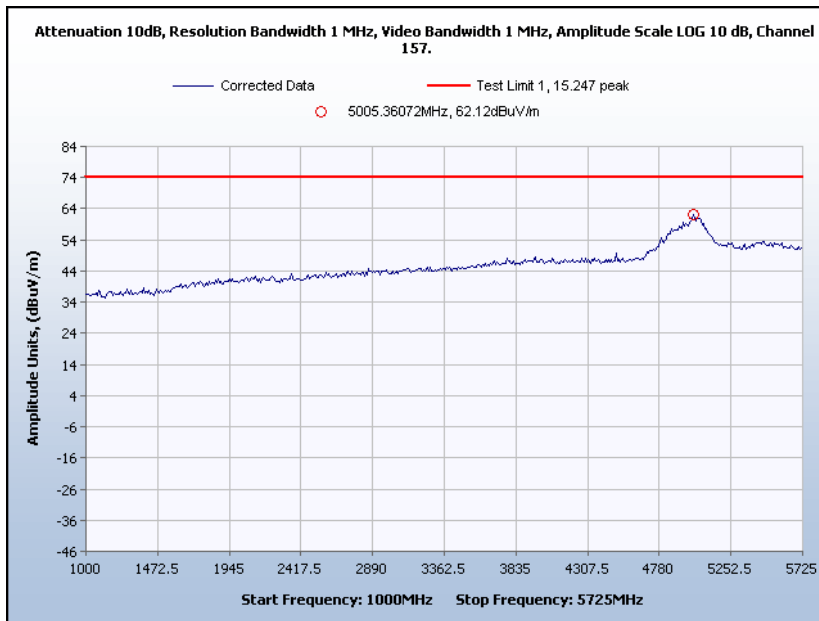
Test Date: June 1, 2007



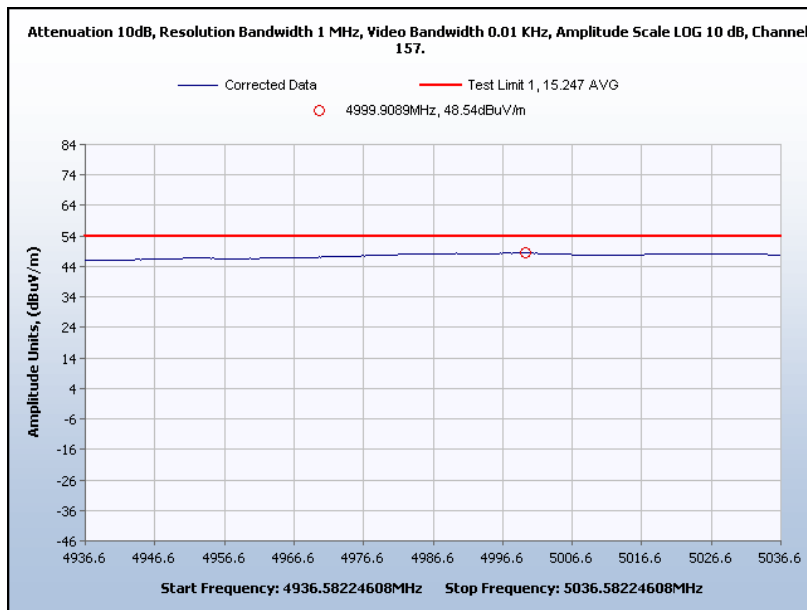
Plot 22. 1-5GHz, Channel 149, Peak



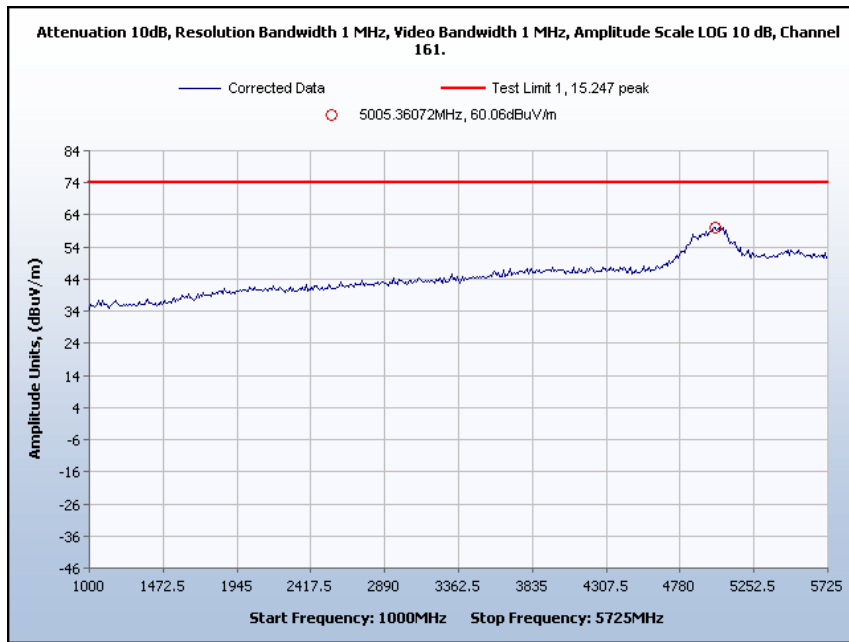
Plot 23. 1-5GHz, Channel 149, Average



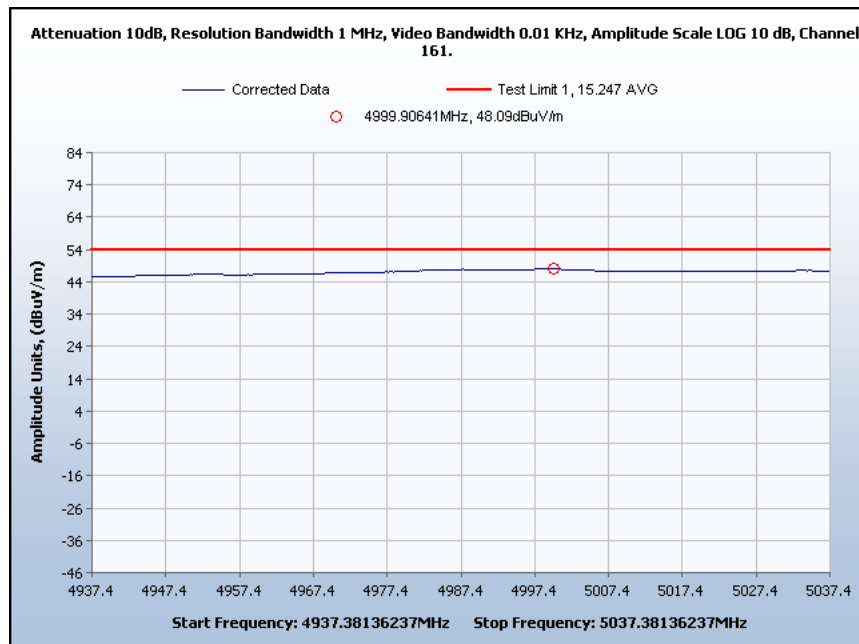
Plot 24. 1-5GHz, Channel 157, Peak



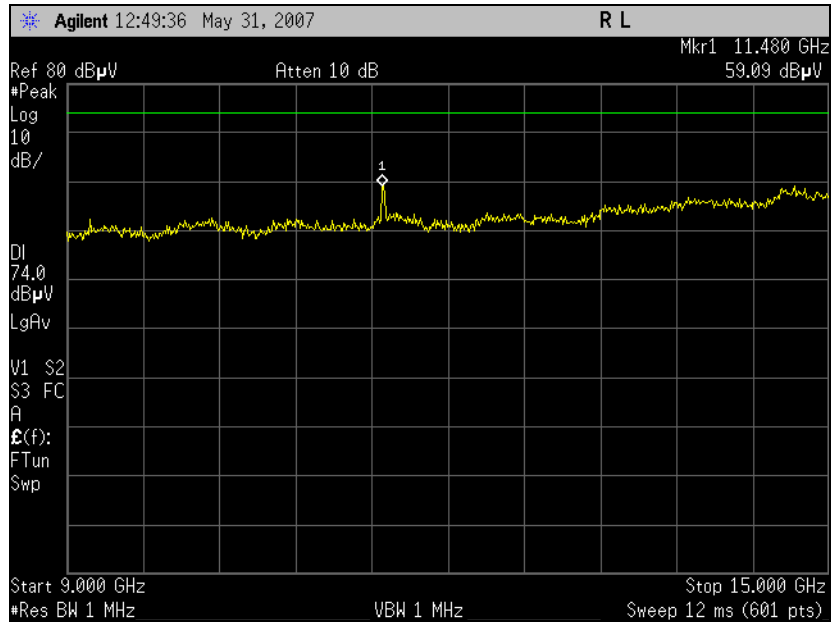
Plot 25. 1-5GHz, Channel 157, Average



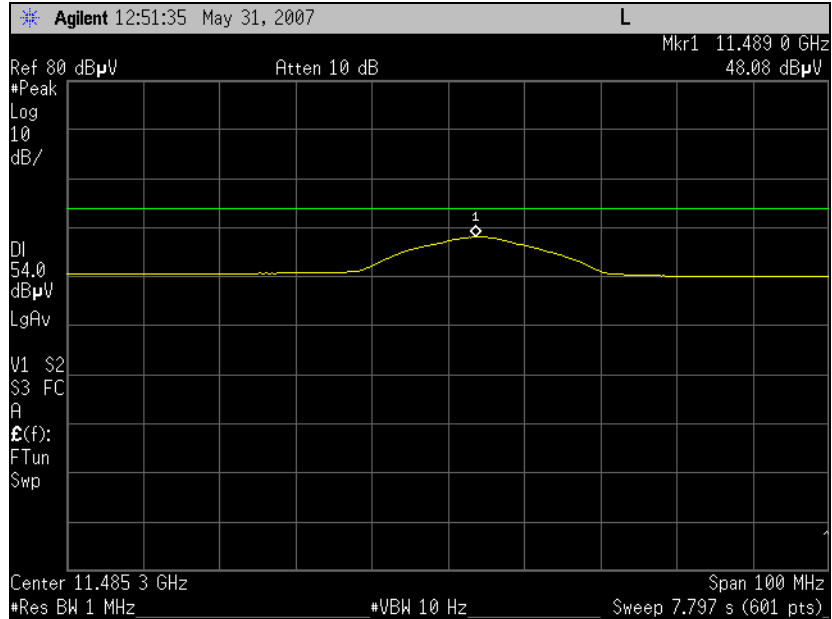
Plot 26. 1-5GHz, Channel 161, Peak



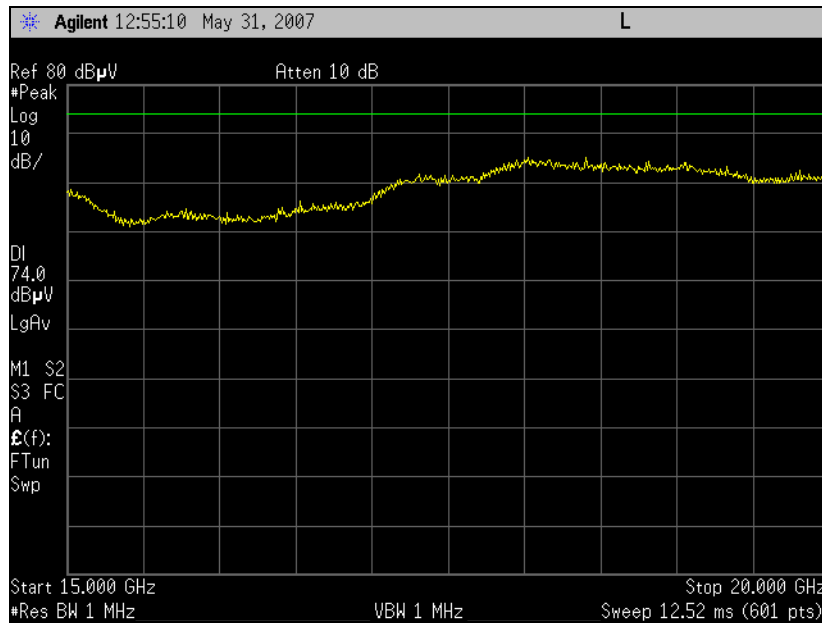
Plot 27. 1-5GHz, Channel 161, Average



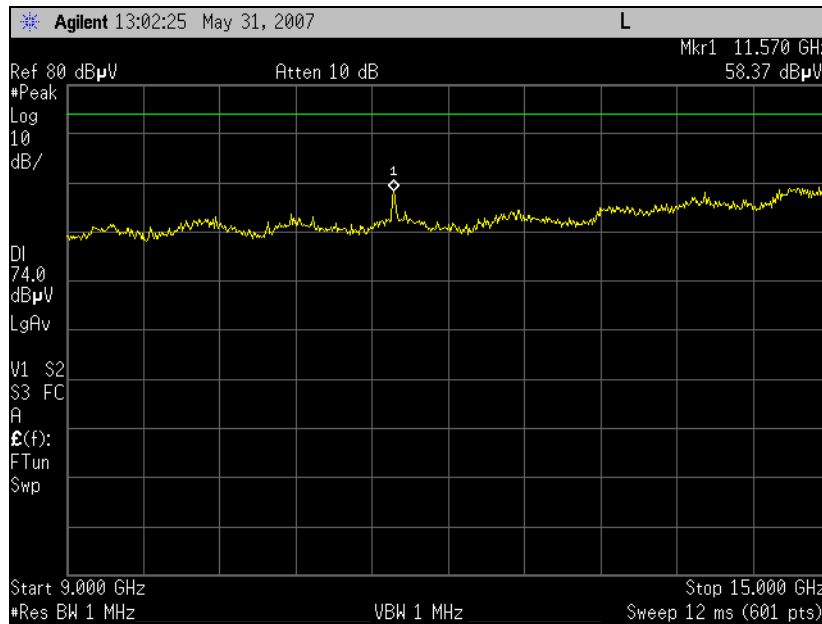
Plot 28. Channel 149, 9 GHz-15 GHz, Peak Plot



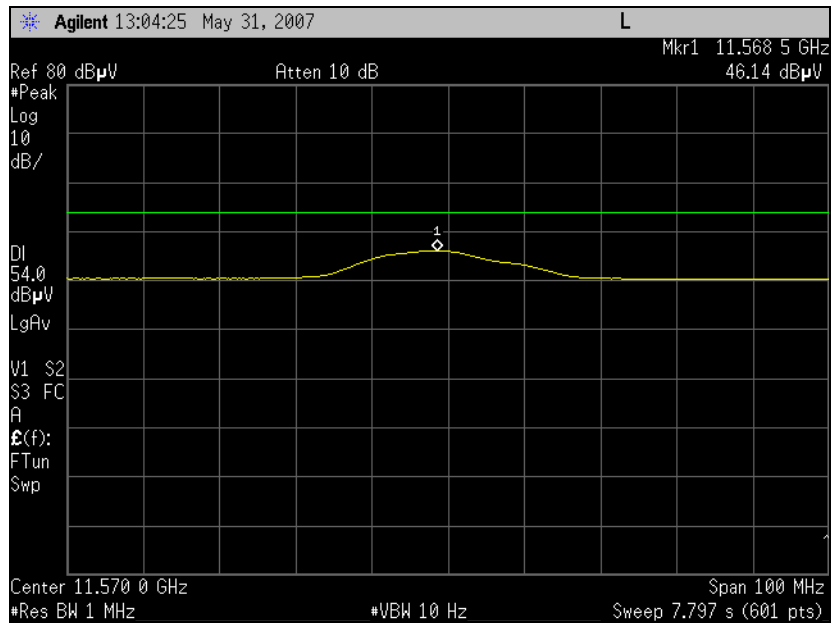
Plot 29. Channel 149, Average Plot



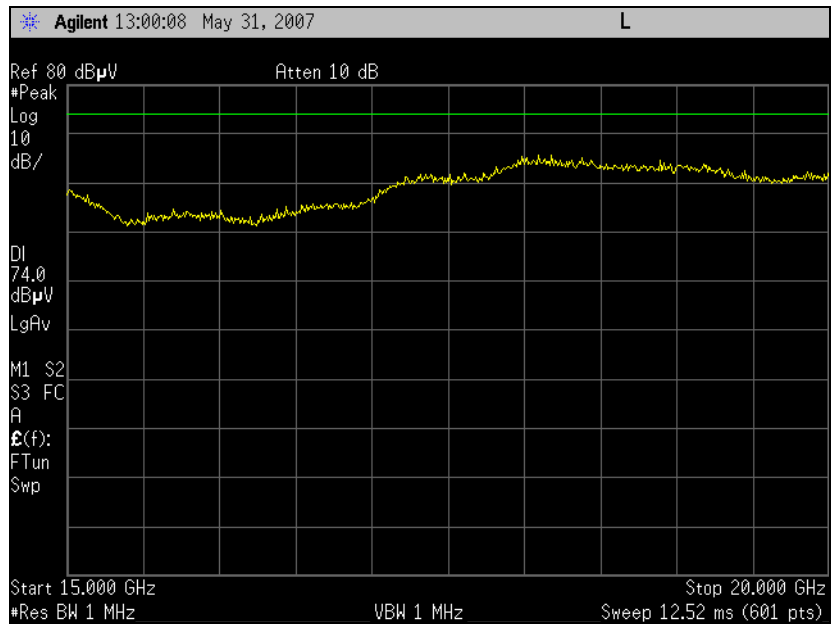
Plot 30. Channel 149, Peak Plot, 15-20 GHz



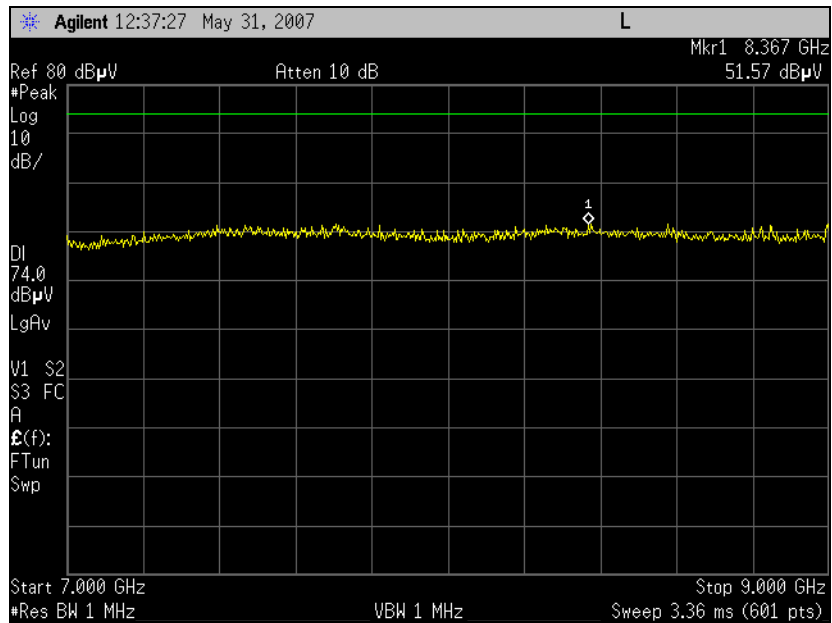
Plot 31. Channel 157, 9 GHz-15 GHz, Peak Plot



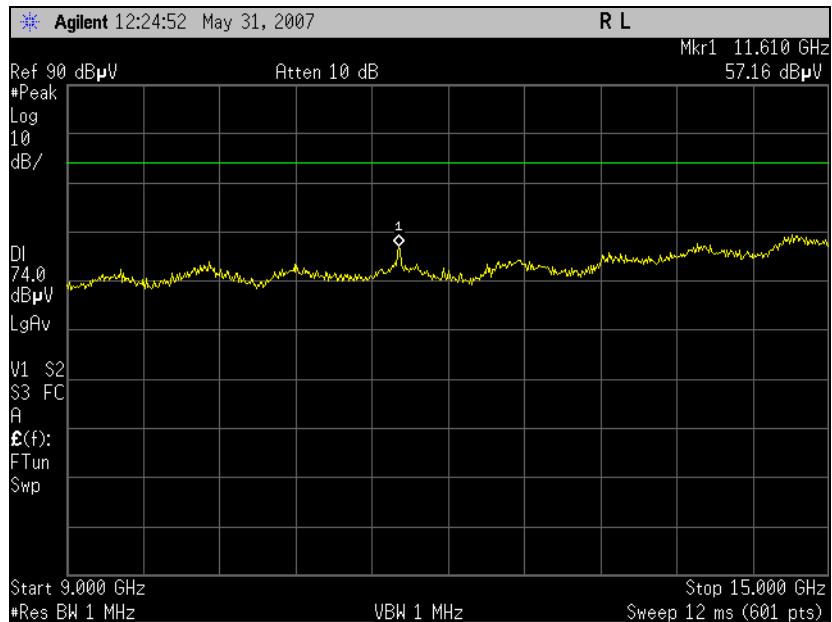
Plot 32. Channel 157, Average Plot



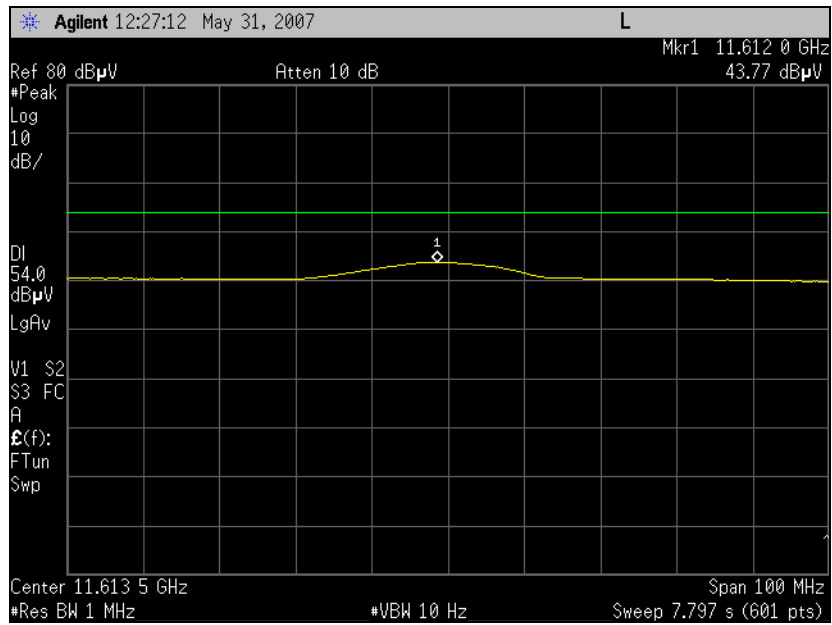
Plot 33. Channel 157, Peak Plot, 15-20 GHz



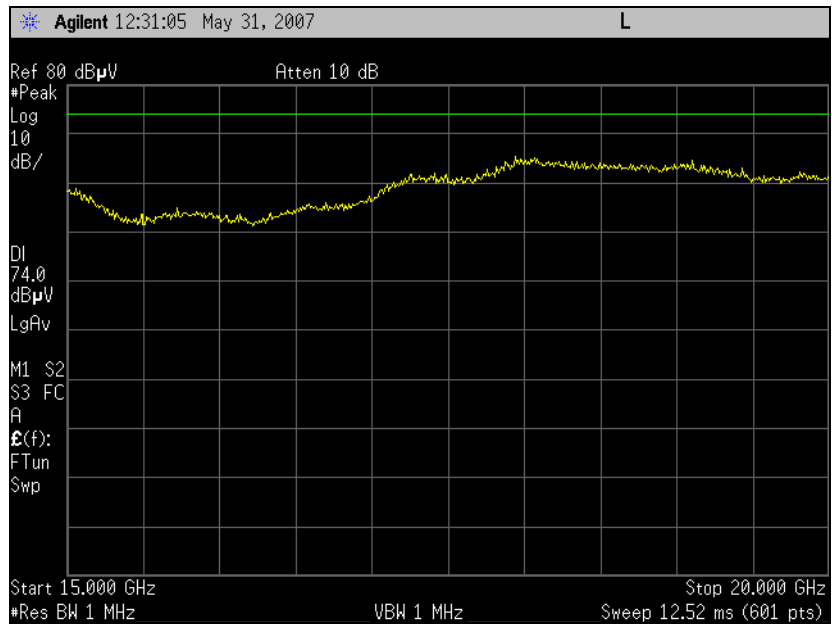
Plot 34. Channel 161, Peak Plot, 7-9 GHz



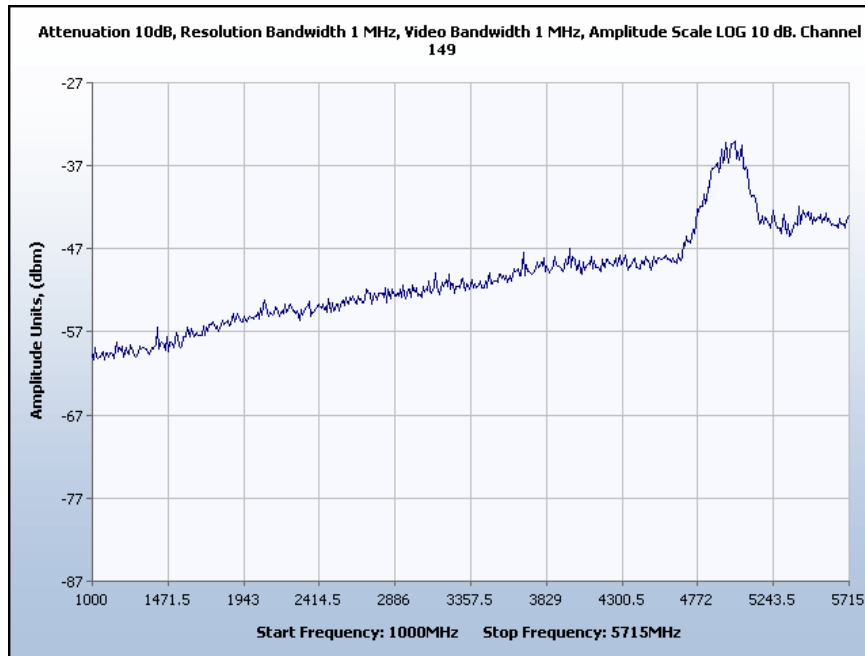
Plot 35. Channel 161, Peak Plot, 9-15 GHz



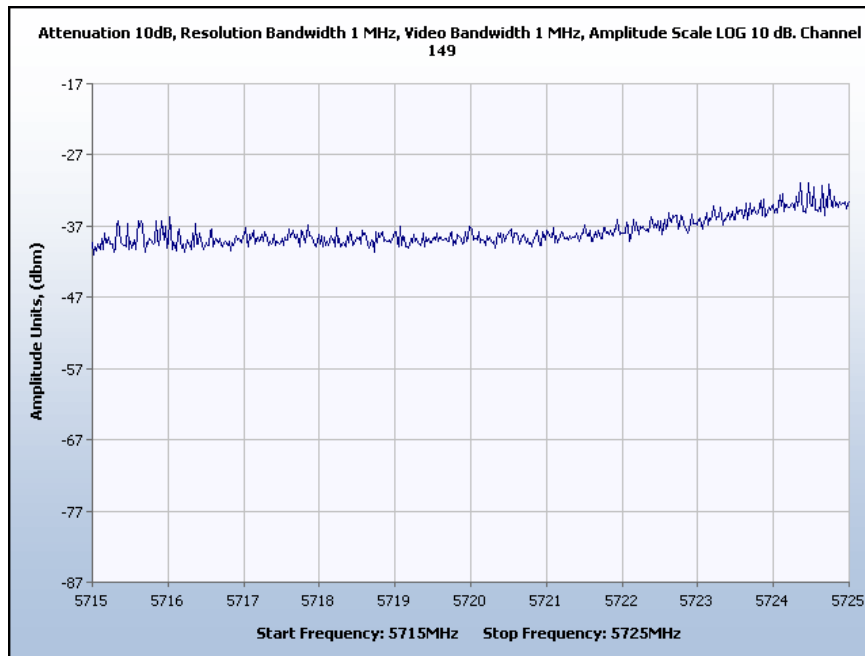
Plot 36. Channel 161, Average Plot



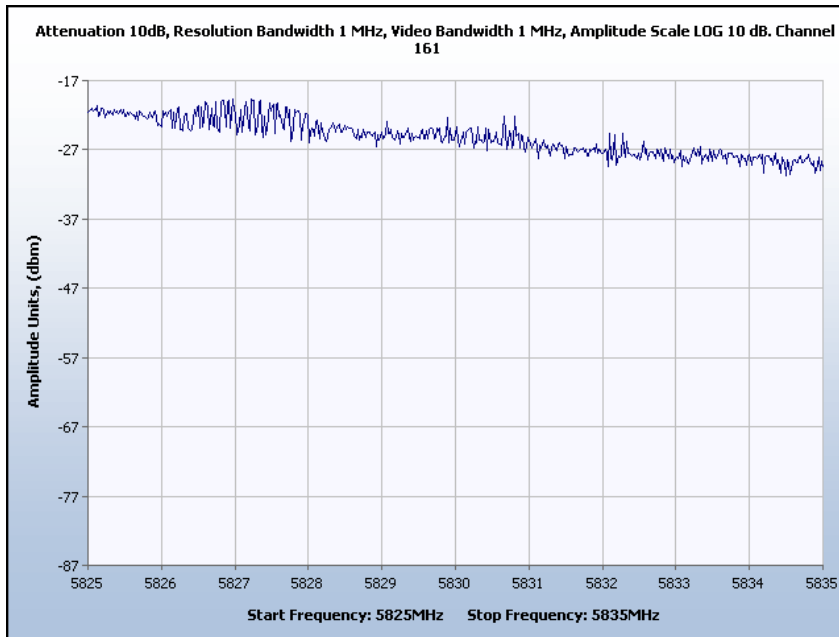
Plot 37. Channel 161, Peak Plot, 15-20 GHz



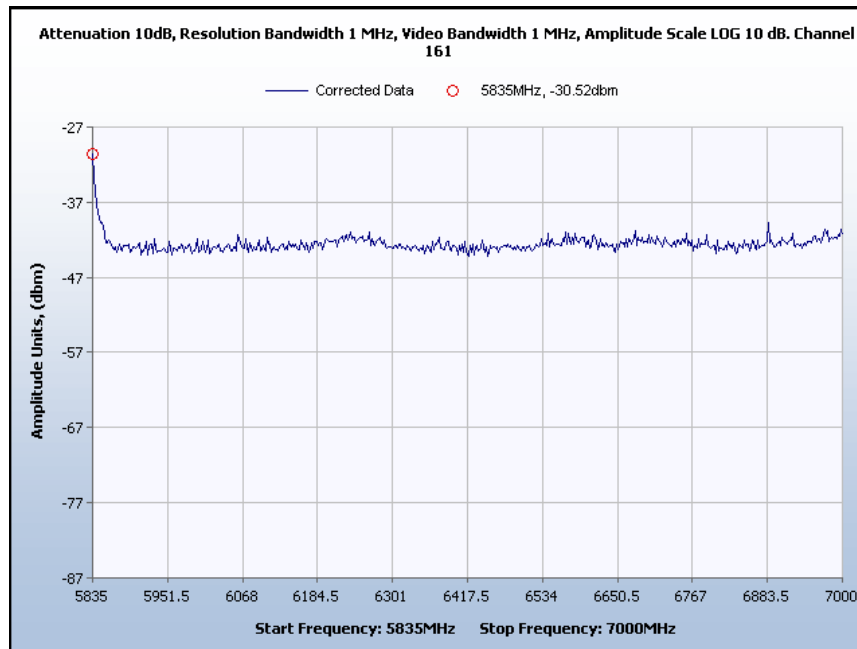
Plot 38. Channel 149, Undesirable Emissions EIRP 1 – 5.715 GHz



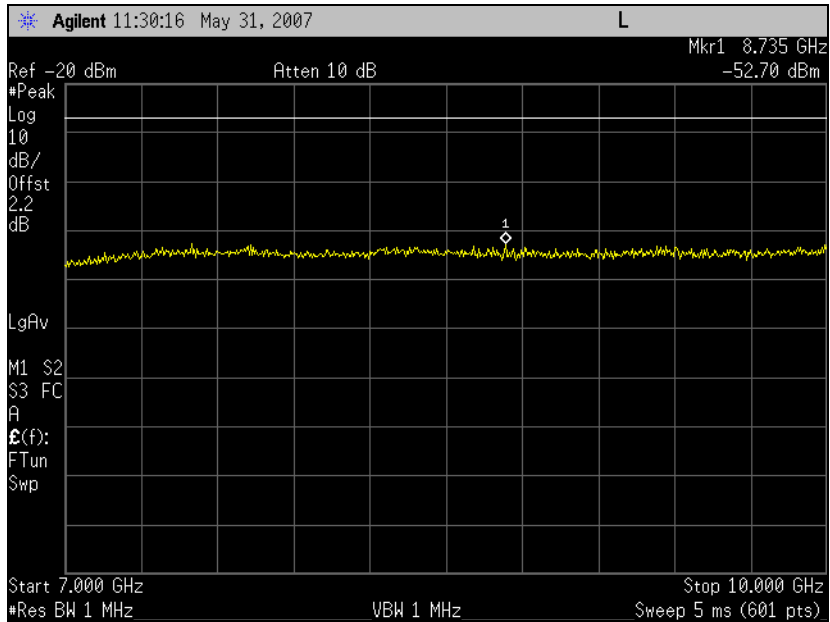
Plot 39. Channel 149, Undesirable Emissions EIRP 5.715 GHz – 5.725 GHz



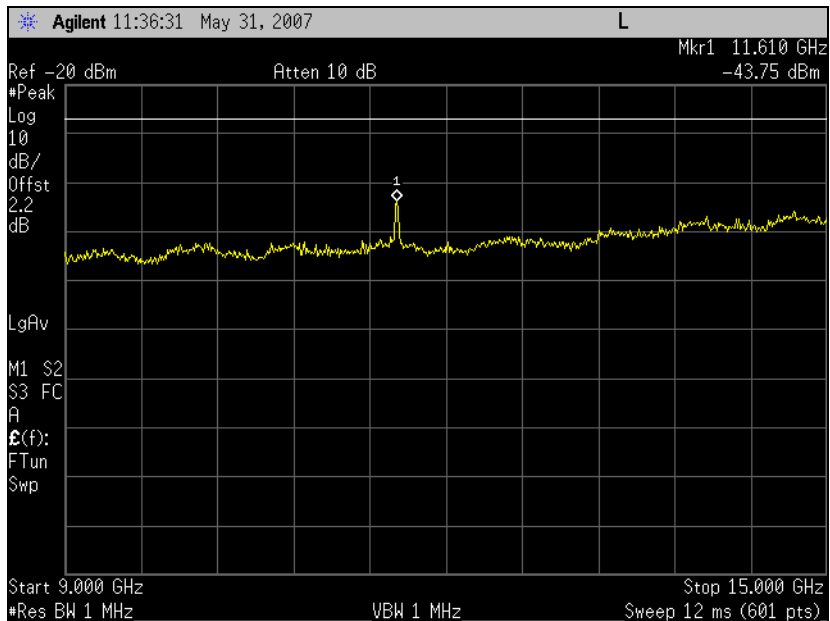
Plot 40. Channel 161, Undesirable Emissions EIRP, 5.825 -5.835 GHz



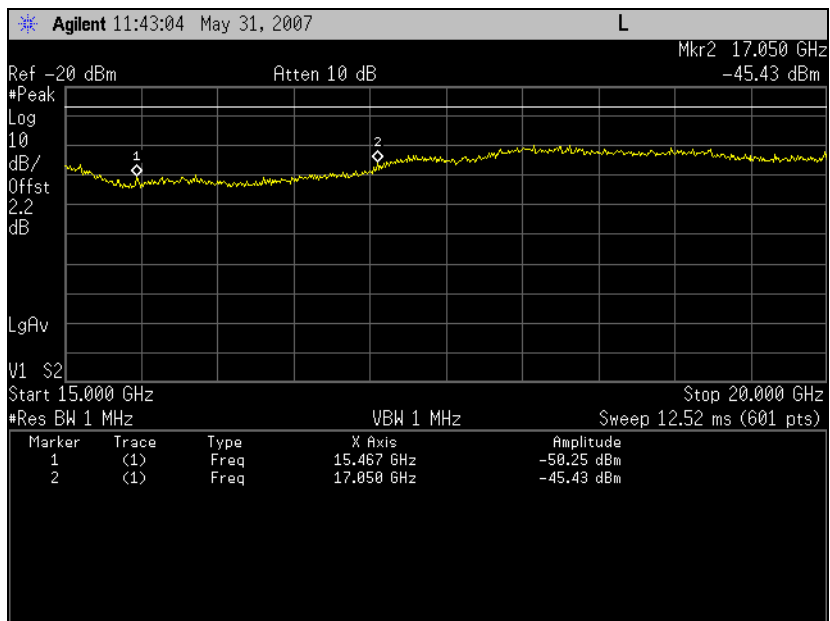
Plot 41. Channel 161, Undesirable Emissions EIRP, 5.835 -7 GHz



Plot 42. Channel 161, Undesirable Emissions EIRP, 7 - 10 GHz



Plot 43. Undesirable Emissions, EIRP, 9 - 15 GHz



Plot 44. Undesirable Emissions, EIRP, 15 - 20 GHz



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(g): Temperature and Voltage Stability

Test Requirements: § 15.407 (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Test Procedures: The EUT was placed in Single Carrier mode. A frequency measurement was made at ambient room temperature. The EUT was placed in a calibrated thermal chamber. A calibrated thermal couple was placed on the EUT. The EUT frequency output was monitored as the temperature was changed in 10° increments through its temperature range of operation. This was done for the middle channel.

A frequency measurement was likewise made at 115 VAC/ 60 Hz input AC mains power. The AC mains was then adjusted to its 85% voltage level and its 115 % voltage level, and the frequency measured at each level.

Test Results: The following are the resulting differences in frequency in parts per million.

Test Engineer: Jeffrey Hazen

Test Date: June 6, 2007



Electromagnetic Compatibility Criteria for Intentional Radiators

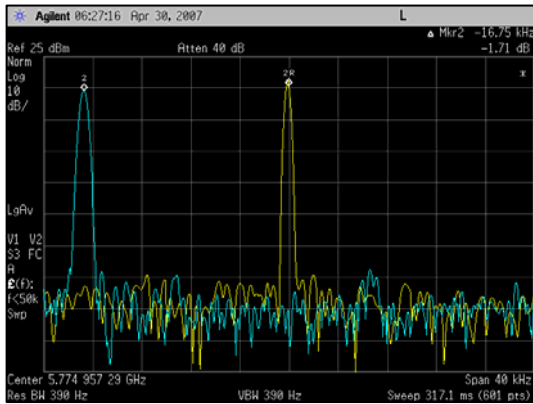
§ 15.407(g): Temperature Stability

Operating Condition	Channel 1 5.77495729 (GHz)	Error (ppm)
Normal	16.75	2.900454
-30 C	6.87	1.189619
-20 C	3.34	0.578359
-10 C	3.93	0.680525
0 C	0.533	0.092295
10 C	0.734	0.127101
20 C	0.534	0.092468
30 C	5.67	0.981825
40 C	24.14	4.180117
50 C	87.2	15.09968
60 C	125.7	21.76639
65 C	16.75	2.900454

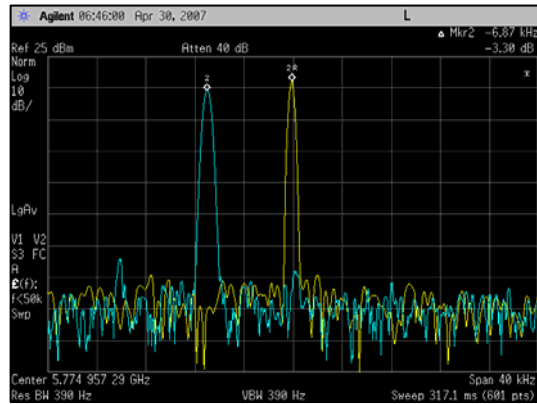
Table 16. Temperature Stability Test Results



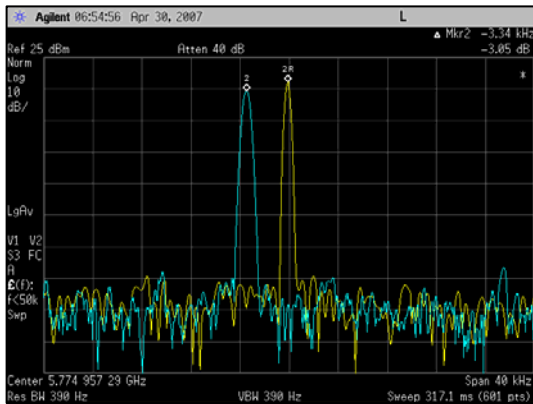
Electromagnetic Compatibility Criteria for Intentional Radiators § 15.407(g): Temperature Stability



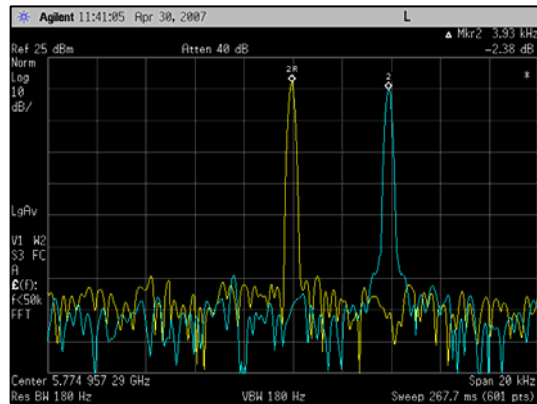
Plot 45. Temperature Stability, -30°C



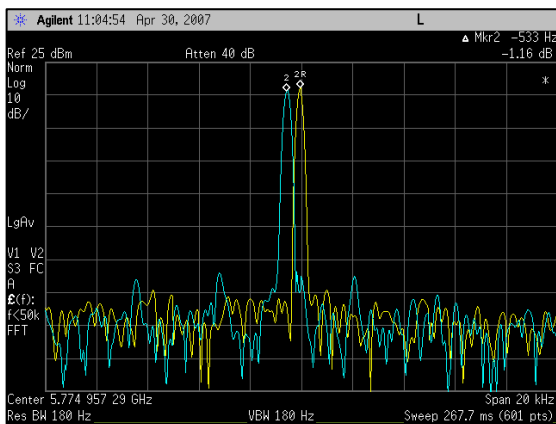
Plot 46. Temperature Stability, -20°C



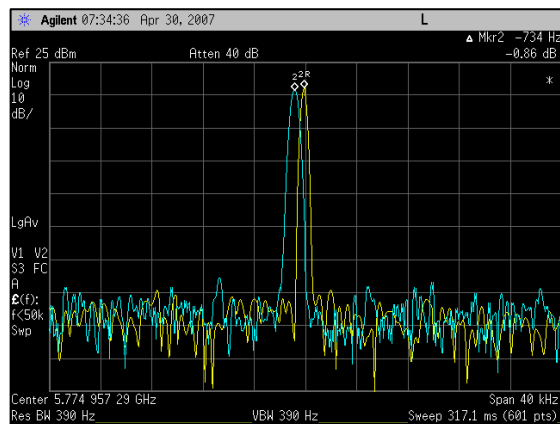
Plot 47. Temperature Stability, -10°C



Plot 48. Temperature Stability, 0°C



Plot 49. Temperature Stability, 10°C

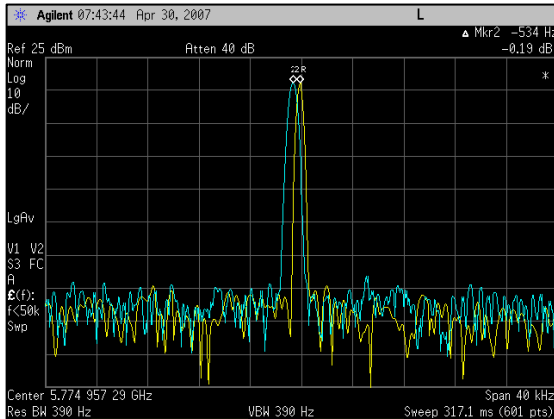


Plot 50. Temperature Stability, 20°C

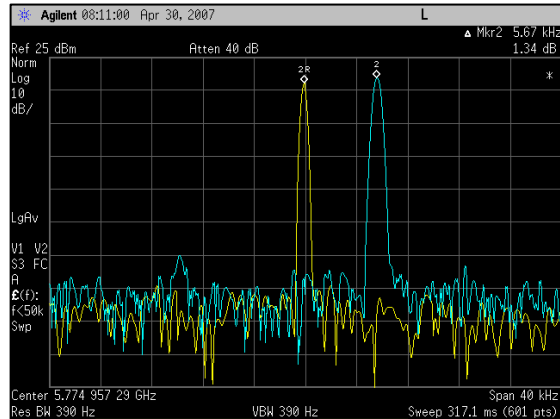


Electromagnetic Compatibility Criteria for Intentional Radiators

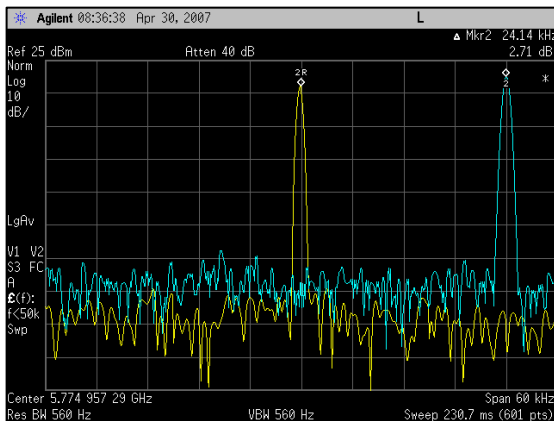
§ 15.407(g): Temperature Stability



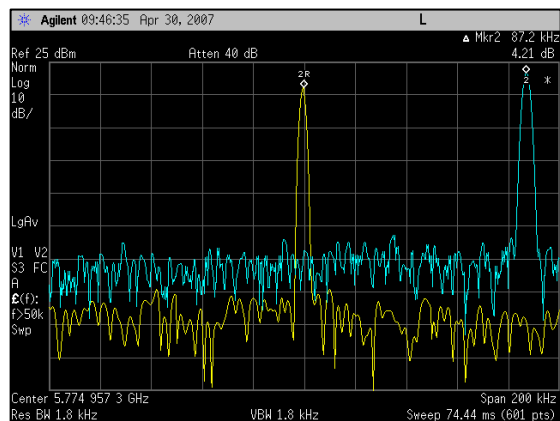
Plot 51. Temperature Stability, 30°C



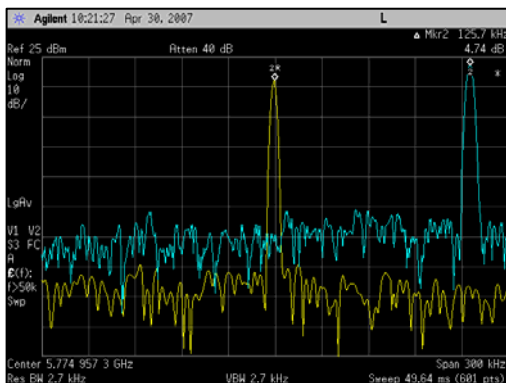
Plot 52. Temperature Stability, 40°C



Plot 53. Temperature Stability, 50°C



Plot 54. Temperature Stability, 60°C

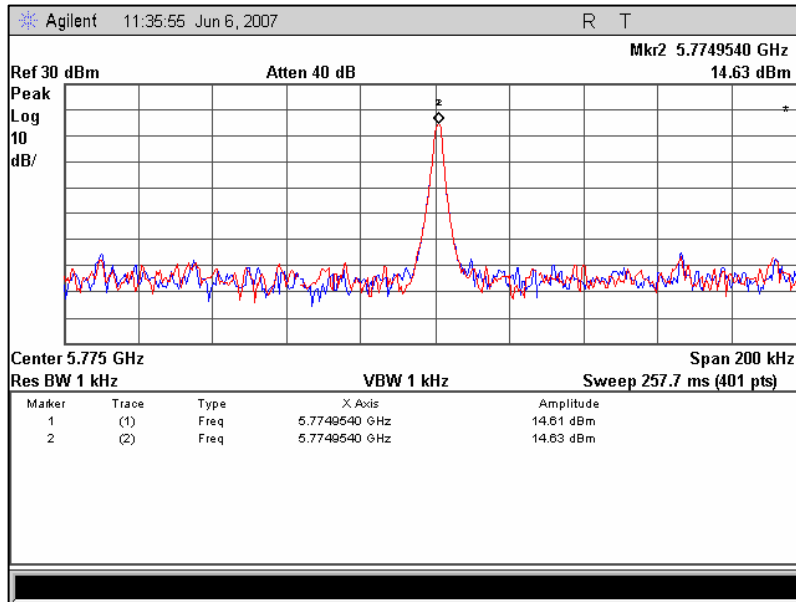


Plot 55. Temperature Stability, 65°C

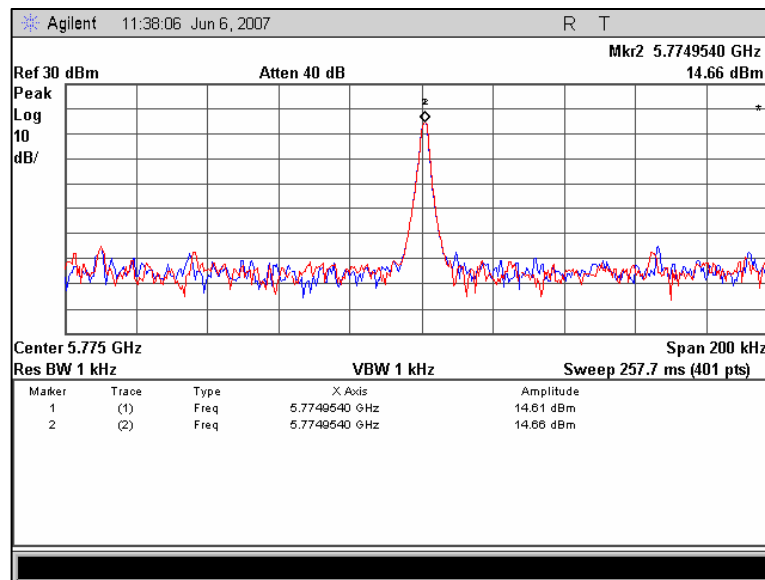


Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(g): Voltage Stability



Plot 56. Voltage Stability, 100% & 85%



Plot 57. Voltage Stability, 100% & 115%



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(g): Temperature Stability



Photograph 4. Temperature Stability Test Setup



Photograph 5. Voltage Stability Test Setup



IV. Test Equipment



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
1T4405	EMC TEST ROOM 2	MET	N/A	SEE NOTE	
1T4156	SPECTRUM ANALYZER; EMC	HEWLETT PACKARD	8594EM	10/06/2006	10/06/2007
1T4564	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	09/01/2006	09/01/2007
1T4212	LISN; SWITCH	SOLAR ELECTRONICS CO	9252-R-24-BNC	12/18/2006	12/18/2007
1T4554	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	04/11/2006	04/11/2008
Test Name: Radiated Emissions					
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4300	SEMI-ANECHOIC CHAMBER #1	EMC TEST SYSTEMS	NONE	2/17/2006	1/17/2009
1T4303	ANTENNA; BILOG	SCHAFNER – CHASE EMC	CBL6140A	6/20/2006	6/20/2007
1T4409	EMI RECEIVER	RHODE & SCHWARTZ	ESIB7	4/24/2007	4/24/2008
1T4558	THERMO/HYGROMETER.	FISCHER SCIENTIFIC	S6-627-9	3/3/2006	3/3/2008
1T4568	RADIATING NOISE SOURCE	MET LABORATORIES	N/A	SEE NOTE	
Test Name: 26 dB Bandwidth					
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
SN: US42070103	PSA	AGILENT	E4448A	02/20/2007	02/20/2008
1T4554	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	04/11/2006	04/11/2008
Test Name: Peak Power Output					
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
SN: US42070103	PSA	AGILENT	E4448A	02/20/2007	02/20/2008
1T4554	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	04/11/2006	04/11/2008
Test Name: Peak Power Spectral Density					
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
SN: US42070103	PSA	AGILENT	E4448A	02/20/2007	02/20/2008
1T4554	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	04/11/2006	04/11/2008



Test Name: Temperature Stability					
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4351	SPECTRUM ANALYZER	AGILENT	E7405A	10/13/2006	10/13/2007
1T4548	AC POWER SOURCE	CALIFORNIA INSTRUMENTS	1251P	SEE NOTE	
1T4258	DIGITAL MULTIMETER	FLUKE	83	10/24/2006	10/24/2007
SN: US42070103	PSA	AGILENT	E4448A	02/20/2007	02/20/2008
1T4554	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	04/11/2006	04/11/2008
1T4505	TEMPERATURE CHAMBER	TEST EQUITY	115	08/16/2006	08/16/2007
1T4553	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	03/03/2006	03/03/2008
Test Name: Voltage Stability					
MET Asset #	Equipment	MET Asset #	Equipment	MET Asset #	Equipment
1T4553	THERMO-HYGROMETER	CONTROL COMPANY	56-627-9	03/03/2006	03/03/2008
1T4351	SPECTRUM ANALYZER	AGILENT	E7405A	10/13/2006	10/13/2007
1T4548	AC POWER SOURCE	CALIFORNIA INSTRUMENTS	1251P	SEE NOTE	
SN: US42070103	PSA	AGILENT	E4448A	02/20/2007	02/20/2008
1T4258	DIGITAL MULTIMETER	FLUKE	83	10/24/2006	10/24/2007
1T4503	SHIELDED ROOM	UNIVERSAL SHIELDING CORP	N/A	SEE NOTE	

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 B 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 B 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.



Motorola Inc.
MOTOMESH Duo 4300-58 (2.4/5.8 GHz 802.11)

Electromagnetic Compatibility
End of Report
CFR Title 47, Part 15, Subpart E

End of Report