MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
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February 17, 2014

7Signal Solutions, Inc.
526 S. Main Street
Akron, OH 44311

Dear Don Sloan,

Enclosed is the EMC Wireless test report for compliance testing of the 7Signal Solutions, Inc., Indoor Eye / INDR-EYE01 as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Title 47 of the CFR, Part 15, Subpart B and ICES-003, Issue 5 August 2012 for Unintentional Radiators, and Part 15.407 Subpart E and RSS-210, Issue 8, Dec. 2010 for Intentional Radiators.

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.

Jennifer Warnell
Documentation Department

Reference: (\7Signal Solutions, Inc.\EMC39456-FCC407)

Electromagnetic Compatibility Criteria
Test Report

for the

7Signal Solutions, Inc.
Model Indoor Eye / INDR-EYE01

Tested under
the Certification Rules
contained in
Title 47 of the CFR, Part 15, Subpart B& ICES-003
for Unintentional Radiators
and
15.407 Subpart E & & RSS-210, Issue 8, Dec. 2010
for Intentional Radiators

MET Report: EMC39456-FCC407

February 17, 2014

Prepared For:

7Signal Solutions, Inc.
526 S. Main Street
Akron, OH 44311

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

Electromagnetic Compatibility Criteria
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for Intentional Radiators

Shawn McMillen, Project Engineer
Electromagnetic Compatibility Lab

Jennifer Warnell
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 Parts 15B, 15.407, of the FCC Rules under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	February 17, 2014	Initial Issue.

Table of Contents

List of Tables

List of Figures

List of Plots

List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the 7Signal Solutions, Inc. Indoor Eye / INDR-EYE01, 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 Indoor Eye / INDR-EYE01. 7Signal Solutions, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Indoor Eye / INDR-EYE01, 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 7Signal Solutions, Inc., purchase order number 0813001. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference	IC Reference RSS-210 Issue 8: 2010; RSS-GEN Issue 3: 2010	Description	Results
47 CFR Part 15.107 (a)	ICES-003 Issue 5 August 2012	Conducted Emission Limits for a Class A Digital Device	Compliant
47 CFR Part 15.109 (a)	ICES-003 Issue 5 August 2012	Radiated Emission Limits for a Class A Digital Device	Compliant
Title 47 of the CFR, Part 15 §15.203	N/A	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	RSS-GEN (7.2.4)	Conducted Emission Limits	Compliant
Title 47 of the CFR, Part 15 §15.407 (a)(2)	RSS-210 (A9.2)	Conducted Transmitter Output Power	Compliant
Title 47 of the CFR, Part 15 §15.407 (b)(2), (3), (5), (6)	RSS-210 (A9.2)	Undesirable Emissions (15.205/15.209 - General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Compliant

Table 1. Executive Summary of EMC Part 15.407 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by 7Signal Solutions, Inc. to perform testing on the Indoor Eye / INDR-EYE01, under 7Signal Solutions, Inc.'s purchase order number 0813001.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the 7Signal Solutions, Inc. Indoor Eye / INDR-EYE01.

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

Model(s) Tested:	Indoor Eye / INDR-EYE01	
Model(s) Covered:	Indoor Eye / INDR-EYE01	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: YLF-INDR-EYE01	
	Type of Modulations:	OFDM
	Equipment Code:	NII
	EUT Frequency Ranges:	5180-5240 MHz 5260-5320 MHz 5500-5700 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Shawn McMillen	
Report Date(s):	February 17, 2014	

Table 2. EUT Summary

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 (UNII)
RSS-210, Issue 8, Dec. 2010	Low-power Licence-exempt Radiocommunications Devices (All Frequency Bands): Category I Equipment
RSS-GEN, Issue 3, Dec. 2010	General Requirements and Information for the Certification of Radio Apparatus
ICES-003, Issue 5 August 2012	Information Technology Equipment (ITE) — Limits and methods of measurement
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
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., 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 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

D. Description of Test Sample

The 7Signal Solutions, Inc. Indoor Eye / INDR-EYE01, Equipment Under Test (EUT), is a Wi-Fi monitoring component of the Sapphire wireless network optimization system. This device (Eye) is a Wi-Fi network client device operating in the standard IEEE802.11 FCC bands at 2.4 GHz and 5 GHz. The Eye mounts in the ceiling among Wi-Fi access points and continually collects over-the-air traffic data which it forwards to a Carat server for analysis and user presentation. The Eye contains one off-the-shelf Wi-Fi radio module and a 6-sector switched antenna system. It associates as a client device to access points, one at a time in round-robin fashion, to conduct throughput tests as well as monitoring and collecting key performance parameters of the wi-fi system.

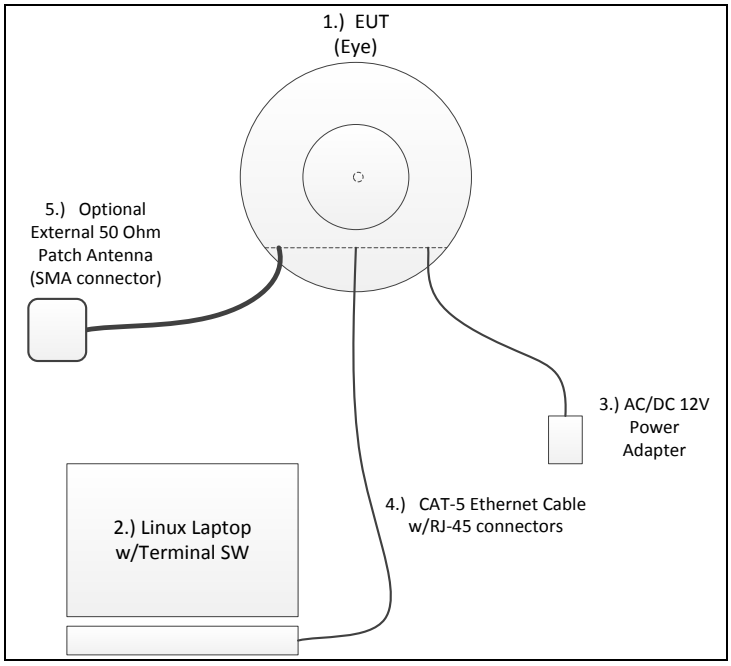


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

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

Ref. ID	Name / Description	Model Number	Part Number	Serial Number	Revision
1	Indoor Eye	INDR-EYE01	--	L46130002	2.7
5	2.4GHz External Antenna	Cushcraft S2406P	--	--	--
5	5GHz External Antenna	Cisco ANT5195P	--	--	--

Table 4. Equipment Configuration

F. Support Equipment

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

Ref. ID	Name / Description	Manufacturer	Model Number
2	Linux Laptop	Asus	--

Table 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
3	DC Input	Power cable and adapter	1	2	No	(117v/60Hz)
4	RJ-45 Ethernet Jack	CAT-5 cable	1	10	No	Laptop Ethernet port

Table 6. Ports and Cabling Information

H. Mode of Operation

The EUT is provided with special software to put it in a debugger mode where a laptop computer can connect via SSH through the Ethernet port. A menu is provided that prompts for transmitter parameters such as frequency, modulation and bandwidth settings. The radio will transmit packets continuously by command in this test mode.

The EUT can also be put into normal operating mode using the 7signal graphical user interface.

I. Method of Monitoring EUT Operation

The primary feedback of the operating state of the EUT is the connected laptop debugger program.

The red LED indicates communication through Ethernet is active when flashing.

J. 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.

K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to 7Signal Solutions, Inc. upon completion of testing.

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

Electromagnetic Compatibility Criteria

§ 15.107 Conducted Emissions Limits

Test Requirement(s):

15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 7. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

15.107 (b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 7. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

Frequency range (MHz)	Class A Conducted Limits (dBµV)		*Class B Conducted Limits (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
* 0.15- 0.45	79	66	66 - 56	56 - 46
0.45 - 0.5	79	66	56	46
0.5 - 30	73	60	60	50
Note 1 — The lower limit shall apply at the transition frequencies. Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz.				

Table 7. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b)

Test Procedures: The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing, test conditions, and test procedures of ANSI C63.4 were used. The EUT was powered through a 50Ω/50µH LISN. An EMI receiver, connected to the measurement port of the LISN, scanned the frequency range from 150 kHz to 30 MHz in order to find the peak conducted emissions. All peak emissions within 6 dB of the limit were re-measured using a quasi-peak and/or average detector as appropriate.

Test Results: The EUT was compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits.

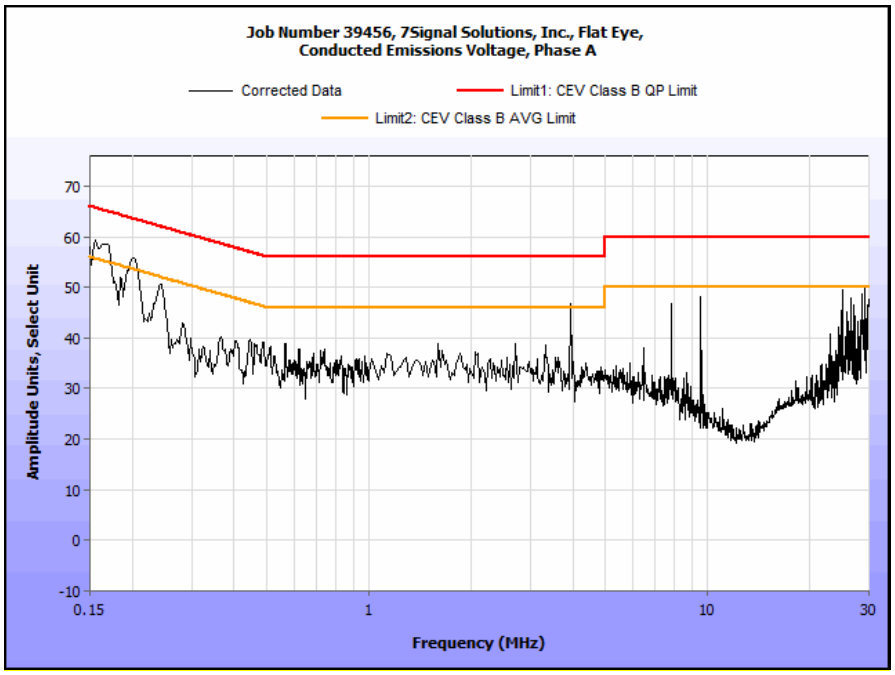
Test Engineer(s): Shawn McMillen

Test Date(s): 01/09/14

Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBµV) QP	Cable Loss (dB)	Corrected Measurement (dBµV) QP	Limit (dBµV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBµV) Avg.	Cable Loss (dB)	Corrected Measurement (dBµV) AVG	Limit (dBµV) AVG	Margin (dB) AVG
0.163	56.14	0	56.14	65.31	-9.17	41.07	0	41.07	55.31	-14.24
1.818	29.88	0	29.88	56	-26.12	11.28	0	11.28	46	-34.72
3.926	41.81	0	41.81	56	-14.19	16.98	0	16.98	46	-29.02
7.818	40.63	0	40.63	60	-19.37	11.56	0	11.56	50	-38.44
9.555	36.47	0	36.47	60	-23.53	15.38	0	15.38	50	-34.62
25	48.6	0	48.6	60	-11.4	45.68	0	45.68	50	-4.32

Table 8. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

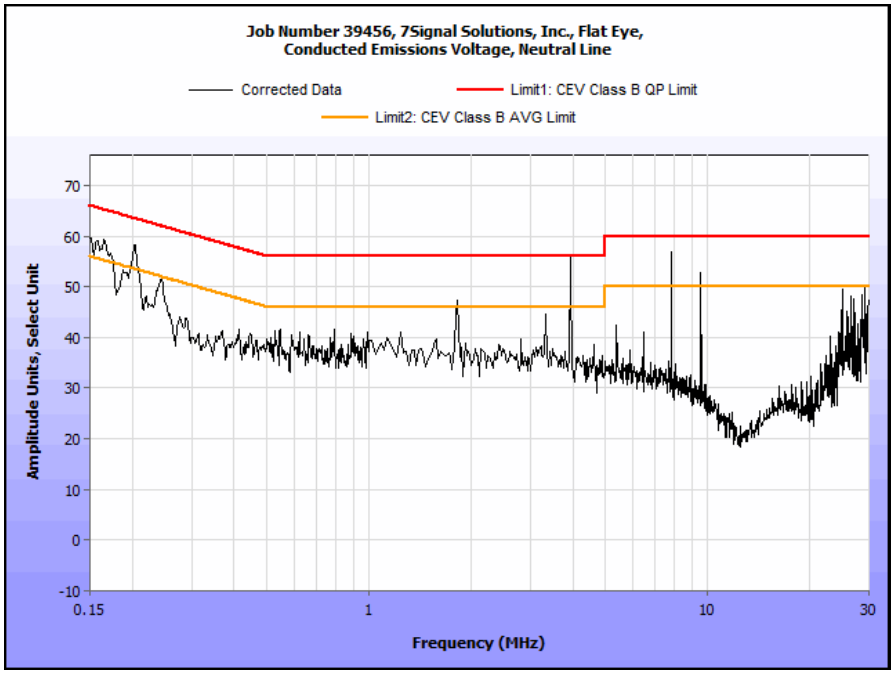


Plot 1. Conducted Emissions, Phase Line Plot

Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBµV) QP	Cable Loss (dB)	Corrected Measurement (dBµV) QP	Limit (dBµV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBµV) Avg.	Cable Loss (dB)	Corrected Measurement (dBµV) AVG	Limit (dBµV) AVG	Margin (dB) AVG
0.151	47.88	0	47.88	65.95	-18.07	29.08	0	29.08	55.95	-26.87
3.927	51.46	0	51.46	56	-4.54	21.46	0	21.46	46	-24.54
6.458	44.21	0	44.21	60	-15.79	15.79	0	15.79	50	-34.21
7.817	47.8	0	47.8	60	-12.2	18.14	0	18.14	50	-31.86
9.555	52.83	0	52.83	60	-7.17	22.04	0	22.04	50	-27.96
29.23	49.77	0	49.77	60	-10.23	46.09	0	46.09	50	-3.91

Table 9. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)



Plot 2. Conducted Emissions, Neutral Line Plot

Radiated Emission Limits

§ 15.109 Radiated Emissions Limits

Test Requirement(s): **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 10.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 10.

Frequency (MHz)	Field Strength (dBµV/m)	
	§15.109 (b), Class A Limit (dBµV) @ 10m	§15.109 (a),Class B Limit (dBµV) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

Table 10. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

Test Results: The EUT was compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits.

Test Engineer(s): Surinder Singh

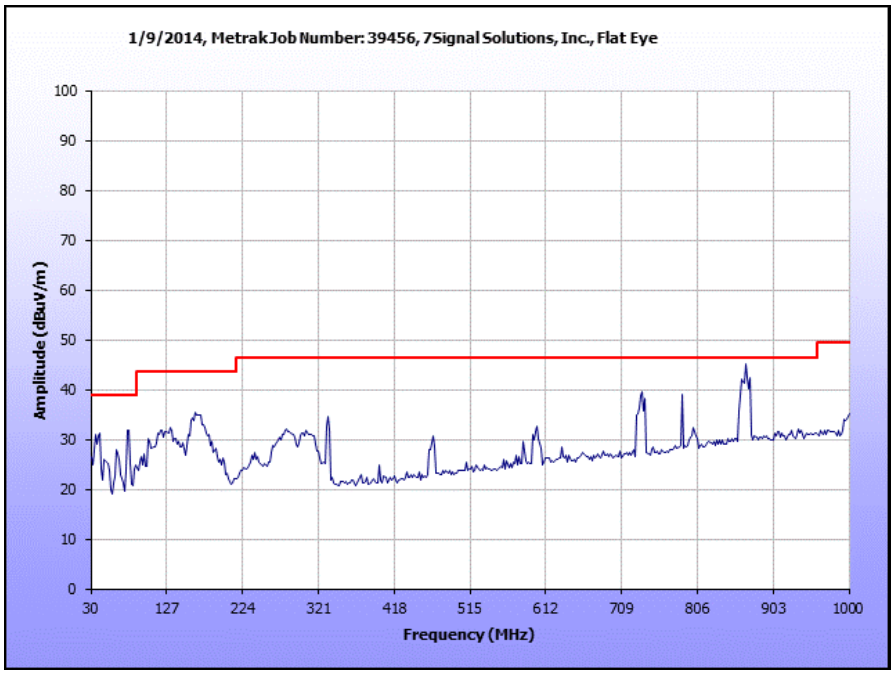
Test Date(s): 01/09/14

Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBµV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
78.928858	27	H	1.0317	23.62	7.90	0.69	10.46	21.75	39	-17.25
78.928858	108	V	1.1195	27.66	7.90	0.69	10.46	25.79	39	-13.21
134.62826	-39	H	1.0386	18.75	13.54	0.92	10.46	22.75	43.5	-20.75
134.62826	124	V	1.0704	23.32	13.54	0.92	10.46	27.32	43.5	-16.18
180.61184	80	H	1.0947	25.57	11.20	0.93	10.46	27.24	43.5	-16.26
180.61184	167	V	1.0386	26.58	11.20	0.93	10.46	28.25	43.5	-15.25
781.67	179	H	1.0891	16.03	21.73	2.41	10.46	29.71	46.4	-16.69
781.67	109	V	1.1304	17.19	21.73	2.41	10.46	30.87	46.4	-15.53
861.49	44	H	1.0547	22.6	22.60	2.50	10.46	37.24	46.4	-9.16
861.49	332	V	1.0547	17.5	22.60	2.50	10.46	32.14	46.4	-14.26

Table 11. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz

Note: The EUT was tested at 3 m.



Plot 3. Radiated Emissions, 30 MHz - 1 GHz

IV. 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 is compliant the criteria of §15.203. The EUT has an integral antenna and the external antenna has a unique connector.

Test Engineer(s): Shawn McMillen

Test Date(s): 01/08/14

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 μH/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 (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 12. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a 0.8 m-high wooden table inside a screen room. 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 μH 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 C63.4-2003 "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 μH LISN as the input transducer to an EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on.

Test Results: The EUT was compliant with this requirement. Measured emissions were below applicable limits.

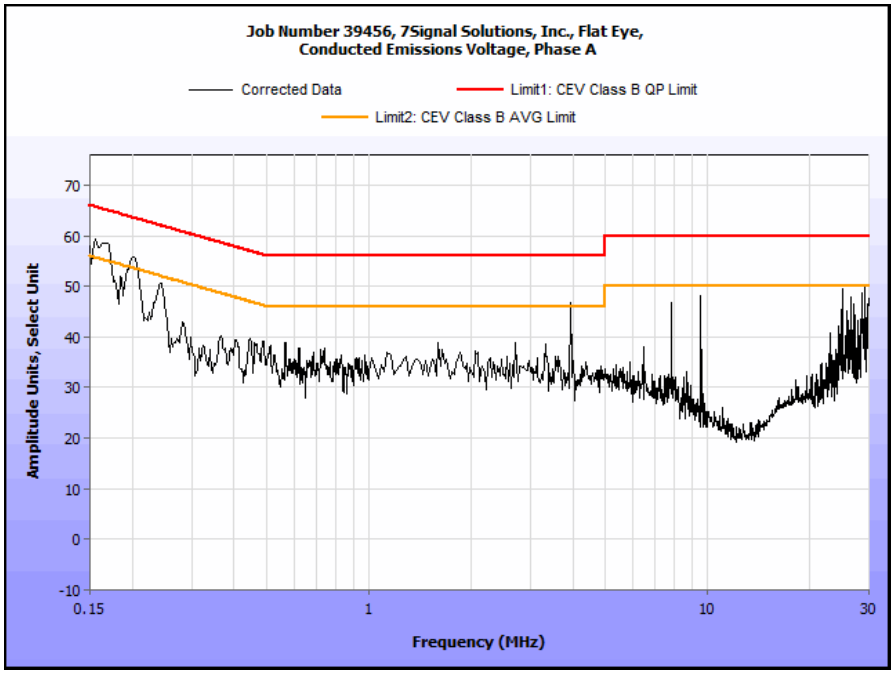
Test Engineer(s): Shawn McMillen

Test Date(s): 01/09/14

15.207(a) Conducted Emissions Test Results

Frequency (MHz)	Uncorrected Meter Reading (dBµV) QP	Cable Loss (dB)	Corrected Measurement (dBµV) QP	Limit (dBµV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBµV) Avg.	Cable Loss (dB)	Corrected Measurement (dBµV) AVG	Limit (dBµV) AVG	Margin (dB) AVG
0.163	56.14	0	56.14	65.31	-9.17	41.07	0	41.07	55.31	-14.24
1.818	29.88	0	29.88	56	-26.12	11.28	0	11.28	46	-34.72
3.926	41.81	0	41.81	56	-14.19	16.98	0	16.98	46	-29.02
7.818	40.63	0	40.63	60	-19.37	11.56	0	11.56	50	-38.44
9.555	36.47	0	36.47	60	-23.53	15.38	0	15.38	50	-34.62
25	48.6	0	48.6	60	-11.4	45.68	0	45.68	50	-4.32

Table 13. Conducted Emissions, 15.207(a), Phase Line, Test Results

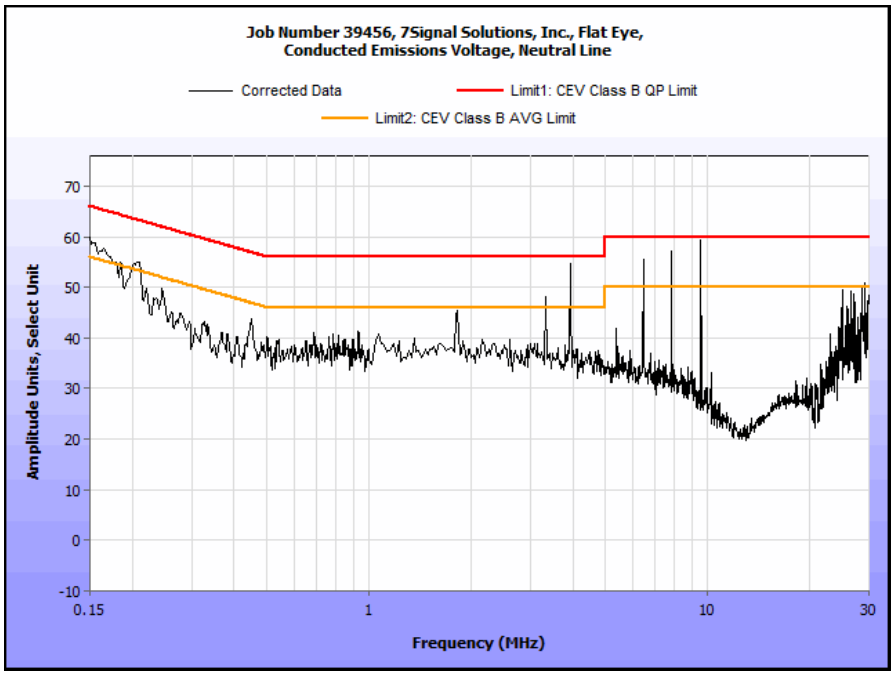


Plot 4. Conducted Emissions, 15.207(a), Phase Line

15.207(a) Conducted Emissions Test Results

Frequency (MHz)	Uncorrected Meter Reading (dBµV) QP	Cable Loss (dB)	Corrected Measurement (dBµV) QP	Limit (dBµV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBµV) Avg.	Cable Loss (dB)	Corrected Measurement (dBµV) AVG	Limit (dBµV) AVG	Margin (dB) AVG
0.151	47.88	0	47.88	65.95	-18.07	29.08	0	29.08	55.95	-26.87
3.927	51.46	0	51.46	56	-4.54	21.46	0	21.46	46	-24.54
6.458	44.21	0	44.21	60	-15.79	15.79	0	15.79	50	-34.21
7.817	47.8	0	47.8	60	-12.2	18.14	0	18.14	50	-31.86
9.555	52.83	0	52.83	60	-7.17	22.04	0	22.04	50	-27.96
29.23	49.77	0	49.77	60	-10.23	46.09	0	46.09	50	-3.91

Table 14. Conducted Emissions, 15.207(a), Neutral Line, Test Results



Plot 5. Conducted Emissions, 15.207(a), Neutral Line

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 407(a)(1) RF Power Output

Test Requirements: **§15.407(a)(1):** For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz.

Test Procedure: The EUT was connected to a spectrum analyzer through an RF cable and an attenuator. The EUT was set to transmit on low, mid, and high channels and the power was measured according to method SA-1 from FCC Publication Number 789033. Power across the antenna ports was summed.

Test Results: Equipment was compliant with the Peak Power Output limits of **§ 15.401(a)(1)**.

Test Engineer(s): Shawn McMillen

Test Date(s): 01/09/14

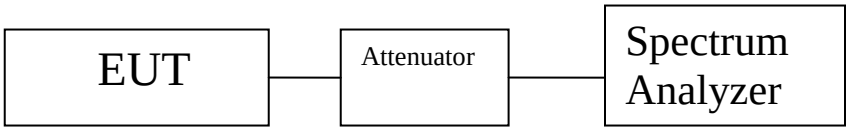


Figure 2. Power Output Test Setup

	Frequency (MHz)	Conducted Power (dBm)
802.11a Port A	5180	11.00
	5200	10.98
	5240	10.97
	5260	10.83
	5300	10.93
	5320	14.48
	5500	10.67
	5580	17.17
	5700	11.38
802.11a Port B	5180	11.54
	5200	11.55
	5240	11.80
	5260	11.50
	5300	11.73
	5320	15.35
	5500	9.89
	5580	16.62
	5700	12.03
802.11n 20 MHz Port A	5180	11.53
	5200	11.55
	5240	11.66
	5260	11.40
	5300	11.41
	5320	11.34
	5500	10.45
	5580	16.81
	5700	11.01
802.11n 20 MHz Port B	5180	12.50
	5200	12.54
	5240	12.42
	5260	12.18
	5300	12.18
	5320	12.52
	5500	9.26
	5580	16.48
	5700	11.69
802.11n 40 MHz Port A	5190	9.84
	5230	10.84
	5270	10.61
	5310	9.69
	5510	8.96
	5550	14.61
	5670	13.24
802.11n 40 MHz Port B	5190	10.33
	5230	11.69
	5270	11.43
	5310	10.44
	5510	7.84
	5550	14.38
	5670	13.32

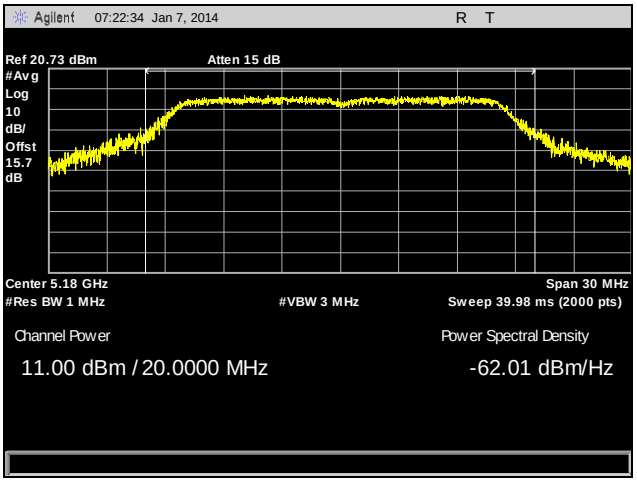
Table 15. RF Power Output, Test Results

Peak Conducted Output Power		
	Frequency (MHz)	**Conducted Power (dBm)**
802.11n 20 MHz summed ports	5180	15.05
	5200	15.08
	5240	15.07
	5260	14.82
	5300	14.82
	5320	14.98
	5500	12.91
	5580	19.66
	5700	14.37

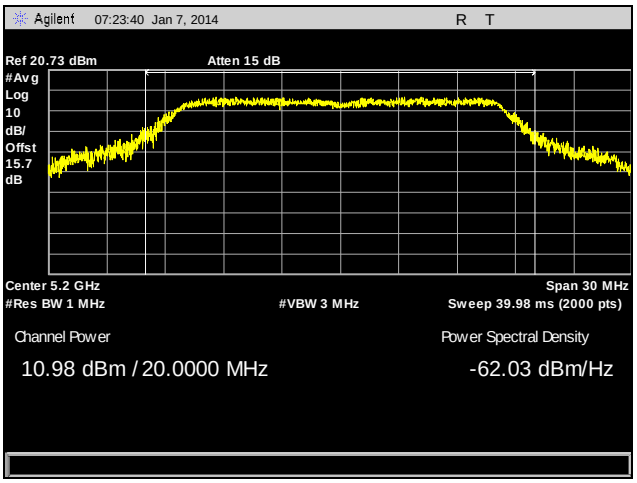
Table 16. RF Power Output, 802.11n 20 MHz, Summed Ports

Peak Conducted Output Power		
	Frequency (MHz)	**Conducted Power (dBm)**
802.11n 40 MHz summed ports	5190	13.10
	5230	14.30
	5270	14.05
	5310	13.09
	5510	11.45
	5550	17.51
	5670	16.29

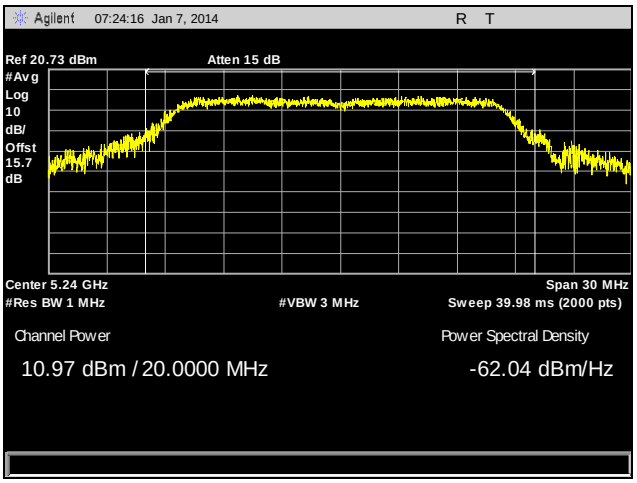
Table 17. RF Power Output, 802.11n 40 MHz, Summed Ports



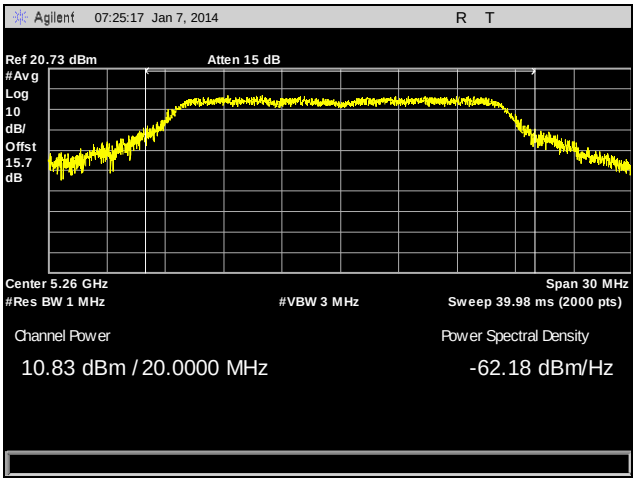
Plot 6. RF Power Output, 5180 MHz, 802.11a, Port A



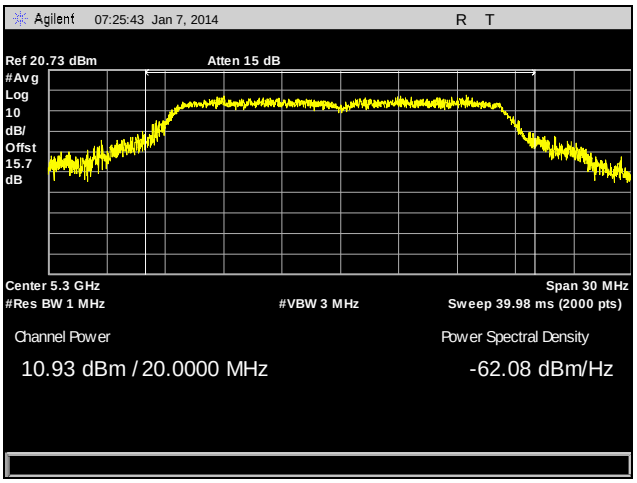
Plot 7. RF Power Output, 5200 MHz, 802.11a, Port A



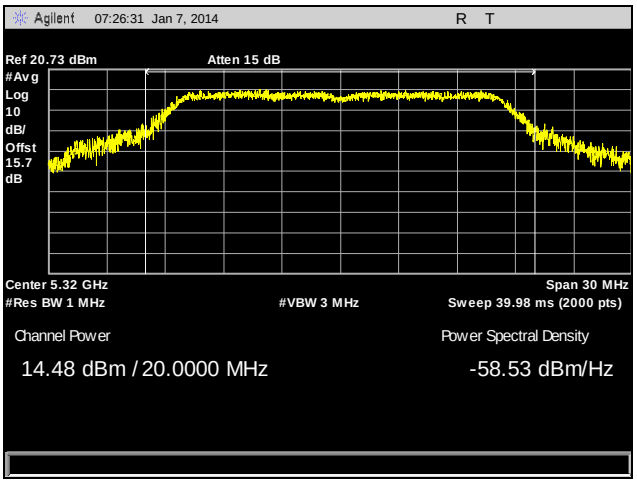
Plot 8. RF Power Output, 5240 MHz, 802.11a, Port A



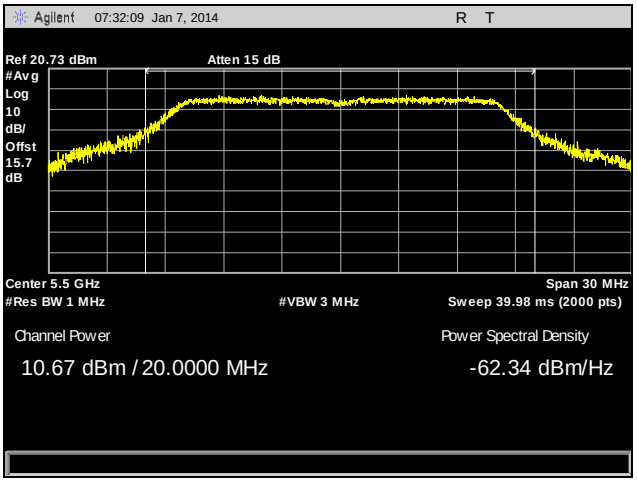
Plot 9. RF Power Output, 5260 MHz, 802.11a, Port A



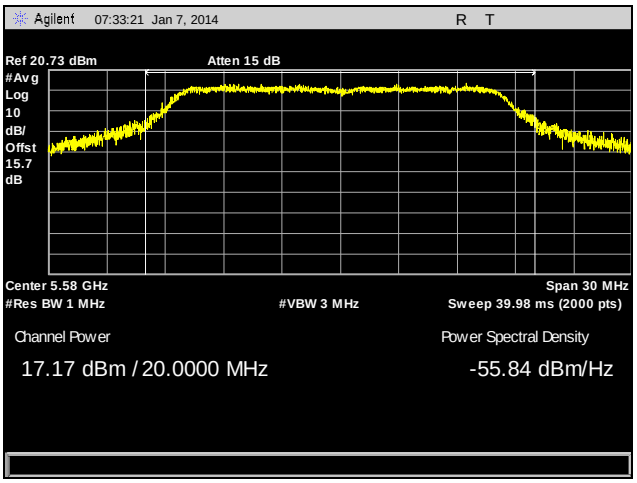
Plot 10. RF Power Output, 5300 MHz, 802.11a, Port A



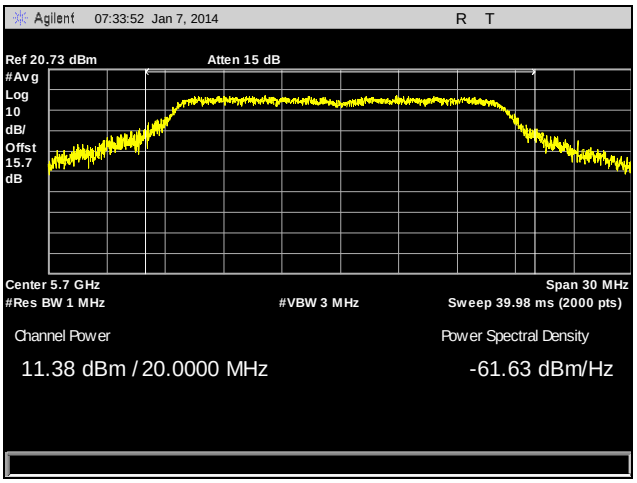
Plot 11. RF Power Output, 5320 MHz, 802.11a, Port A



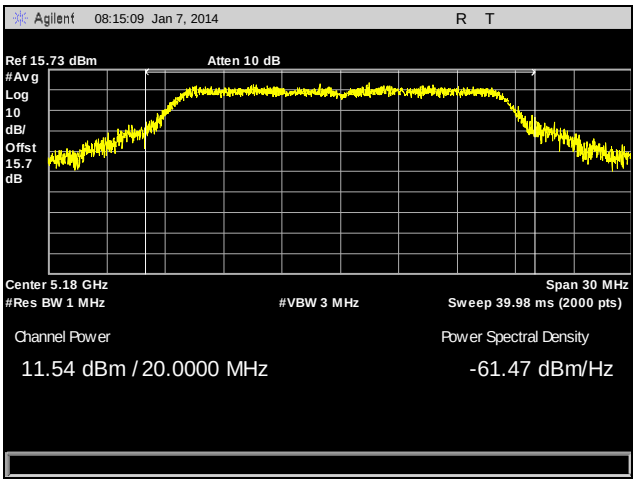
Plot 12. RF Power Output, 5500 MHz, 802.11a, Port A



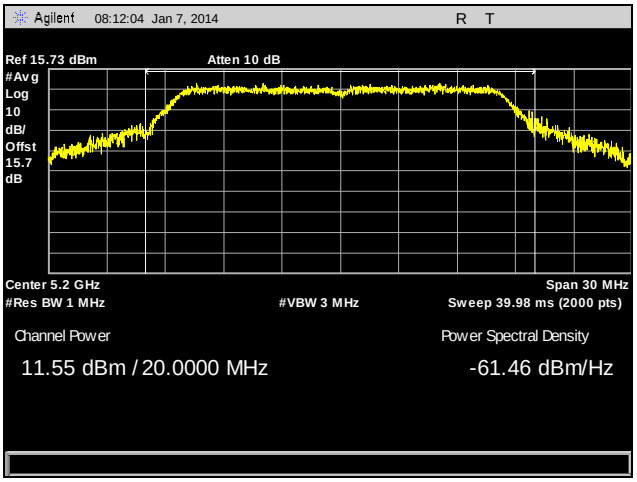
Plot 13. RF Power Output, 5580 MHz, 802.11a, Port A



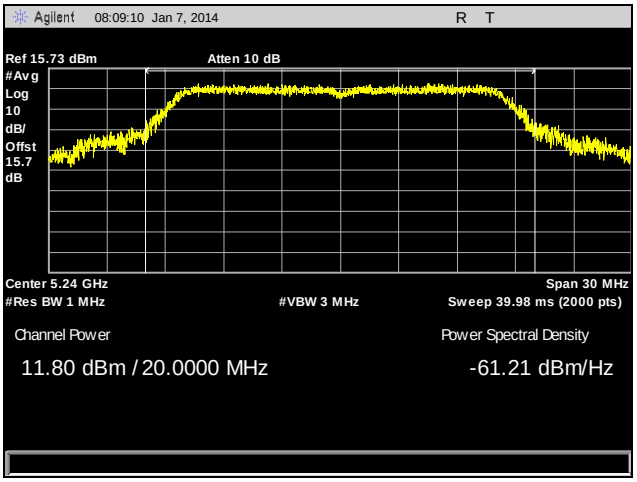
Plot 14. RF Power Output, 5700 MHz, 802.11a, Port A



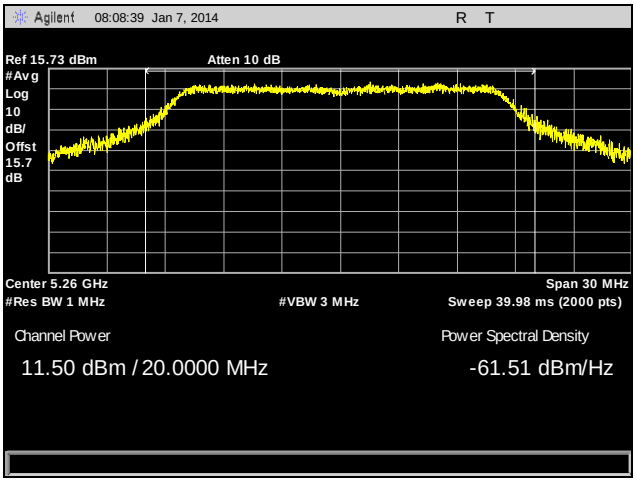
Plot 15. RF Power Output, 5180 MHz, 802.11a, Port B



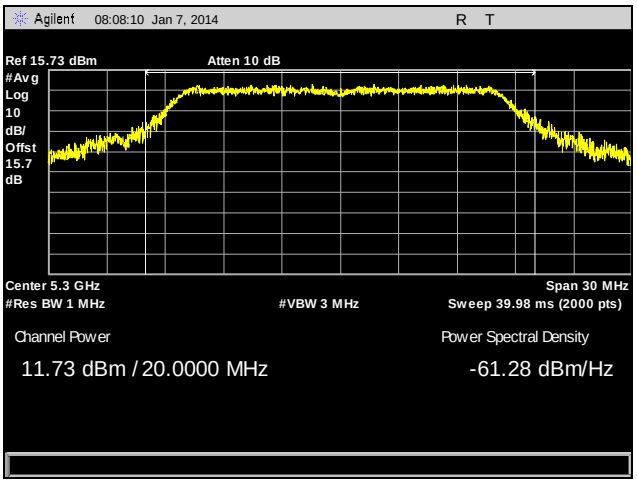
Plot 16. RF Power Output, 5200 MHz, 802.11a, Port B



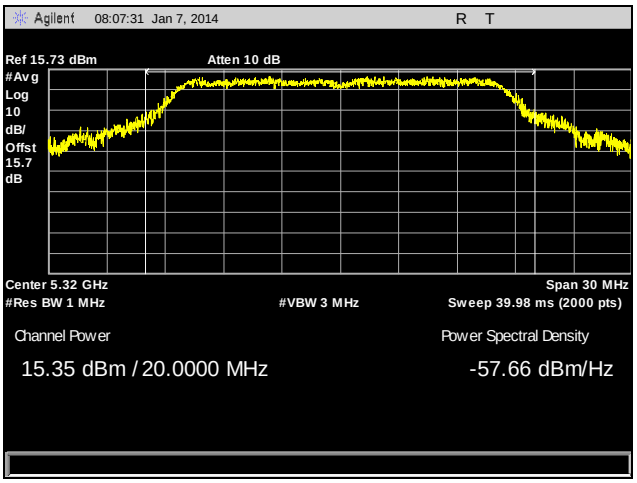
Plot 17. RF Power Output, 5240 MHz, 802.11a, Port B



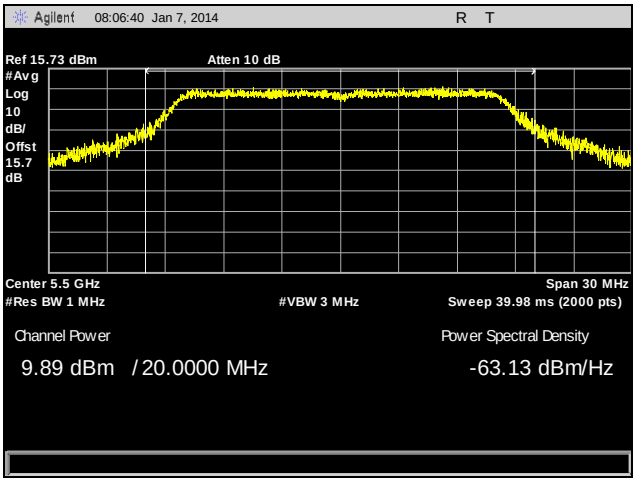
Plot 18. RF Power Output, 5260 MHz, 802.11a, Port B



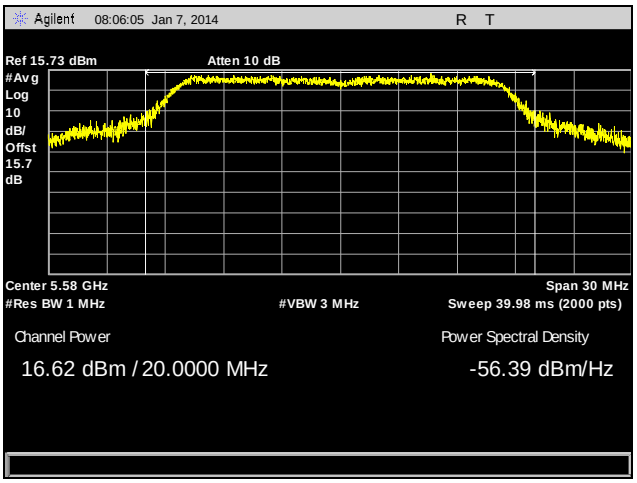
Plot 19. RF Power Output, 5300 MHz, 802.11a, Port B



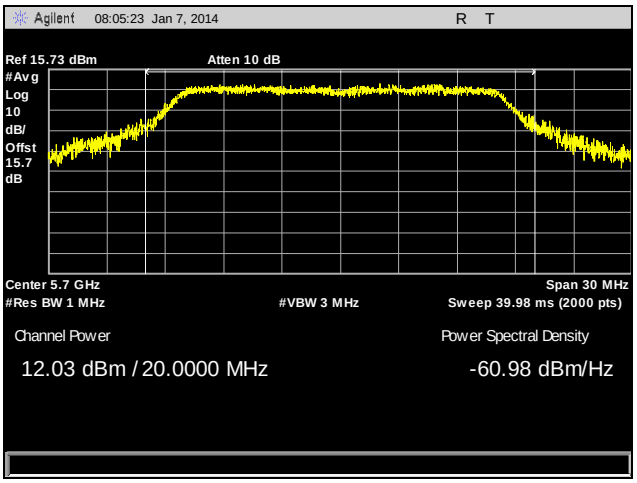
Plot 20. RF Power Output, 5320 MHz, 802.11a, Port B



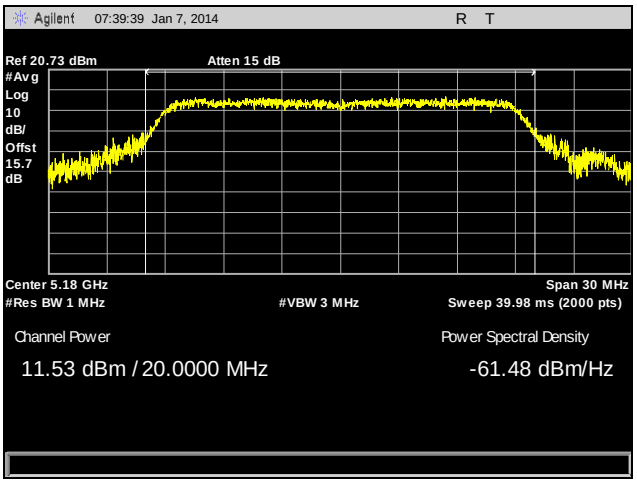
Plot 21. RF Power Output, 5500 MHz, 802.11a, Port B



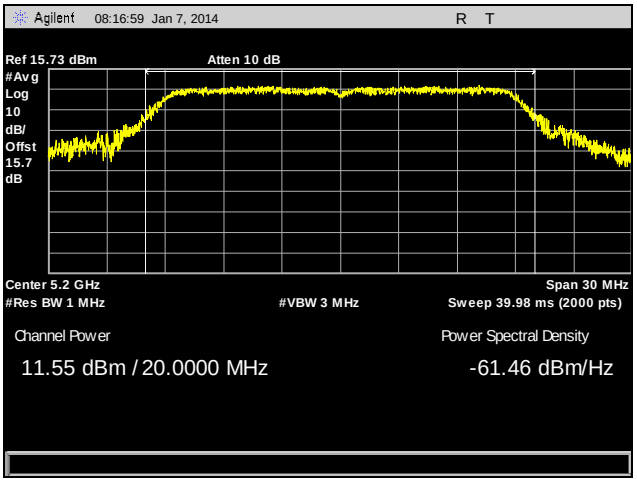
Plot 22. RF Power Output, 5580 MHz, 802.11a, Port B



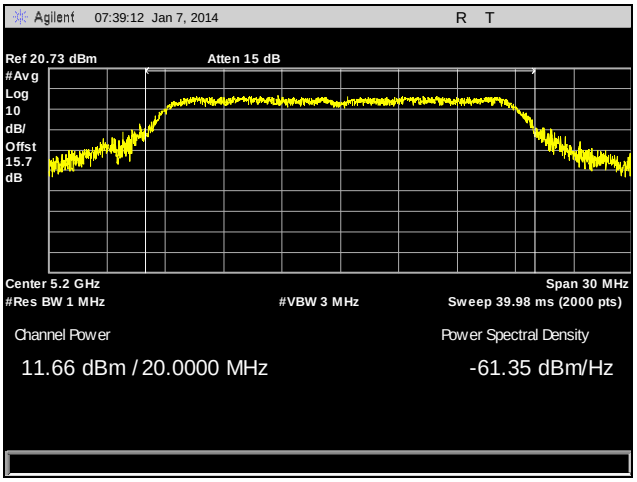
Plot 23. RF Power Output, 5700 MHz, 802.11a, Port B



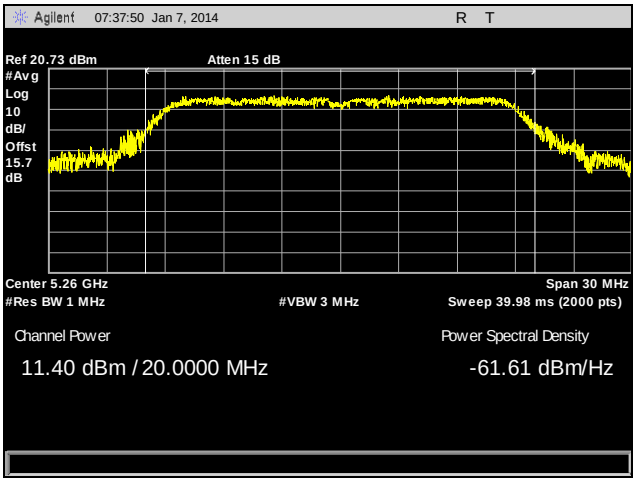
Plot 24. RF Power Output, 5180 MHz, 802.11n 20 MHz, Port A



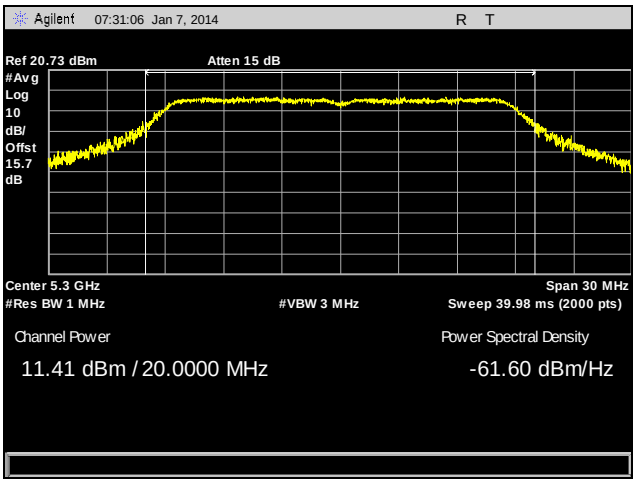
Plot 25. RF Power Output, 5200 MHz, 802.11n 20 MHz, Port A



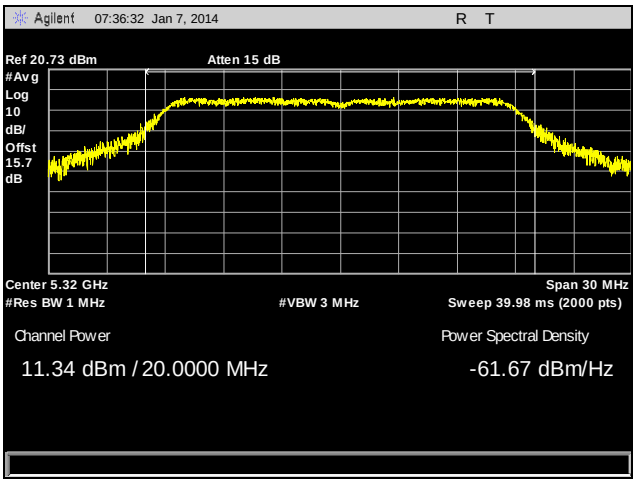
Plot 26. RF Power Output, 5240 MHz, 802.11n 20 MHz, Port A



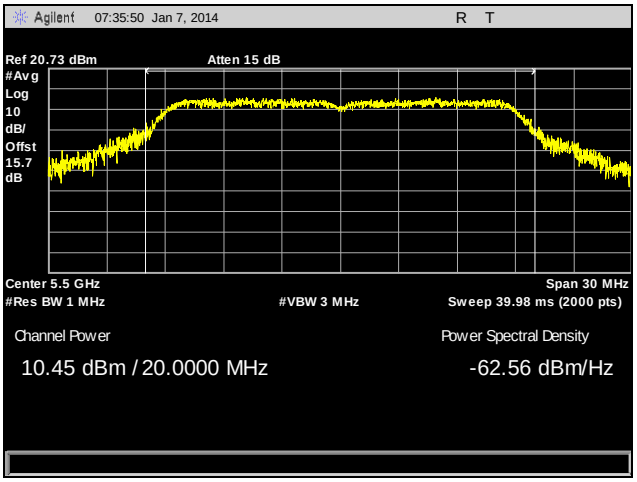
Plot 27. RF Power Output, 5260 MHz, 802.11n 20 MHz, Port A



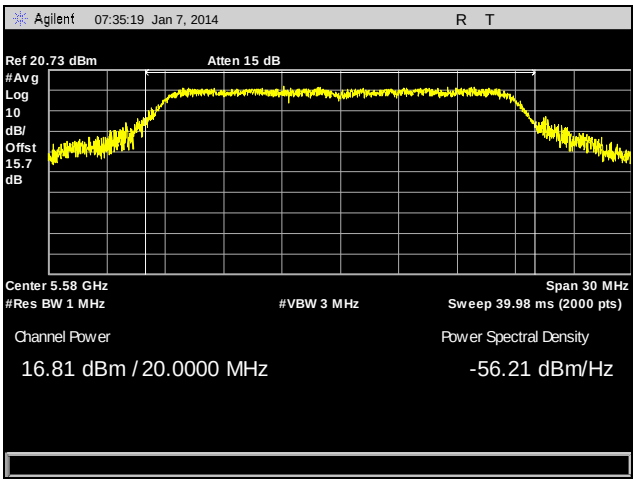
Plot 28. RF Power Output, 5300 MHz, 802.11n 20 MHz, Port A



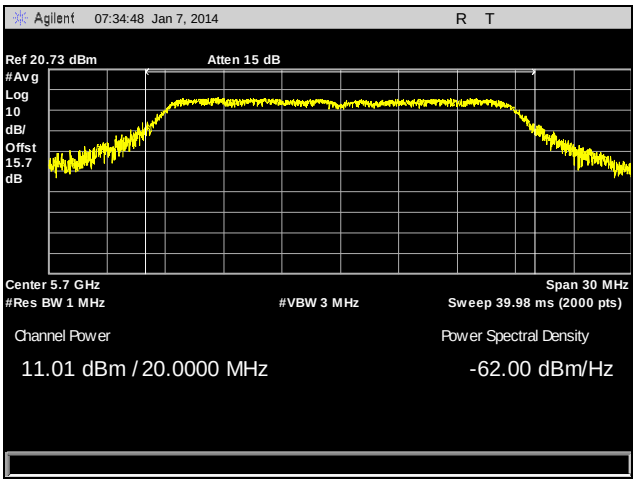
Plot 29. RF Power Output, 5320 MHz, 802.11n 20 MHz, Port A



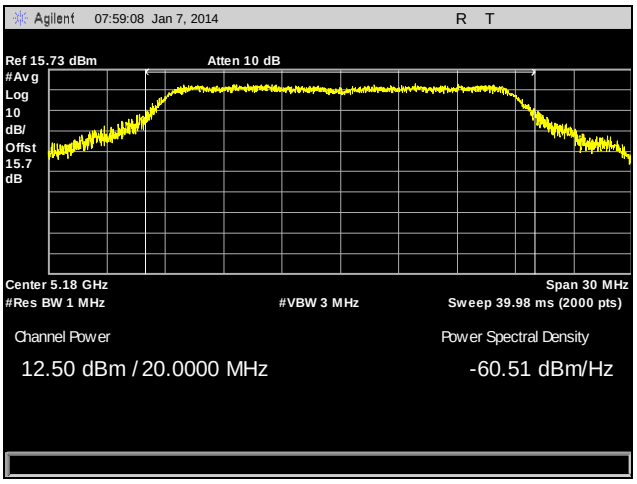
Plot 30. RF Power Output, 5500 MHz, 802.11n 20 MHz, Port A



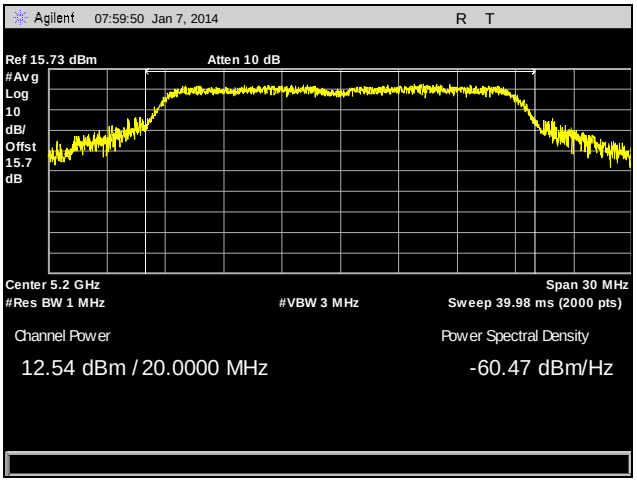
Plot 31. RF Power Output, 5580 MHz, 802.11n 20 MHz, Port A



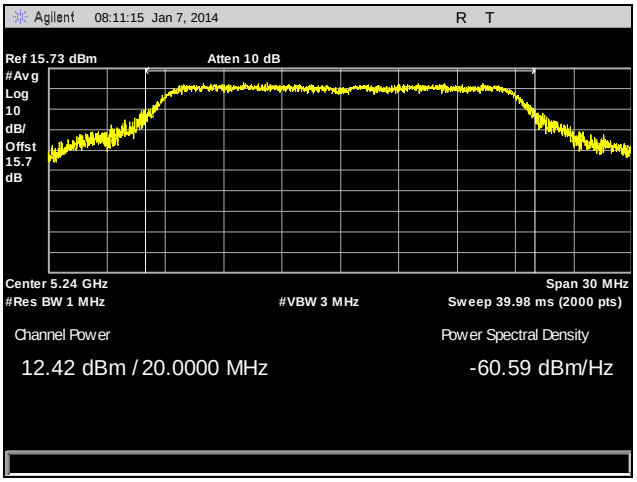
Plot 32. RF Power Output, 5700 MHz, 802.11n 20 MHz, Port A



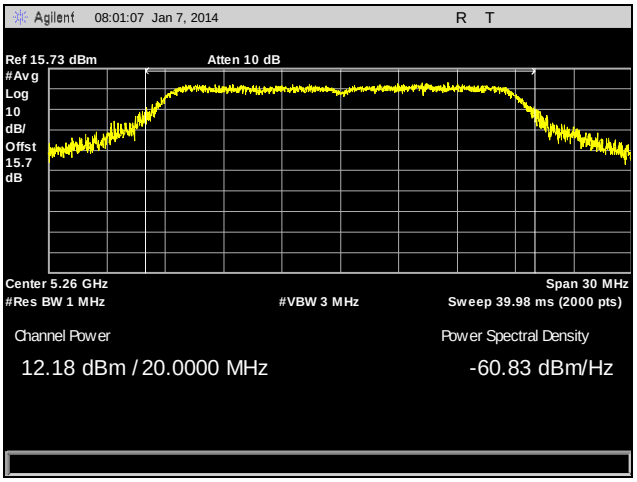
Plot 33. RF Power Output, 5180 MHz, 802.11n 20 MHz, Port B



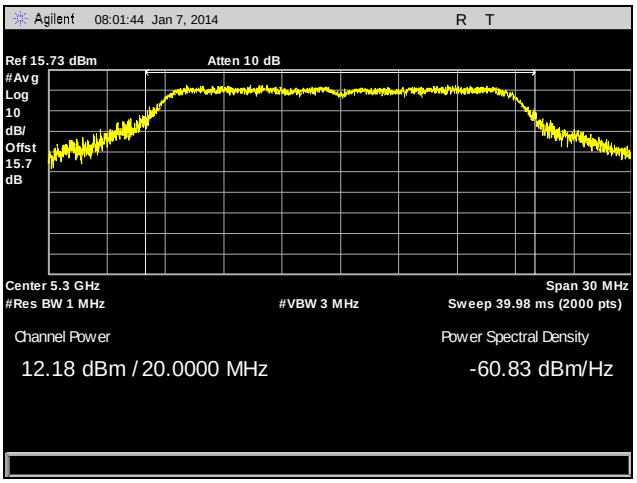
Plot 34. RF Power Output, 5200 MHz, 802.11n 20 MHz, Port B



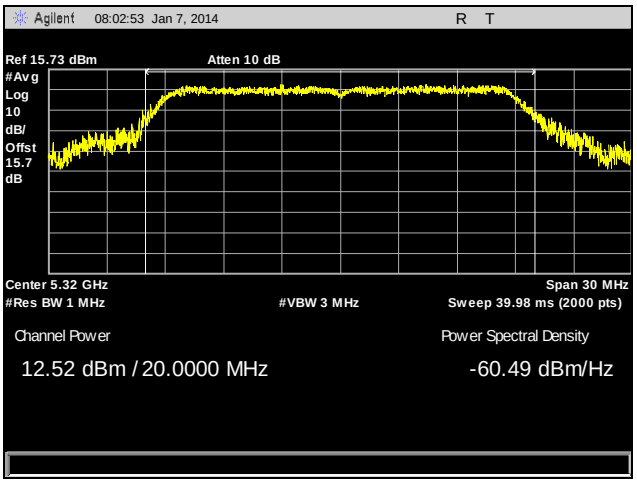
Plot 35. RF Power Output, 5240 MHz, 802.11n 20 MHz, Port B



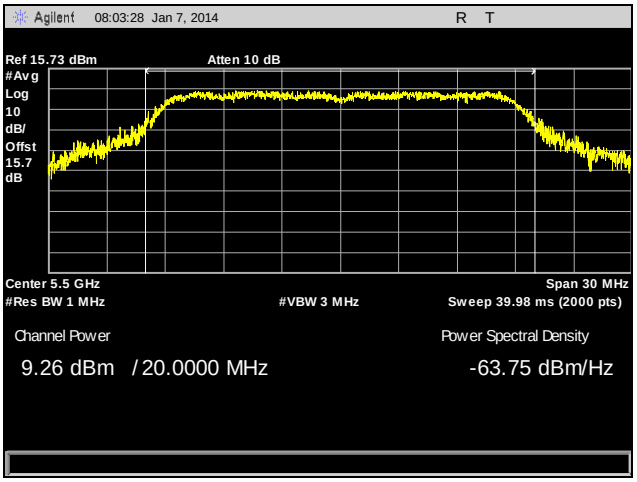
Plot 36. RF Power Output, 5260 MHz, 802.11n 20 MHz, Port B



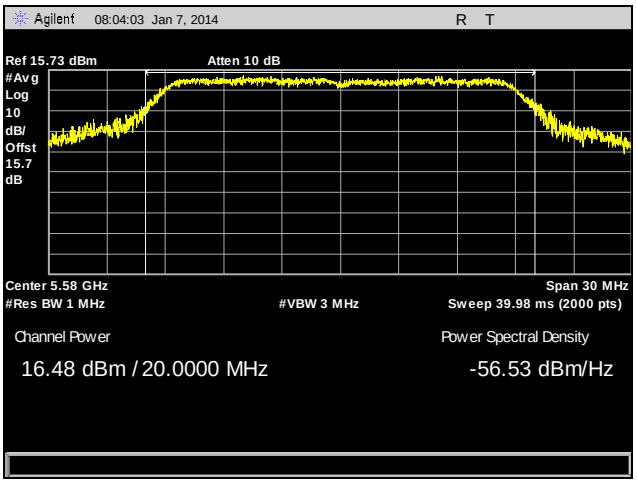
Plot 37. RF Power Output, 5300 MHz, 802.11n 20 MHz, Port B



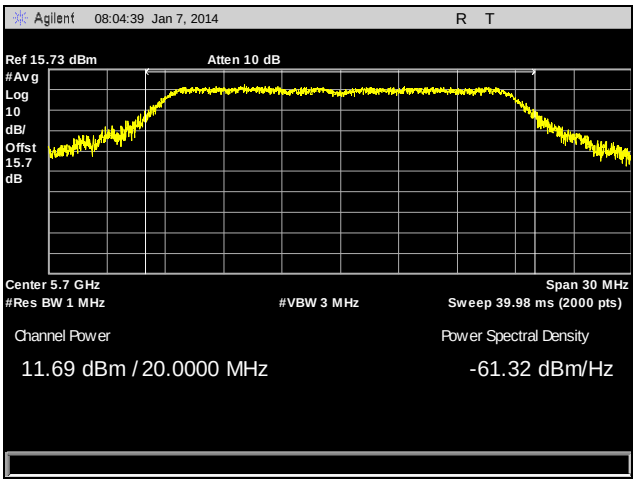
Plot 38. RF Power Output, 5320 MHz, 802.11n 20 MHz, Port B



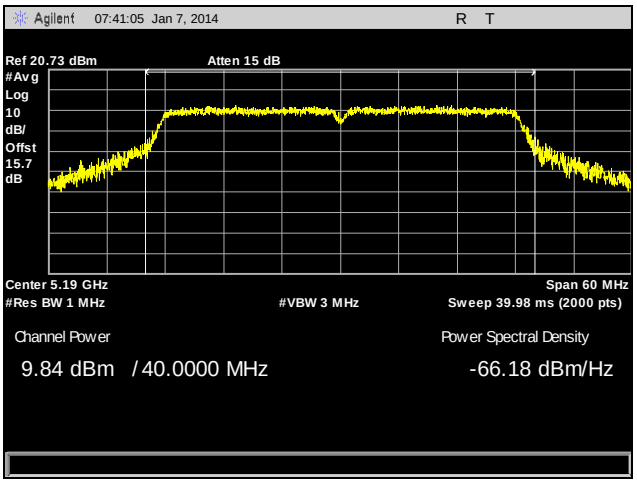
Plot 39. RF Power Output, 5500 MHz, 802.11n 20 MHz, Port B



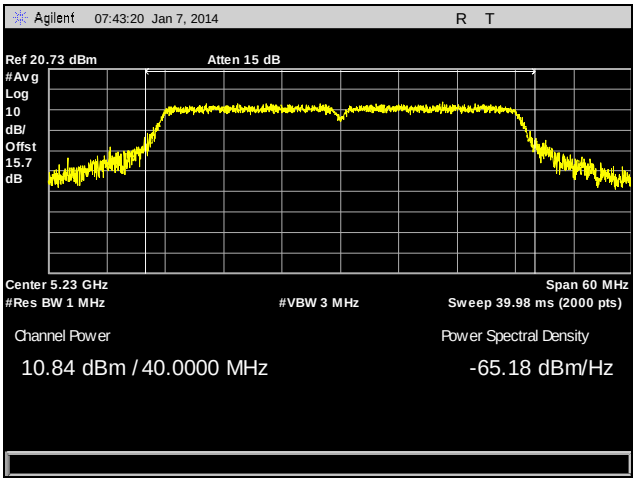
Plot 40. RF Power Output, 5580 MHz, 802.11n 20 MHz, Port B



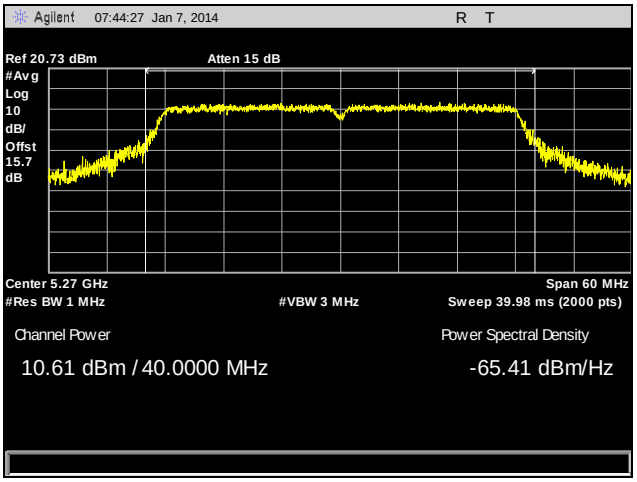
Plot 41. RF Power Output, 5700 MHz, 802.11n 20 MHz, Port B



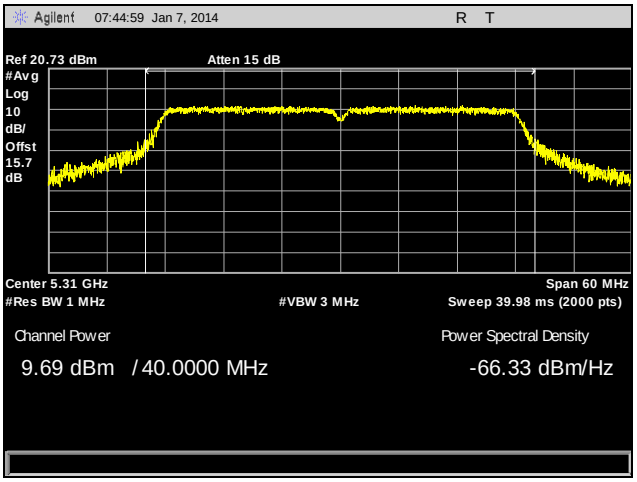
Plot 42. RF Power Output, 5190 MHz, 802.11n 40 MHz, Port A



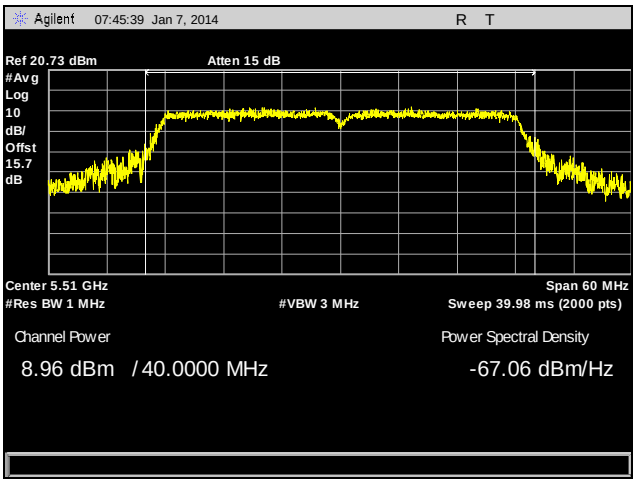
Plot 43. RF Power Output, 5230 MHz, 802.11n 40 MHz, Port A



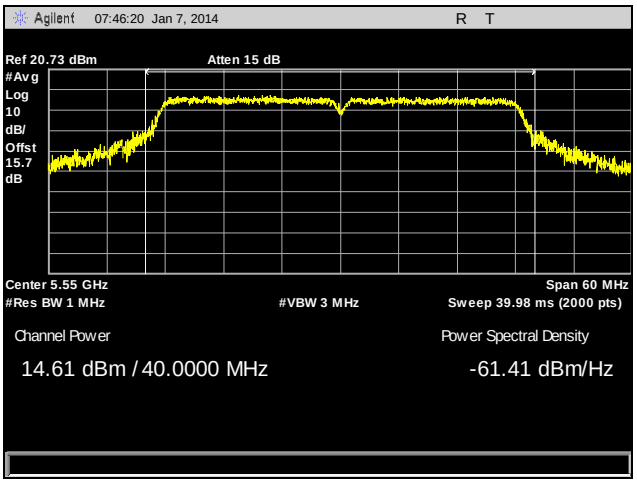
Plot 44. RF Power Output, 5270 MHz, 802.11n 40 MHz, Port A



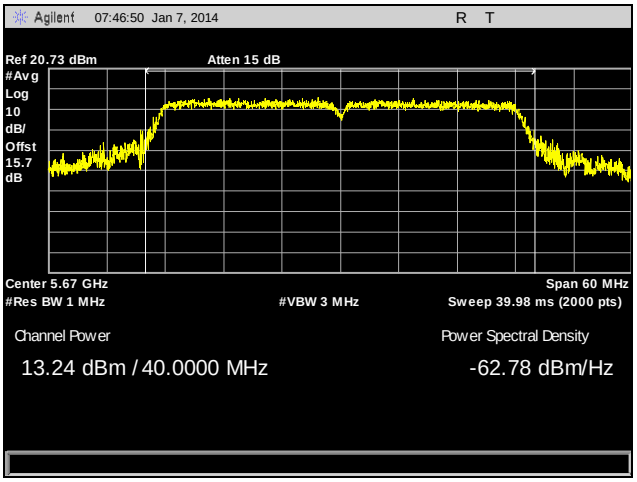
Plot 45. RF Power Output, 5310 MHz, 802.11n 40 MHz, Port A



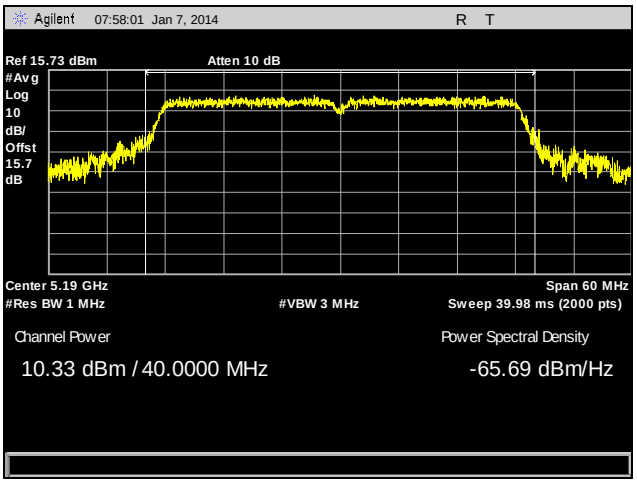
Plot 46. RF Power Output, 5510 MHz, 802.11n 40 MHz, Port A



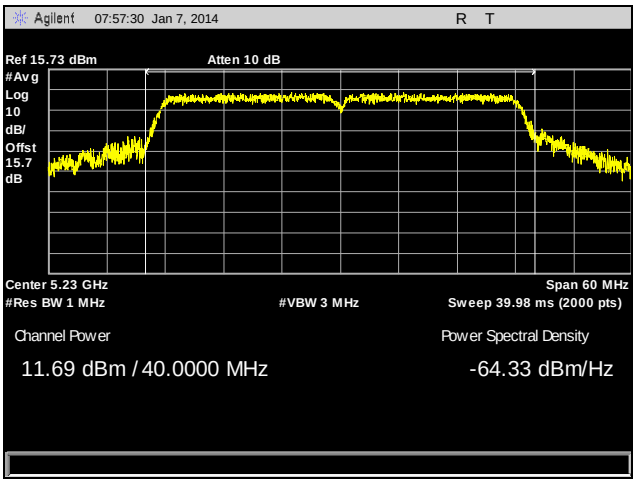
Plot 47. RF Power Output, 5550 MHz, 802.11n 40 MHz, Port A



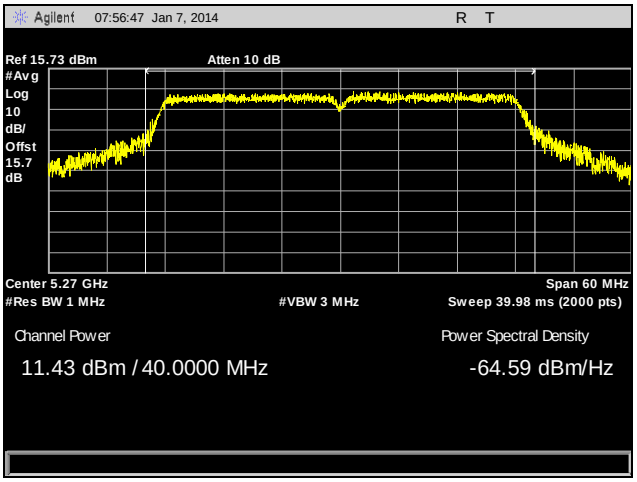
Plot 48. RF Power Output, 5670 MHz, 802.11n 40 MHz, Port A



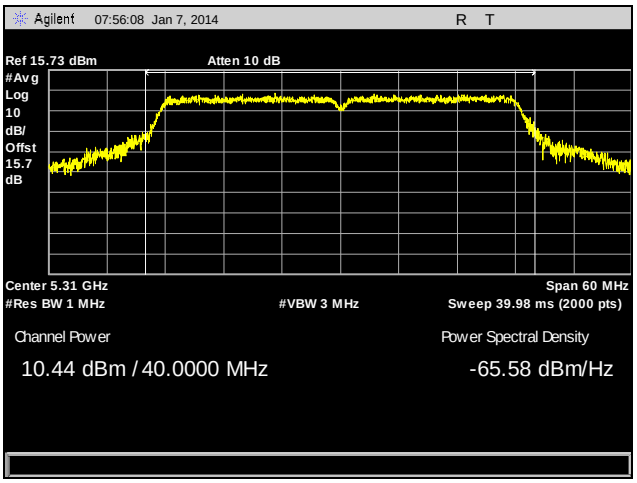
Plot 49. RF Power Output, 5190 MHz, 802.11n 40 MHz, Port B



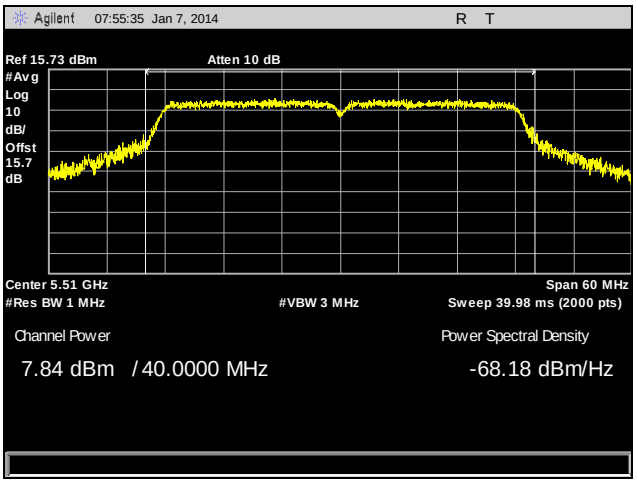
Plot 50. RF Power Output, 5230 MHz, 802.11n 40 MHz, Port B



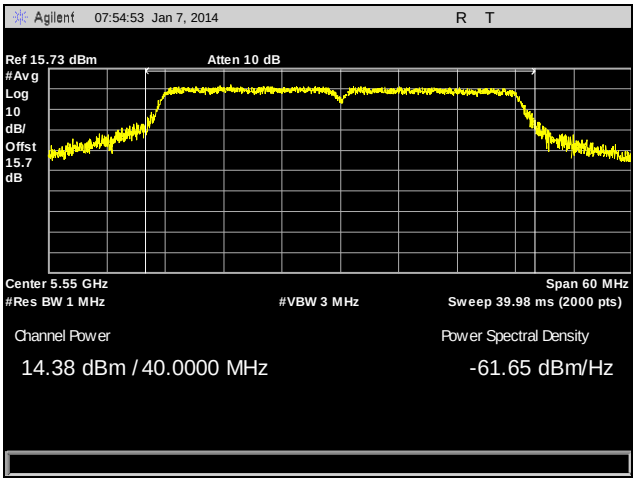
Plot 51. RF Power Output, 5270 MHz, 802.11n 40 MHz, Port B



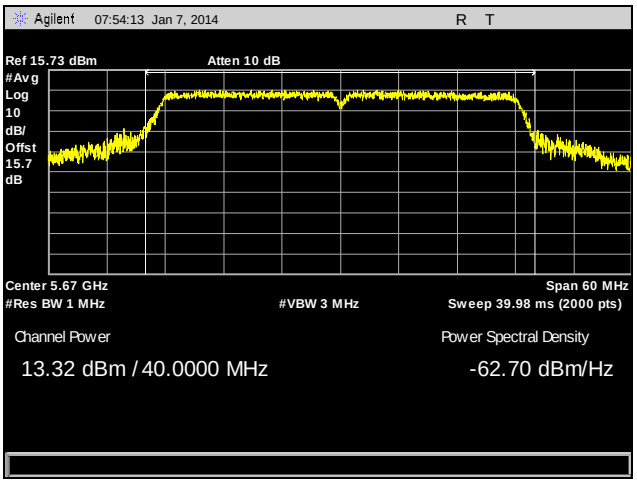
Plot 52. RF Power Output, 5310 MHz, 802.11n 40 MHz, Port B



Plot 53. RF Power Output, 5510 MHz, 802.11n 40 MHz, Port B



Plot 54. RF Power Output, 5550 MHz, 802.11n 40 MHz, Port B



Plot 55. RF Power Output, 5670 MHz, 802.11n 40 MHz, Port B

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(b)(1), (6), (7) Undesirable Emissions

Test Requirements: **§ 15.407(b)(1), (6), (7)**; **§15.205:** Emissions outside the frequency band.

§ 15.407(b)(1): For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

§ 15.407(b)(6): Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

§ 15.407(b)(7): The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Test Procedure: The EUT was placed on a non-conducting 0.8m high stand on a turntable in a semi-anechoic chamber. The EUT was set to transmit on low, mid, and high channels, while the turntable was rotated 360 degrees through three orthogonal axes and the receiving antenna height was varied to maximize emissions.

For frequencies from 30MHz to 1GHz, measurements were first made using a peak detector with a 100kHz resolution bandwidth. Emissions which exceeded the limits were re-measured using a quasi-peak detector with a 120kHz resolution bandwidth.

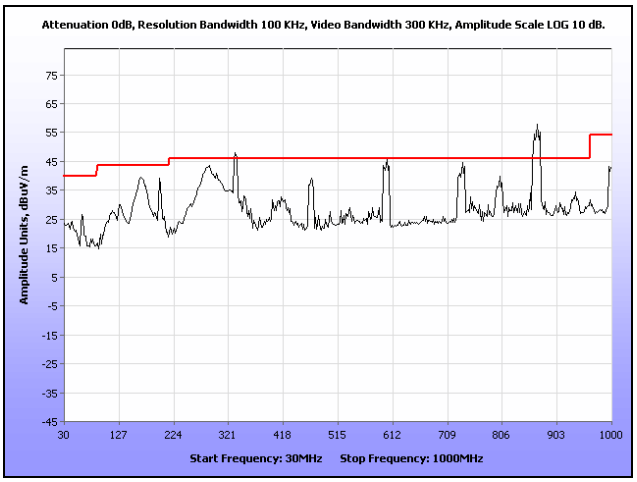
For measurements above 1 GHz, measurements were made with a Peak detector with 1 MHz resolution bandwidth. Where the spurious emissions fell into a restricted band, measurements were also made with an average detector to make sure they complied with 15.209 limits. Emissions were explored up to 40 GHz.
The equation, **EIRP= E + 20 log D – 104.8** was used to convert an EIRP limit to a field strength limit.
E = field strength (dBUv/m)
D = Reference measurement distance

Test Results: The EUT was compliant with the Radiated Emission limits for Intentional Radiators. See following pages for detailed test results. No emissions were found above 18GHz therefore only mid channels were reported above 18GHz.

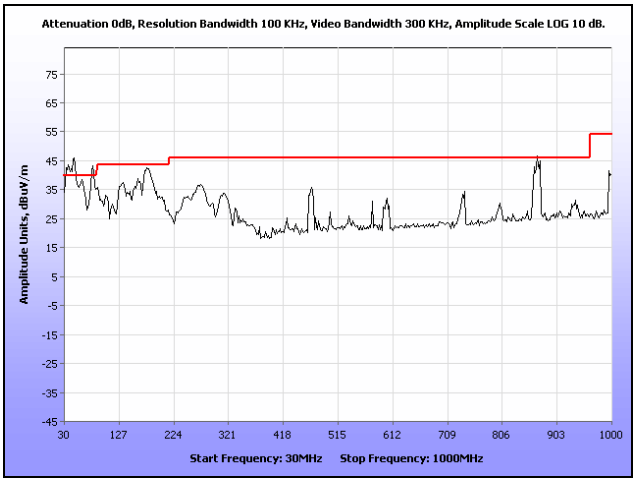
Test Engineer(s): Shawn McMillen

Test Date(s): 01/08/14

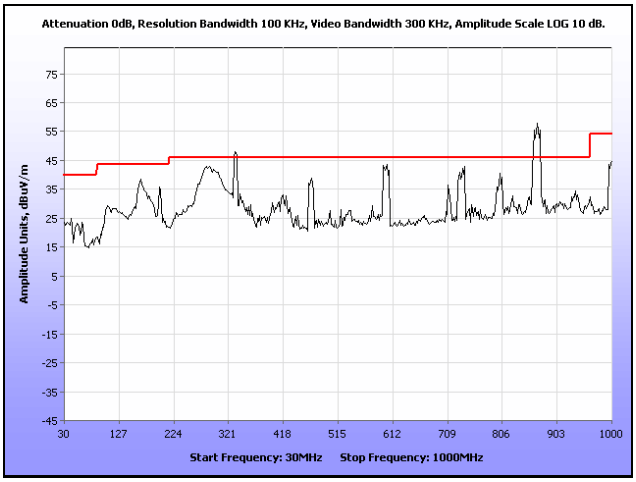
Radiated Spurious Emissions Test Results – Internal Antenna, UNII 1



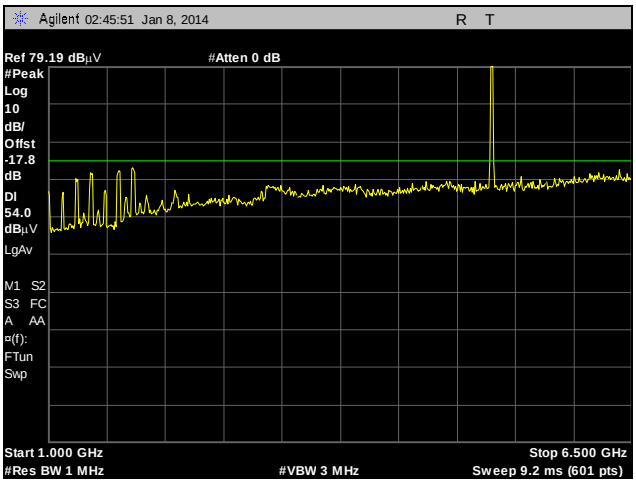
Plot 56. Radiated Spurious Emissions, Internal Antenna, Digital Pre-Scan, Radio Off, Horizontal



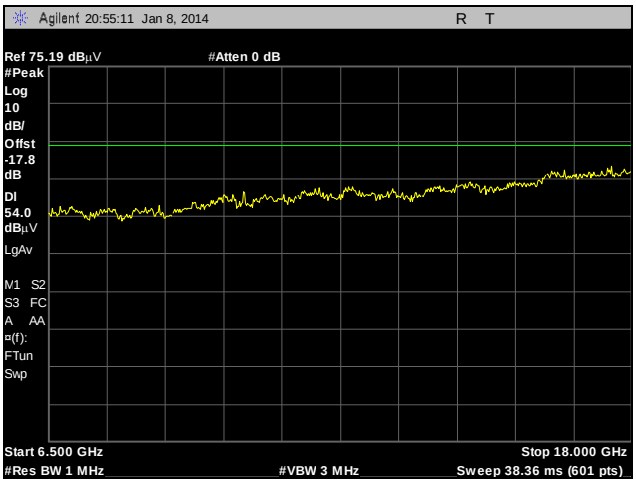
Plot 57. Radiated Spurious Emissions, Internal Antenna, Digital Pre-Scan, Radio Off, Vertical



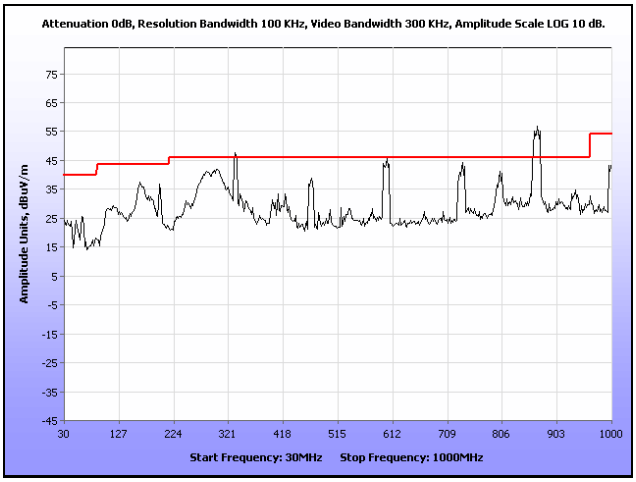
Plot 58. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5180 MHz, 30 MHz – 1 GHz



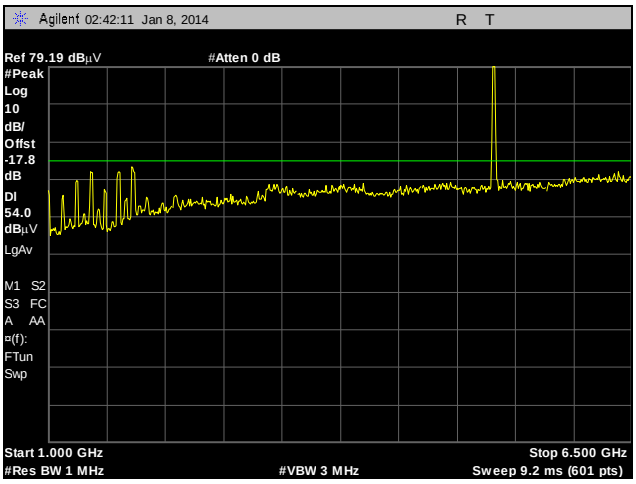
Plot 59. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5180 MHz, 1 GHz – 6.5 GHz, Peak under Average



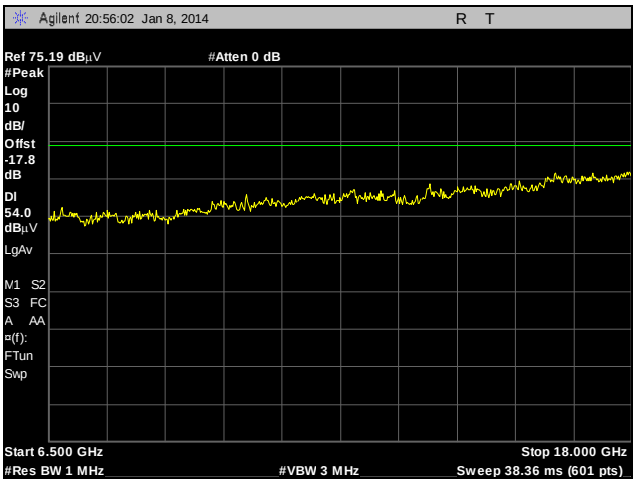
Plot 60. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5180 MHz, 6.5 GHz – 18 GHz, Peak under Average



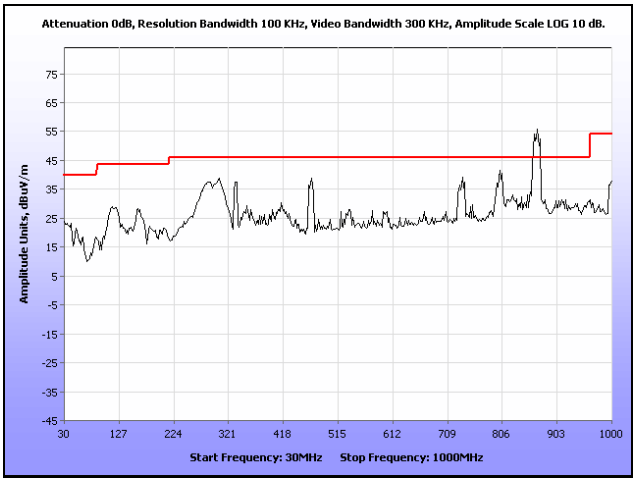
Plot 61. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5200 MHz, 30 MHz – 1 GHz



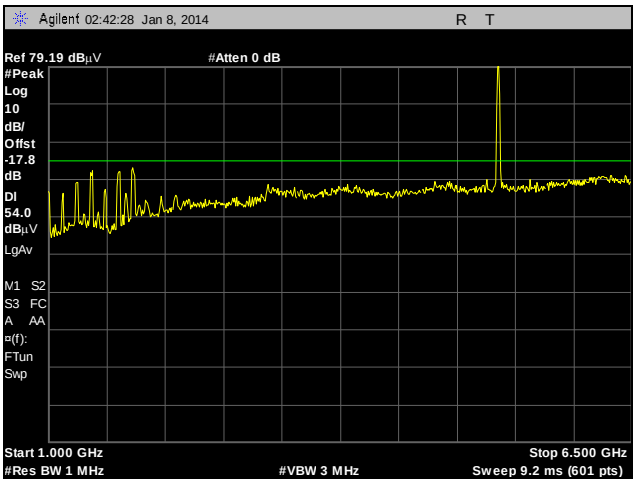
Plot 62. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5200 MHz, 1 GHz – 6.5 GHz, Peak under Average



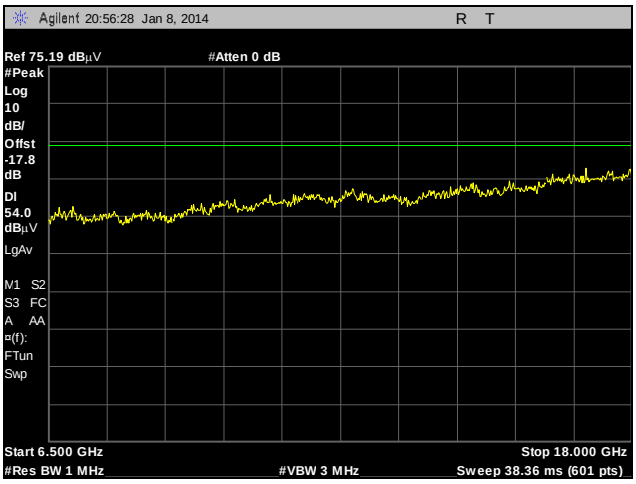
Plot 63. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5200 MHz, 6.5 GHz – 18 GHz, Peak under Average



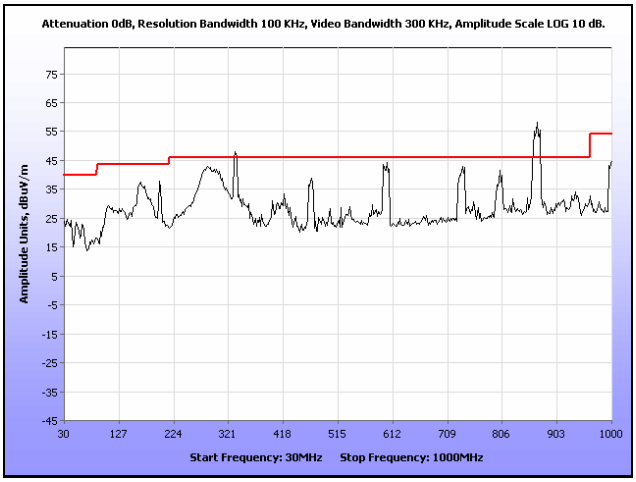
Plot 64. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5240 MHz, 30 MHz – 1 GHz



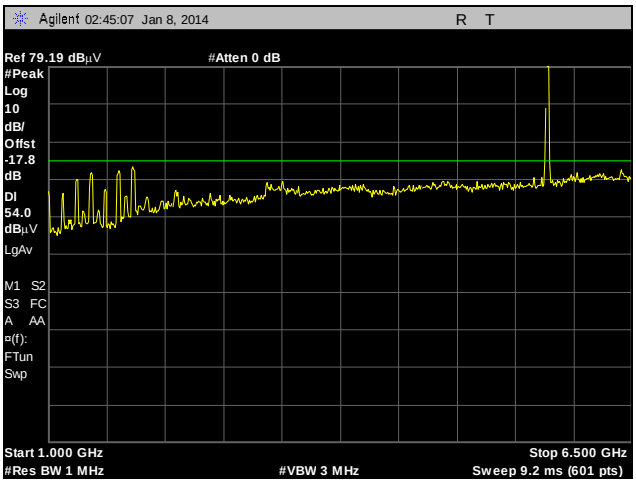
Plot 65. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5240 MHz, 1 GHz – 6.5 GHz, Peak under Average



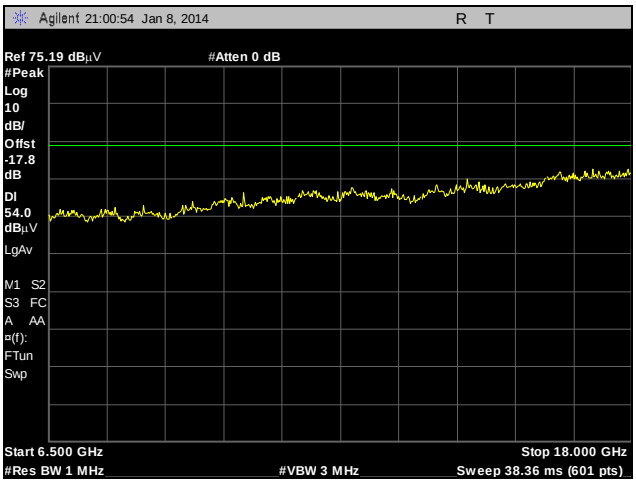
Plot 66. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5240 MHz, 6.5 GHz – 18 GHz, Peak under Average



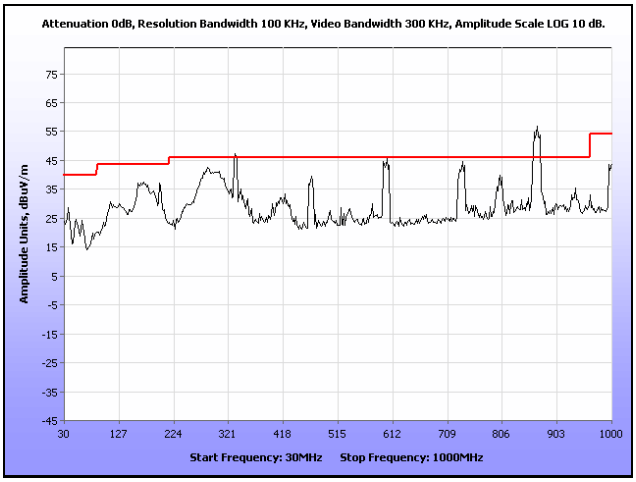
Plot 67. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5180 MHz, 30 MHz – 1 GHz



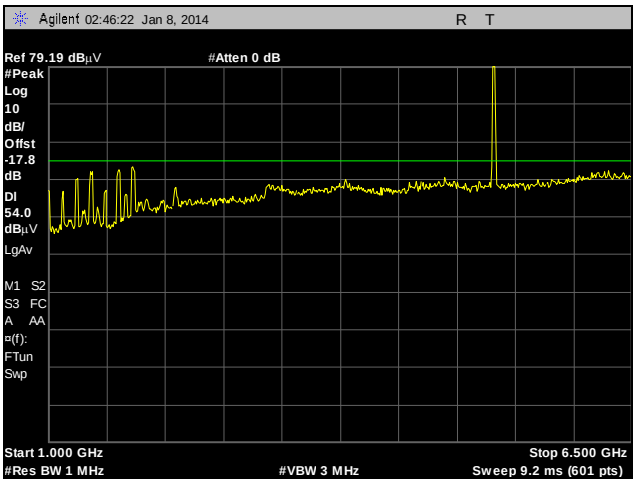
Plot 68. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5180 MHz, 1 GHz – 6.5 GHz, Peak under Average



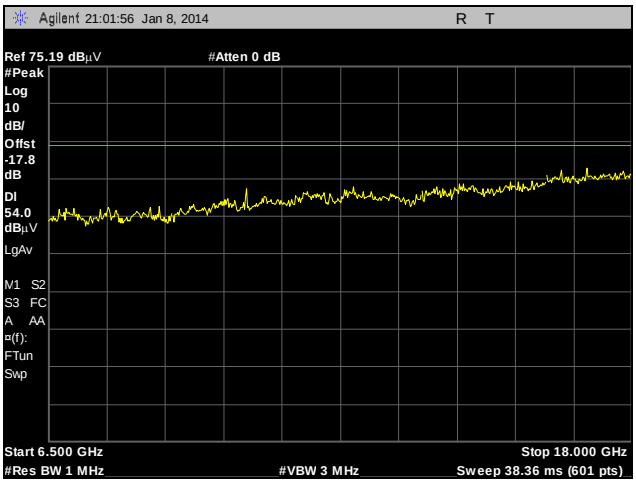
Plot 69. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5180 MHz, 6.5 GHz – 18 GHz, Peak under Average



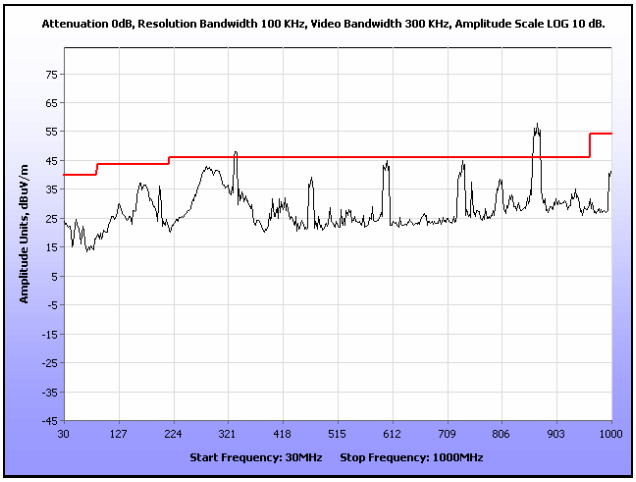
Plot 70. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5200 MHz, 30 MHz – 1 GHz



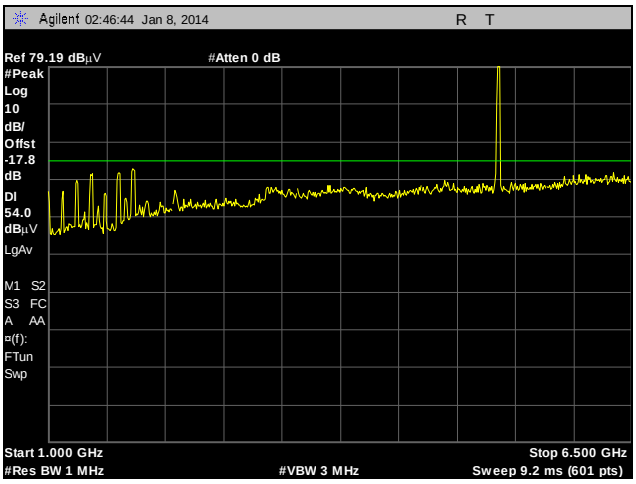
Plot 71. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5200MHz, 1 GHz – 6.5 GHz, Peak under Average



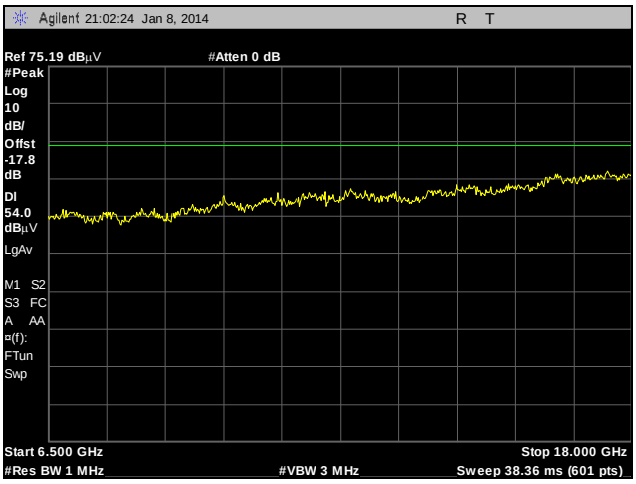
Plot 72. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5200 MHz, 6.5 GHz – 18 GHz, Peak under Average



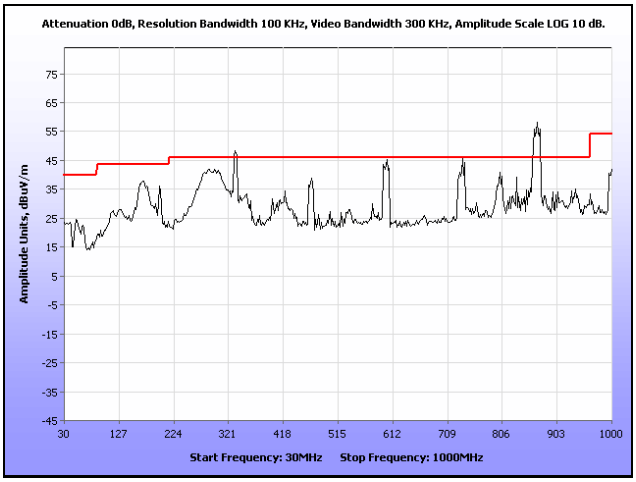
Plot 73. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5240 MHz, 30 MHz – 1 GHz



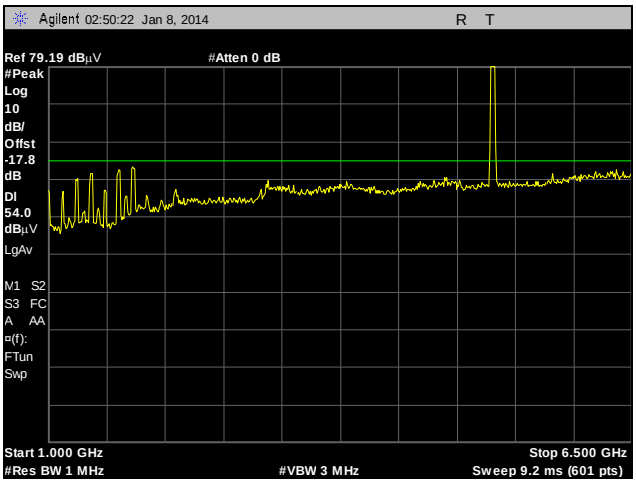
Plot 74. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5240 MHz, 1 GHz – 6.5 GHz, Peak under Average



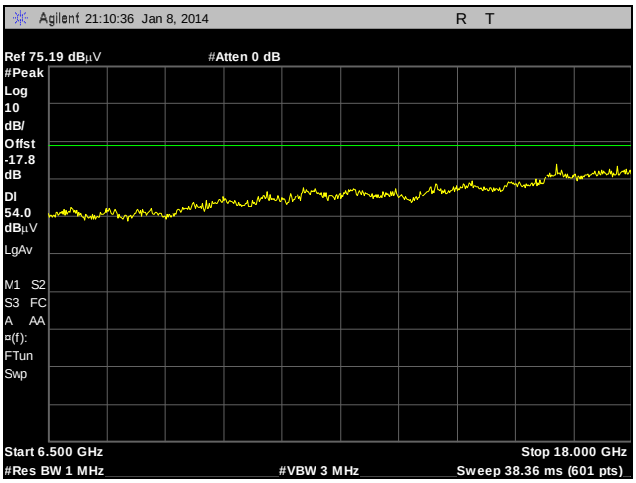
Plot 75. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5240 MHz, 6.5 GHz – 18 GHz, Peak under Average



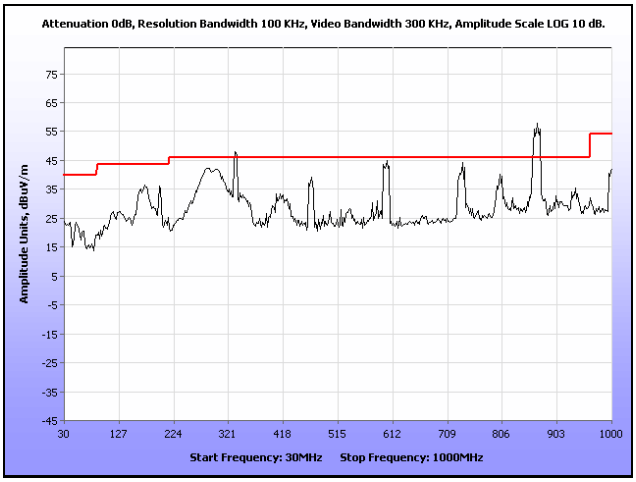
Plot 76. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5190 MHz, 30 MHz – 1 GHz



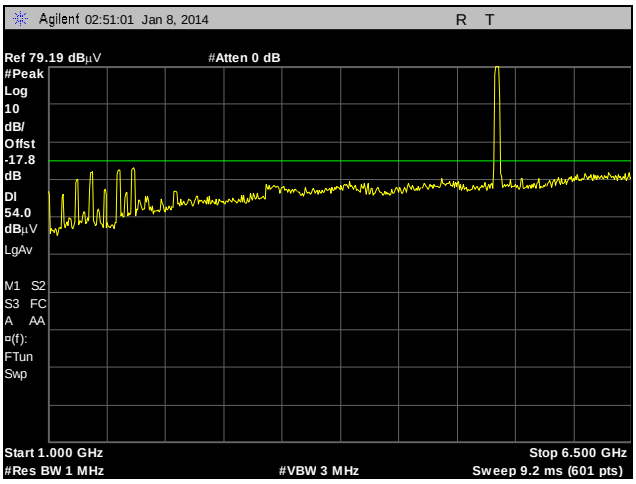
Plot 77. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5190 MHz, 1 GHz – 6.5 GHz, Peak under Average



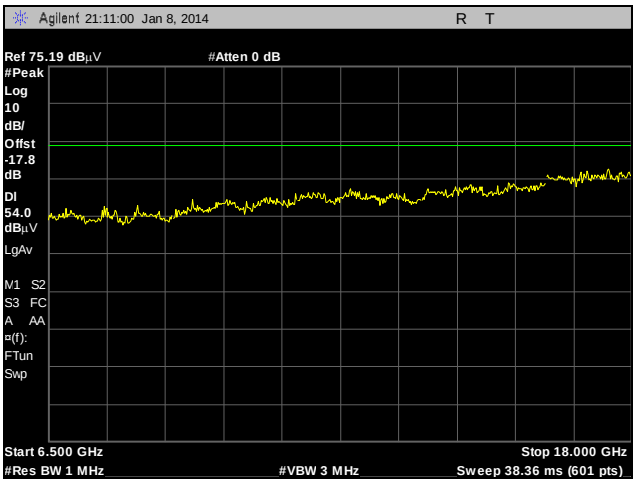
Plot 78. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5190 MHz, 6.5 GHz – 18 GHz, Peak under Average



Plot 79. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5230 MHz, 30 MHz – 1 GHz

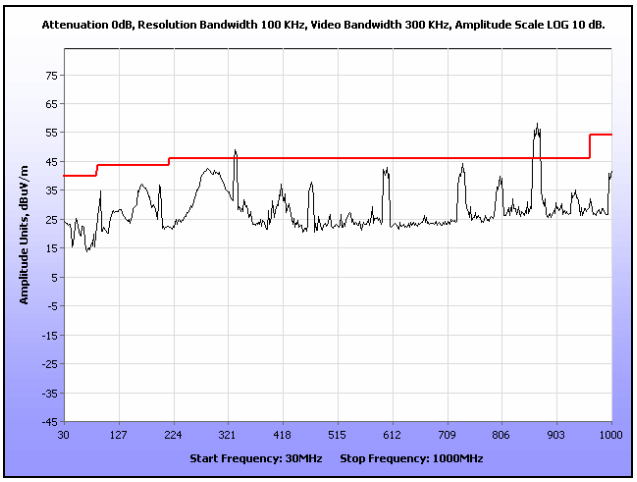


Plot 80. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5230 MHz, 1 GHz – 6.5 GHz, Peak under Average

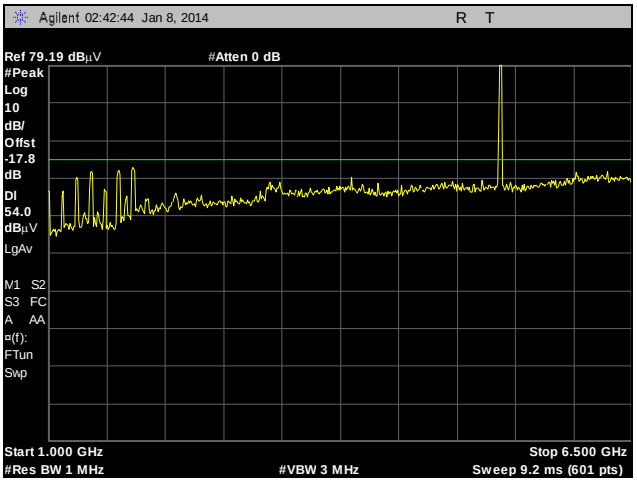


Plot 81. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5230 MHz, 6.5 GHz – 18 GHz, Peak under Average

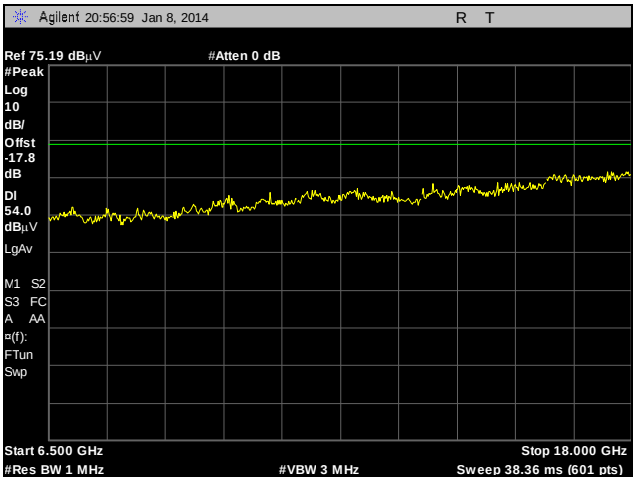
Radiated Spurious Emissions Test Results – Internal Antenna, Lower UNII 2



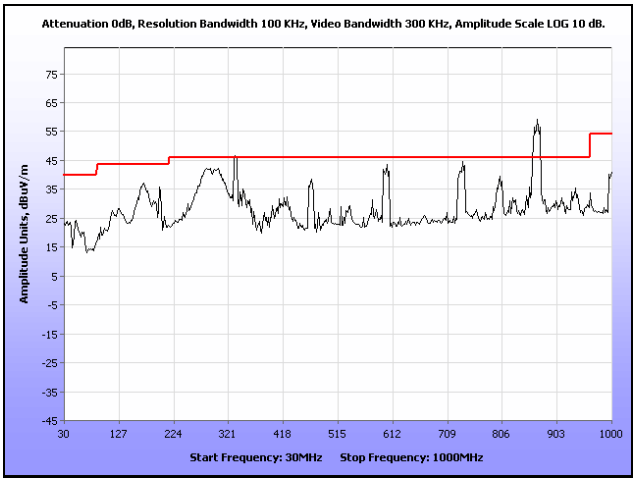
Plot 82. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5260 MHz, 30 MHz – 1 GHz



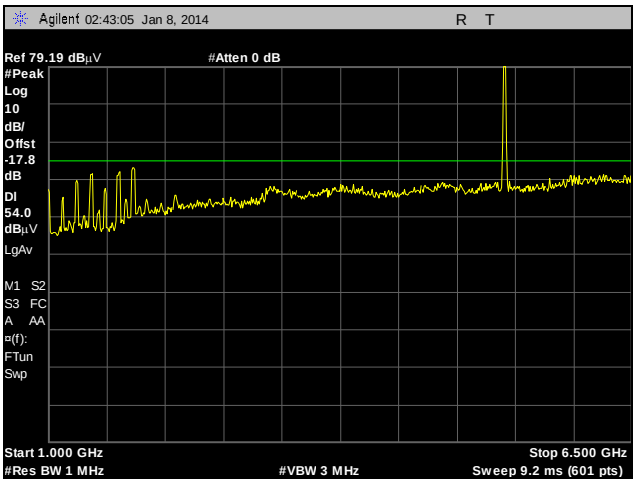
Plot 83. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5260 MHz, 1 GHz – 6.5 GHz, Peak under Average



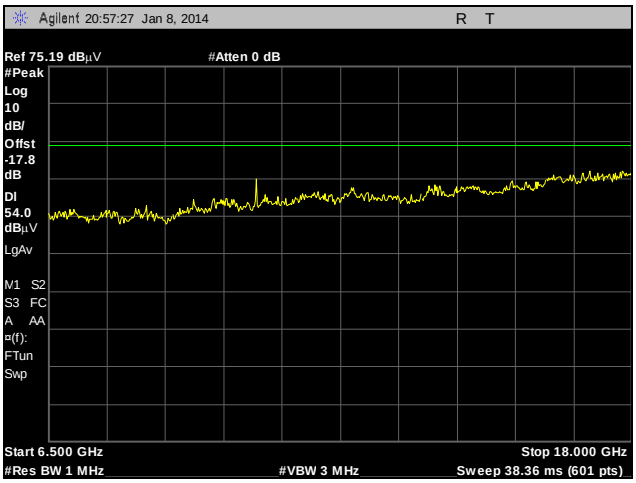
Plot 84. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5260 MHz, 6.5 GHz – 18 GHz, Peak under Average



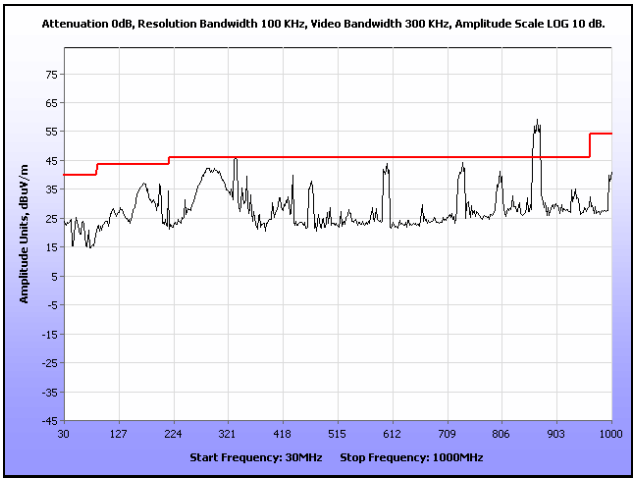
Plot 85. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5300 MHz, 30 MHz – 1 GHz



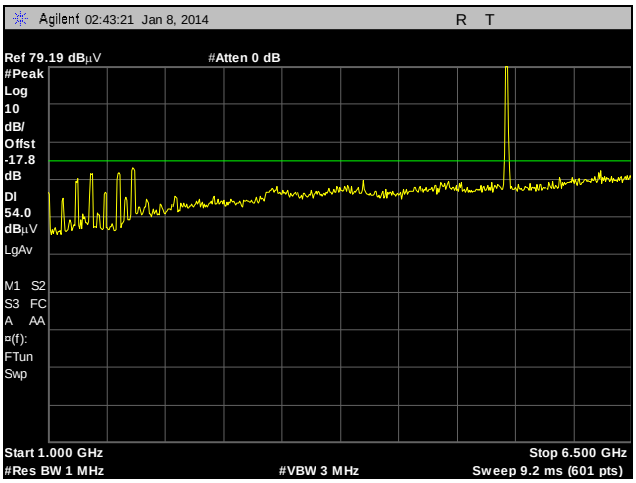
Plot 86. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5300 MHz, 1 GHz – 6.5 GHz, Peak under Average



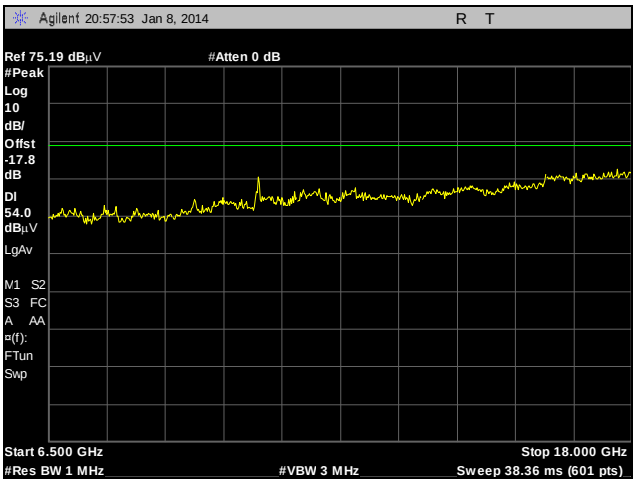
Plot 87. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5300 MHz, 6.5 GHz – 18 GHz, Peak under Average



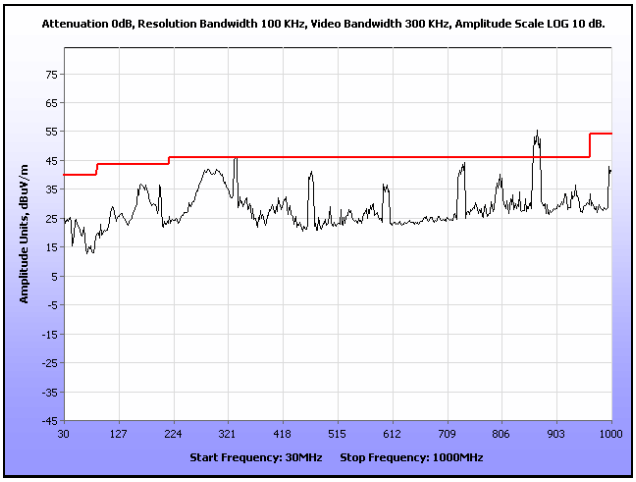
Plot 88. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5320 MHz, 30 MHz – 1 GHz



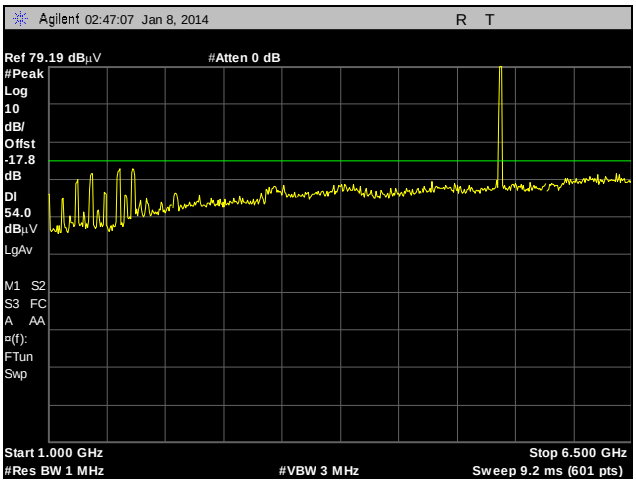
Plot 89. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5320 MHz, 1 GHz – 6.5 GHz, Peak under Average



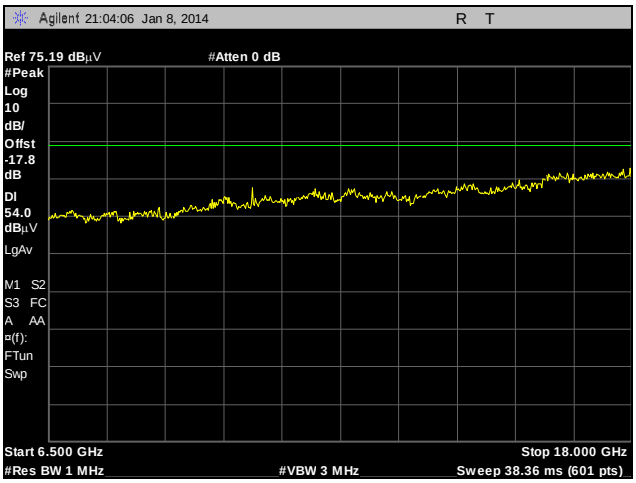
Plot 90. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5320 MHz, 6.5 GHz – 18 GHz, Peak under Average



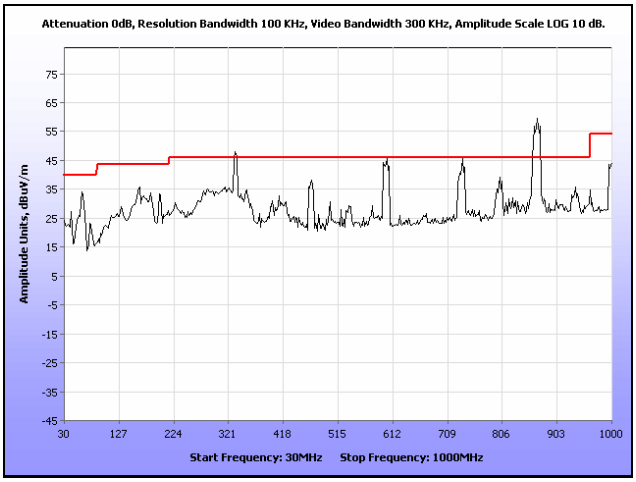
Plot 91. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5260 MHz, 30 MHz – 1 GHz



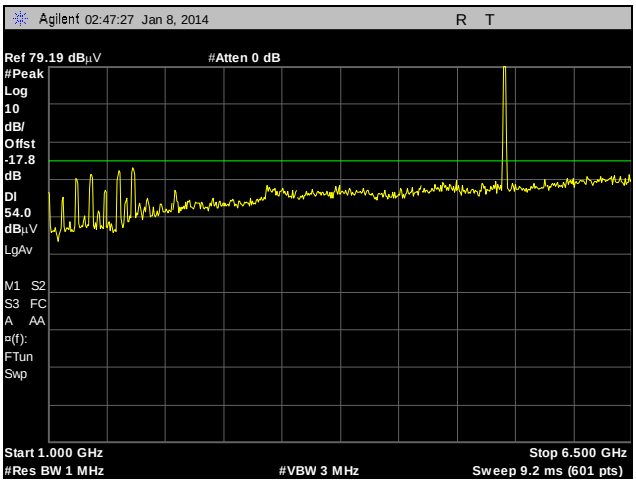
Plot 92. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5260 MHz, 1 GHz – 6.5 GHz, Peak under Average



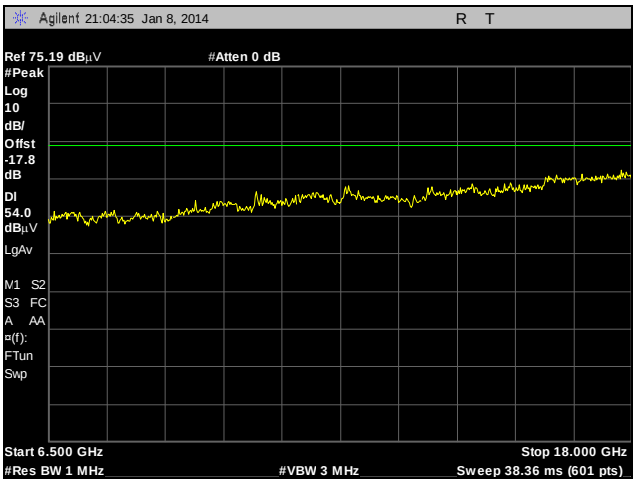
Plot 93. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5260 MHz, 6.5 GHz – 18 GHz, Peak under Average



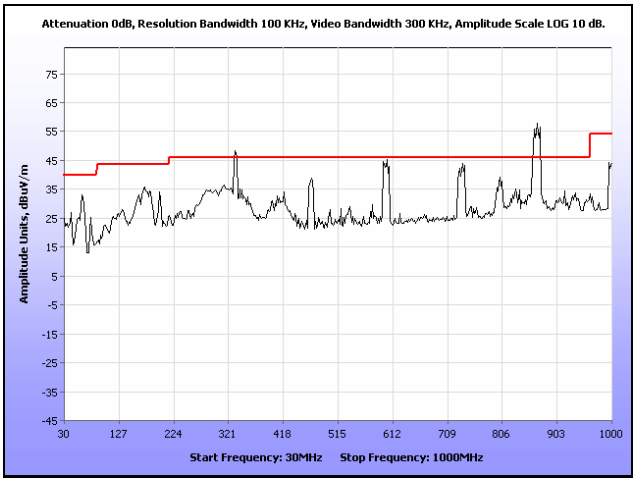
Plot 94. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5300 MHz, 30 MHz – 1 GHz



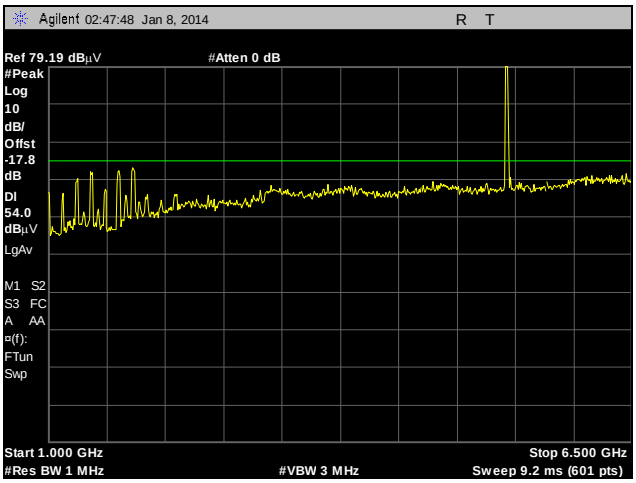
Plot 95. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5300MHz, 1 GHz – 6.5 GHz, Peak under Average



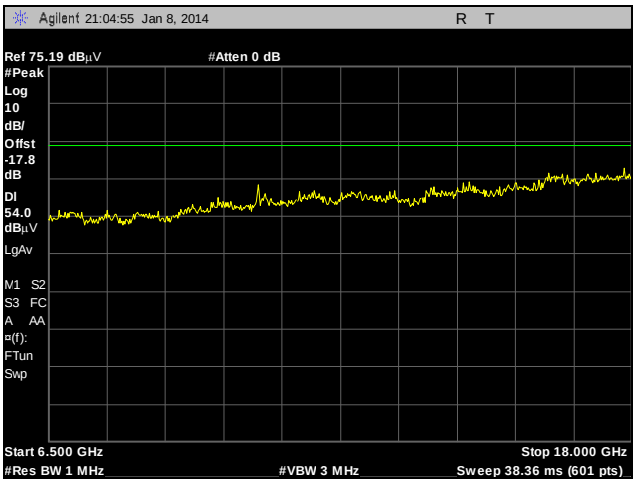
Plot 96. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5300 MHz, 6.5 GHz – 18 GHz, Peak under Average



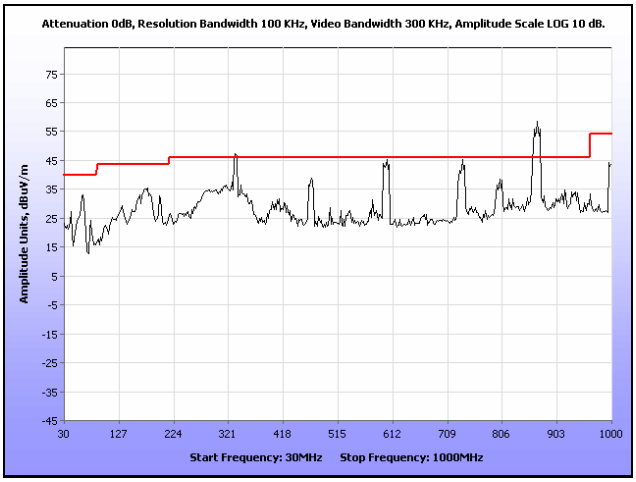
Plot 97. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5320 MHz, 30 MHz – 1 GHz



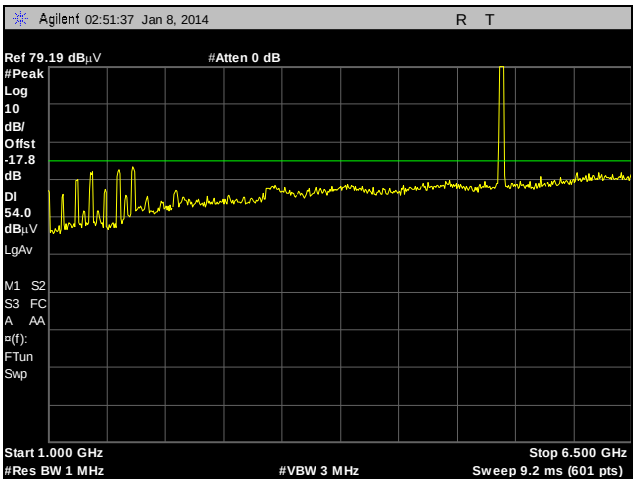
Plot 98. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5320 MHz, 1 GHz – 6.5 GHz, Peak under Average



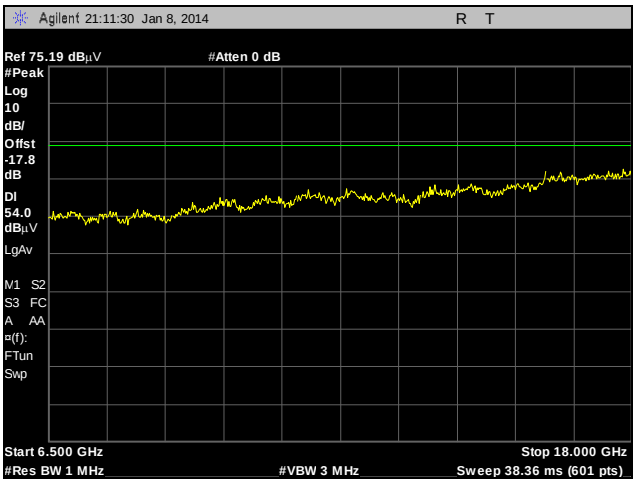
Plot 99. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5320 MHz, 6.5 GHz – 18 GHz, Peak under Average



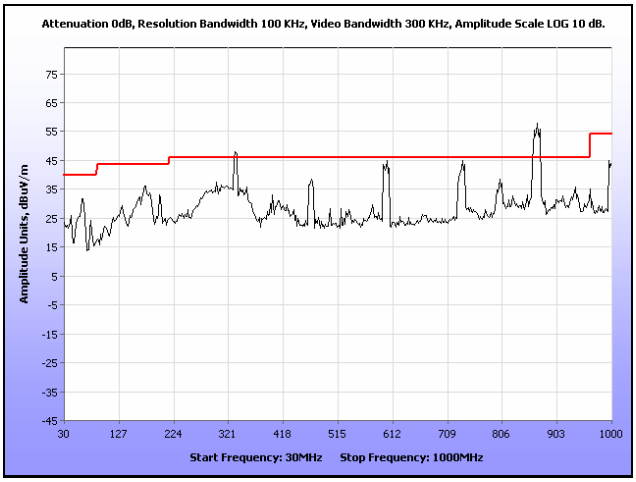
Plot 100. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5270 MHz, 30 MHz – 1 GHz



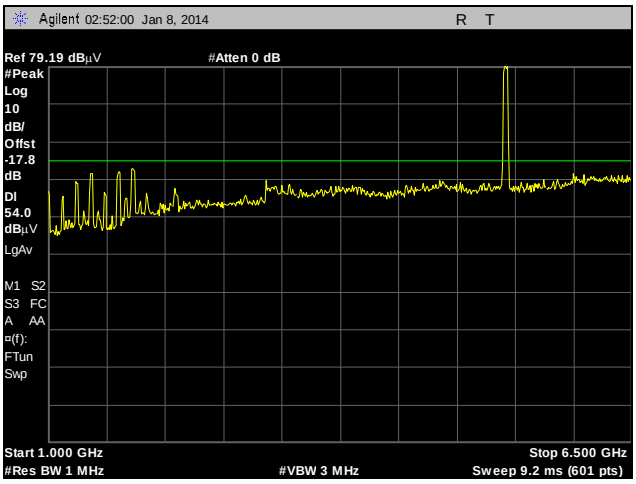
Plot 101. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5270 MHz, 1 GHz – 6.5 GHz, Peak under Average



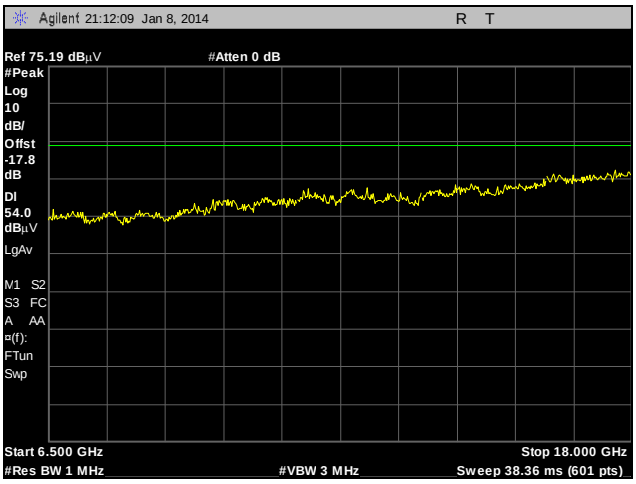
Plot 102. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5270 MHz, 6.5 GHz – 18 GHz, Peak under Average



Plot 103. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5310 MHz, 30 MHz – 1 GHz

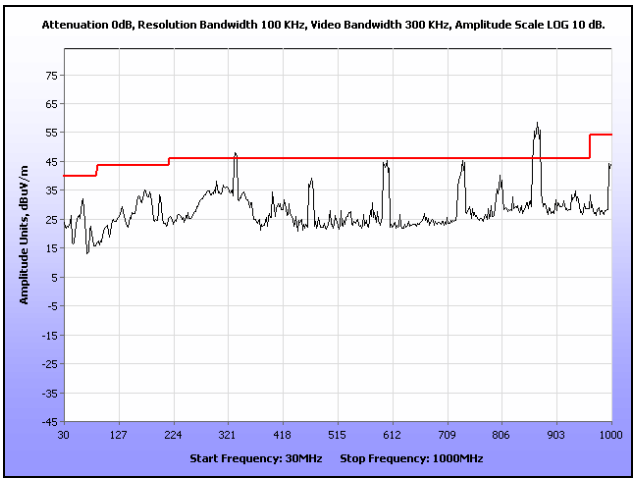


Plot 104. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5310 MHz, 1 GHz – 6.5 GHz, Peak under Average

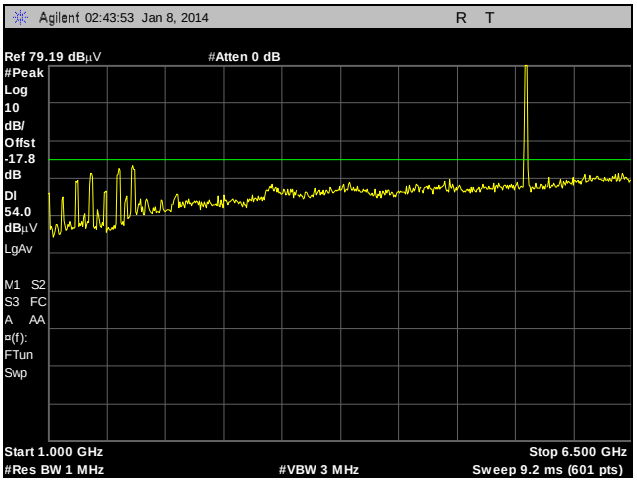


Plot 105. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5310 MHz, 6.5 GHz – 18 GHz, Peak under Average

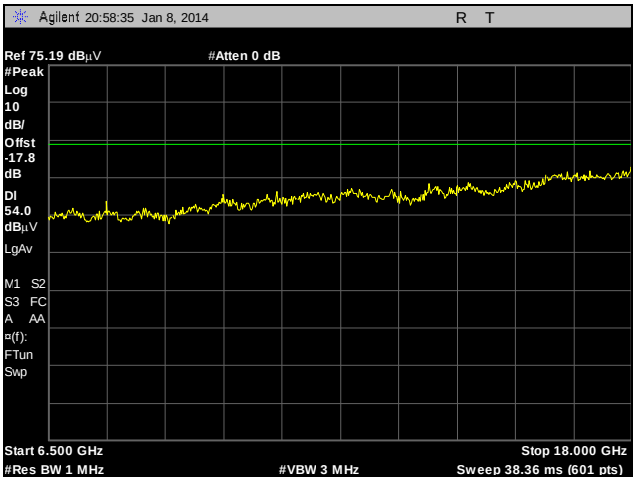
Radiated Spurious Emissions Test Results – Internal Antenna, Upper UNII 2



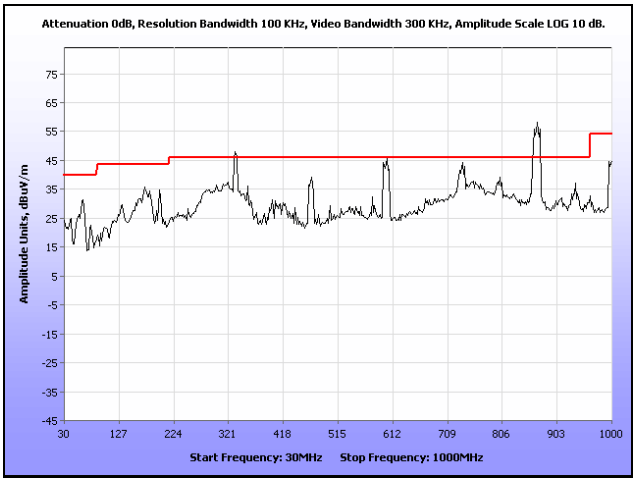
Plot 106. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5500 MHz, 30 MHz – 1 GHz



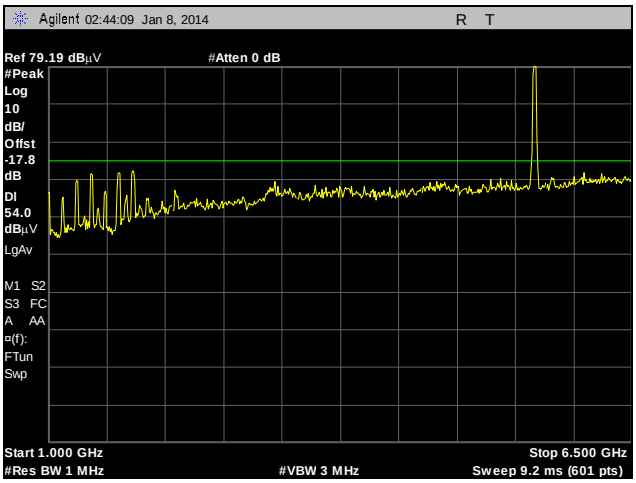
Plot 107. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5500 MHz, 1 GHz – 6.5 GHz, Peak under Average



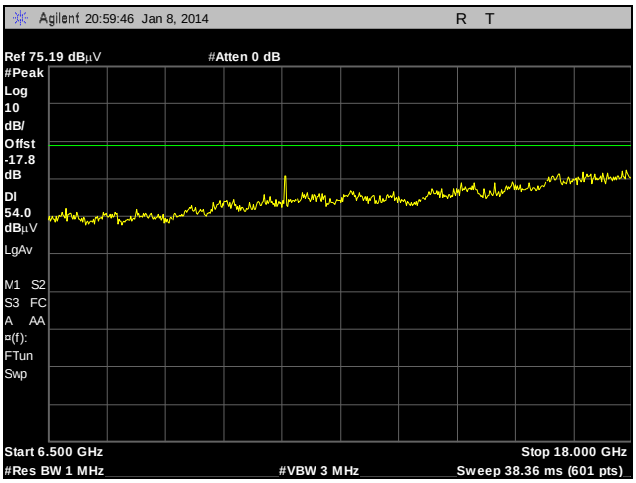
Plot 108. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5500 MHz, 6.5 GHz – 18 GHz, Peak under Average



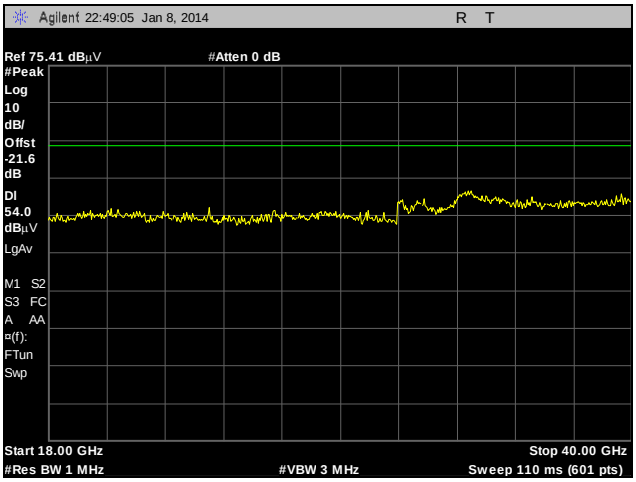
Plot 109. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5580 MHz, 30 MHz – 1 GHz



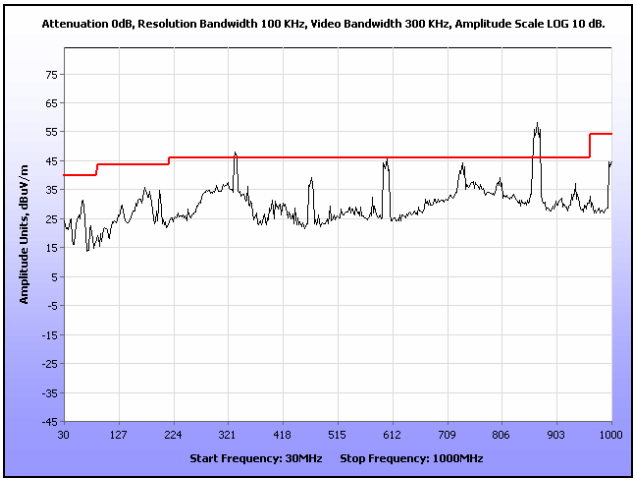
Plot 110. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5580 MHz, 1 GHz – 6.5 GHz, Peak under Average



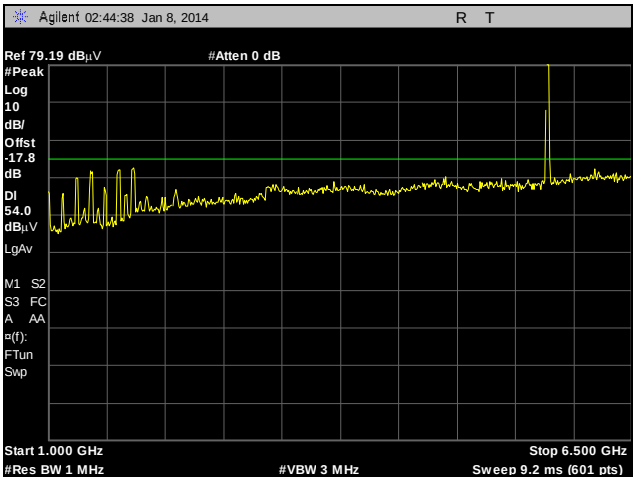
Plot 111. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5580 MHz, 6.5 GHz – 18 GHz, Peak under Average



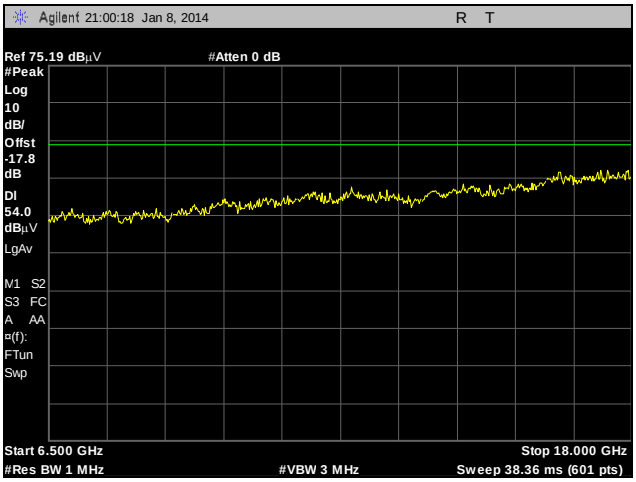
Plot 112. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5580 MHz, 6.5 GHz – 18 GHz, Peak under Average



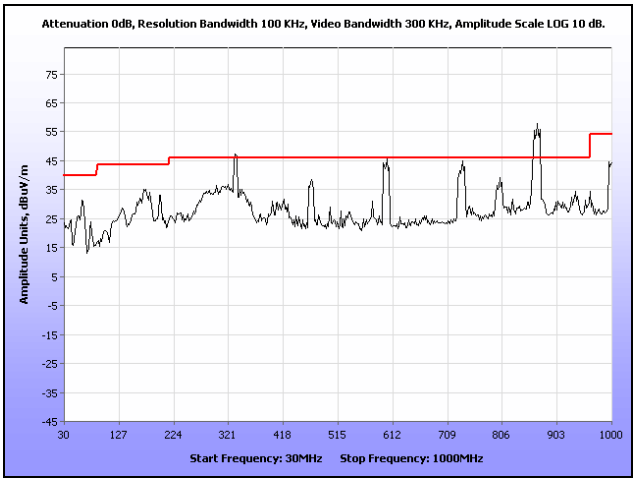
Plot 113. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5700 MHz, 30 MHz – 1 GHz



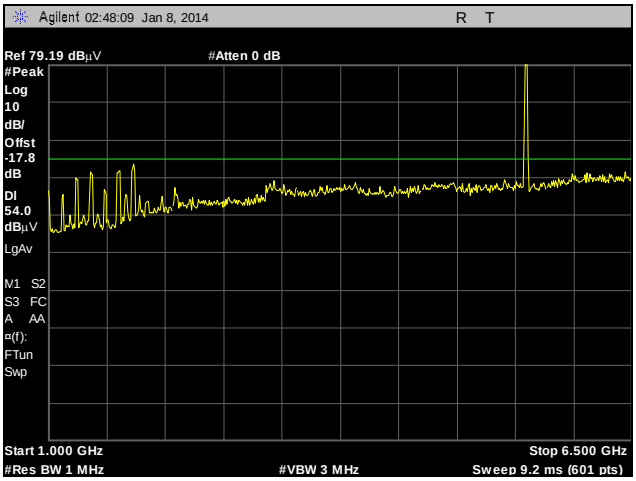
Plot 114. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5700 MHz, 1 GHz – 6.5 GHz, Peak under Average



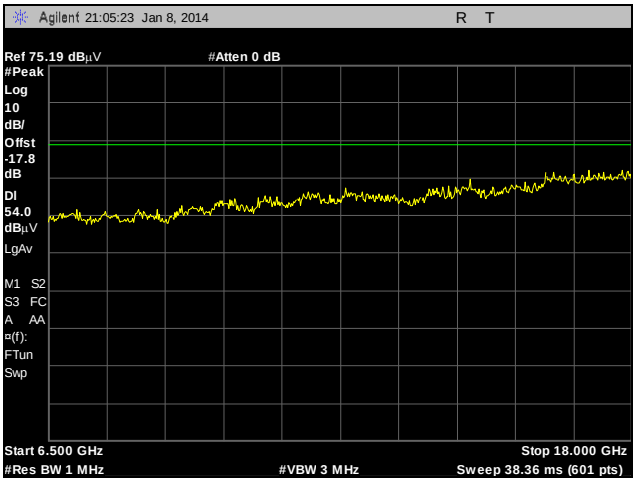
Plot 115. Radiated Spurious Emissions, Internal Antenna, 802.11a, 5700 MHz, 6.5 GHz – 18 GHz, Peak under Average



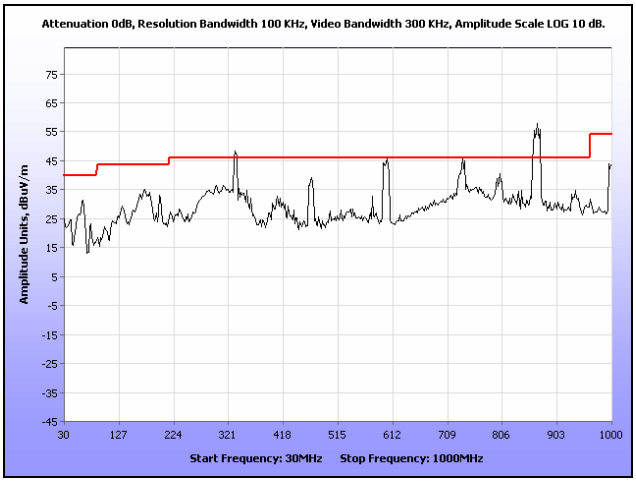
Plot 116. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5500 MHz, 30 MHz – 1 GHz



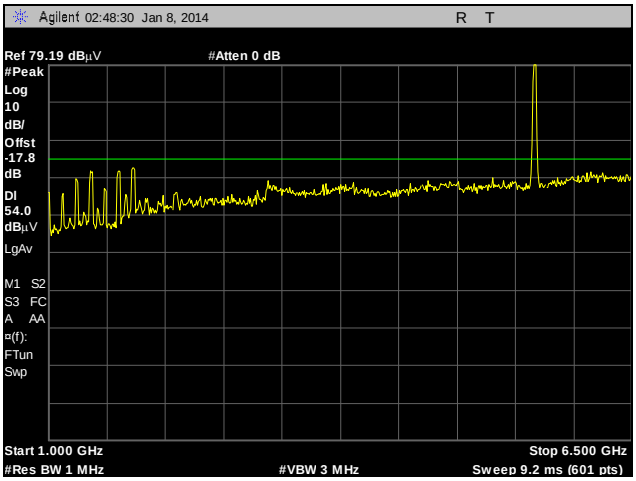
Plot 117. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5500 MHz, 1 GHz – 6.5 GHz, Peak under Average



Plot 118. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5500 MHz, 6.5 GHz – 18 GHz, Peak under Average

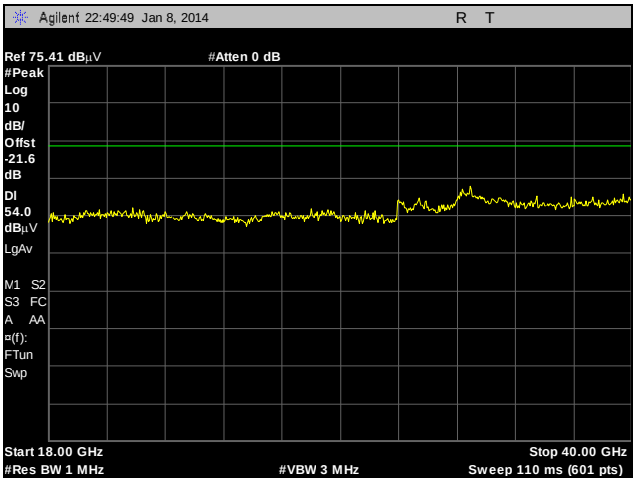


Plot 119. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5580 MHz, 30 MHz – 1 GHz

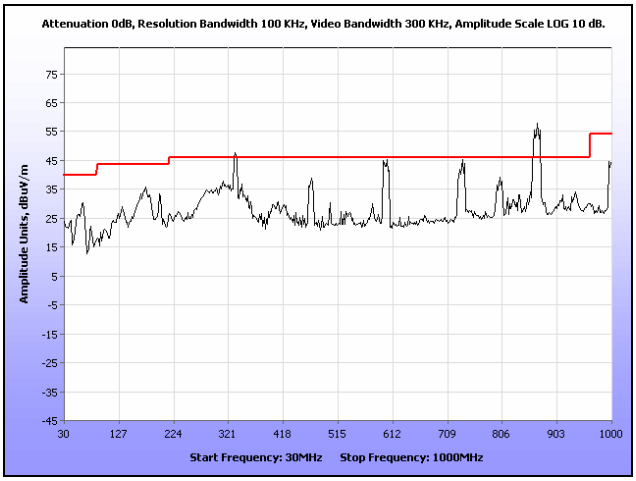


Plot 120. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5580MHz, 1 GHz – 6.5 GHz, Peak under Average

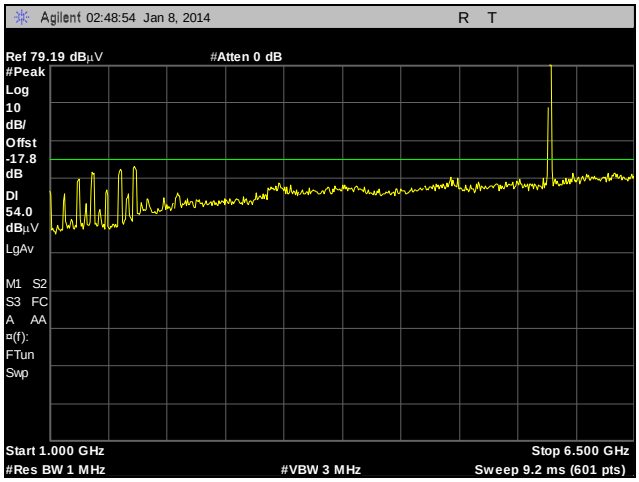
Plot 121. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5580 MHz, 6.5 GHz – 18 GHz, Peak under Average



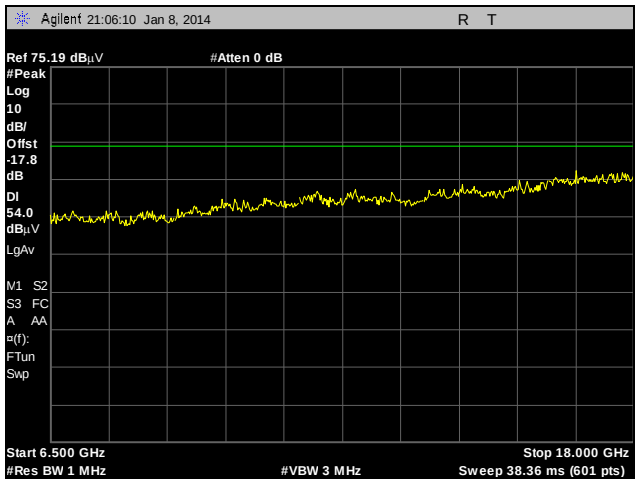
Plot 122. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5580 MHz, 18 GHz – 40GHz, Peak under Average



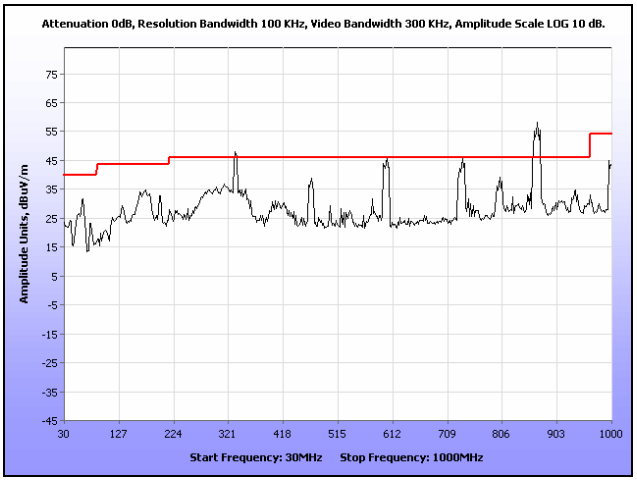
Plot 123. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5700 MHz, 30 MHz – 1 GHz



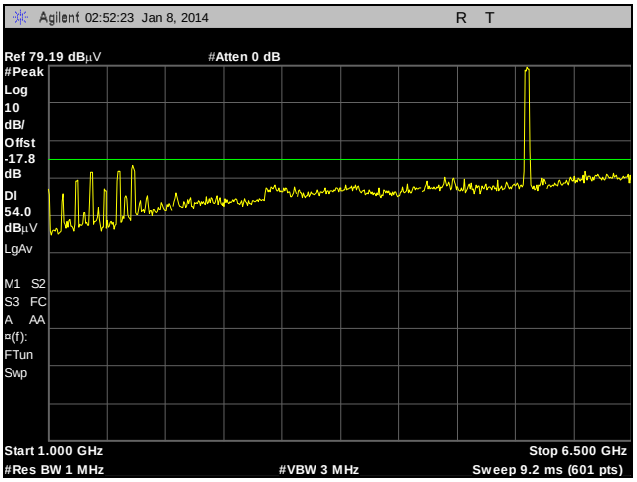
Plot 124. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5700 MHz, 1 GHz – 6.5 GHz, Peak under Average



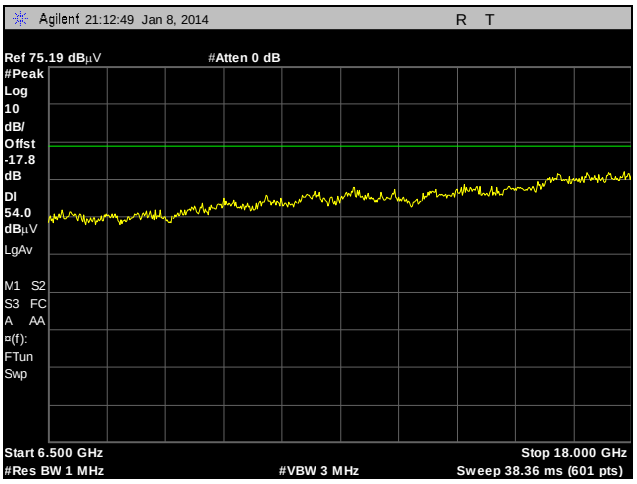
Plot 125. Radiated Spurious Emissions, Internal Antenna, 802.11n 20 MHz, 5700 MHz, 6.5 GHz – 18 GHz, Peak under Average



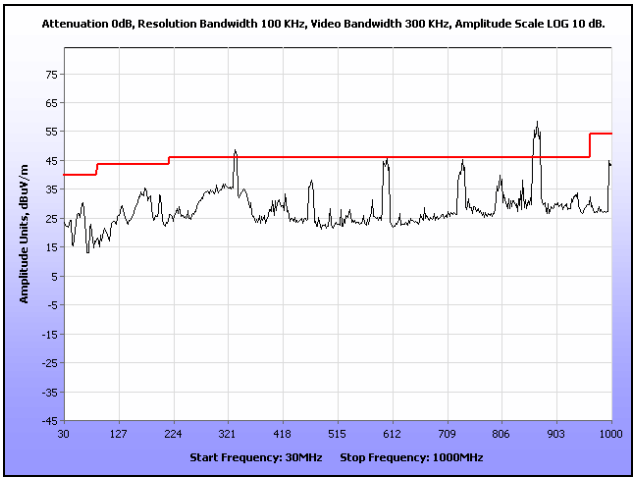
Plot 126. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5510 MHz, 30 MHz – 1 GHz



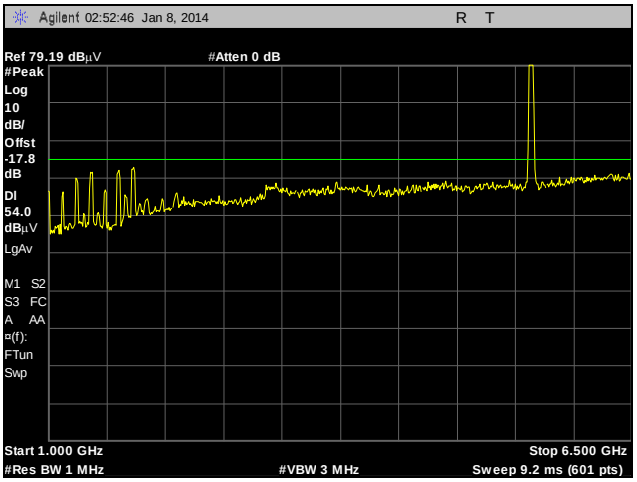
Plot 127. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5510 MHz, 1 GHz – 6.5 GHz, Peak under Average



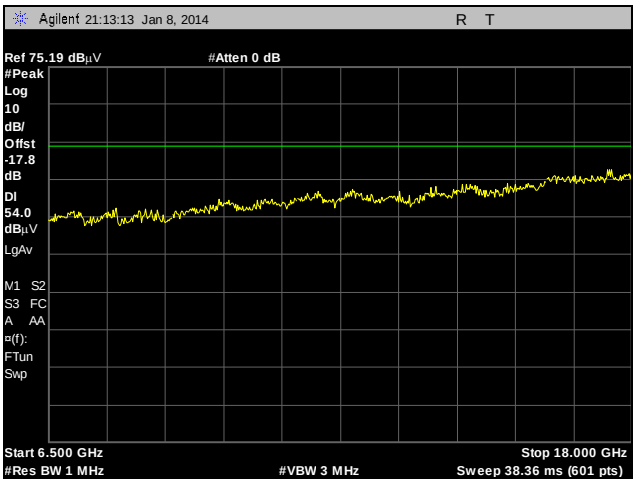
Plot 128. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5510 MHz, 6.5 GHz – 18 GHz, Peak under Average



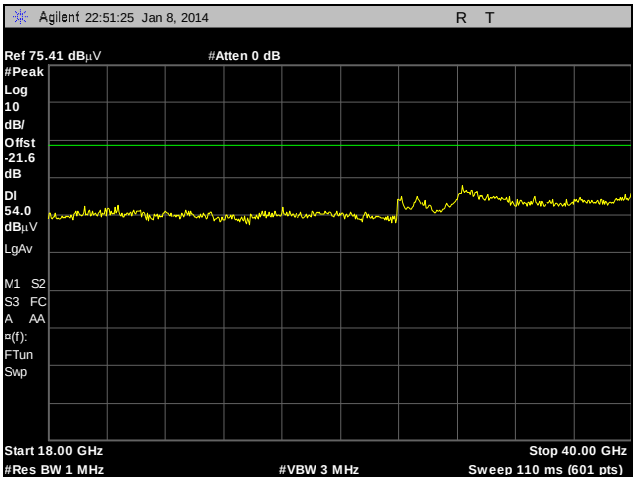
Plot 129. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5550 MHz, 30 MHz – 1 GHz



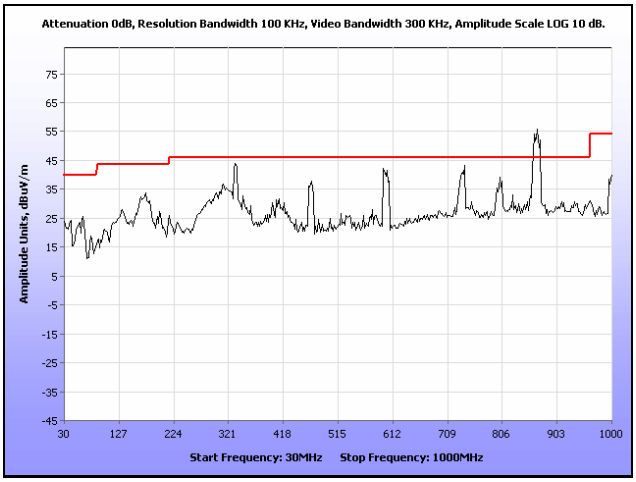
Plot 130. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5550 MHz, 1 GHz – 6.5 GHz, Peak under Average



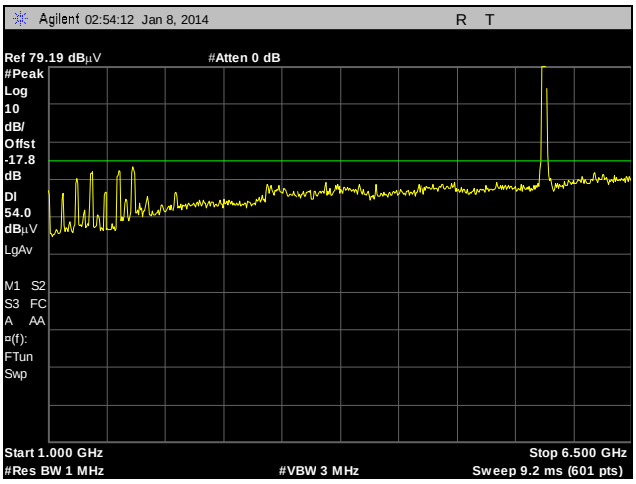
Plot 131. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5550 MHz, 6.5 GHz – 18 GHz, Peak under Average



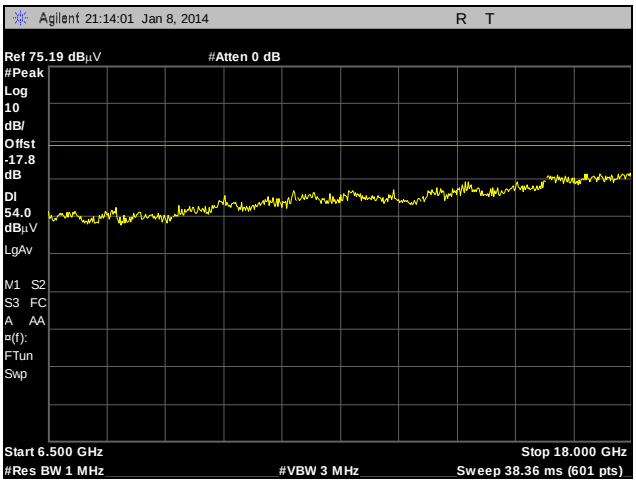
Plot 132. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5550 MHz, 18 GHz – 40 GHz, Peak under Average



Plot 133. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5670 MHz, 30 MHz – 1 GHz

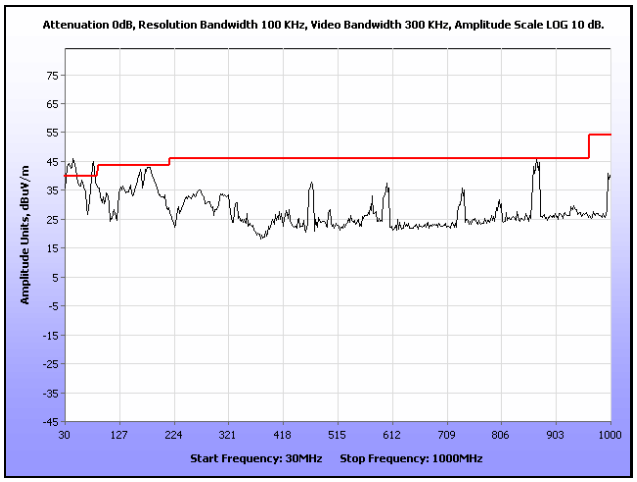


Plot 134. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5670 MHz, 1 GHz – 6.5 GHz, Peak under Average

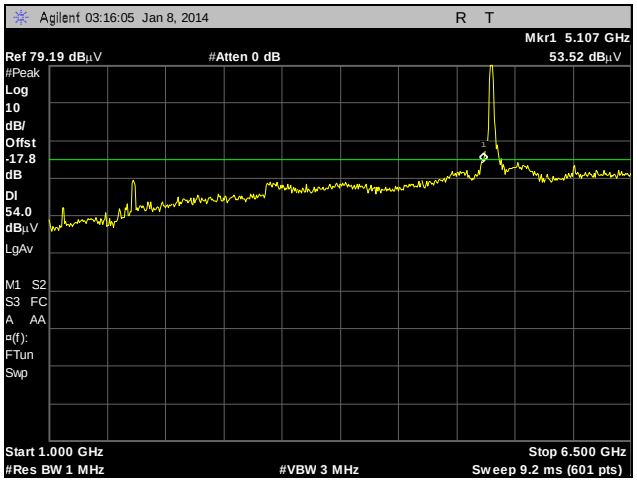


Plot 135. Radiated Spurious Emissions, Internal Antenna, 802.11n 40 MHz, 5670 MHz, 6.5 GHz – 18 GHz, Peak under Average

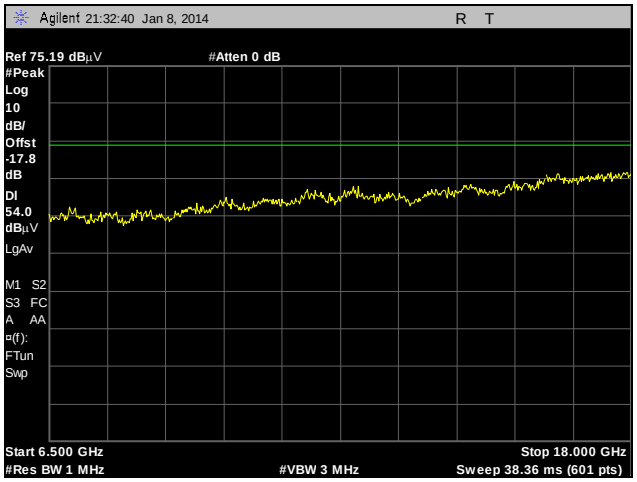
Radiated Spurious Emissions Test Results – External Antenna, UNII 1



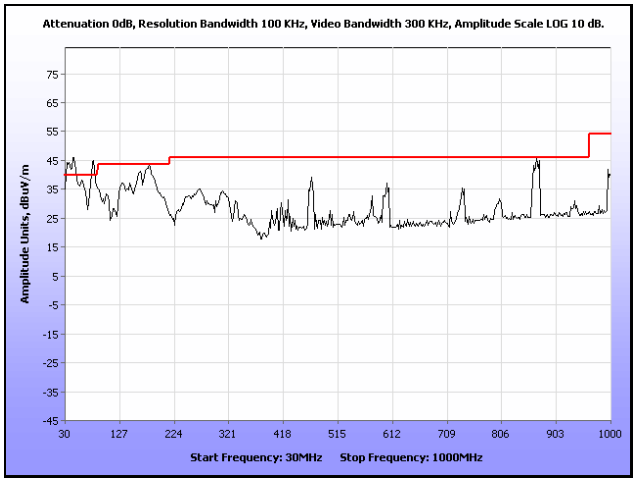
Plot 136. Radiated Spurious Emissions, External Antenna, 802.11a, 5180 MHz, 30 MHz – 1 GHz



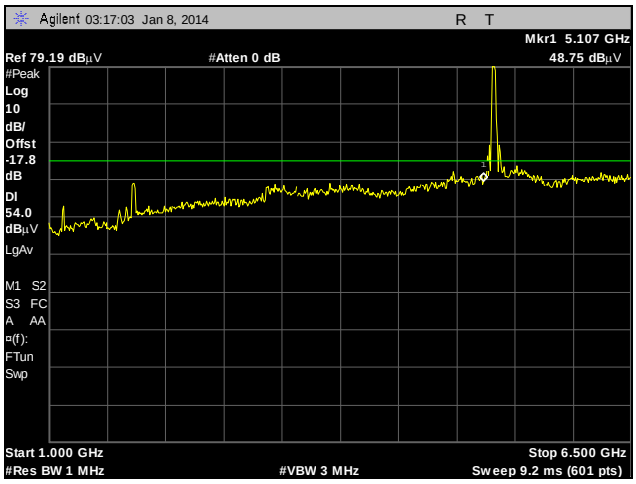
Plot 137. Radiated Spurious Emissions, External Antenna, 802.11a, 5180 MHz, 1 GHz – 6.5 GHz, Peak under Average



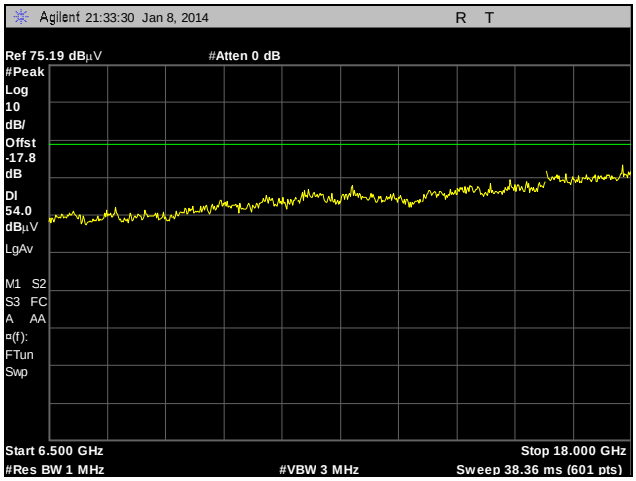
Plot 138. Radiated Spurious Emissions, External Antenna, 802.11a, 5180 MHz, 6.5 GHz – 18 GHz, Peak under Average



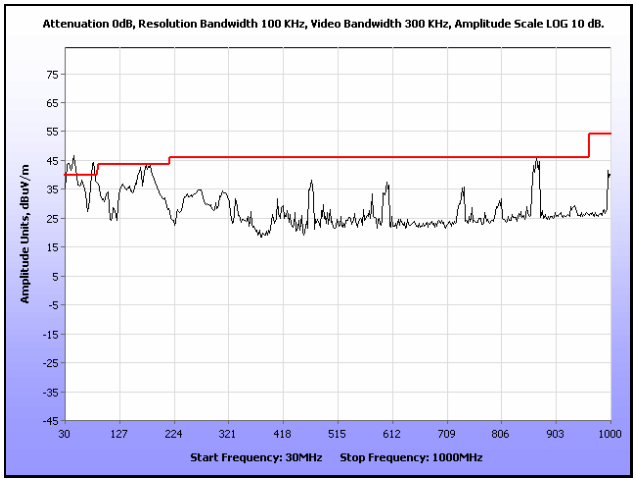
Plot 139. Radiated Spurious Emissions, External Antenna, 802.11a, 5200 MHz, 30 MHz – 1 GHz



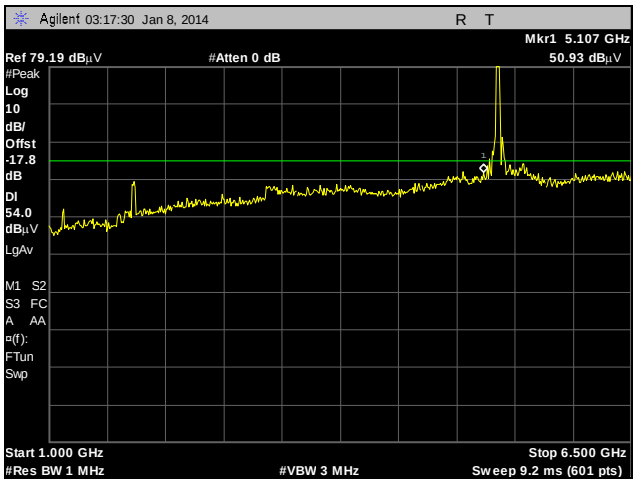
Plot 140. Radiated Spurious Emissions, External Antenna, 802.11a, 5200 MHz, 1 GHz – 6.5 GHz, Peak under Average



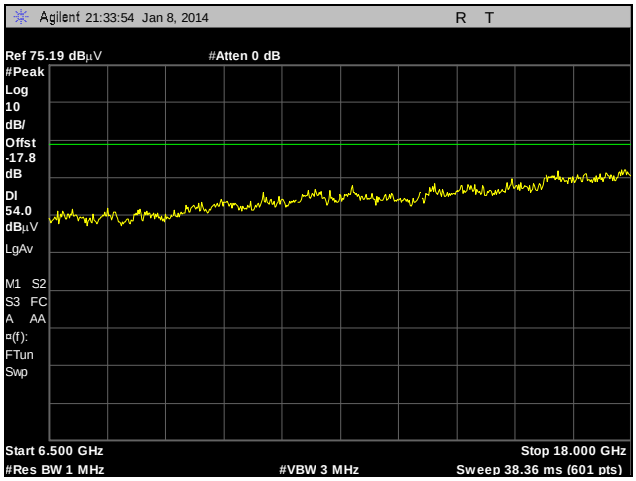
Plot 141. Radiated Spurious Emissions, External Antenna, 802.11a, 5200 MHz, 6.5 GHz – 18 GHz, Peak under Average



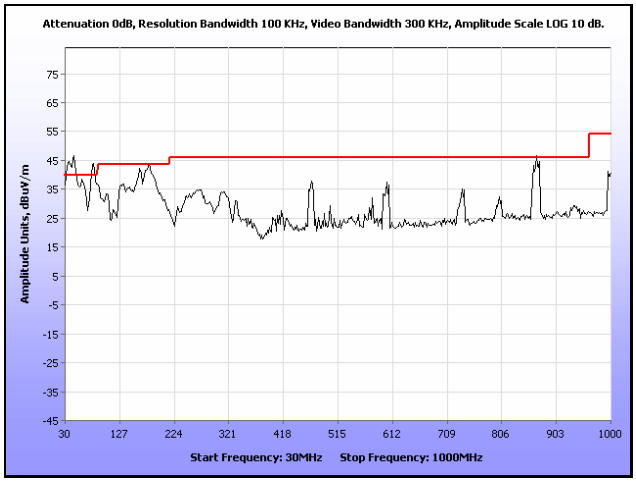
Plot 142. Radiated Spurious Emissions, External Antenna, 802.11a, 5240 MHz, 30 MHz – 1 GHz



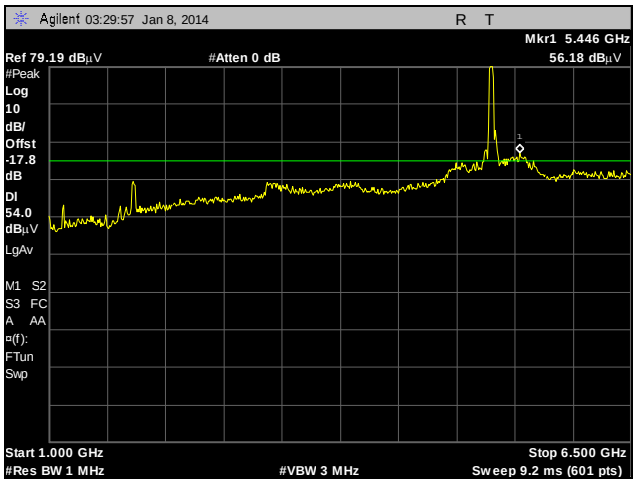
Plot 143. Radiated Spurious Emissions, External Antenna, 802.11a, 5240 MHz, 1 GHz – 6.5 GHz, Peak under Average



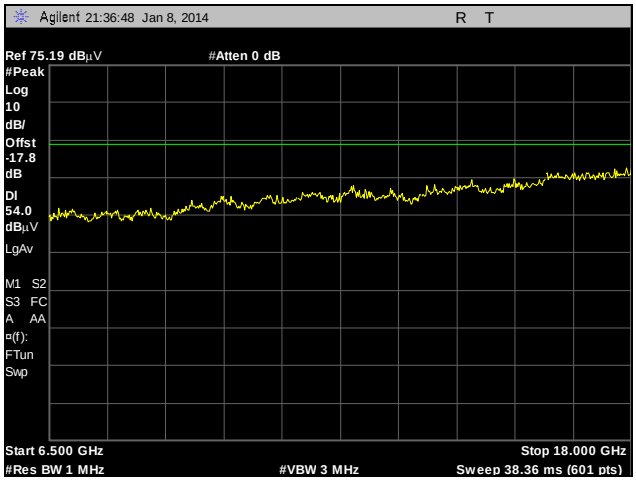
Plot 144. Radiated Spurious Emissions, External Antenna, 802.11a, 5240 MHz, 6.5 GHz – 18 GHz, Peak under Average



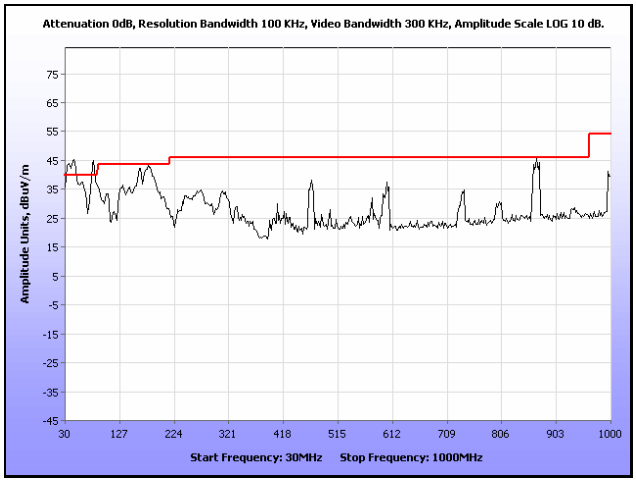
Plot 145. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5180 MHz, 30 MHz – 1 GHz



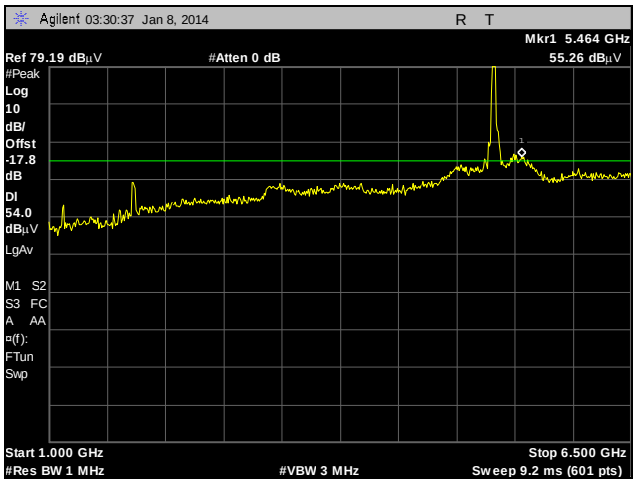
Plot 146. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5180 MHz, 1 GHz – 6.5 GHz, Peak under Average



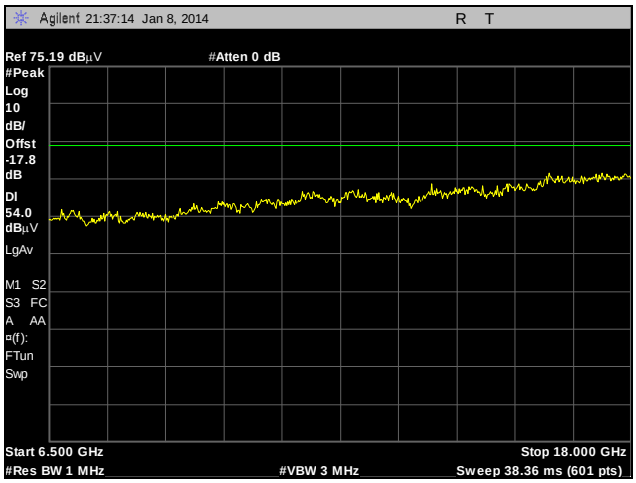
Plot 147. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5180 MHz, 6.5 GHz – 18 GHz, Peak under Average



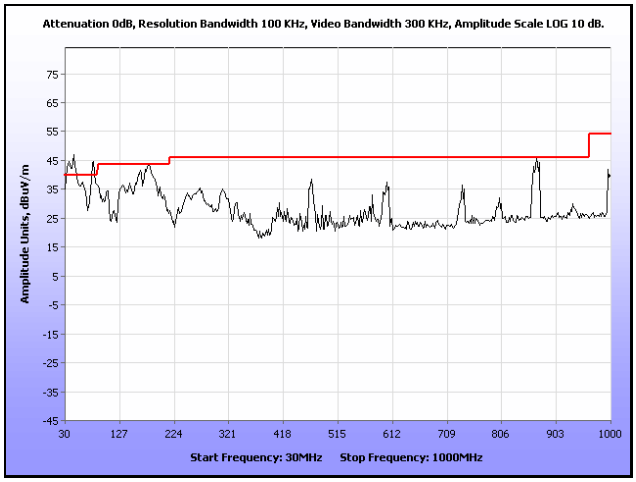
Plot 148. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5200 MHz, 30 MHz – 1 GHz



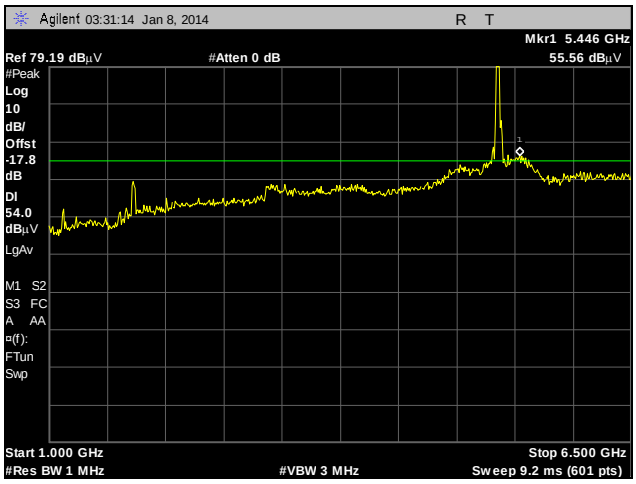
Plot 149. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5200MHz, 1 GHz – 6.5 GHz, Peak under Average



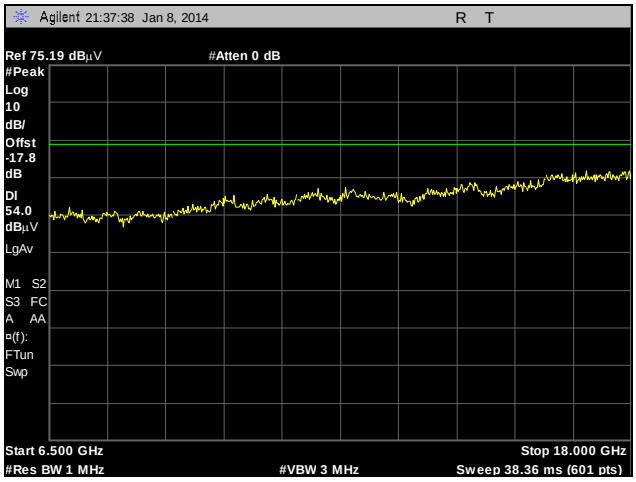
Plot 150. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5200 MHz, 6.5 GHz – 18 GHz, Peak under Average



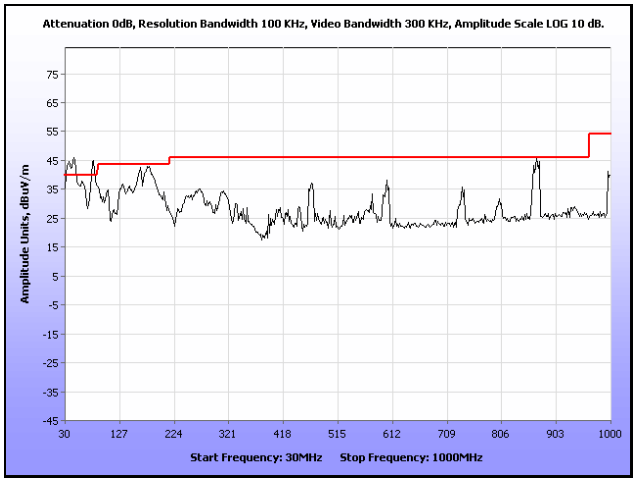
Plot 151. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5240 MHz, 30 MHz – 1 GHz



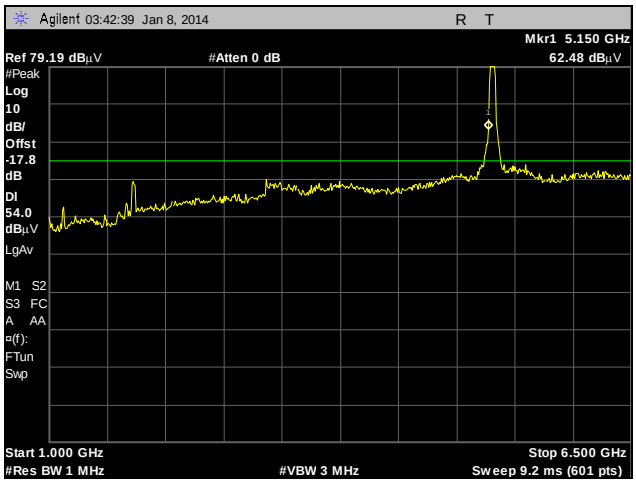
Plot 152. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5240 MHz, 1 GHz – 6.5 GHz, Peak under Average



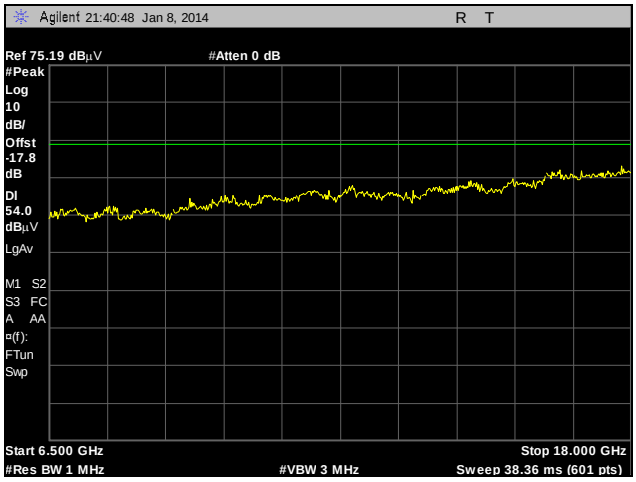
Plot 153. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5240 MHz, 6.5 GHz – 18 GHz, Peak under Average



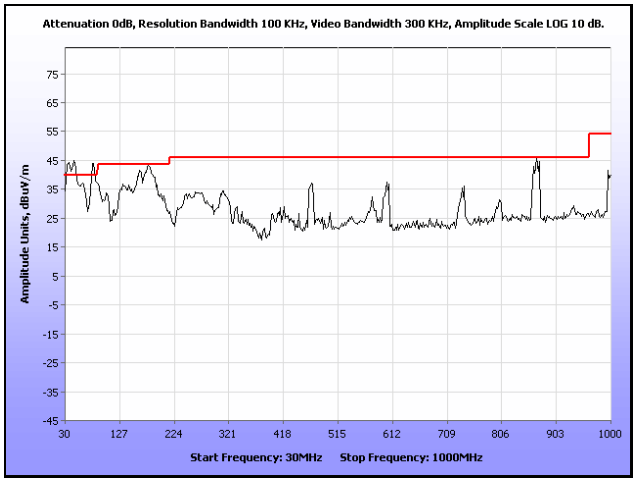
Plot 154. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5190 MHz, 30 MHz – 1 GHz



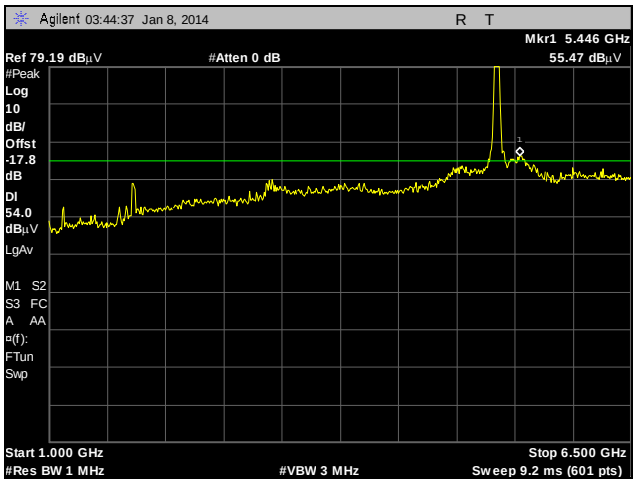
Plot 155. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5190 MHz, 1 GHz – 6.5 GHz, Peak under Average



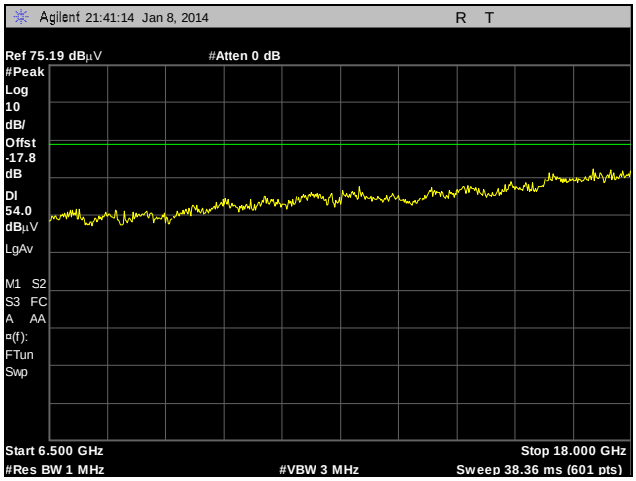
Plot 156. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5190 MHz, 6.5 GHz – 18 GHz, Peak under Average



Plot 157. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5230 MHz, 30 MHz – 1 GHz

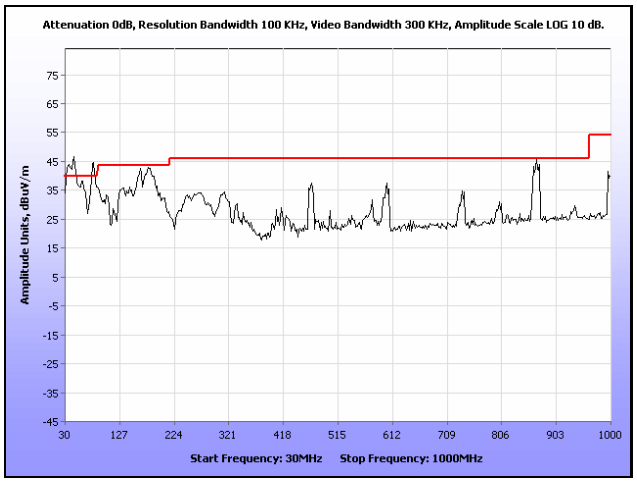


Plot 158. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5230 MHz, 1 GHz – 6.5 GHz, Peak under Average

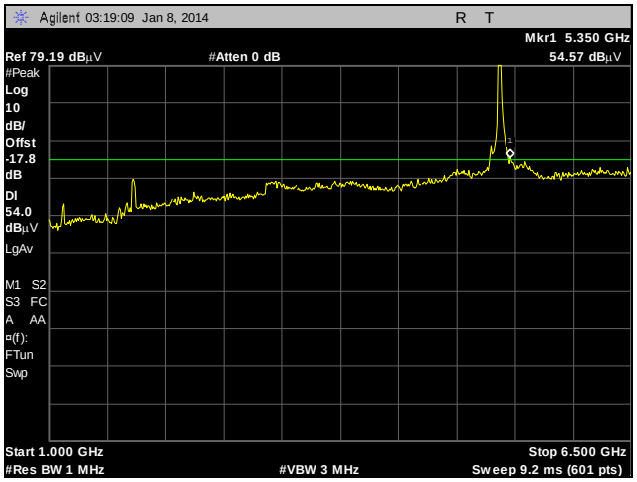


Plot 159. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5230 MHz, 6.5 GHz – 18 GHz, Peak under Average

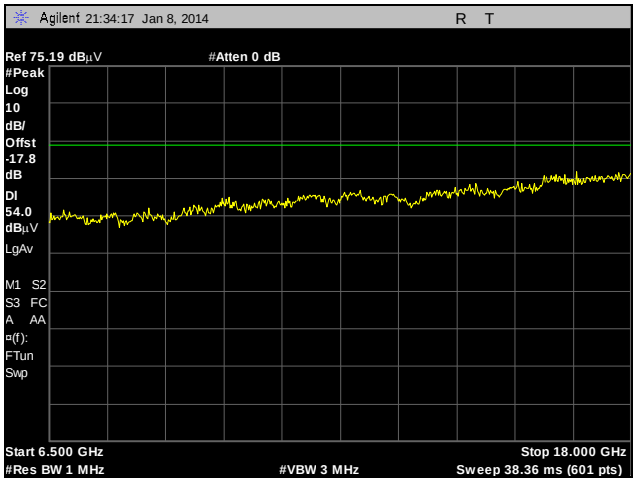
Radiated Spurious Emissions Test Results – External Antenna, Lower UNII 2



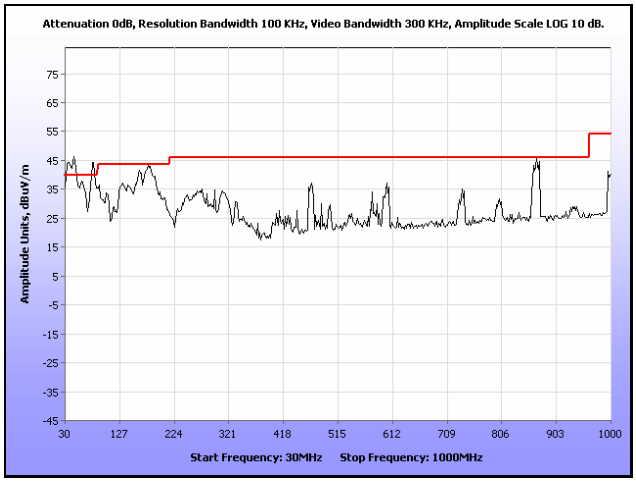
Plot 160. Radiated Spurious Emissions, External Antenna, 802.11a, 5260 MHz, 30 MHz – 1 GHz



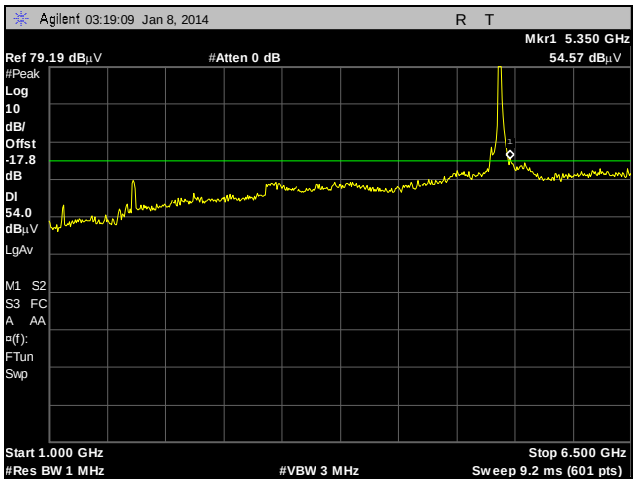
Plot 161. Radiated Spurious Emissions, External Antenna, 802.11a, 5260 MHz, 1 GHz – 6.5 GHz, Peak under Average



Plot 162. Radiated Spurious Emissions, External Antenna, 802.11a, 5260 MHz, 6.5 GHz – 18 GHz, Peak under Average

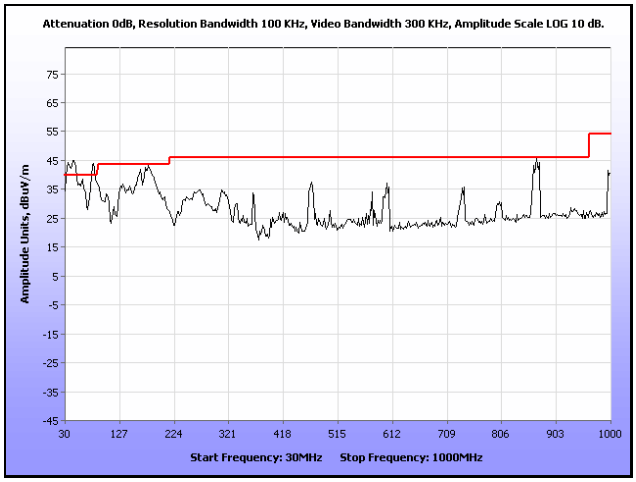


Plot 163. Radiated Spurious Emissions, External Antenna, 802.11a, 5300 MHz, 30 MHz – 1 GHz

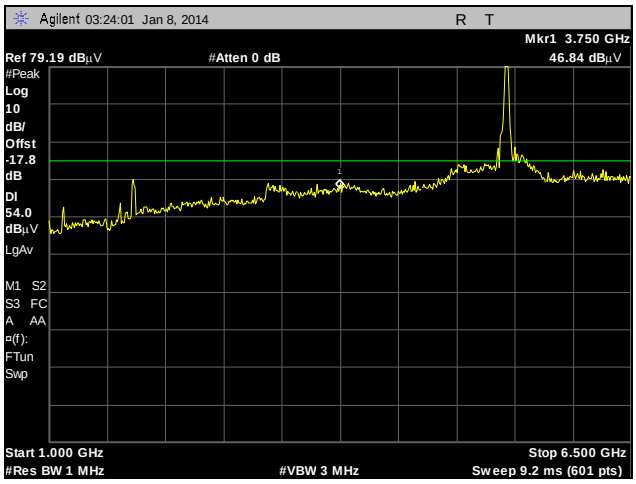


Plot 164. Radiated Spurious Emissions, External Antenna, 802.11a, 5300 MHz, 1 GHz – 6.5 GHz, Peak under Average

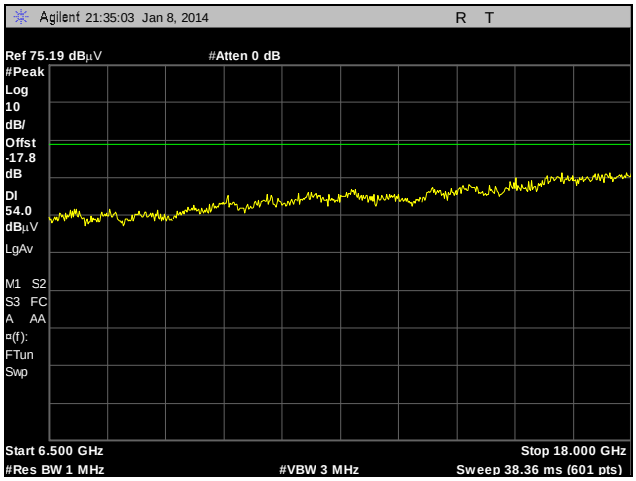
Plot 165. Radiated Spurious Emissions, External Antenna, 802.11a, 5300 MHz, 6.5 GHz – 18 GHz, Peak under Average



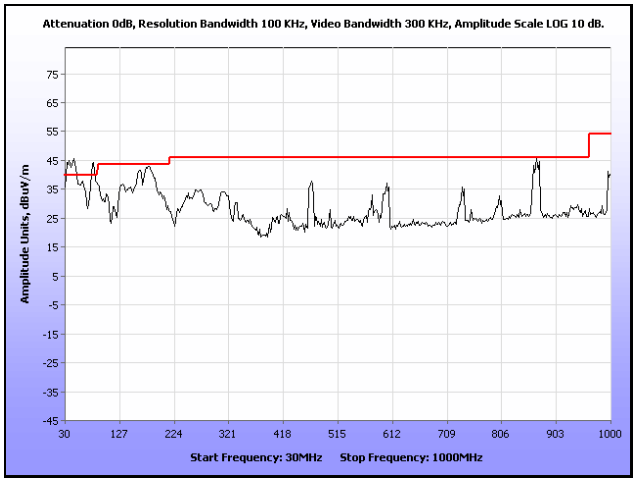
Plot 166. Radiated Spurious Emissions, External Antenna, 802.11a, 5320 MHz, 30 MHz – 1 GHz



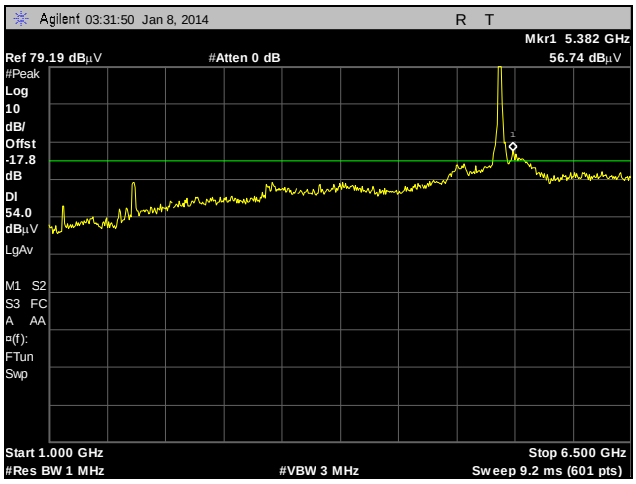
Plot 167. Radiated Spurious Emissions, External Antenna, 802.11a, 5320 MHz, 1 GHz – 6.5 GHz, Peak under Average



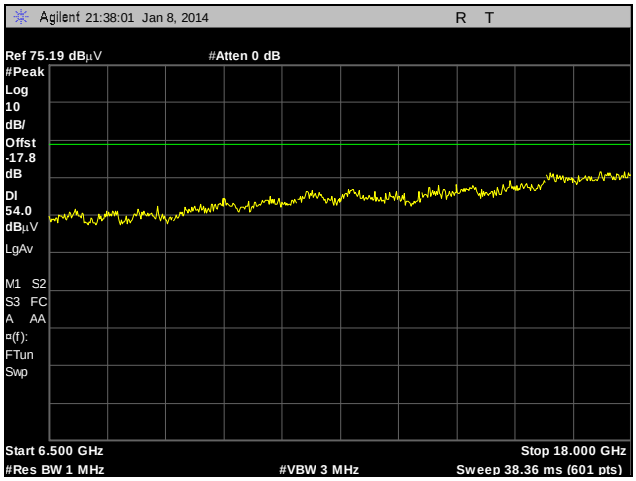
Plot 168. Radiated Spurious Emissions, External Antenna, 802.11a, 5320 MHz, 6.5 GHz – 18 GHz, Peak under Average



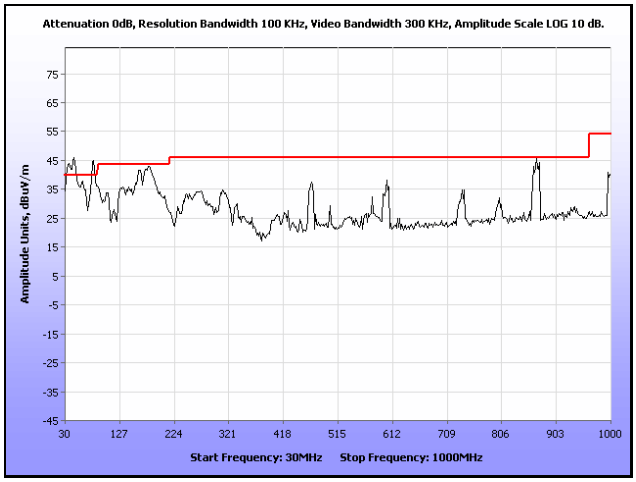
Plot 169. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5260 MHz, 30 MHz – 1 GHz



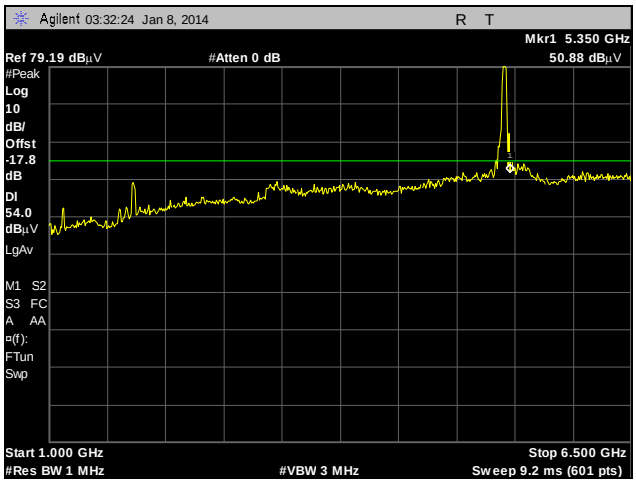
Plot 170. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5260 MHz, 1 GHz – 6.5 GHz, Peak under Average



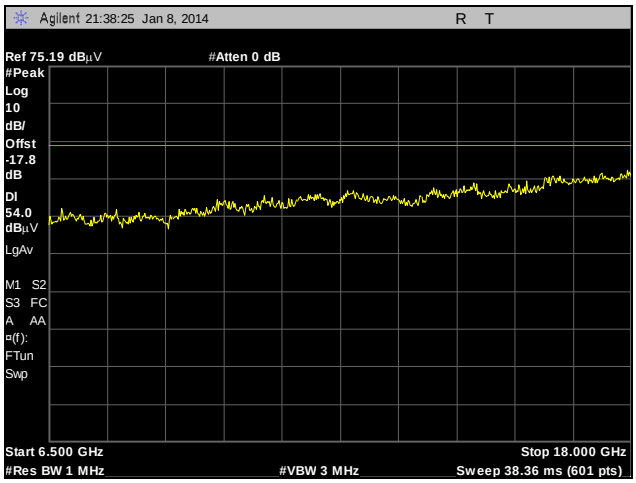
Plot 171. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5260 MHz, 6.5 GHz – 18 GHz, Peak under Average



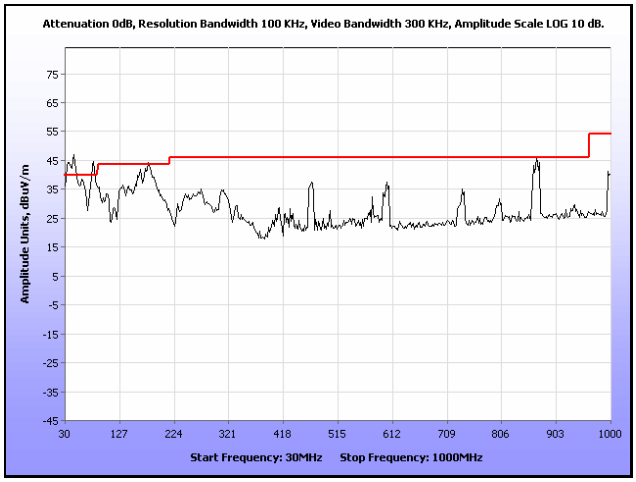
Plot 172. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5300 MHz, 30 MHz – 1 GHz



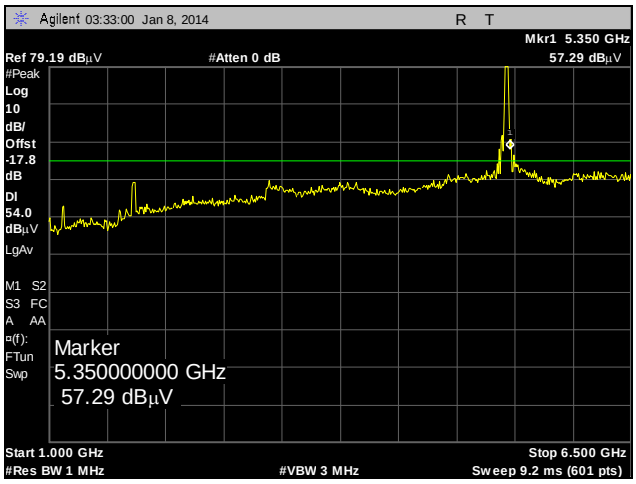
Plot 173. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5300MHz, 1 GHz – 6.5 GHz, Peak under Average



Plot 174. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5300 MHz, 6.5 GHz – 18 GHz, Peak under Average

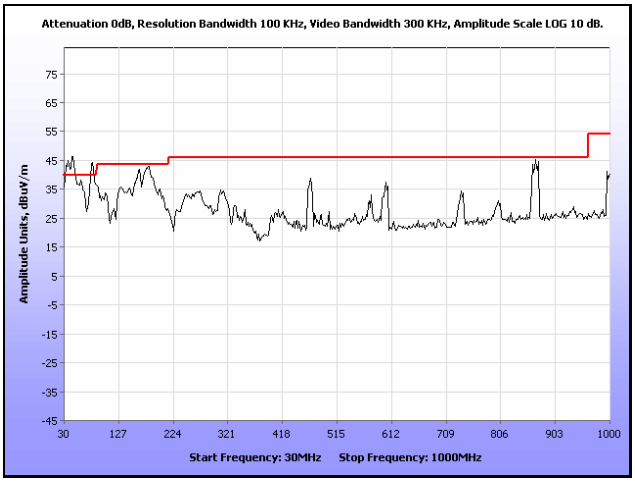


Plot 175. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5320 MHz, 30 MHz – 1 GHz

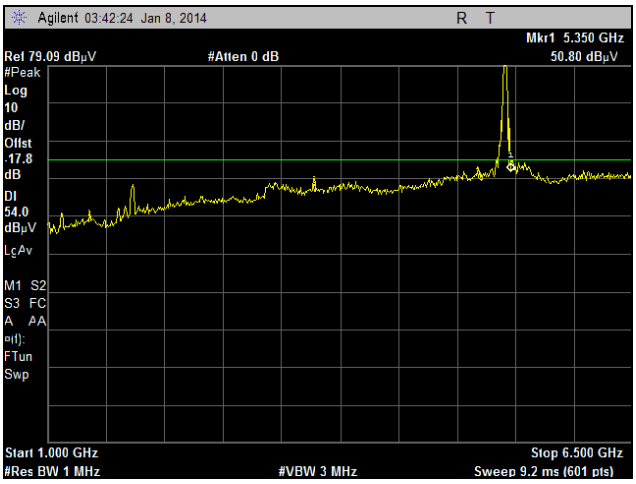


Plot 176. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5320 MHz, 1 GHz – 6.5 GHz, Peak under Average

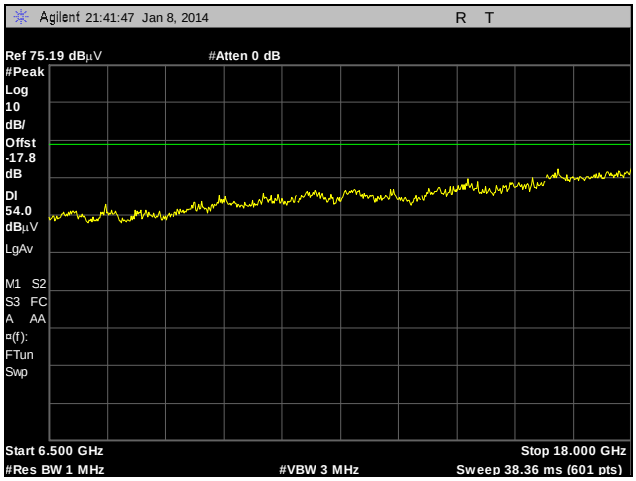
Plot 177. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5320 MHz, 6.5 GHz – 18 GHz, Peak under Average



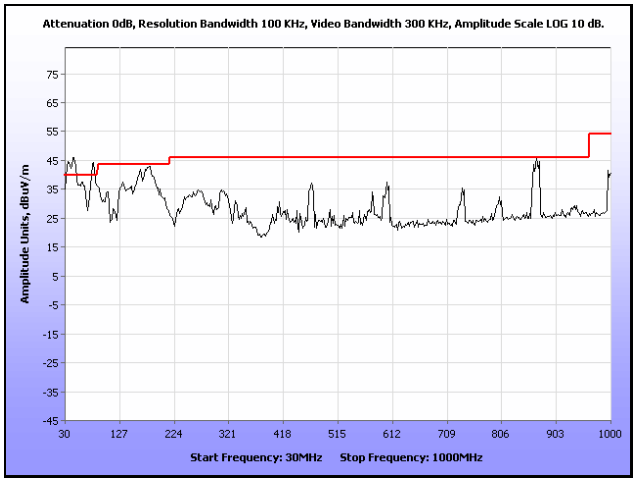
Plot 178. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5270 MHz, 30 MHz – 1 GHz



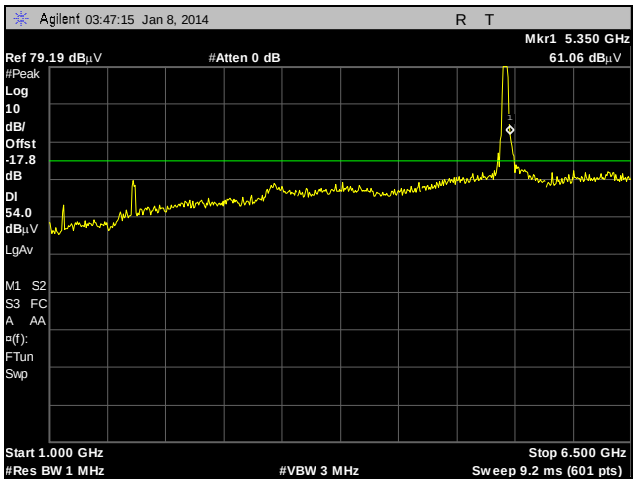
Plot 179. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5270 MHz, 1 GHz – 6.5 GHz, Peak under Average



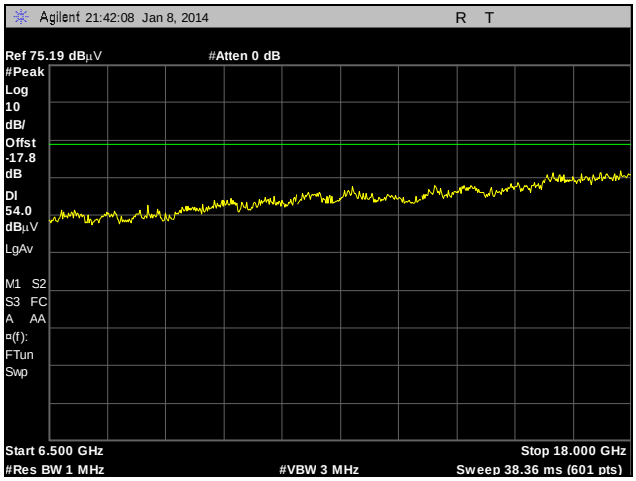
Plot 180. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5270 MHz, 6.5 GHz – 18 GHz, Peak under Average



Plot 181. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5310 MHz, 30 MHz – 1 GHz

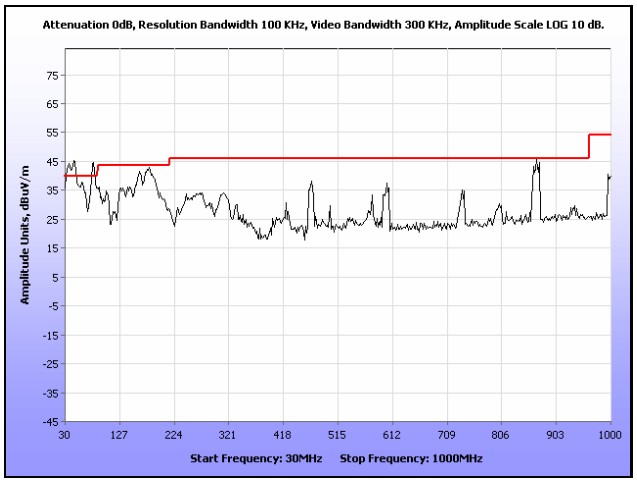


Plot 182. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5310 MHz, 1 GHz – 6.5 GHz, Peak under Average

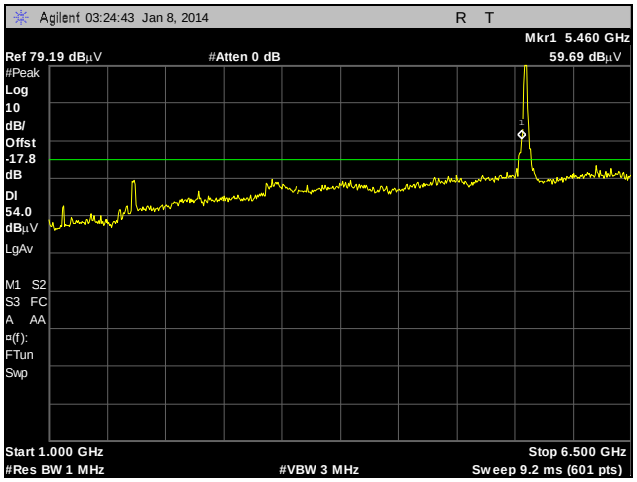


Plot 183. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5310 MHz, 6.5 GHz – 18 GHz, Peak under Average

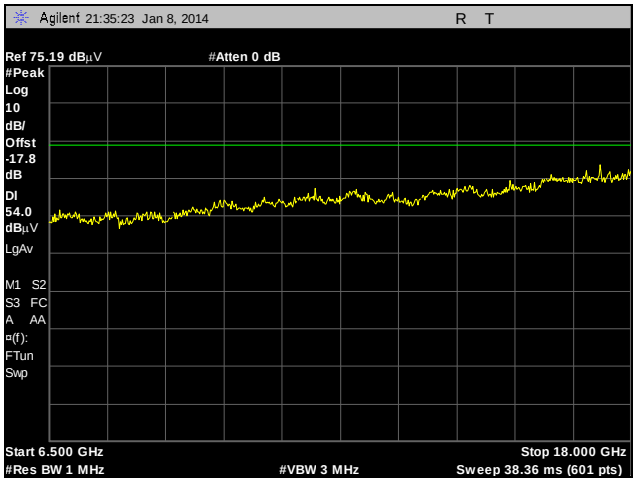
Radiated Spurious Emissions Test Results – External Antenna, Upper UNII 2



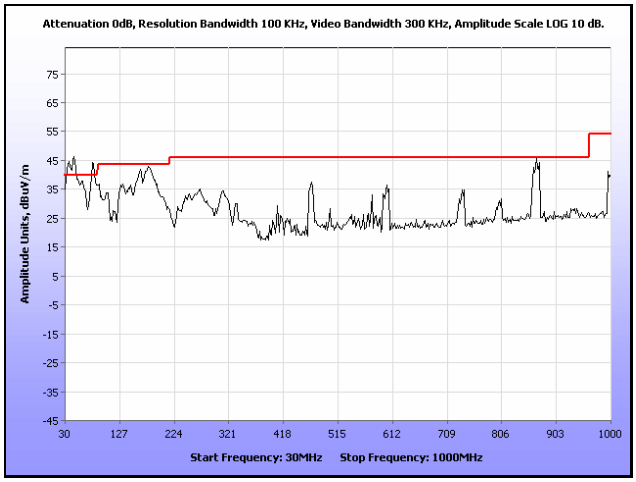
Plot 184. Radiated Spurious Emissions, External Antenna, 802.11a, 5500 MHz, 30 MHz – 1 GHz



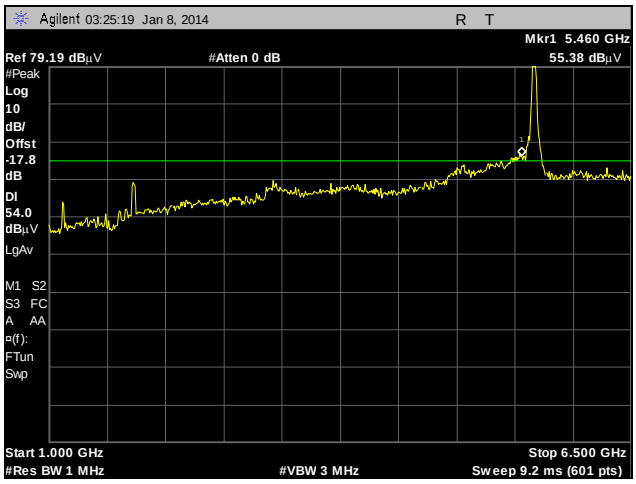
Plot 185. Radiated Spurious Emissions, External Antenna, 802.11a, 5500 MHz, 1 GHz – 6.5 GHz, Peak under Average



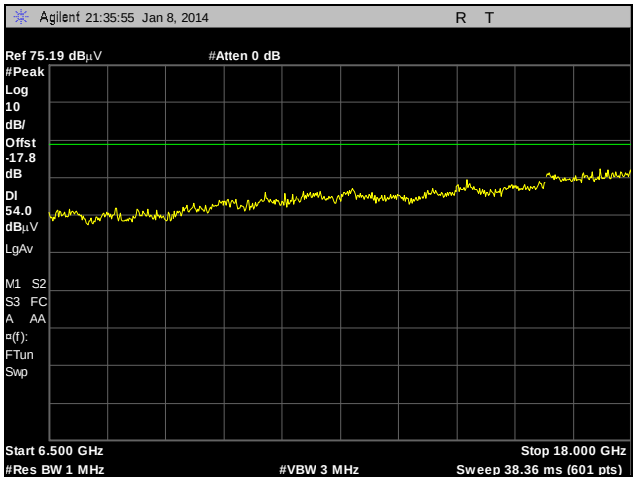
Plot 186. Radiated Spurious Emissions, External Antenna, 802.11a, 5500 MHz, 6.5 GHz – 18 GHz, Peak under Average



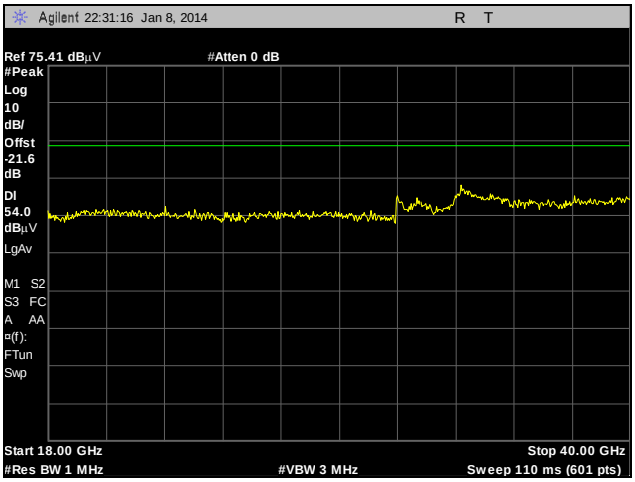
Plot 187. Radiated Spurious Emissions, External Antenna, 802.11a, 5580 MHz, 30 MHz – 1 GHz



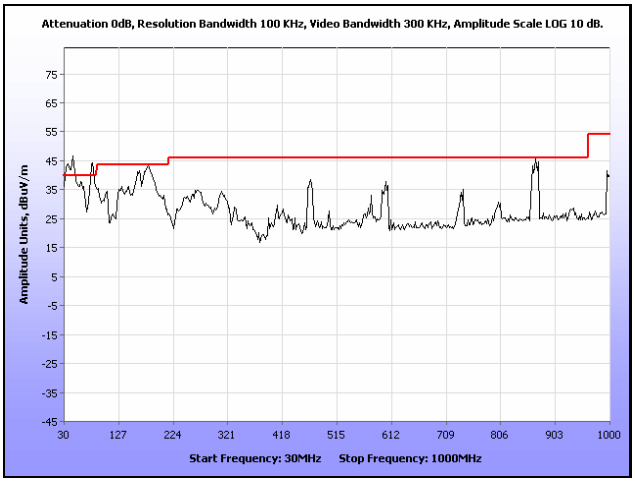
Plot 188. Radiated Spurious Emissions, External Antenna, 802.11a, 5580 MHz, 1 GHz – 6.5 GHz, Peak under Average



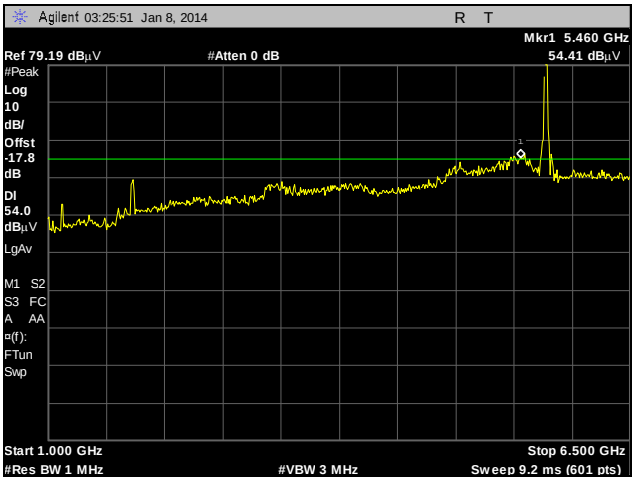
Plot 189. Radiated Spurious Emissions, External Antenna, 802.11a, 5580 MHz, 6.5 GHz – 18 GHz, Peak under Average



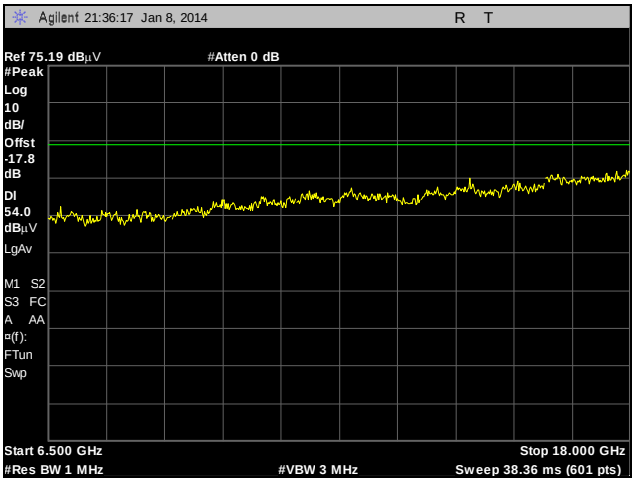
Plot 190. Radiated Spurious Emissions, External Antenna, 802.11a, 5580 MHz, 18 GHz – 40 GHz, Peak under Average



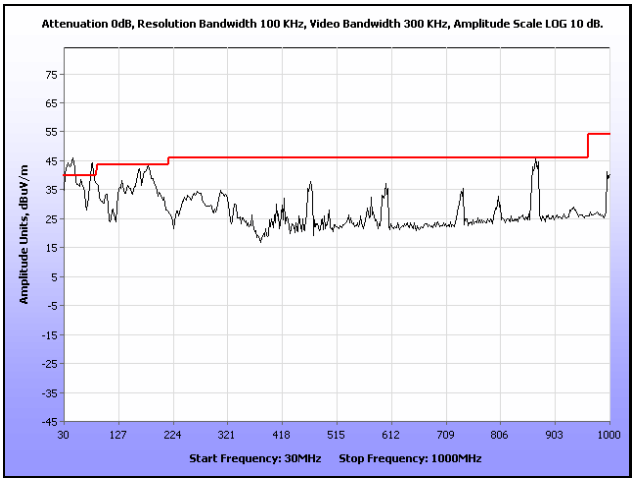
Plot 191. Radiated Spurious Emissions, External Antenna, 802.11a, 5700 MHz, 30 MHz – 1 GHz



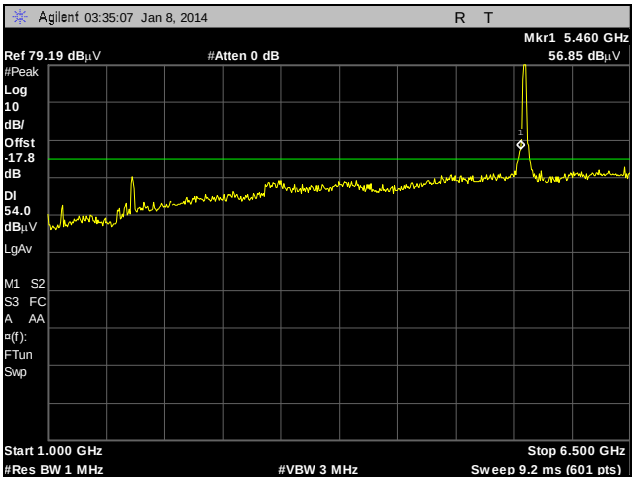
Plot 192. Radiated Spurious Emissions, External Antenna, 802.11a, 5700 MHz, 1 GHz – 6.5 GHz, Peak under Average



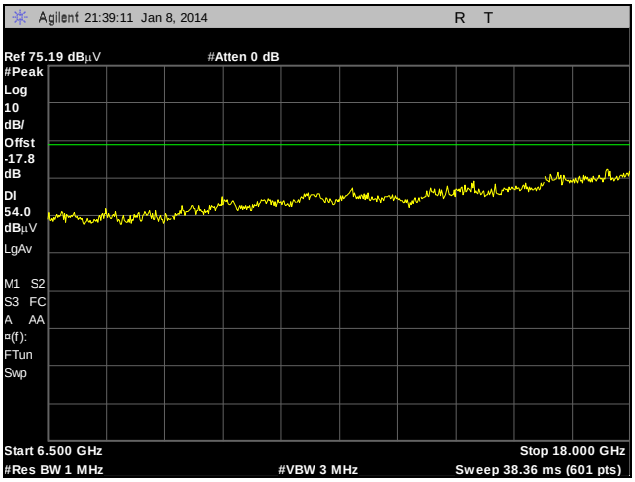
Plot 193. Radiated Spurious Emissions, External Antenna, 802.11a, 5700 MHz, 6.5 GHz – 18 GHz, Peak under Average



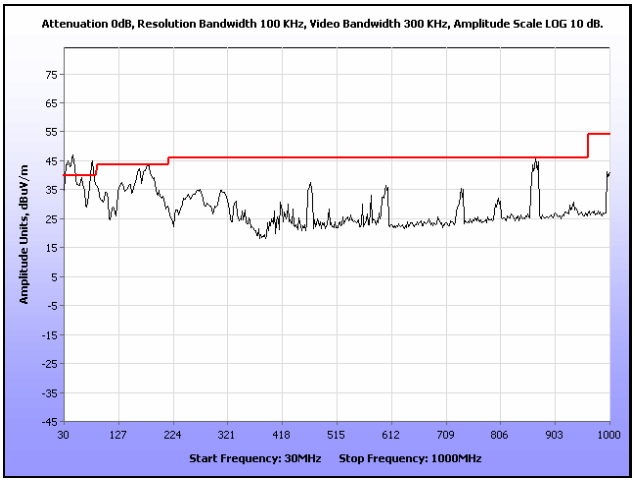
Plot 194. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5500 MHz, 30 MHz – 1 GHz



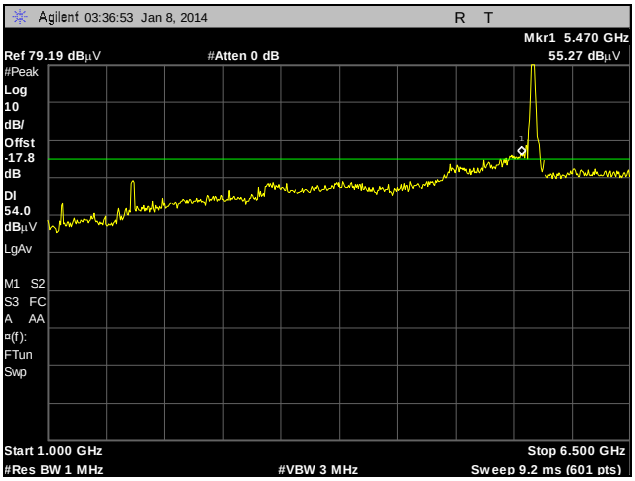
Plot 195. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5500 MHz, 1 GHz – 6.5 GHz, Peak under Average



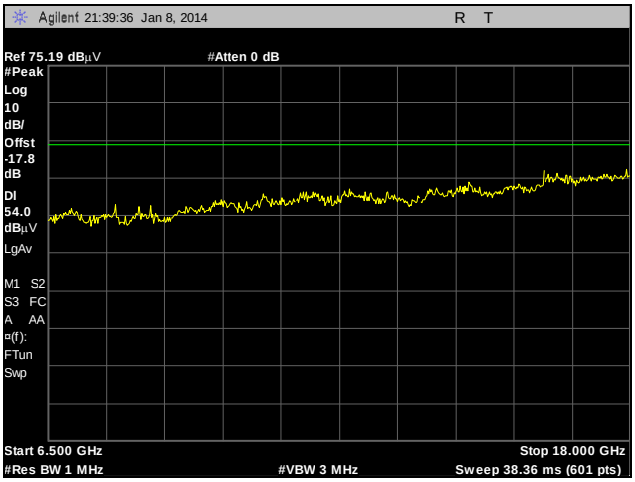
Plot 196. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5500 MHz, 6.5 GHz – 18 GHz, Peak under Average



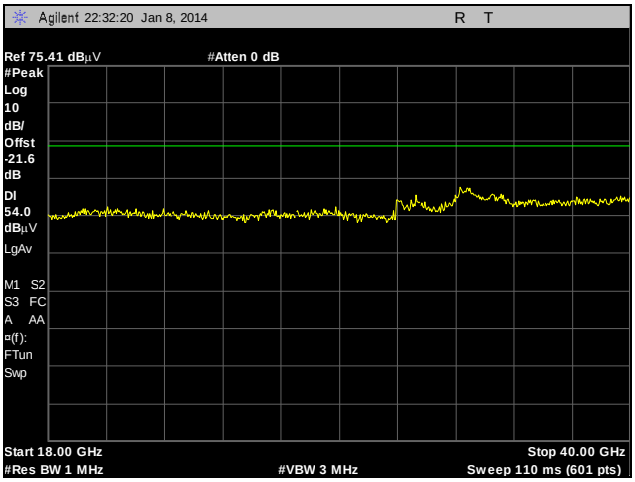
Plot 197. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5580 MHz, 30 MHz – 1 GHz



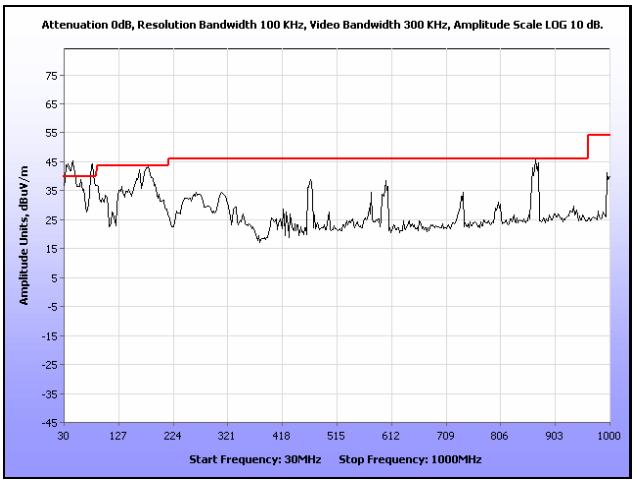
Plot 198. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5580MHz, 1 GHz – 6.5 GHz, Peak under Average



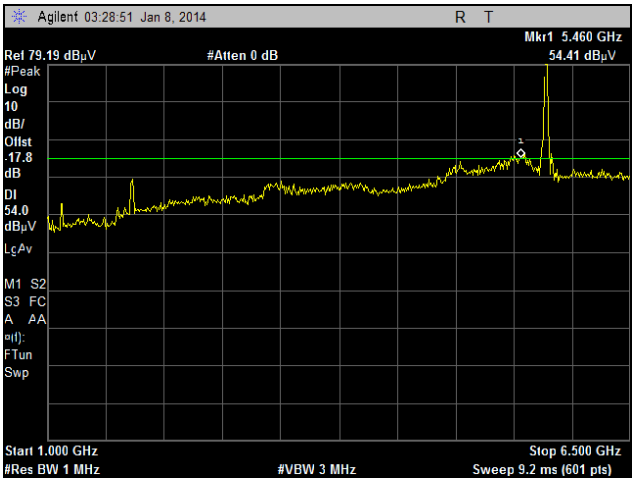
Plot 199. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5580 MHz, 6.5 GHz – 18 GHz, Peak under Average



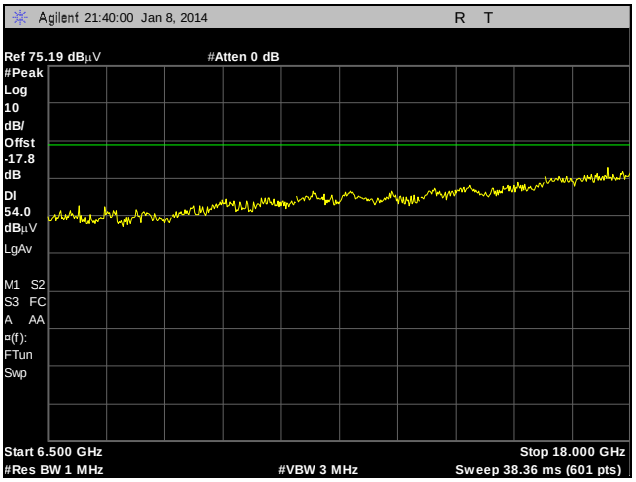
Plot 200. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5580 MHz, 18 GHz – 40GHz, Peak under Average



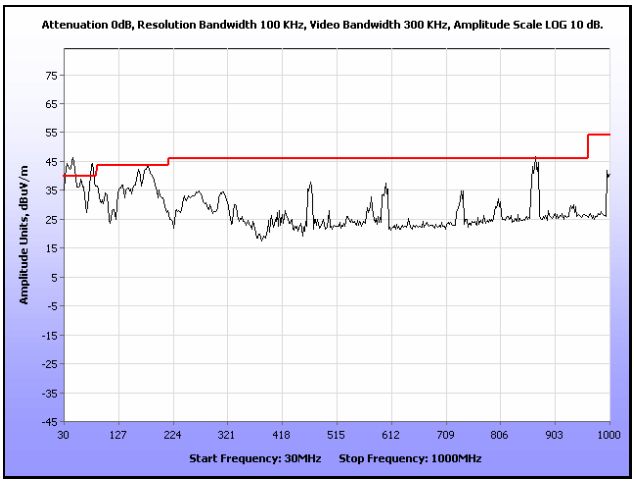
Plot 201. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5700 MHz, 30 MHz – 1 GHz



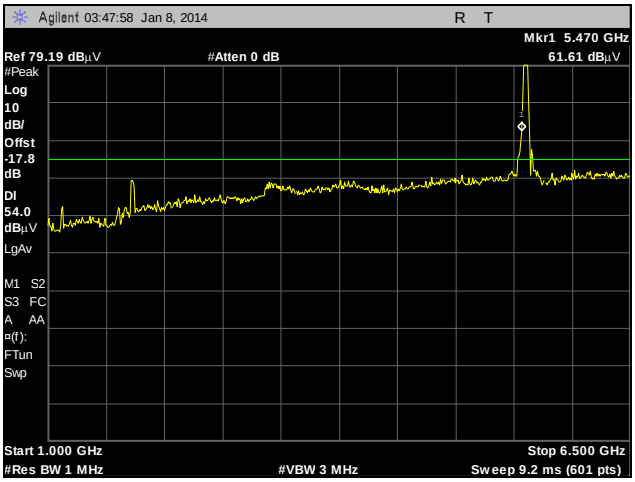
Plot 202. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5700 MHz, 1 GHz – 6.5 GHz, Peak under Average



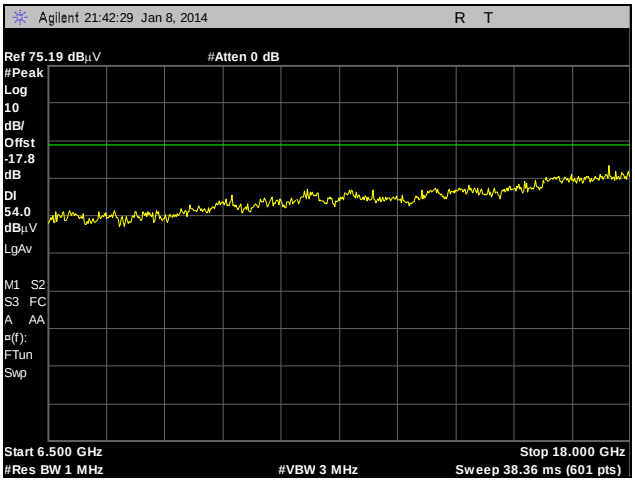
Plot 203. Radiated Spurious Emissions, External Antenna, 802.11n 20 MHz, 5700 MHz, 6.5 GHz – 18 GHz, Peak under Average



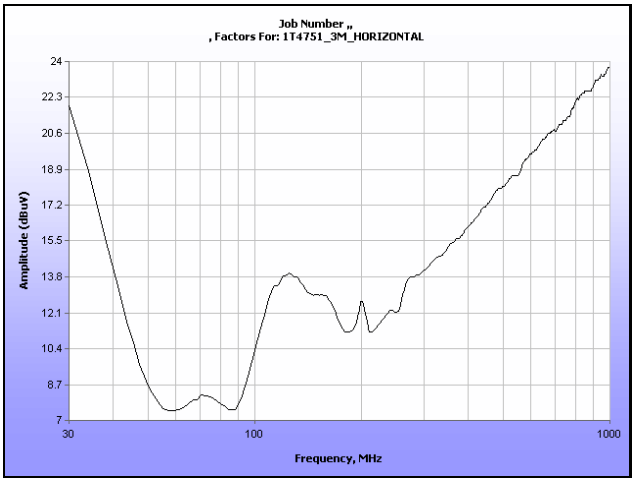
Plot 204. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5510 MHz, 30 MHz – 1 GHz



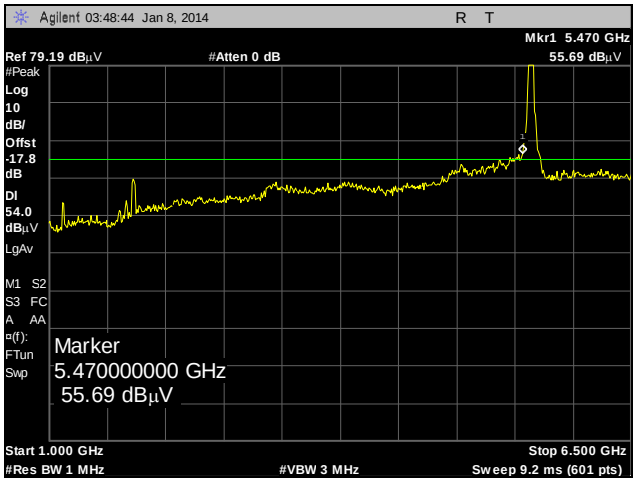
Plot 205. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5510 MHz, 1 GHz – 6.5 GHz, Peak under Average



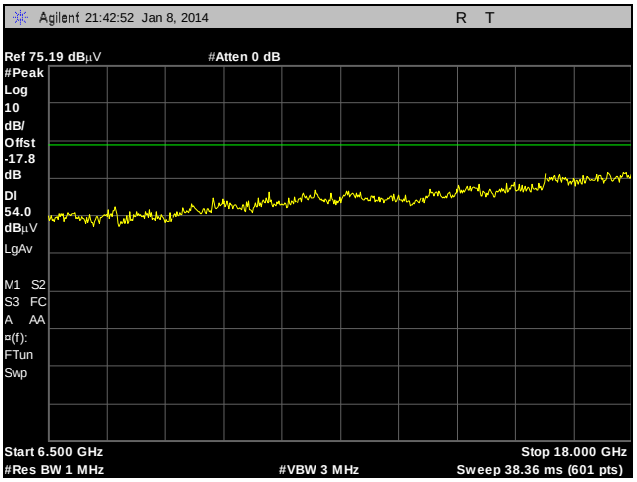
Plot 206. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5510 MHz, 6.5 GHz – 18 GHz, Peak under Average



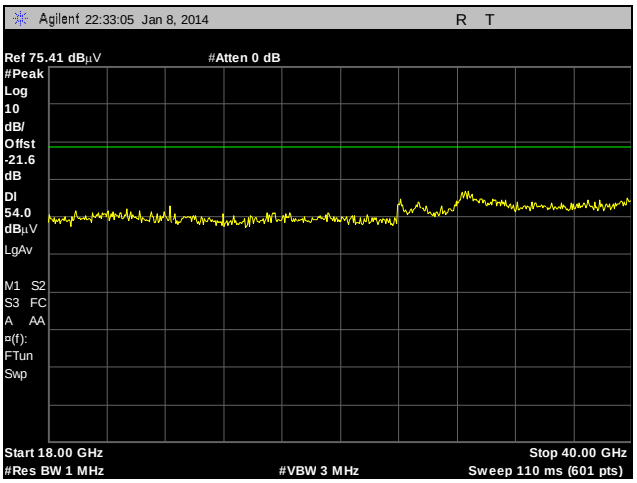
Plot 207. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5550 MHz, 30 MHz – 1 GHz



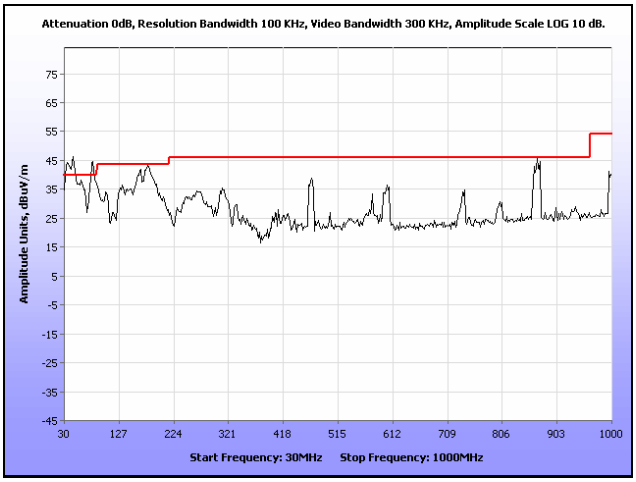
Plot 208. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5550 MHz, 1 GHz – 6.5 GHz, Peak under Average



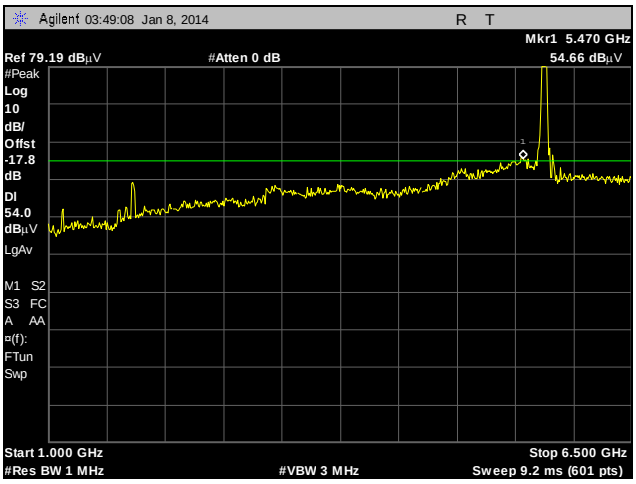
Plot 209. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5550 MHz, 6.5 GHz – 18 GHz, Peak under Average



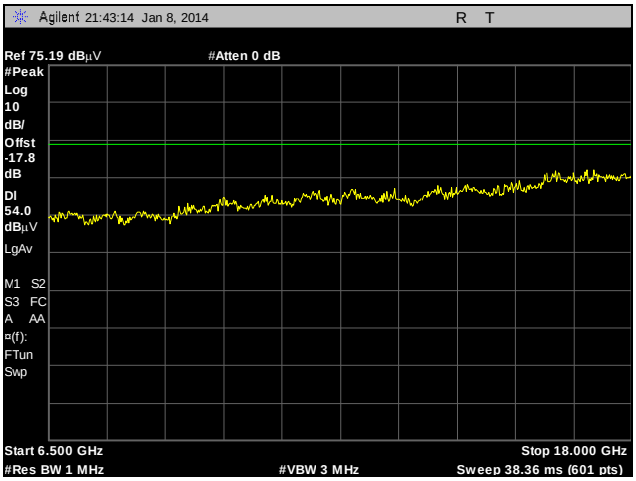
Plot 210. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5550 MHz, 18 GHz – 40 GHz, Peak under Average



Plot 211. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5670 MHz, 30 MHz – 1 GHz

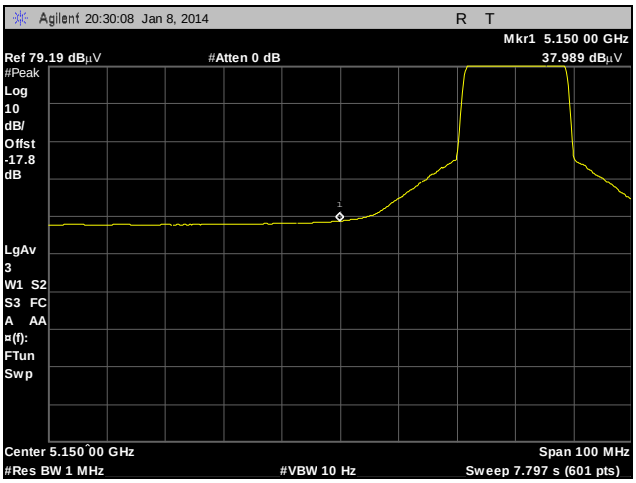


Plot 212. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5670 MHz, 1 GHz – 6.5 GHz, Peak under Average

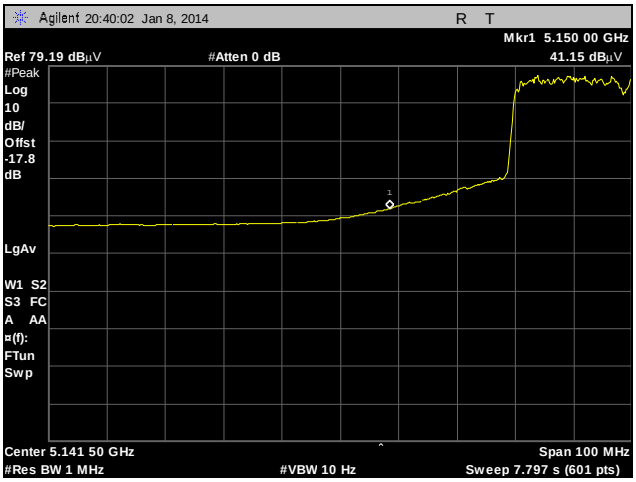


Plot 213. Radiated Spurious Emissions, External Antenna, 802.11n 40 MHz, 5670 MHz, 6.5 GHz – 18 GHz, Peak under Average

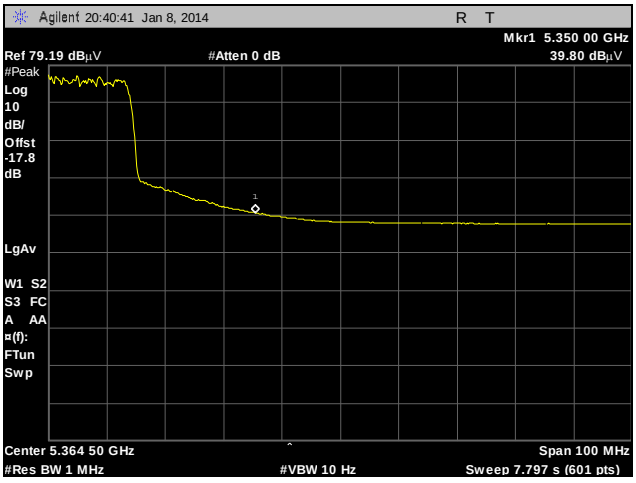
Band Edge



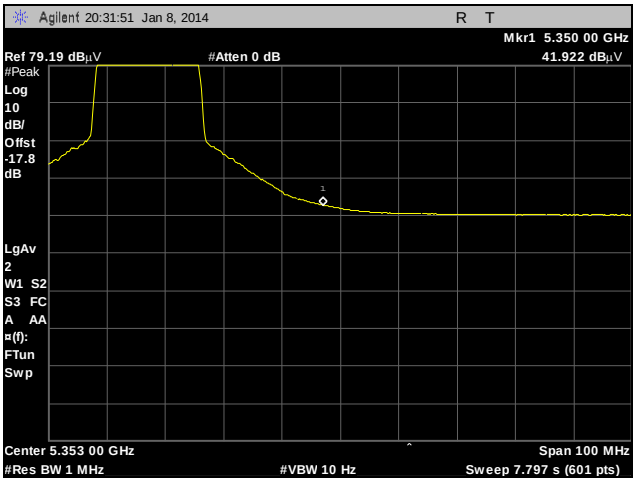
Plot 214. Radiated Band Edge, Internal Antenna, 802.11a, 5180 MHz, Average



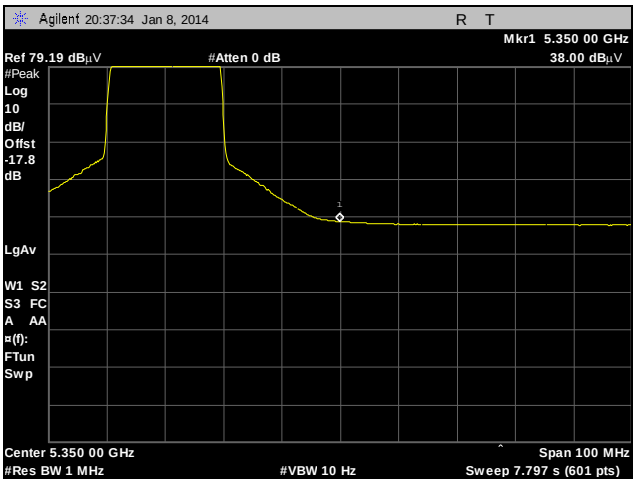
Plot 215. Radiated Band Edge, Internal Antenna, 802.11n 40 MHz, 5190 MHz, Average



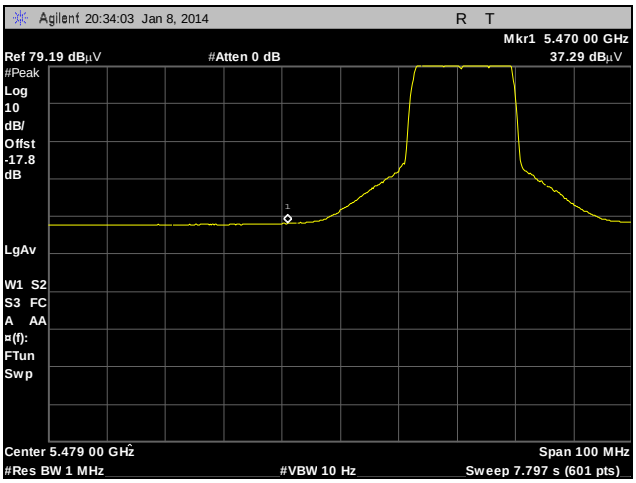
Plot 216. Radiated Band Edge, Internal Antenna, 802.11n 40 MHz, 5310 MHz, Average



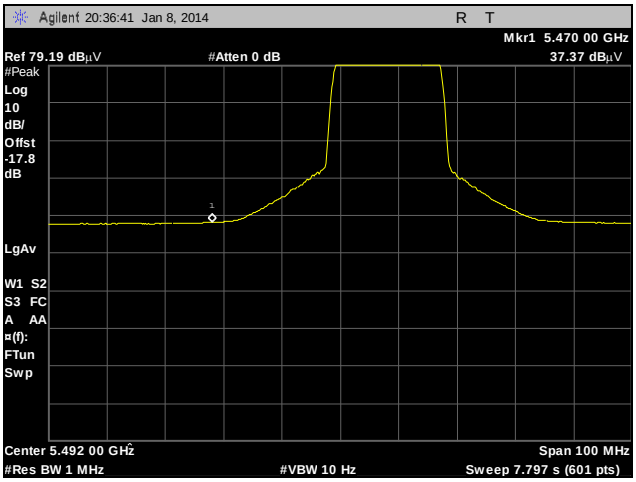
Plot 217. Radiated Band Edge, Internal Antenna, 802.11a, 5320 MHz, Average



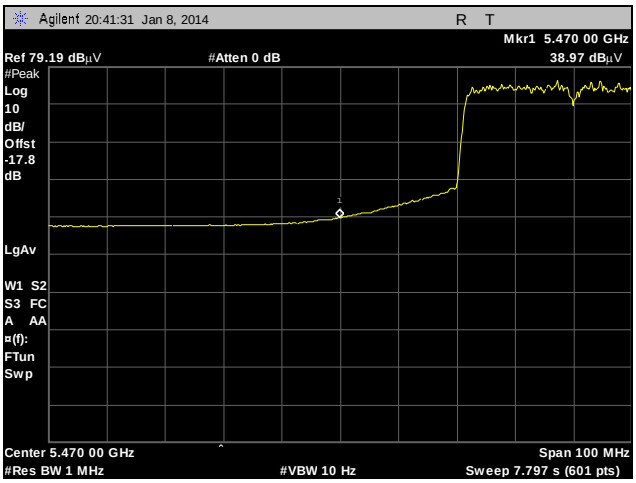
Plot 218. Radiated Band Edge, Internal Antenna, 802.11n 20 MHz, 5320 MHz, Average



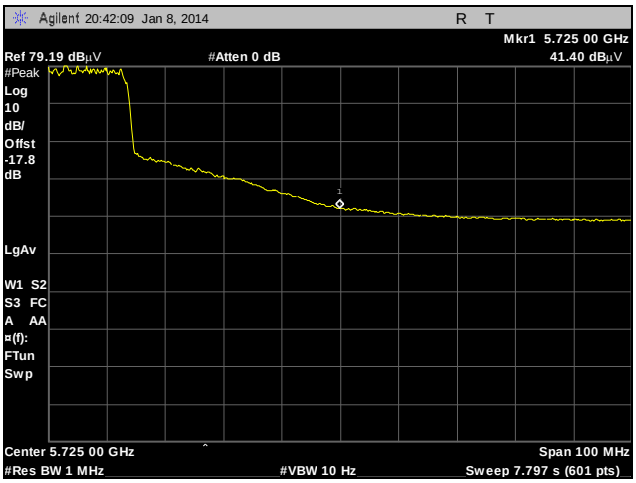
Plot 219. Radiated Band Edge, Internal Antenna, 802.11a, 5500 MHz, Average



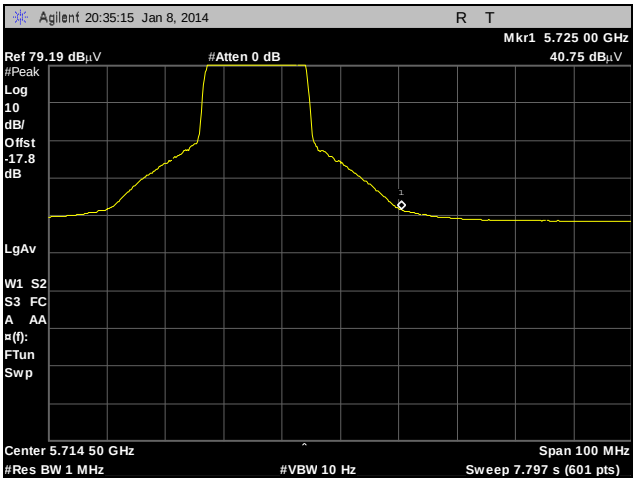
Plot 220. Radiated Band Edge, Internal Antenna, 802.11n 20 MHz, 5500 MHz, Average



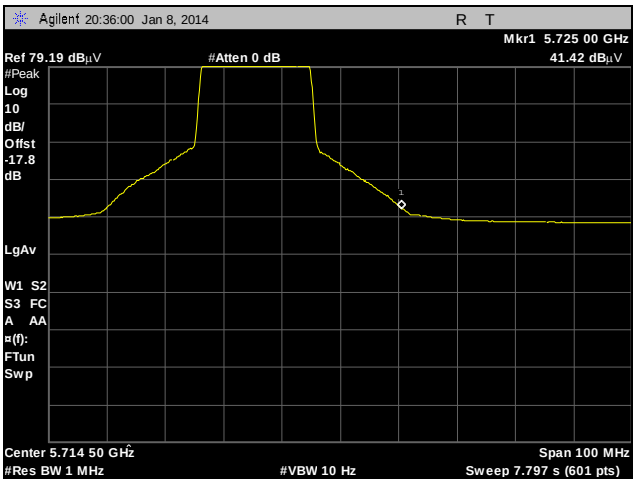
Plot 221. Radiated Band Edge, Internal Antenna, 802.11n 40 MHz, 5510 MHz, Average



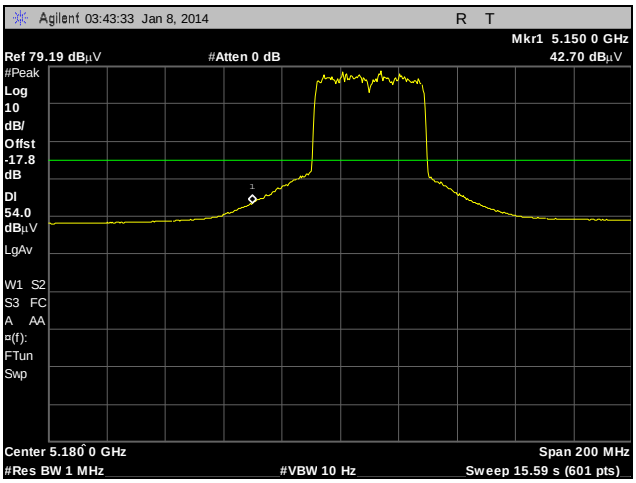
Plot 222. Radiated Band Edge, Internal Antenna, 802.11n 40 MHz, 5670 MHz, Average



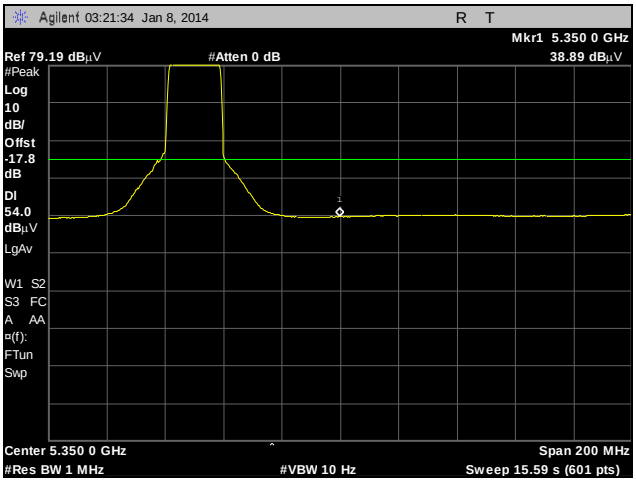
Plot 223. Radiated Band Edge, Internal Antenna, 802.11a, 5700 MHz, Average



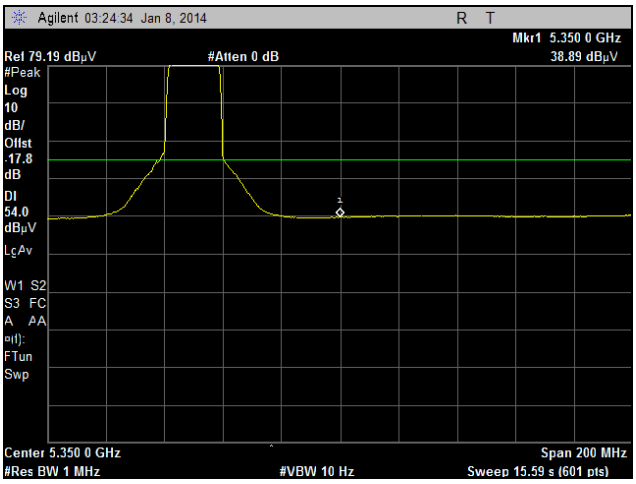
Plot 224. Radiated Band Edge, Internal Antenna, 802.11n 20 MHz, 5700 MHz, Average



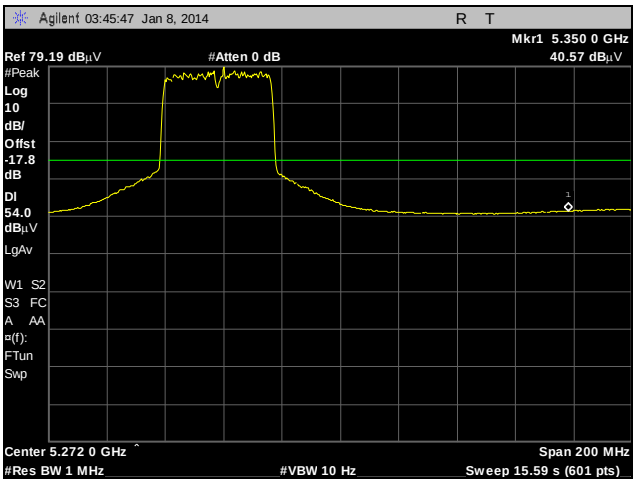
Plot 225. Radiated Band Edge, External Antenna, 802.11a, 5190 MHz, Average



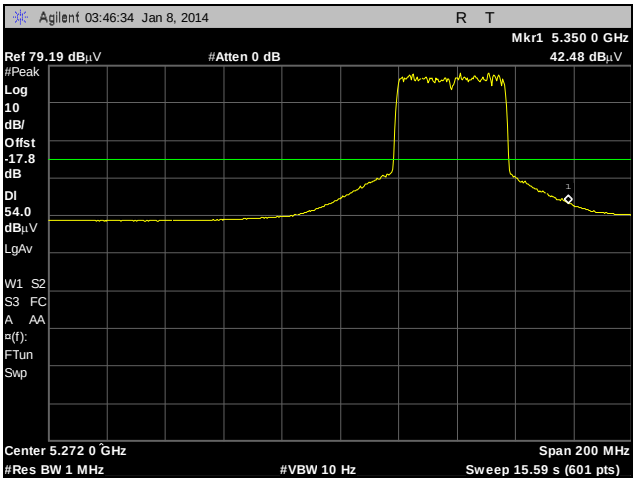
Plot 226. Radiated Band Edge, External Antenna, 802.11a, 5260 MHz, Average



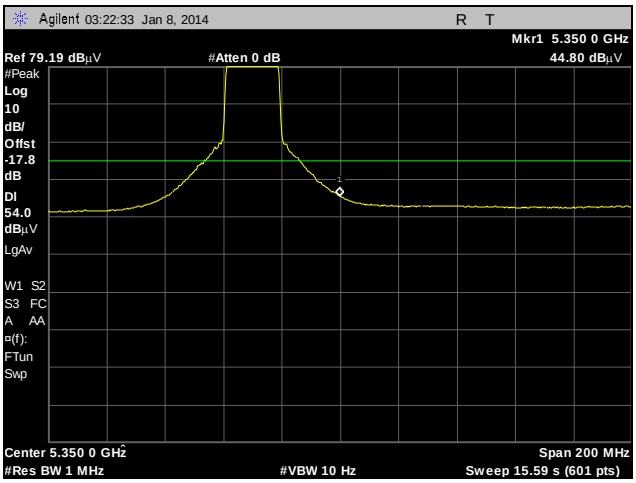
Plot 227. Radiated Band Edge, External Antenna, 802.11n 20 MHz, 5260 MHz, Average



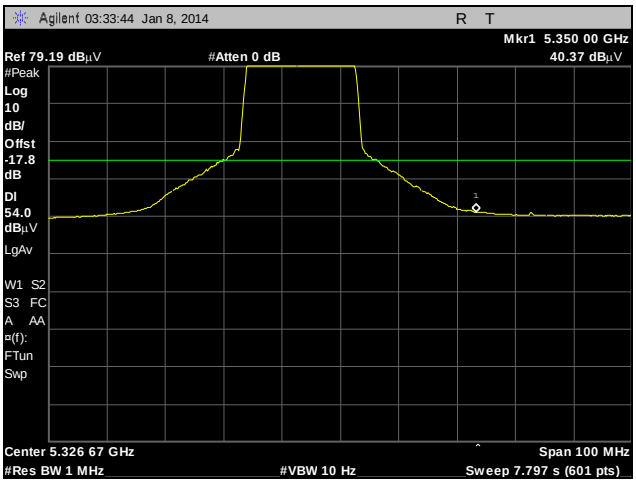
Plot 228. Radiated Band Edge, External Antenna, 802.11n 40 MHz, 5270 MHz, Average



Plot 229. Radiated Band Edge, External Antenna, 802.11n 40 MHz, 5310 MHz, Average



Plot 230. Radiated Band Edge, External Antenna, 802.11a, 5320 MHz, Average



Plot 231. Radiated Band Edge, External Antenna, 802.11n 20 MHz, 5320 MHz, Average

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4300	SEMI-ANECHOIC CHAMBER # 1 (NSA)	EMC TEST SYSTEMS	NONE	07/24/2012	07/24/2015
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	01/08/2013	07/08/2014
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	07/16/2012	07/16/2014
1T4818	COMB GENERATOR	COM-POWER	CGO-520	SEE NOTE	
1T4786	HYGROMETER / THERMOMETER / BAROMETER / DEW POINT PEN	CONTROL COMPANY	15-078-198, FB70423, 245CD	02/01/2012	02/01/2014
1T4149	HIGH-FREQUENCY ANECHOIC CHAMBER	RAY-PROOF	81	NOT REQUIRED	
1T4612	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	07/30/2013	01/30/2015
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	08/06/2012	02/06/2014

Table 18. Test Equipment List

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 commercial 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) 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.

ICES-003 Procedural & Labeling Requirements

From the Industry Canada Electromagnetic Compatibility Advisory Bulletin entitled, "Implementation and Interpretation of the Interference-Causing Equipment Standard for Digital Apparatus, ICES-003" (EMCAB-3, Issue 2, July 1995):

> "At present, CISPR 22: 2002 and ICES technical requirements are essentially equivalent. Therefore, if you have CISPR 22: 2002 approval by meeting CISPR Publication 22, the only additional requirements are: to attach a note to the report of the test results for compliance, indicating that these results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations; to maintain these records on file for the requisite five year period; and to provide the device with a notice of compliance in accordance with ICES-003."

Procedural Requirements:

According to Industry Canada's Interference Causing Equipment Standard for Digital Apparatus ICES-003 Issue 5 August 2012:

Section 6.1: A record of the measurements and results, showing the date that the measurements were completed, shall be retained by the manufacturer or importer for a period of at least five years from the date shown in the record and made available for examination on the request of the Minister.

Section 6.2: A written notice indicating compliance must accompany each unit of digital apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. Where because of insufficient space or other constraints it is not feasible to affix a label to the apparatus, the notice may be in the form of a statement in the users' manual.

Labeling Requirements:

The suggested text for the notice, in English and in French, is provided below, from the Annex of ICES-003:

CAN ICES-3 (A)/NMB-3(A)

End of Report