



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

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February 3, 2014

Meru Networks, Inc.
894 Ross Dr.
Sunnyvale, CA 94089

Dear Rajendran Chary,

Enclosed is the EMC Wireless test report for compliance testing of the Meru Networks, Inc., AP822i 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 Issue 2012 for Unintentional Radiators and Part 15.407 and Industry Canada RSS-210, Annex 9, Issue 8, December 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: (\Meru Networks, Inc.\EMCS37430B-FCC407 (UNII 2) Rev. 3)

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**Electromagnetic Compatibility Criteria
Test Report**

for the

**Meru Networks, Inc.
Model AP822i**

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15 Subpart B & ICES-003
for Class B Digital Devices
&
FCC Part 15.407 & RSS-210, Annex 9
for Intentional Radiators

MET Report: EMCS37430B-FCC407 (UNII 2) Rev. 3

February 3, 2014

Prepared For:

**Meru Networks, Inc.
894 Ross Dr.
Sunnyvale, CA 94089**

Prepared By:
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for Intentional Radiators



Jonathan Chao, 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 and Industry Canada standards ICES-003, Issue 5 Issue 2012, RSS-210 Annex 9 under normal use and maintenance.



Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	June 12, 2013	Initial Issue.
1	July 1, 2013	Revised to add appendix.
2	January 9, 2014	Revised to add additional model.
3	February 3, 2014	Revised to add DFS.

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List of Terms and Abbreviations

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

IV. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Meru Networks, Inc. AP822i, 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 AP822i. Meru Networks, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the AP822i, 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 Meru Networks, Inc., purchase order number 104838. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference	Industry Canada Reference	Description	Results
§15.107	ICES-003 Issue 5 Issue 2012	Conducted Emissions	Compliant
§15.109	ICES-003 Issue 5 Issue 2012	Radiated Emissions	Compliant
§15.203	RSS-GEN 7.1.4	Antenna Requirements	Compliant
§15.207	RSS-GEN 7.2.2; RSS-210 2.2	AC Conducted Emissions 150KHz – 30MHz	Compliant
§15.403 (i)	A8.2	26dB Occupied Bandwidth	Compliant
§15.407 (a)(2)	A9.2(3)	Conducted Transmitter Output Power	Compliant
§15.407 (a)(2)	A9.2(3)	Power Spectral Density	Compliant
§15.407 (a)(6)	N/A	Peak Excursion	Compliant
§15.407 (b)(2), (3), (5), (6)	A9.3(4)	Undesirable Emissions (15.205/15.209 - General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Compliant
§15.407(f)	RSS-GEN	RF Exposure	Compliant
§15.407(g)	2.1	Frequency Stability	Compliant
N/A	RSS-Gen(4.8)	Receiver Spurious Emissions	Compliant
15.407 (h)(2)(ii)	RSS-210 A9.4.b.ii	Initial Channel Availability Check Time	Compliant
15.407 (h)	--	DFS Bandwidth	Compliant
15.407 (h)(2)(ii)	RSS-210 A9.4.b.ii	Radar Burst at the Beginning of Channel Availability Check Time	Compliant
15.407 (h)(2)(ii)	RSS-210 A9.4.b.ii	Radar Burst at the End of Channel Availability Check Time	Compliant
15.407 (h)(2)(iii)	RSS-210 A9.4.b.iii and A9.4.b.iv	Channel Move Time and Channel Closing Time	Compliant
15.407 (h)(2)(iv)	RSS-210 A9.4.b.v	Non-Occupancy Period	Compliant
15.407 (h)(2)	N/A	Statistical Performance Check	Compliant

Table 1. Executive Summary of EMC Part 15.407 Compliance Testing

V. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Meru Networks, Inc. to perform testing on the AP822i, under Meru Networks, Inc.'s purchase order number 104838.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Meru Networks, Inc. AP822i.

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

Model(s) Tested:	AP822i	
Model(s) Covered:	AP822i	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: RE7-AP822I IC: 6749A-AP822I	
	Type of Modulations:	OFDM
	Equipment Code:	NII
	Peak RF Output Power:	21.21 dBm
	EUT Frequency Ranges:	5260 – 5310 MHz 5500 – 5580 MHz 5660 – 5700 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Jonathan Chao	
Report Date(s):	February 3, 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 Issue 2012	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
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., 3162 Belick St., Santa Clara, CA 95054. 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 Meru Networks, Inc. AP822i, Equipment Under Test (EUT), is an 802.11AC wireless access point (WAP) that allows wireless devices to connect to a wired network using Wi-Fi, standard. The WAP usually connects to a router (via a wired network), and can relay data between the wireless devices (such as computers or printers) and wired devices on the network. The APP822i is exactly the same as the AP822i. The only difference is that one of the chains in the 3x3 MIMO configurations is terminated.



Photograph 1. Meru Networks, Inc. AP822i

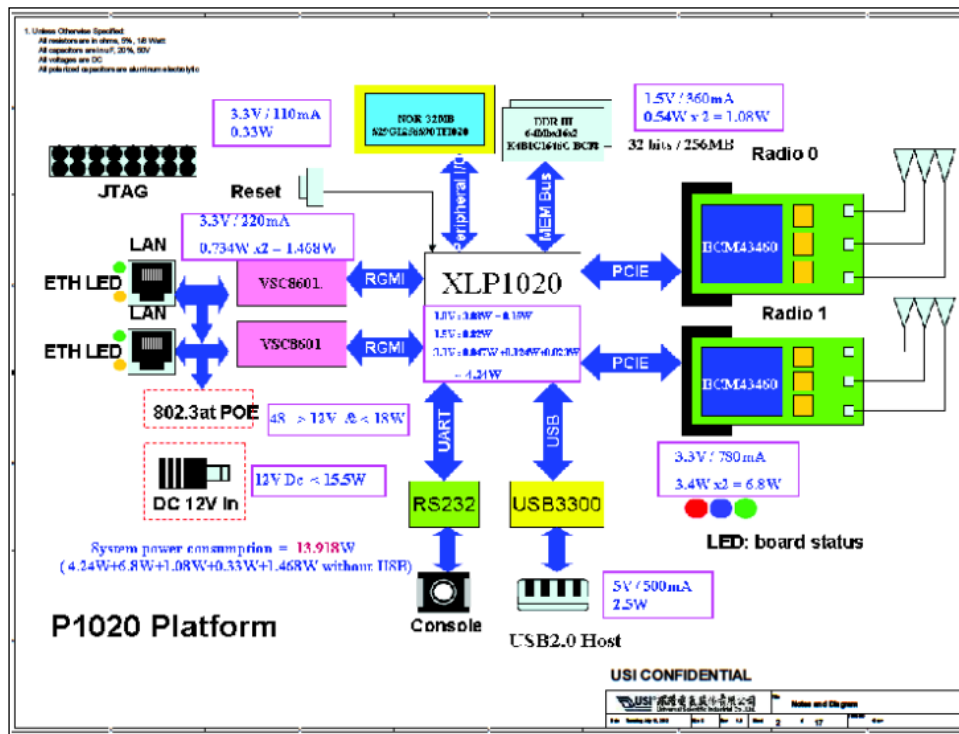


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

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

Ref. ID	Name / Description	Model Number	Serial Number
1	Dual Radio Access Point	AP822i	4812A832i112533
2	Dual Radio Access Point	AP822i	4812A832i112523

Table 4. Equipment Configuration

F. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Type	Model and Serial Number
PoE	PD-9001GR/AC
Cable	Serial cable
Cable	Ethernet cable

Table 5. Support Equipment

G. Ports and Cabling Information

The EUT did not require any ports and cabling information for operation or monitoring.

H. Mode of Operation

During the normal operation the configuration is controlled by the Meru controller which sets the country code, ESSID, Operating frequency band and Channel etc.

I. Method of Monitoring EUT Operation

During the normal operation with controller Green or Blue LED indication on the Access point indicate the normal operation of the Access point. A Red LED indicates a failure of hardware or software settings.

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 Meru Networks, 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 6. 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 6. 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 (dB μ V)		*Class B Conducted Limits (dB μ V)	
	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.

* -- Limits per Subsection 15.207(a).

Table 6. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b) and 15.207(a)

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 50 Ω /50 μ H 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 B requirement(s) of this section. Measured emissions were below applicable limits.

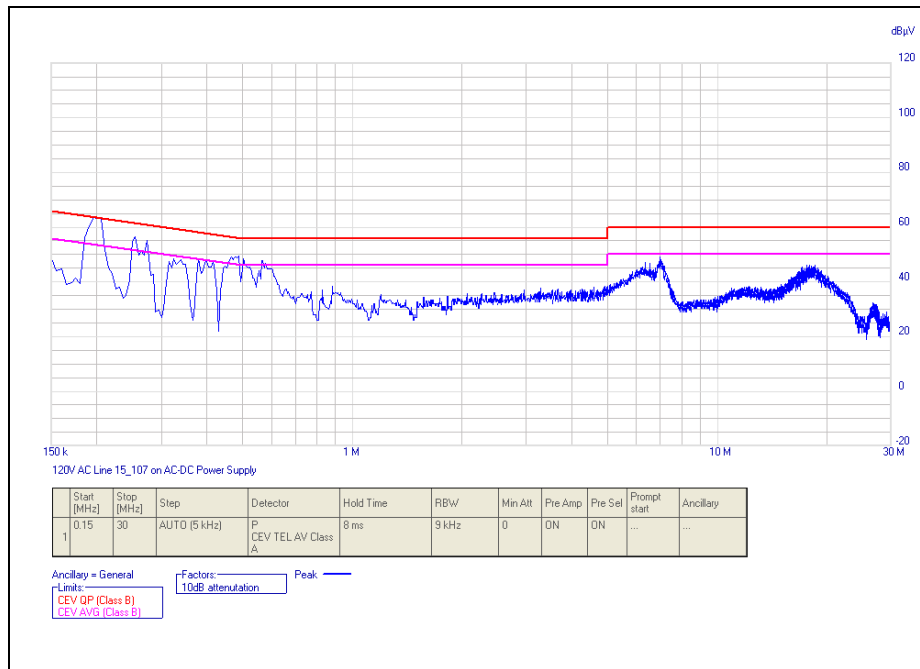
Test Engineer(s): Joseph Dizon

Test Date(s): 01/31/13 & 02/01/13

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

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Line 15.107	0.195	63.56	63.827	-0.267	Pass	42.56	53.827	-11.267	Pass
120V AC Line 15.107	0.255	55.66	61.605	-5.945	Pass	33.14	51.605	-18.465	Pass
120V AC Line 15.107	0.275	54.34	60.979	-6.639	Pass	32.31	50.979	-18.669	Pass

Table 7. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz), AC-DC Power Supply

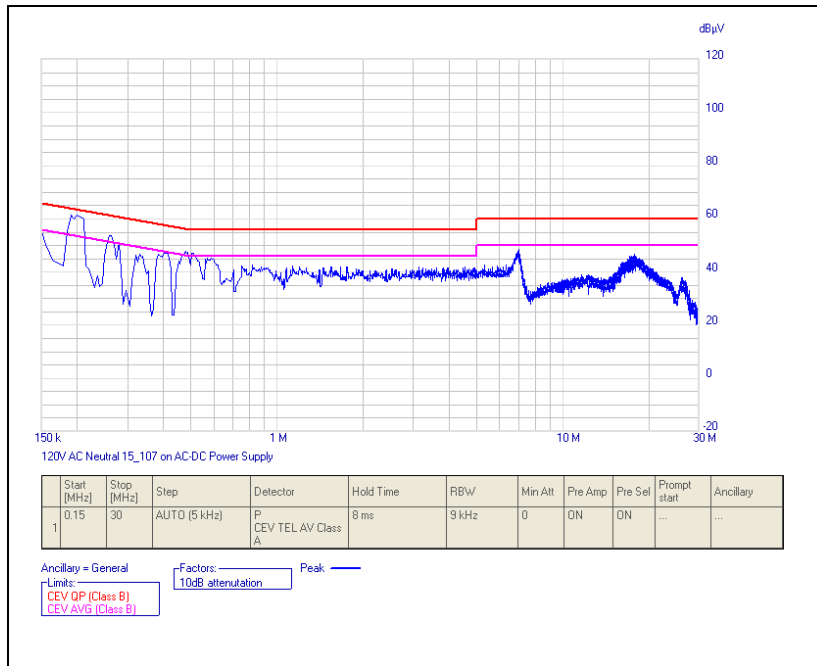


Plot 1. Conducted Emission, Phase Line Plot, AC-DC Power Supply

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

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Neutral 15.107	0.15	53.23	66	-12.77	Pass	23.71	56	-32.29	Pass
120V AC Neutral 15.107	0.2	57.39	63.617	-6.227	Pass	38.46	53.617	-15.157	Pass
120V AC Neutral 15.107	0.265	48.4	61.286	-12.886	Pass	33.07	51.286	-18.216	Pass

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

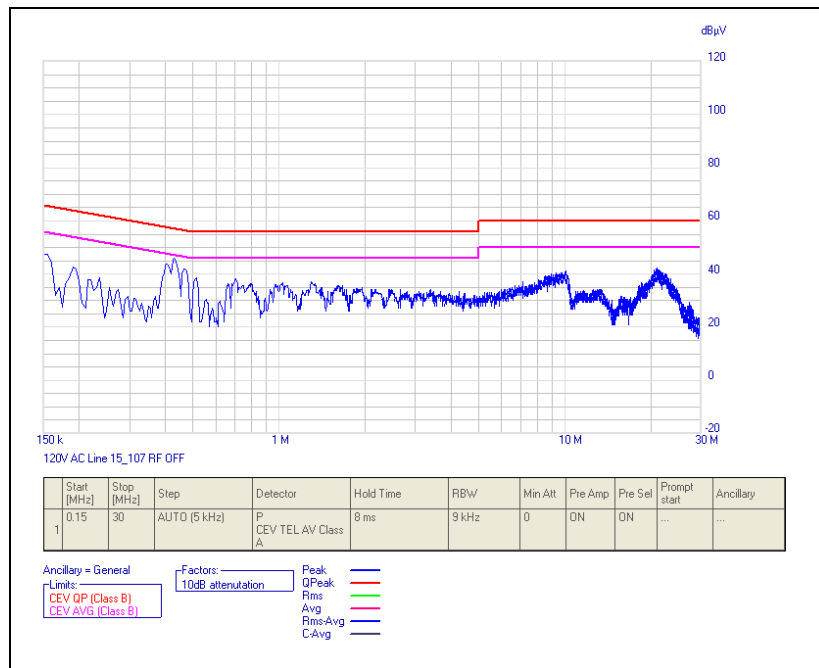


Plot 2. Conducted Emission, Neutral Line Plot, AC-DC Power Supply

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

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Line 15.107	0.155	51.05	65.728	-14.678	Pass	34.3	55.728	-21.428	Pass
120V AC Line 15.107	0.405	44	57.773	-13.773	Pass	34.78	47.773	-12.993	Pass
120V AC Line 15.107	0.43	46.68	57.277	-10.597	Pass	39	47.277	-8.277	Pass

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

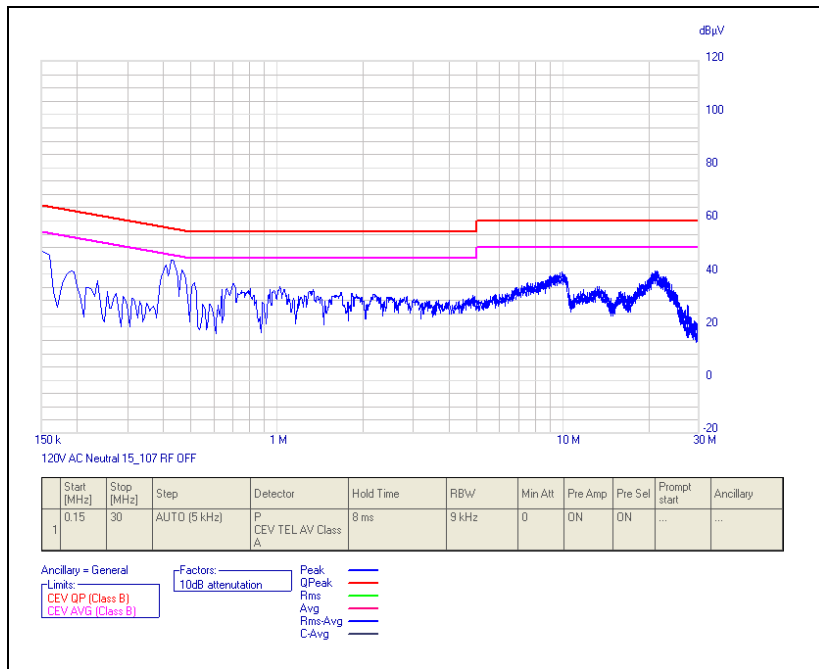


Plot 3. Conducted Emission, Phase Line Plot, PoE

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

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Neutral 15.107	0.15	53.73	66	-12.27	Pass	31.84	56	-24.16	Pass
120V AC Neutral 15.107	0.41	43.5	57.671	-14.171	Pass	28.96	47.671	-18.711	Pass
120V AC Neutral 15.107	0.43	46.04	57.277	-11.237	Pass	38.26	47.277	-9.017	Pass

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

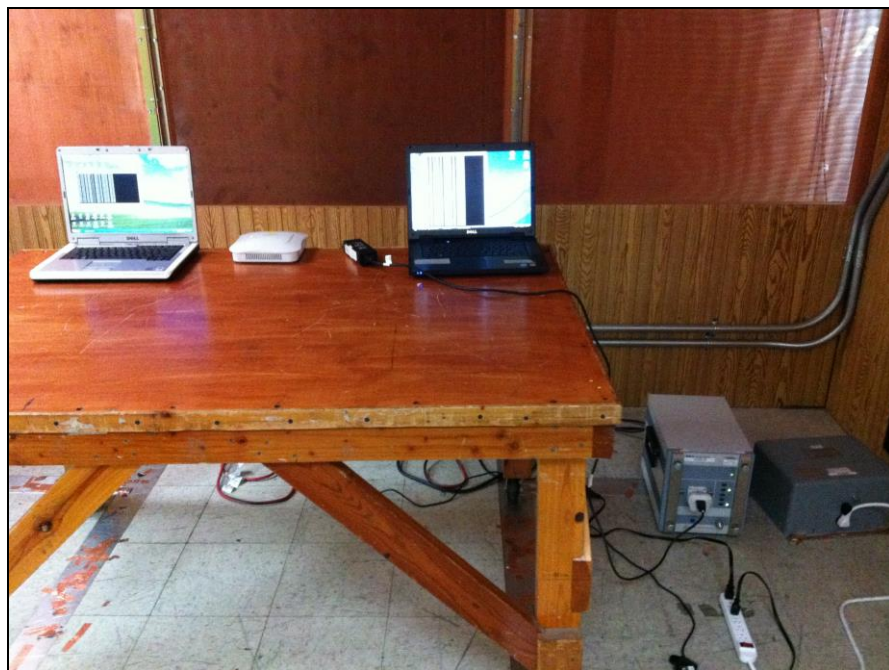


Plot 4. Conducted Emission, Neutral Line Plot, PoE

Conducted Emission Limits Test Setup



Photograph 2. Conducted Emissions, Test Setup, AC-DC Power Supply



Photograph 3. Conducted Emissions, Test Setup, PoE

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 (dB μ V/m)	
	§15.109 (b), Class A Limit (dB μ V) @ 10m	§15.109 (a), Class B Limit (dB μ V) @ 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 10m 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 B requirement(s) of this section. Measured emissions were below applicable limits.

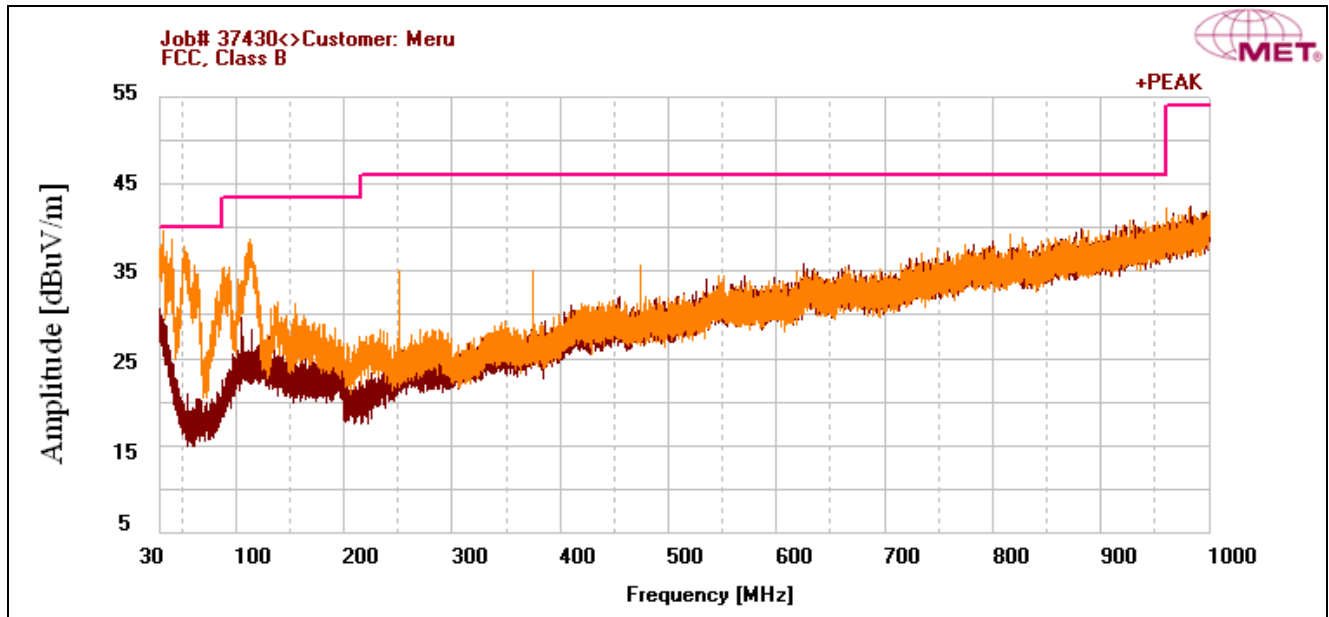
Test Engineer(s): John Frank & Joseph Dizon

Test Date(s): 01/18/13

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
32.64	V	330	100	38.854	17.116	30.506	0	10.46	35.924	40	-4.076
53.244	V	190	100	48.646	7.051	30.299	0	10.46	35.858	40	-4.142
113.707	V	235	100	44.356	12.3	29.496	0	10.46	37.62	43.5	-5.88
249.977	V	150	100	28.837	12.098	28.335	0	10.46	23.06	46	-22.94
374.978	V	150	100	28.837	12.098	28.335	0	10.46	23.06	46	-22.94
475.008	V	172	100	34.121	16.801	27.167	0	10.46	34.215	46	-11.785

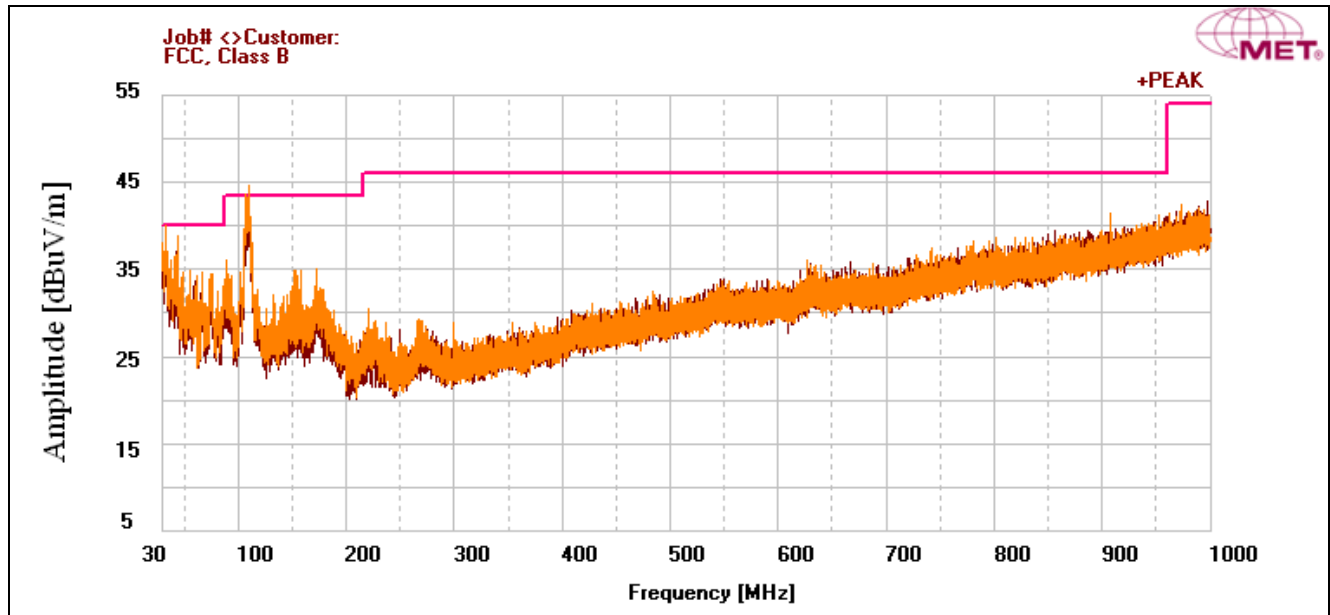
Table 11. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, FCC Limits



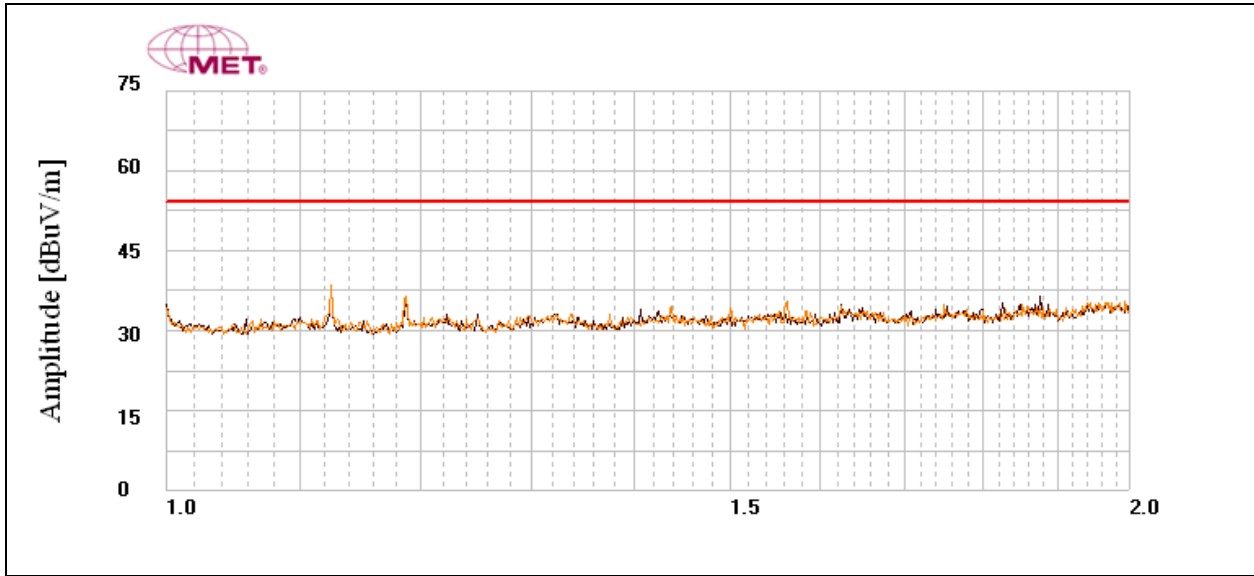
Plot 5. Radiated Emissions, 30 MHz - 1 GHz, FCC Limits, AC-DC Power Supply

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
109.416	V	227	100	47.163	12.1	29.538	0	10.46	40.185	43.5	-3.315
109.696	V	260	100	47.27	12.1	29.535	0	10.46	40.295	43.5	-3.205
32.68	V	35	100	38.483	17.092	30.505	0	10.46	35.53	40	-4.47
43.826	V	337	100	45.557	10.722	30.399	0	10.46	36.34	40	-3.66
157.394	V	296	100	37.557	10	29.068	0	10.46	28.949	43.5	-14.551
173.118	V	43	100	41.059	9.7	28.913	0	10.46	32.306	43.5	-11.194

Table 12. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, FCC Limits



Plot 6. Radiated Emissions, 30 MHz - 1 GHz, FCC Limits, PoE

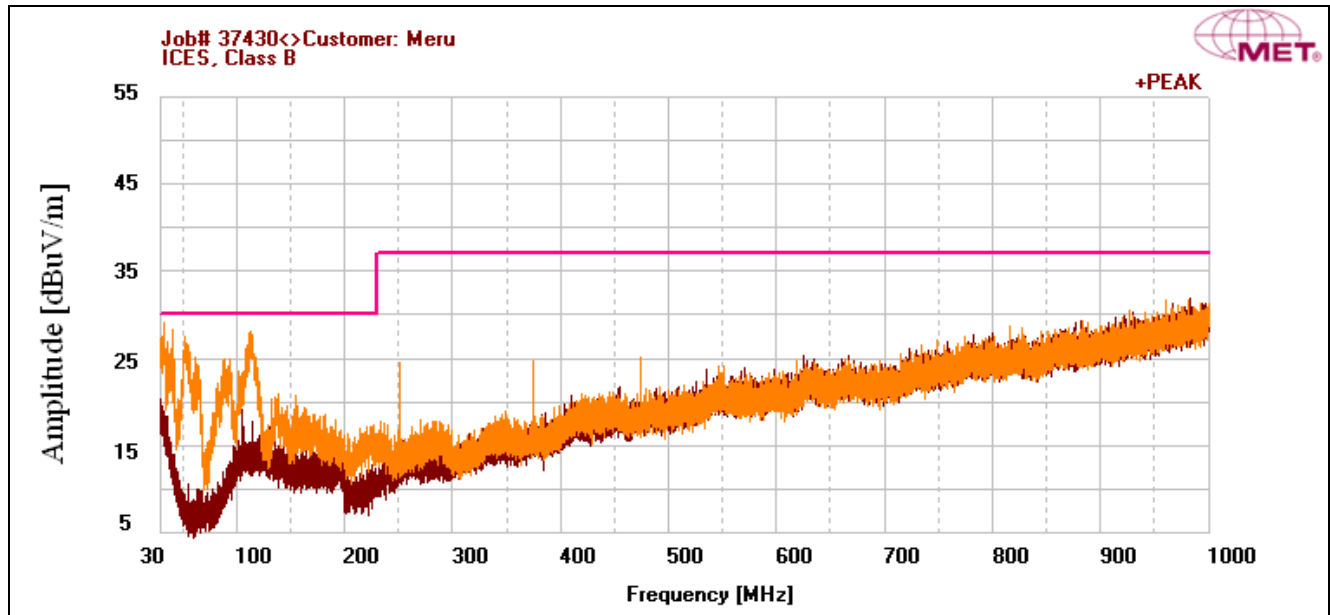


Plot 7. Radiated Emissions, Above 1 GHz, FCC Limits, PoE

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
32.64	V	330	100	38.854	17.116	30.506	0	0	25.464	30	-4.536
53.244	V	190	100	48.646	7.051	30.299	0	0	25.398	30	-4.602
113.707	V	235	100	44.356	12.3	29.496	0	0	27.16	30	-2.84
249.977	V	150	100	28.837	12.098	28.335	0	0	12.6	37	-24.4
374.978	V	150	100	28.837	12.098	28.335	0	0	12.6	37	-24.4
475.008	V	172	100	34.121	16.801	27.167	0	0	23.755	37	-13.245

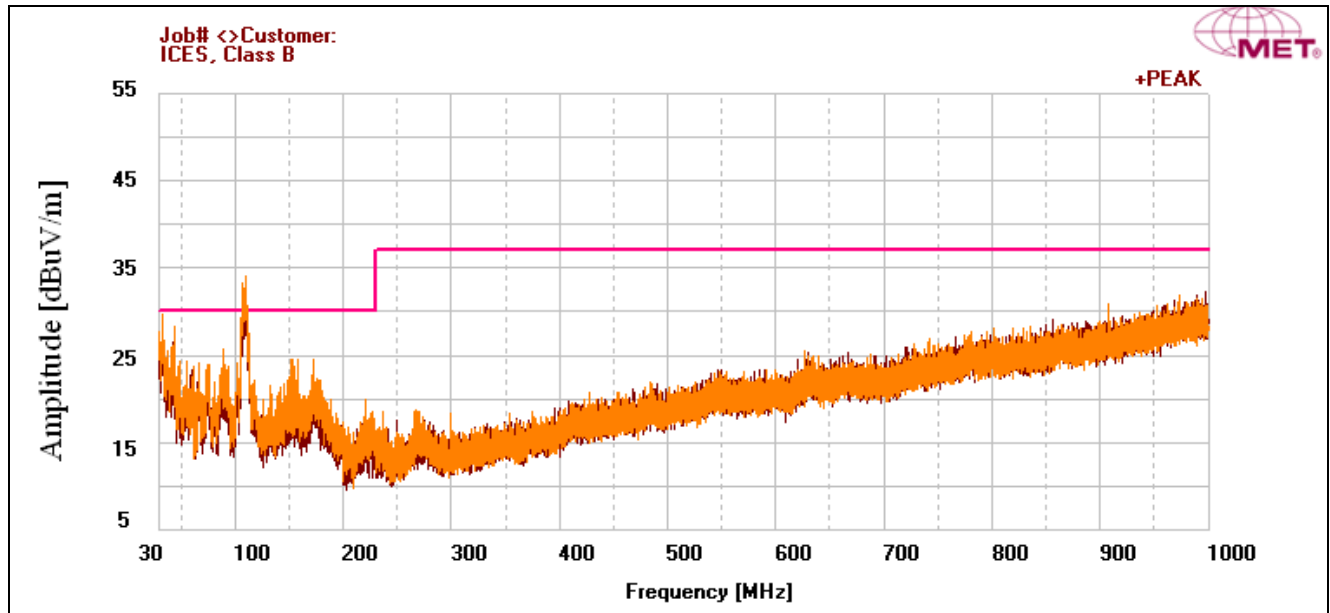
Table 13. Radiated Emissions Limits, Test Results, ICES-003 Limits



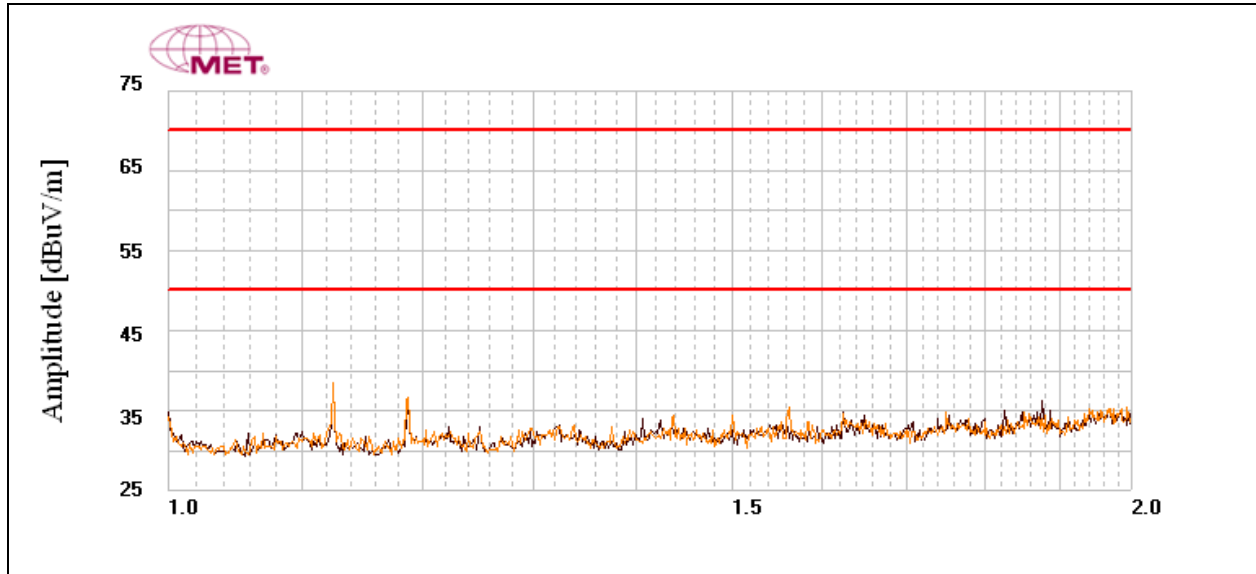
Plot 8. Radiated Emissions, ICES-003 Limits, AC-DC Power Supply

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
109.416	V	227	100	47.163	12.1	29.538	0	0	29.725	30	-0.275
109.696	V	260	100	47.27	12.1	29.535	0	0	29.835	30	-0.165
32.68	V	35	100	38.483	17.092	30.505	0	0	25.07	30	-4.93
43.826	V	337	100	45.557	10.722	30.399	0	0	25.88	30	-4.12
157.394	V	296	100	37.557	10	29.068	0	0	18.489	30	-11.511
173.118	V	43	100	41.059	9.7	28.913	0	0	21.846	30	-8.154

Table 14. Radiated Emissions Limits, Test Results, ICES-003 Limits



Plot 9. Radiated Emissions, ICES-003 Limits, PoE



Plot 10. Radiated Emissions, Above 1 GHz, ICES-003 Limits, PoE
Above 1 GHz

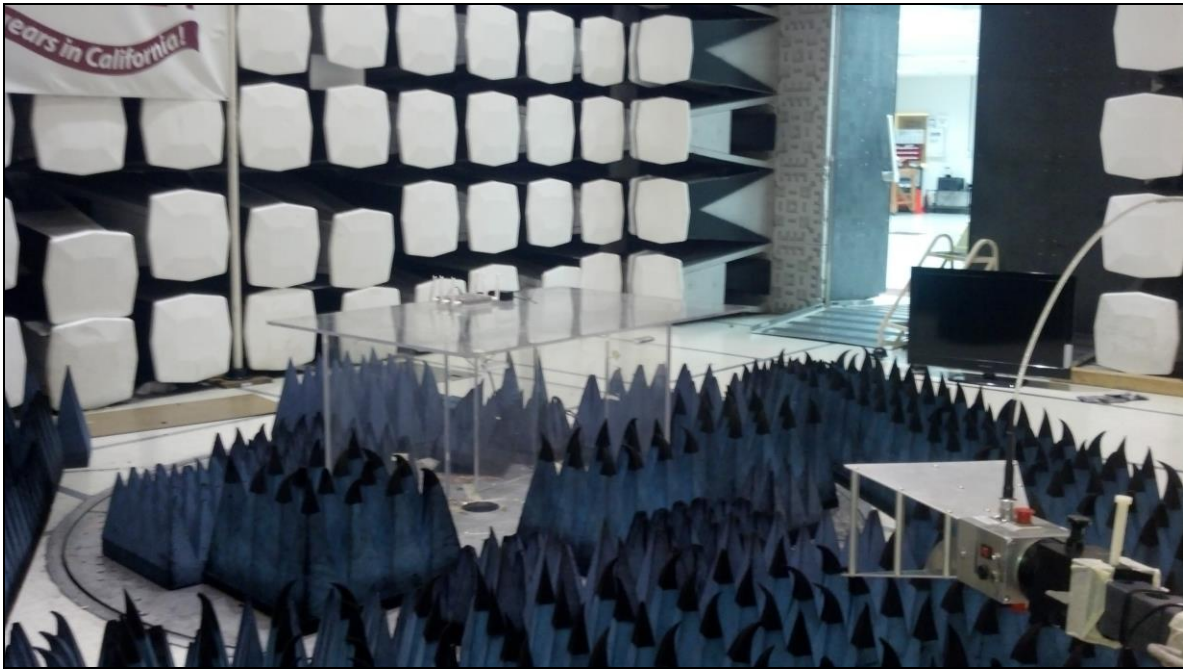
Radiated Emission Limits Test Setup



Photograph 4. Radiated Emission, Test Setup, AC-DC Power Supply



Photograph 5. Radiated Emission, Test Setup, PoE



Photograph 6. Radiated Emission, Test Setup, Above 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. Antenna is integrated with the unit.

Test Engineer(s): Jonathan Chao

Test Date(s): 02/18/13

Gain (dBi)		Antenna Description	Manufacturer	Model Number
2.4 GHz	5 GHz			
3	4	Internal PIFA Dual-Band 3 x 3	Meru	MERU-P1623

Table 15. Antenna List

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s): § 15.207 (a): For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Σ line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dB μ V)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 16. 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 μ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2003 "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 μ H 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.

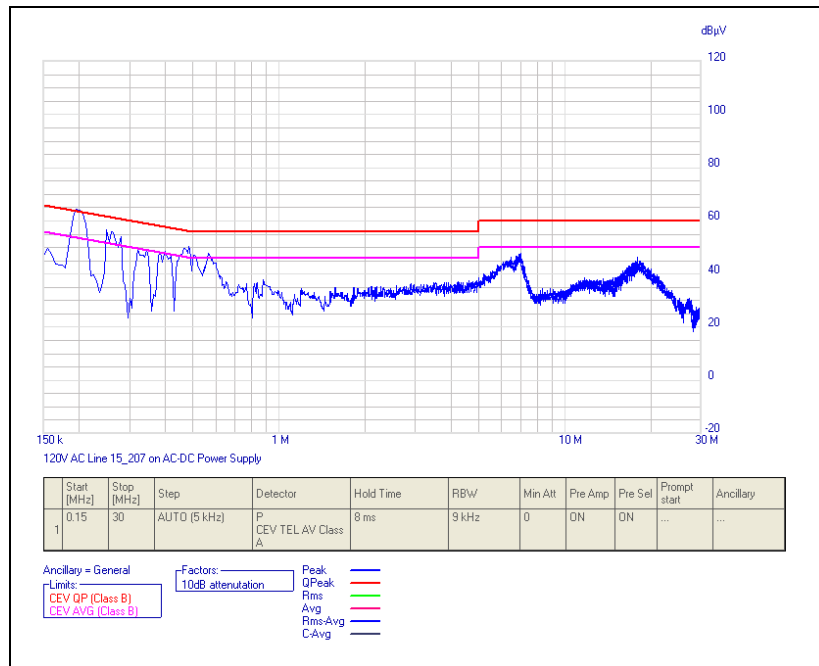
Test Engineer(s): Joseph Dizon

Test Date(s): 01/31/13 & 02/01/13

15.207(a) Conducted Emissions Test Results, AC-DC Power Supply

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Line 15.207	0.195	63.35	63.827	-0.477	Pass	43.02	53.827	-10.807	Pass
120V AC Line 15.207	0.25	55.66	61.769	-6.109	Pass	30.01	51.769	-21.759	Pass
120V AC Line 15.207	0.485	51.48	56.26	-4.78	Pass	32.42	46.26	-13.84	Pass

Table 17. Conducted Emissions, 15.207(a), Phase Line, Test Results, AC-DC Power Supply

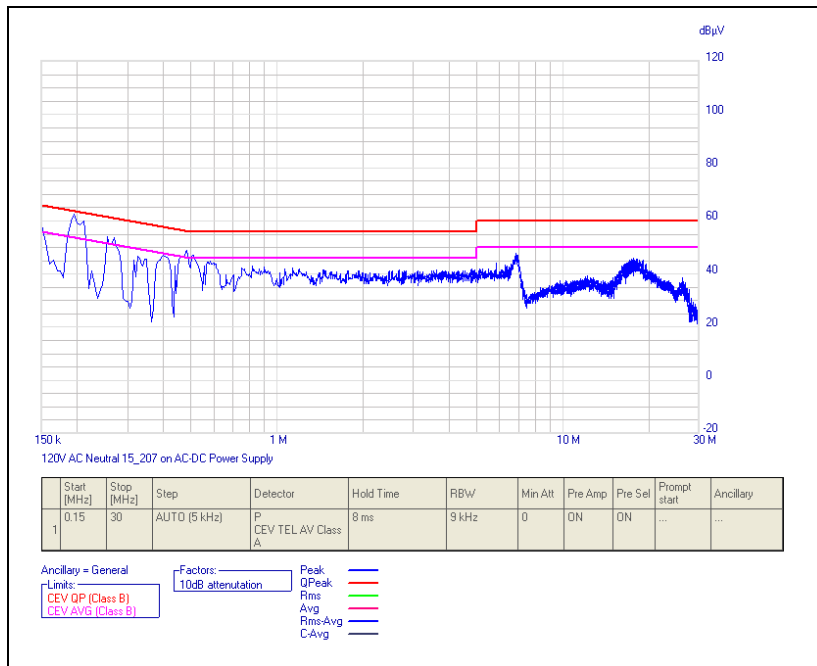


Plot 11. Conducted Emissions, 15.207(a), Phase Line, AC-DC Power Supply

15.207(a) Conducted Emissions Test Results, AC-DC Power Supply

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Neutral 15.207	0.15	53.37	66	-12.63	Pass	23.86	56	-32.14	Pass
120V AC Neutral 15.207	0.195	62.75	63.827	-1.077	Pass	39.32	53.827	-14.507	Pass
120V AC Neutral 15.207	0.255	54.71	61.605	-6.895	Pass	30.65	51.605	-20.955	Pass

Table 18. Conducted Emissions, 15.207(a), Neutral Line, Test Results, AC-DC Power Supply

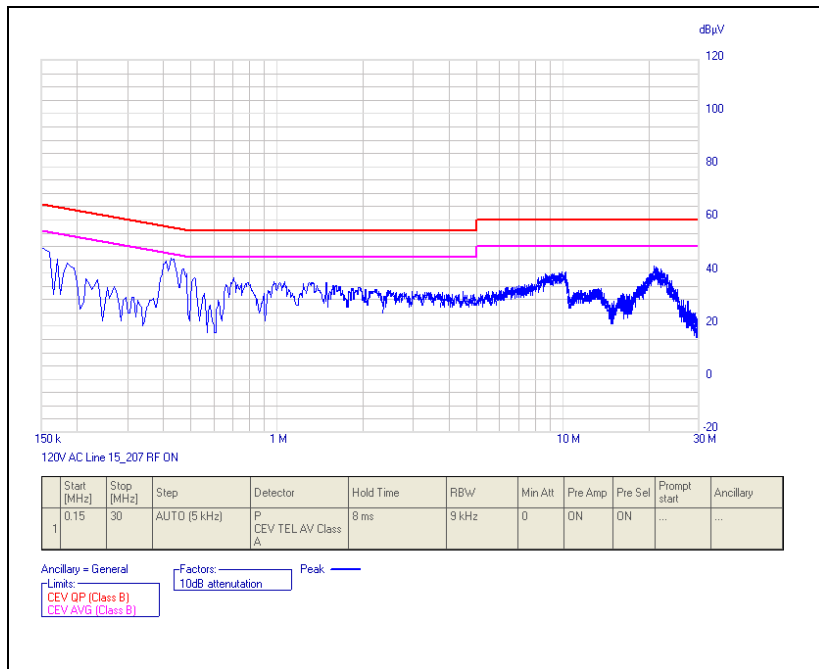


Plot 12. Conducted Emissions, 15.207(a), Neutral Line, AC-DC Power Supply

15.207(a) Conducted Emissions Test Results, PoE

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Line 15.207	0.15	62.57	66	-3.43	Pass	45.33	56	-10.67	Pass
120V AC Line 15.207	0.17	45.72	64.963	-19.243	Pass	18.68	54.963	-36.283	Pass
120V AC Line 15.207	0.425	46.58	57.373	-10.793	Pass	33.82	47.373	-13.553	Pass

Table 19. Conducted Emissions, 15.207(a), Phase Line, Test Results, PoE

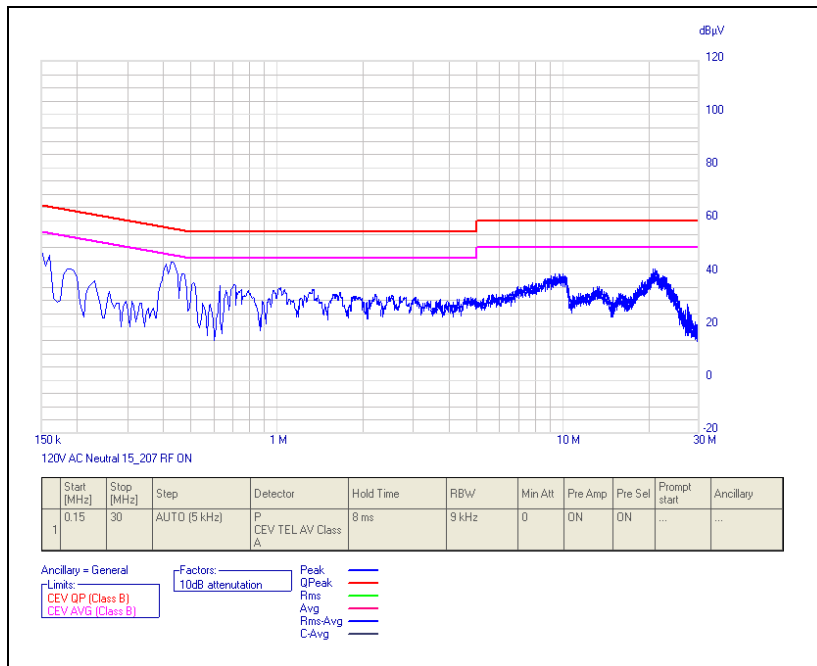


Plot 13. Conducted Emissions, 15.207(a), Phase Line, PoE

15.207(a) Conducted Emissions Test Results, PoE

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
120V AC Neutral 15.207	0.15	62.65	66	-3.35	Pass	44.02	56	-11.98	Pass
120V AC Neutral 15.207	0.43	43.2	57.277	-14.077	Pass	38.2	47.277	-9.077	Pass
120V AC Neutral 15.207	21.095	56.84	60	-3.16	Pass	48.62	50	-1.38	Pass

Table 20. Conducted Emissions, 15.207(a), Neutral Line, Test Results, PoE



Plot 14. Conducted Emissions, 15.207(a), Neutral Line, PoE

15.207(a) Conducted Emissions Test Setup Photo



Photograph 7. Conducted Emissions, 15.207(a), Test Setup, AC-DC Power Supply



Photograph 8. Conducted Emissions, 15.207(a), Test Setup, PoE

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.403(c) 26dB Bandwidth

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

Test Procedure: The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 26 dB Bandwidth was measured and recorded.

Test Results The 26 dB Bandwidth was compliant with the requirements of this section and was determined from the plots on the following pages.

Test Engineer(s): Jonathan Chao

Test Date(s): 02/18/13

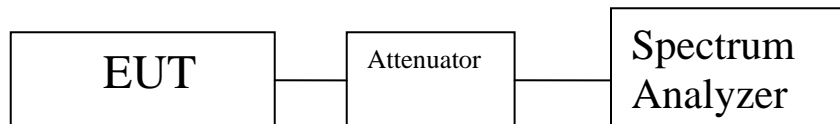


Figure 2. Occupied Bandwidth, Test Setup

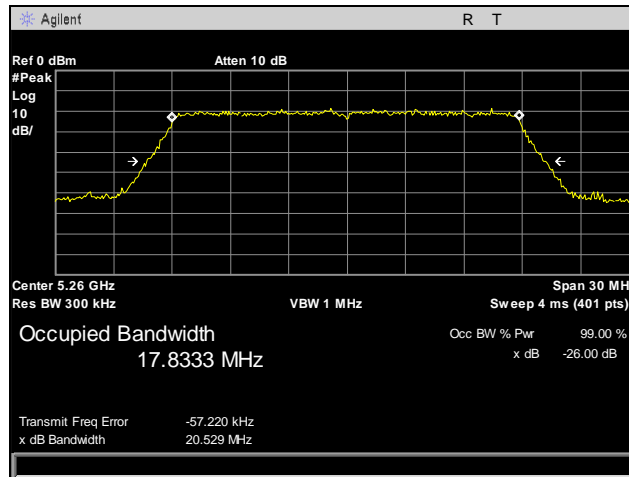
Mode	Channel	Frequency (MHz)	Port	26dB Bandwidth (MHz)
802.11a	Low	5260	1	20.529
	Mid	5300	1	20.566
	High	5320	1	20.437
802.11n HT20	Low	5260	1	20.676
			2	20.564
			3	20.717
	Mid	5300	1	20.695
			2	20.432
			3	20.553
	High	5320	1	20.653
			2	20.434
			3	20.542
802.11n HT40	Low	5270	1	41.091
			2	40.875
			3	40.696
	High	5310	1	40.933
			2	40.871
			3	40.837
802.11n HT80	--	5290	1	82.437
			2	82.475
			3	82.265
802.11a	Low	5500	1	20.544
	Mid	5580	1	20.560
	High	5700	1	20.439
802.11n HT20	Low	5500	1	20.679
			1	20.498
			1	20.630
	Mid	5580	1	20.521
			2	20.513
			3	20.617
	High	5700	1	20.690
			2	20.518
			3	20.586
802.11n HT40	Low	5510	1	40.878
			2	40.963
			3	40.925
	Mid	5550	1	41.254
			2	40.717
			3	40.644
	High	5670	1	41.039
			2	40.834
			3	40.873
802.11n HT80	Low	5530	1	82.597
			2	82.019
			3	82.458
	Mid	5610	1	82.893
			2	82.041
			3	82.199

Table 21. 26 dB Occupied Bandwidth, Test Results

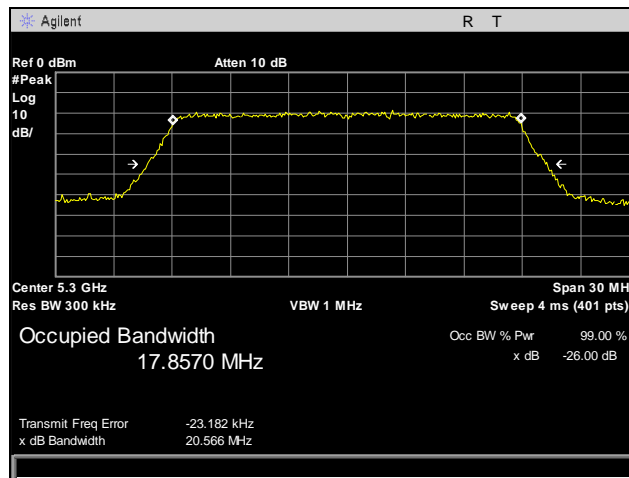
Mode	Channel	Frequency (MHz)	Port	99% Bandwidth (MHz)
802.11a	Low	5260	1	16.5588
	Mid	5300	1	16.5346
	High	5320	1	16.5016
802.11n HT20	Low	5260	1	17.6682
			2	17.7954
			3	17.7287
	Mid	5300	1	17.7427
			2	17.5887
			3	17.6392
	High	5320	1	17.7015
			2	17.7339
			3	17.3037
802.11n HT40	Low	5270	1	36.3529
			2	36.5301
			3	36.4923
	High	5310	1	36.6054
			2	36.6231
			3	36.8203
802.11n HT80	--	5290	1	75.3184
			2	75.1250
			3	75.2550
802.11a	Low	5500	1	16.6043
	Mid	5580	2	16.5763
	High	5700	3	16.5139
802.11n HT20	Low	5500	1	17.6960
			2	17.6949
			3	17.7244
	Mid	5580	1	17.6654
			2	17.5580
			3	17.7043
	High	5700	1	17.7007
			2	17.6299
			3	17.7272
802.11n HT40	Low	5510	1	36.4466
			2	36.1125
			3	35.8052
	Mid	5550	1	36.0200
			2	36.6307
			3	36.6126
	High	5670	1	36.3228
			2	36.6325
			3	36.5958
802.11n HT80	Low	5530	1	75.8819
			2	74.3955
			3	75.1427
	Mid	5610	1	75.0579
			2	75.5720
			3	75.5991

Table 22. 99% Occupied Bandwidth, Test Results

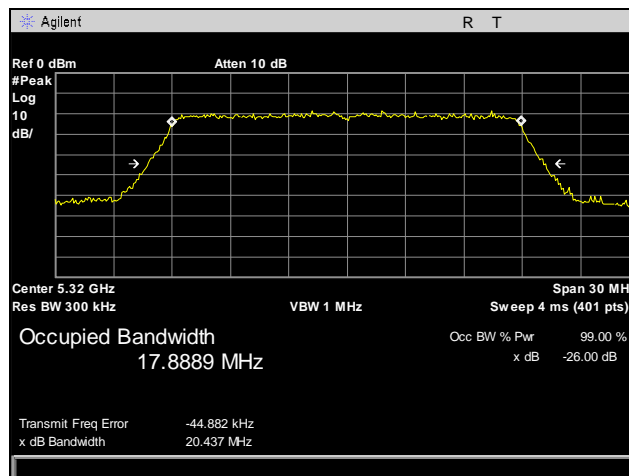
26 dB Occupied Bandwidth, 802.11a, Lower Band



Plot 15. 26 dB Occupied Bandwidth, 802.11a, Port 1, Low Channel, 5260 MHz

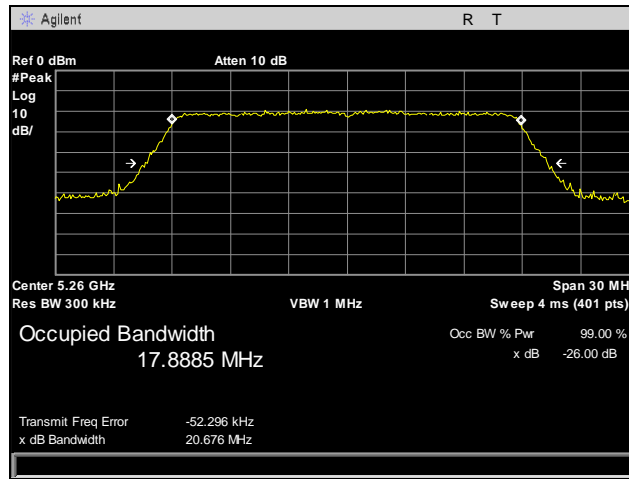


Plot 16. 26 dB Occupied Bandwidth, 802.11a, Port 1, Mid Channel, 5300 MHz

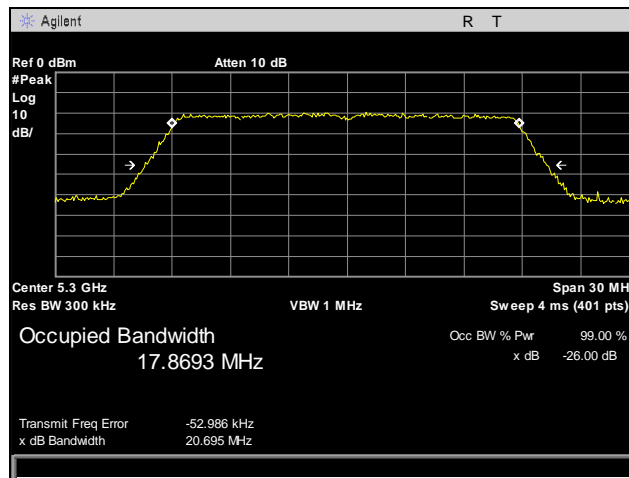


Plot 17. 26 dB Occupied Bandwidth, 802.11a, Port 1, High Channel, 5320 MHz

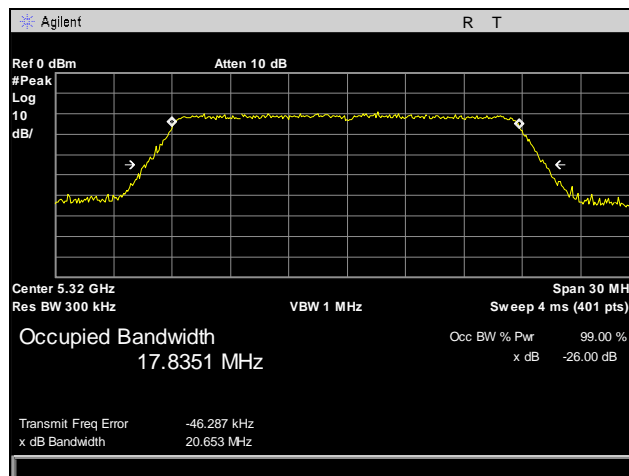
26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, Lower Band



Plot 18. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, Low Channel, 5260 MHz

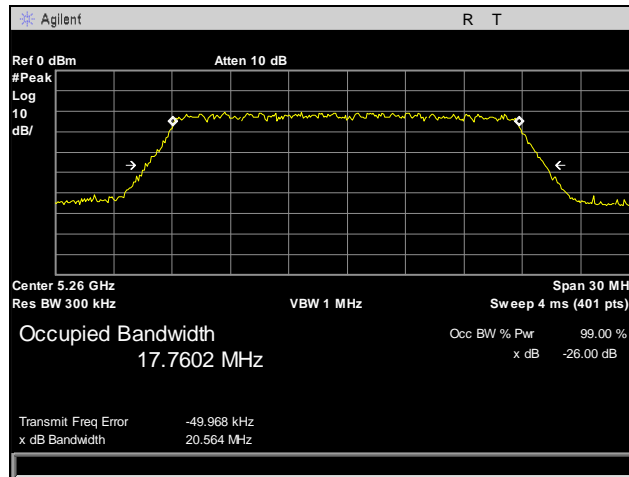


Plot 19. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, Mid Channel, 5300 MHz

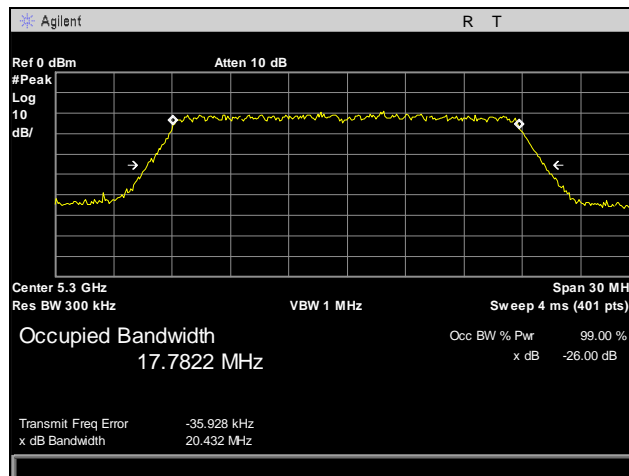


Plot 20. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, High Channel, 5320 MHz

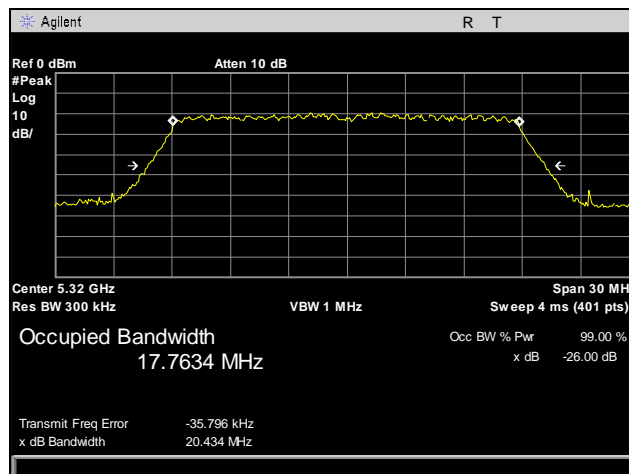
26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, Lower Band



Plot 21. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, Low Channel, 5260 MHz

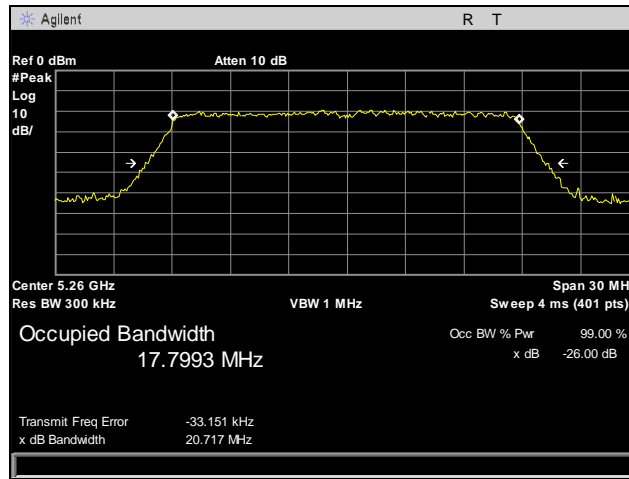


Plot 22. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, Mid Channel, 5300 MHz

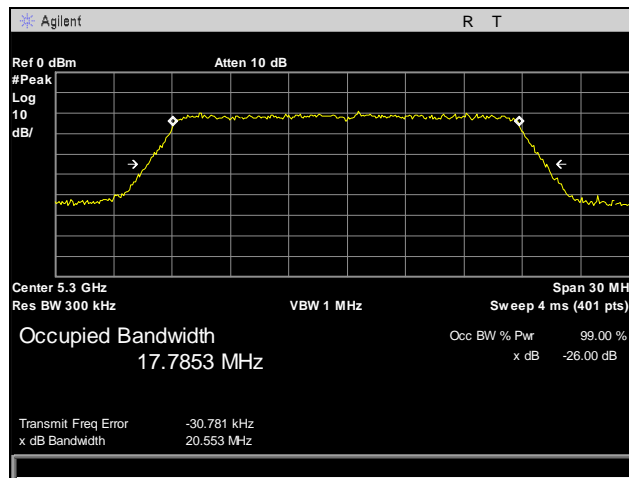


Plot 23. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, High Channel, 5320 MHz

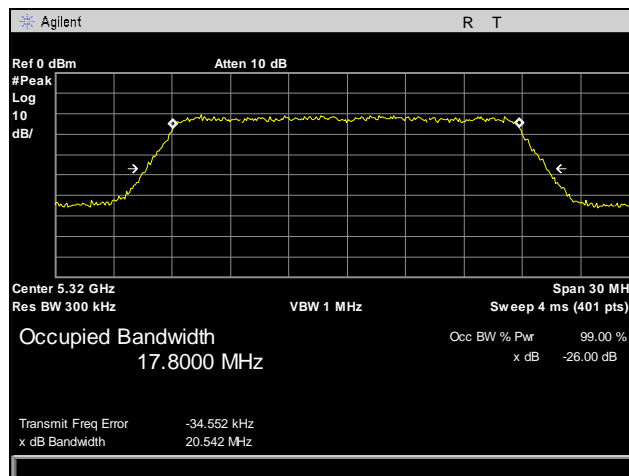
26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, Lower Band



Plot 24. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, Low Channel, 5260 MHz

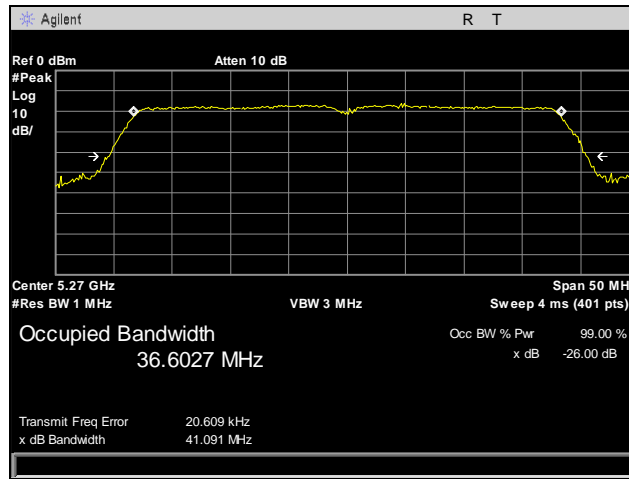


Plot 25. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, Mid Channel, 5300 MHz

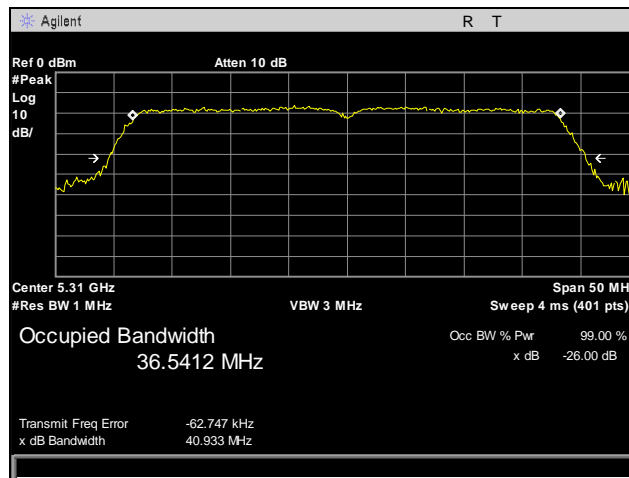


Plot 26. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, High Channel, 5320 MHz

26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 1, Lower Band

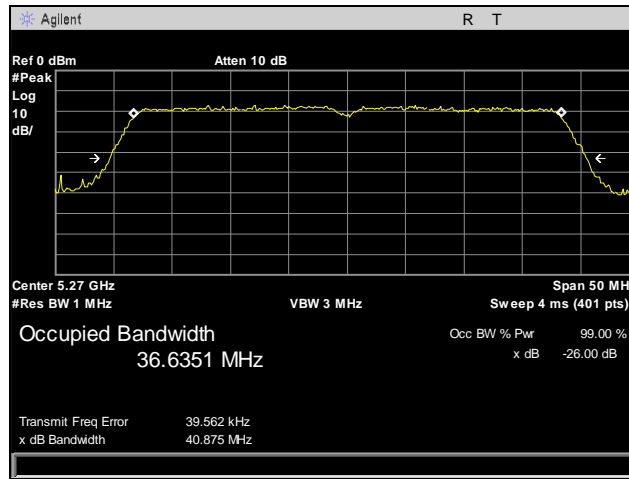


Plot 27. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 1, Low Channel, 5270 MHz

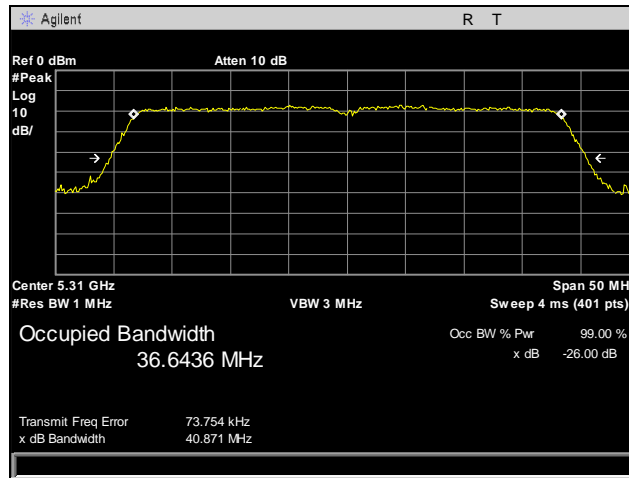


Plot 28. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 1, High Channel, 5310 MHz

26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 2, Lower Band

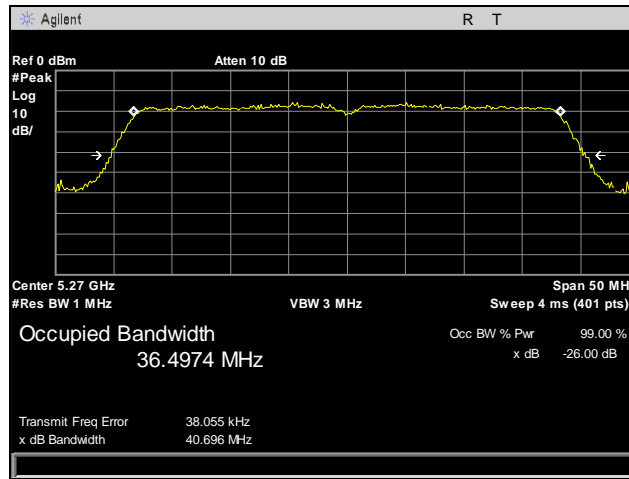


Plot 29. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 2, Low Channel, 5270 MHz

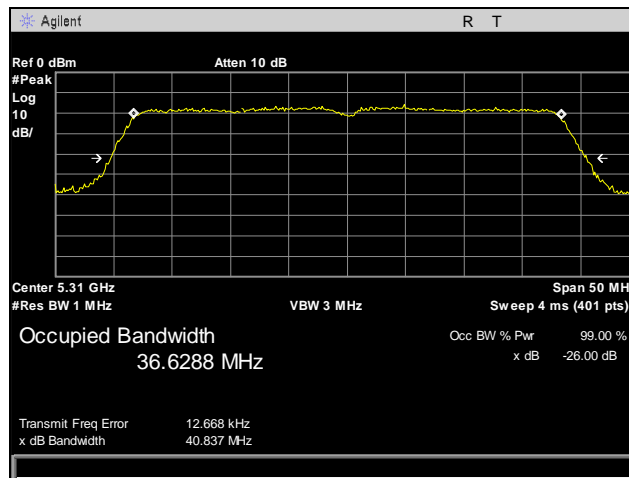


Plot 30. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 2, High Channel, 5310 MHz

26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 3, Lower Band

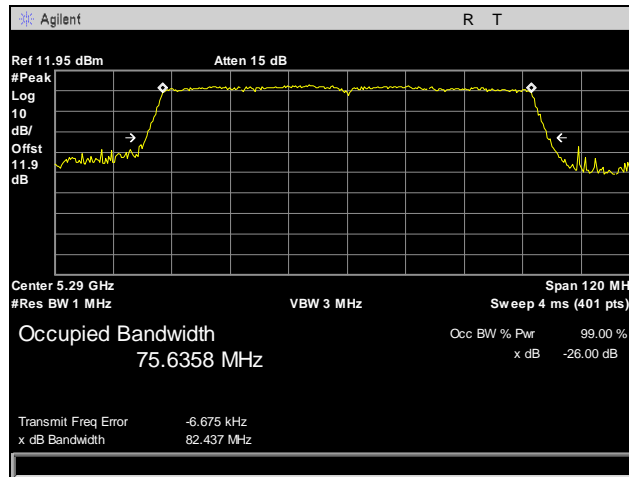


Plot 31. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 3, Low Channel, 5270 MHz

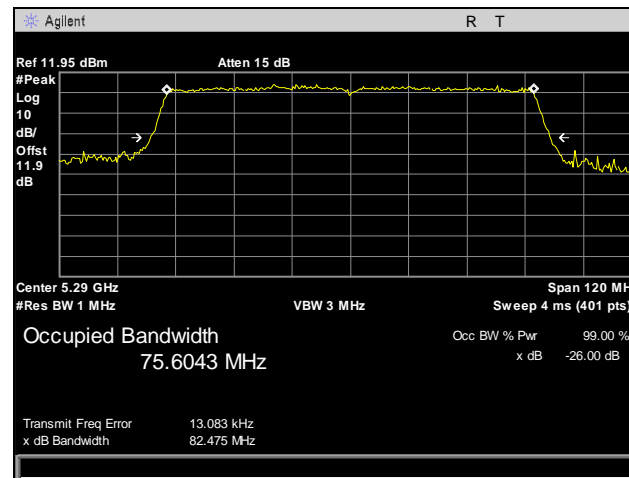


Plot 32. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 3, High Channel, 5310 MHz

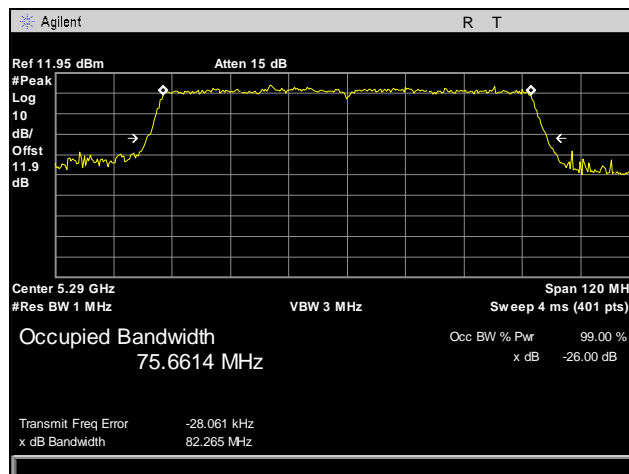
26 dB Occupied Bandwidth, 802.11n 80 MHz, Lower Band



Plot 33. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 1, 5290 MHz

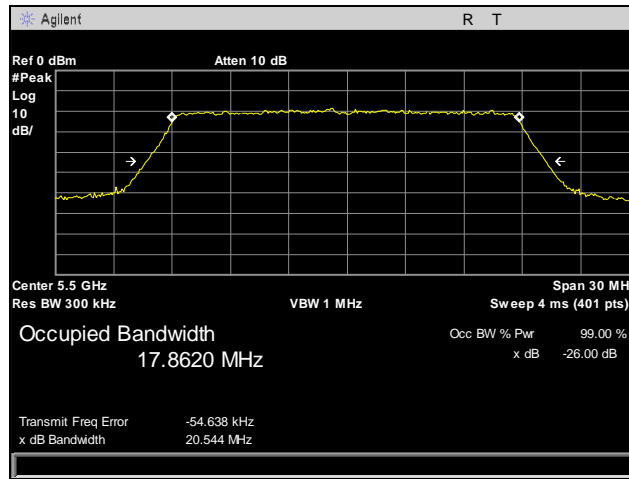


Plot 34. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 2, 5290 MHz

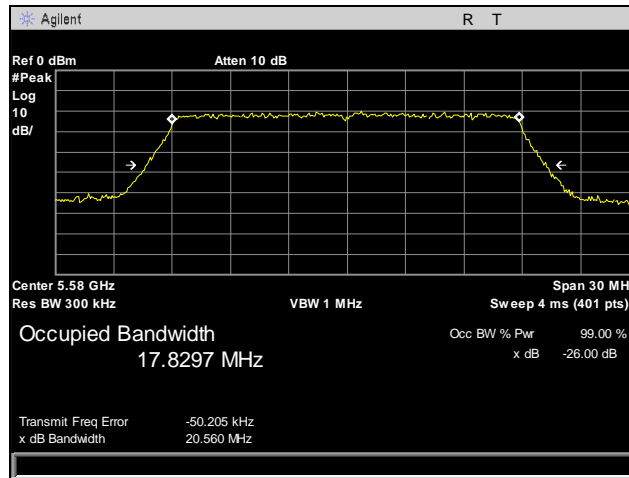


Plot 35. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 3, 5290 MHz

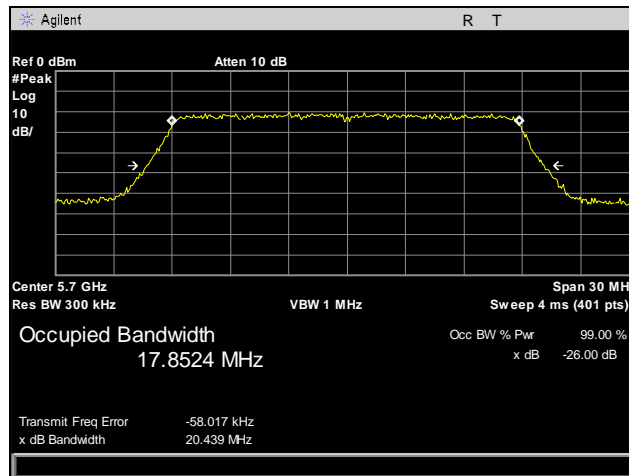
26 dB Occupied Bandwidth, 802.11a, Upper Band



Plot 36. 26 dB Occupied Bandwidth, 802.11a, Port 1, Low Channel, 5500 MHz

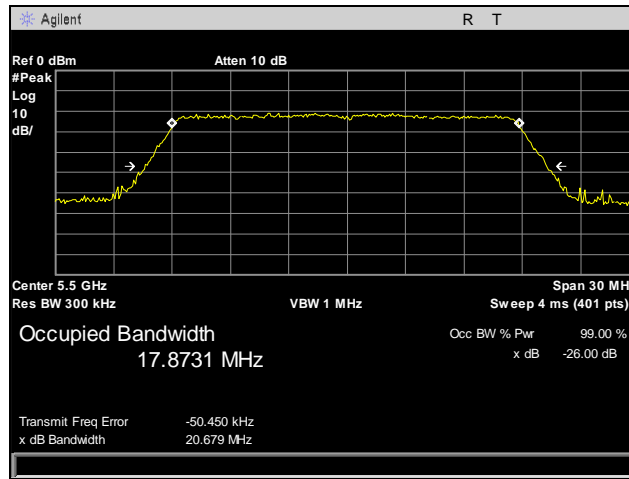


Plot 37. 26 dB Occupied Bandwidth, 802.11a, Port 1, Mid Channel, 5580 MHz

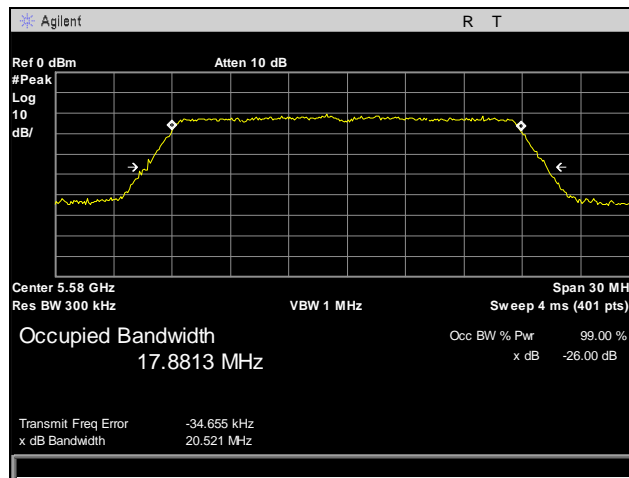


Plot 38. 26 dB Occupied Bandwidth, 802.11a, Port 1, High Channel, 5700 MHz

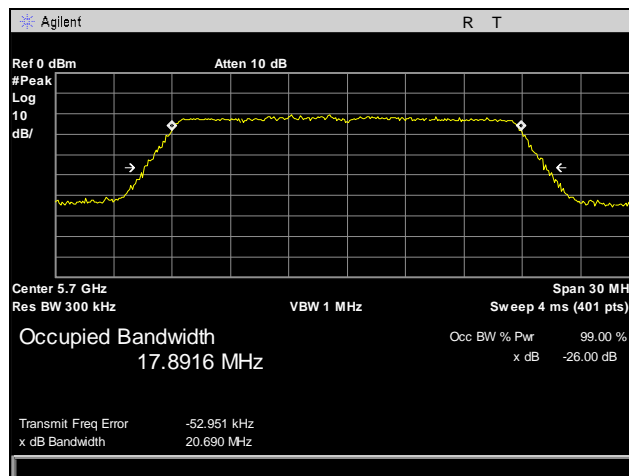
26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, Upper Band



Plot 39. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, Low Channel, 5500 MHz

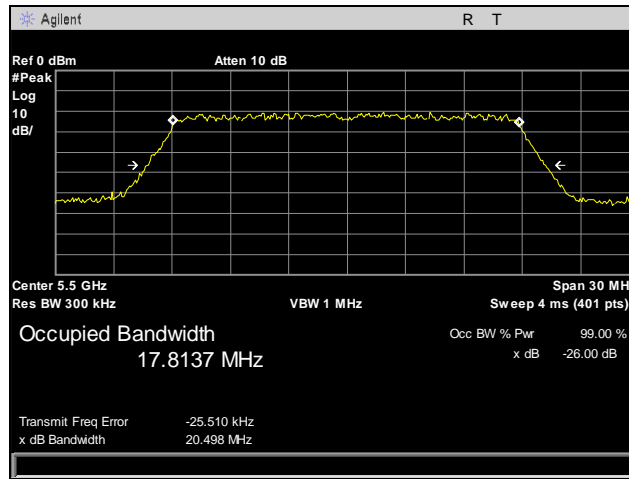


Plot 40. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, Mid Channel, 5580 MHz

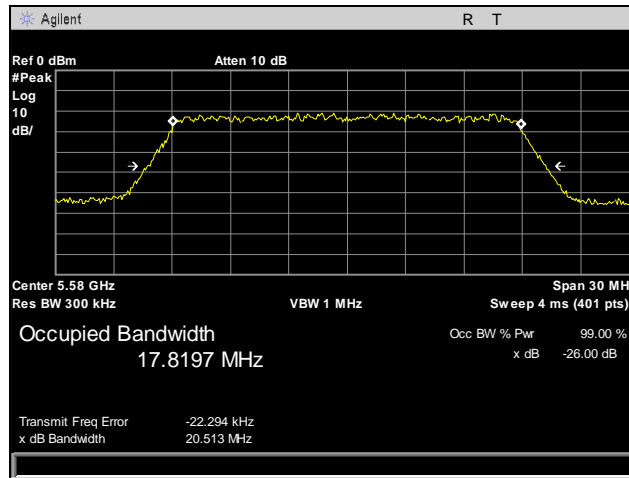


Plot 41. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 1, High Channel, 5700 MHz

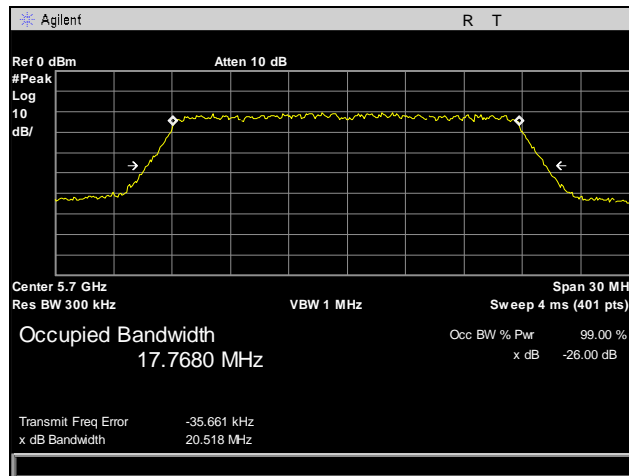
26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, Upper Band



Plot 42. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, Low Channel, 5500 MHz

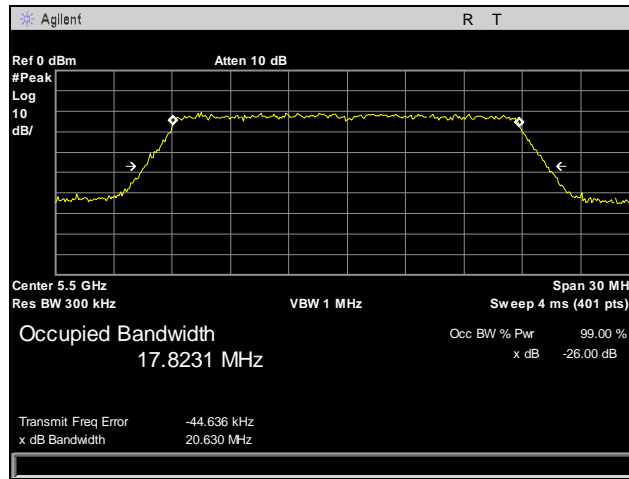


Plot 43. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, Mid Channel, 5580 MHz

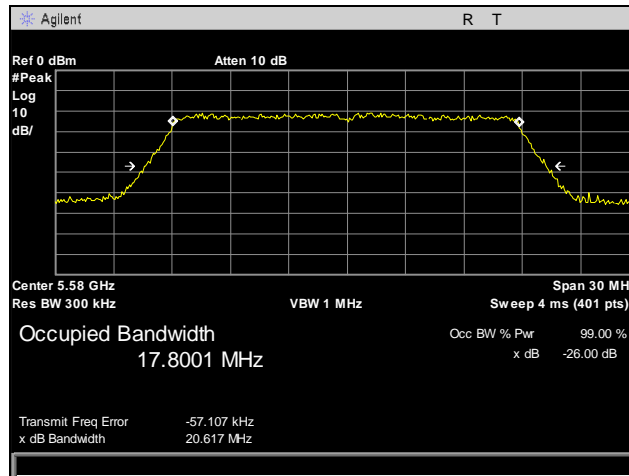


Plot 44. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 2, High Channel, 5700 MHz

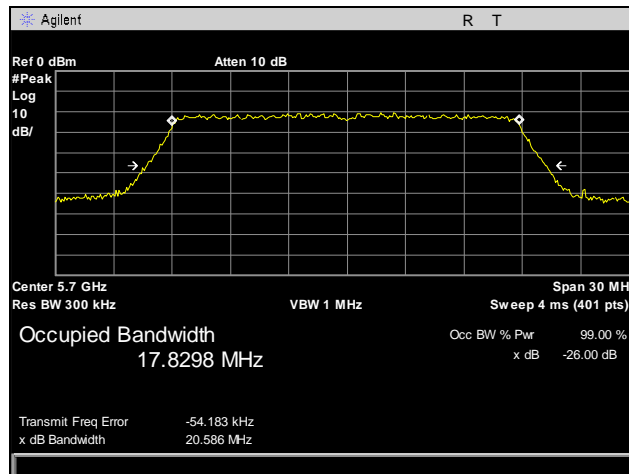
26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, Upper Band



Plot 45. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, Low Channel, 5500 MHz

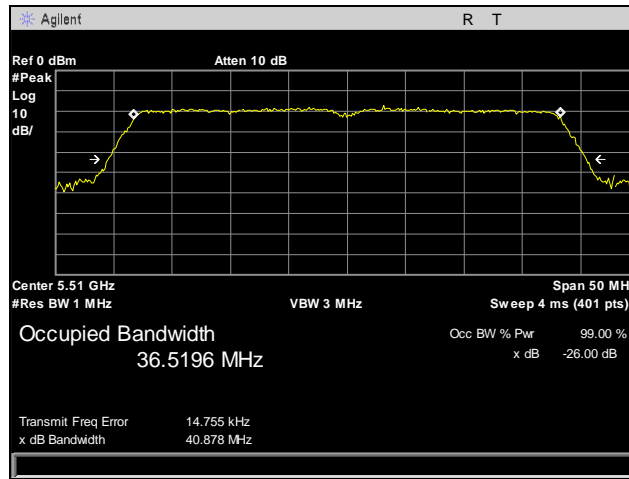


Plot 46. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, Mid Channel, 5580 MHz

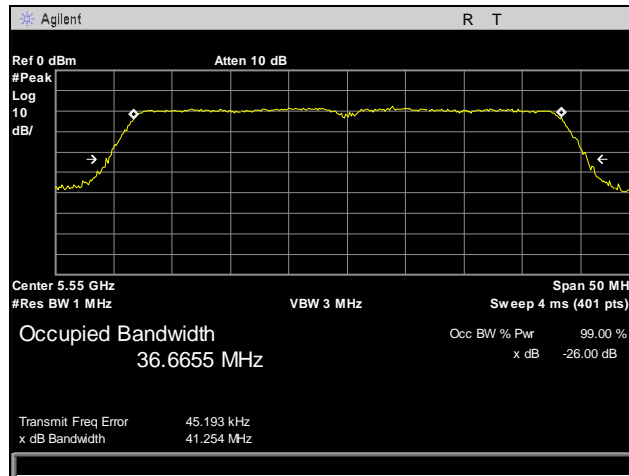


Plot 47. 26 dB Occupied Bandwidth, 802.11n 20 MHz, Port 3, High Channel, 5700 MHz

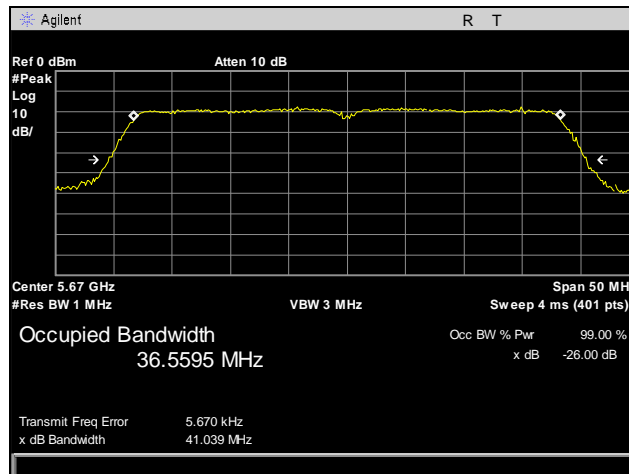
26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 1, Upper Band



Plot 48. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 1, Low Channel, 5510 MHz

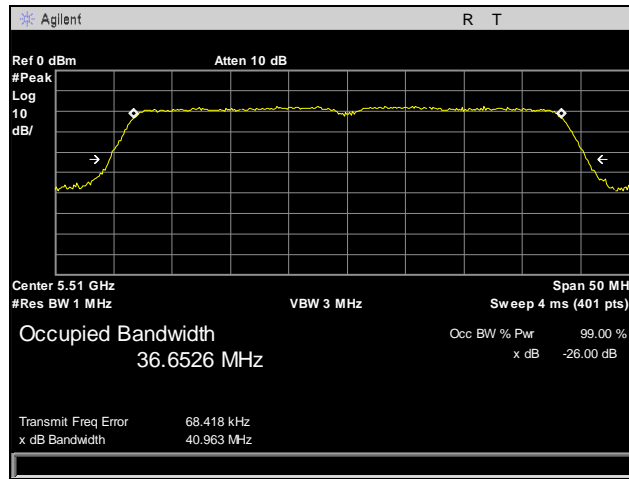


Plot 49. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 1, Mid Channel, 5550 MHz

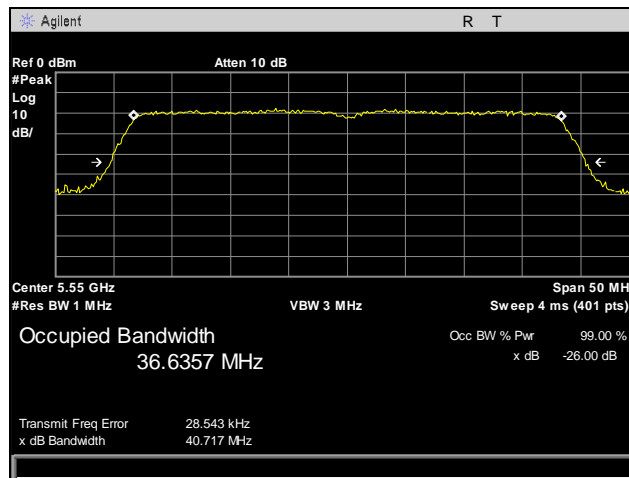


Plot 50. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 1, High Channel, 5670 MHz

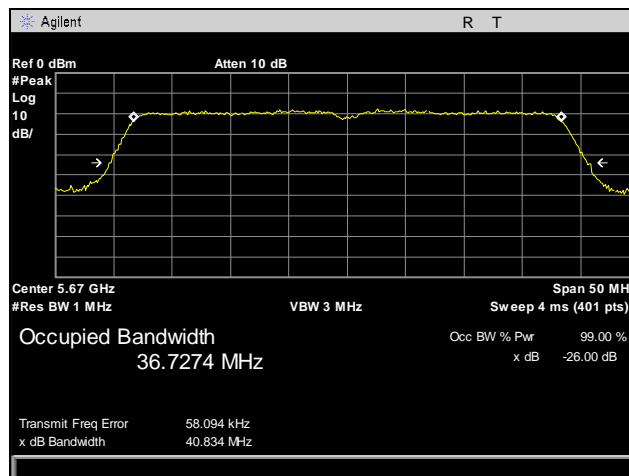
26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 2, Upper Band



Plot 51. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 2, Low Channel, 5510 MHz

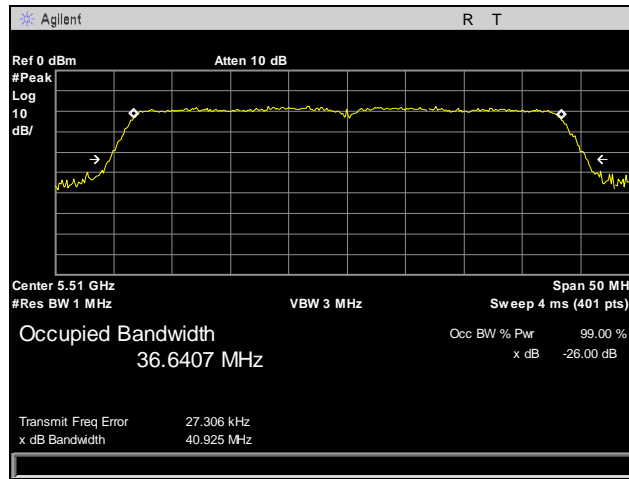


Plot 52. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 2, Mid Channel, 5550 MHz

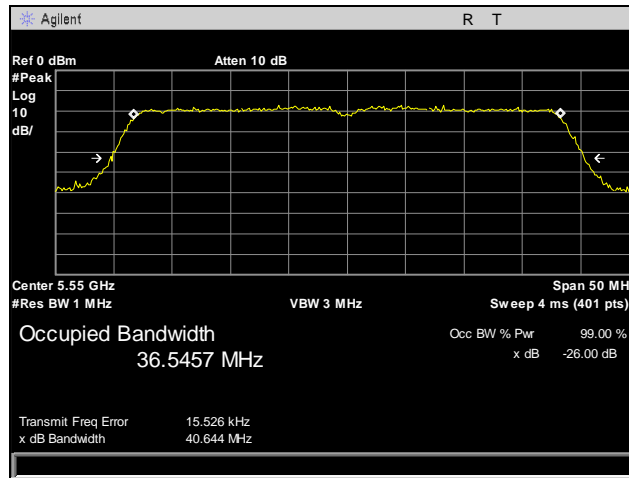


Plot 53. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 2, High Channel, 5670 MHz

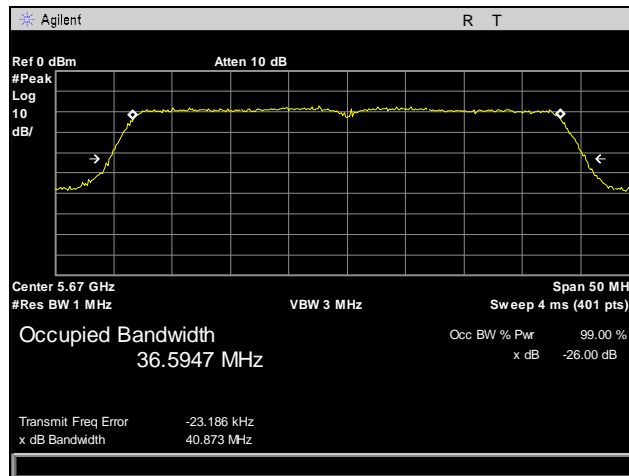
26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 3, Upper Band



Plot 54. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 3, Low Channel, 5510 MHz

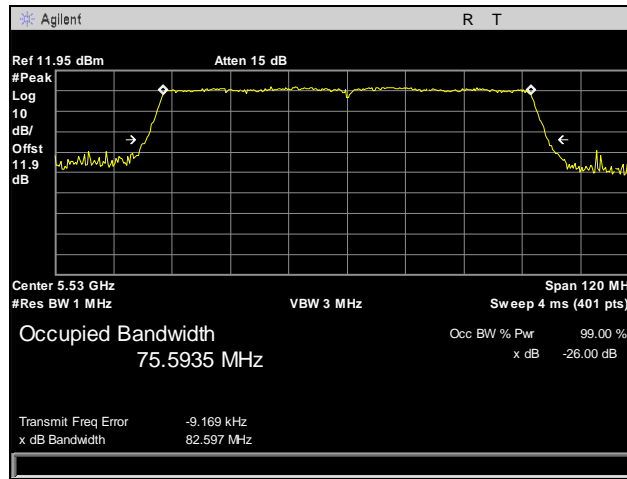


Plot 55. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 3, Mid Channel, 5550 MHz

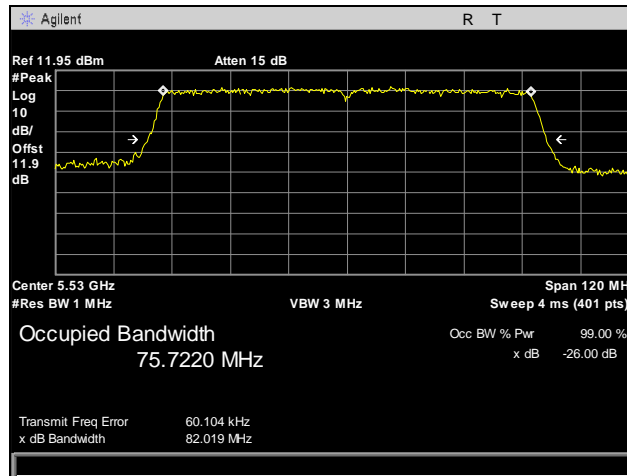


Plot 56. 26 dB Occupied Bandwidth, 802.11n 40 MHz, Port 3, High Channel, 5670 MHz

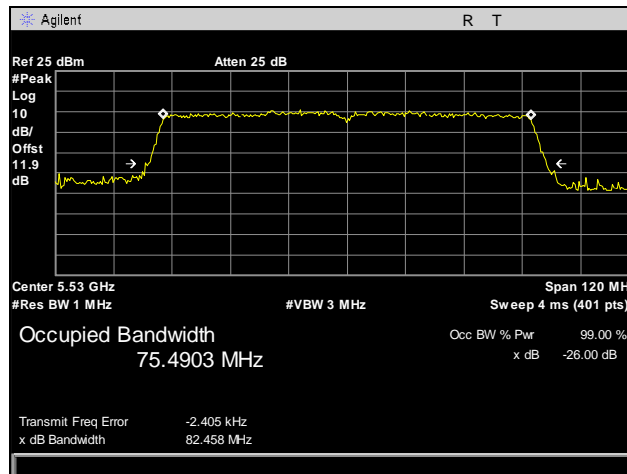
26 dB Occupied Bandwidth, 802.11n 80 MHz, Upper Band



Plot 57. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 1, Low Channel, 5530 MHz

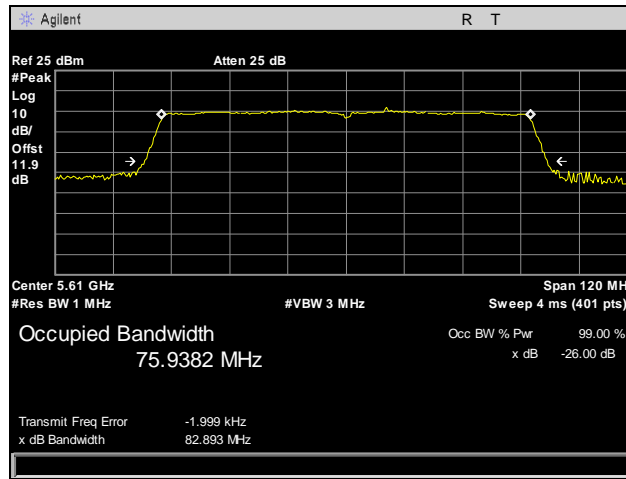


Plot 58. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 2, Low Channel, 5530 MHz

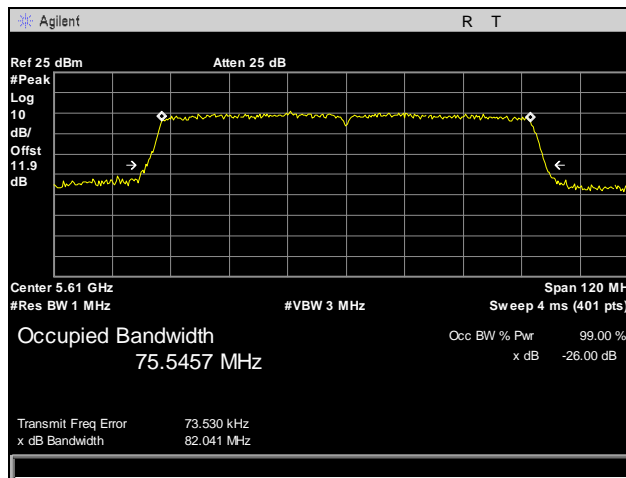


Plot 59. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 3, Low Channel, 5530 MHz

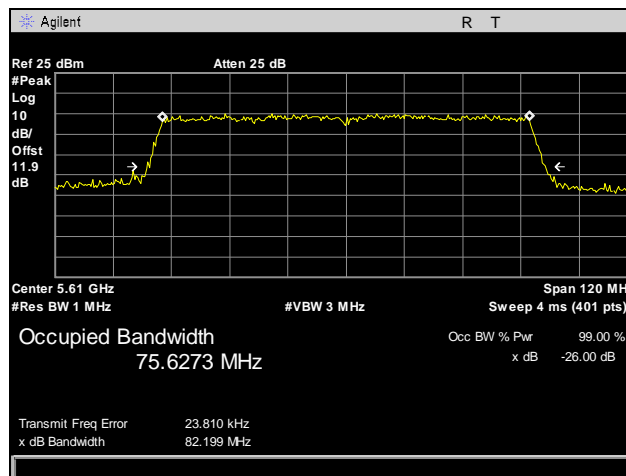
26 dB Occupied Bandwidth, 802.11n 80 MHz, Upper Band



Plot 60. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 1, Mid Channel, 5610 MHz

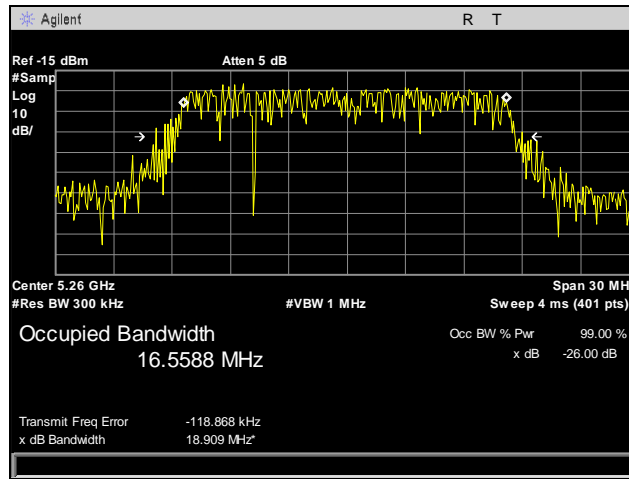


Plot 61. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 2, Mid Channel, 5610 MHz

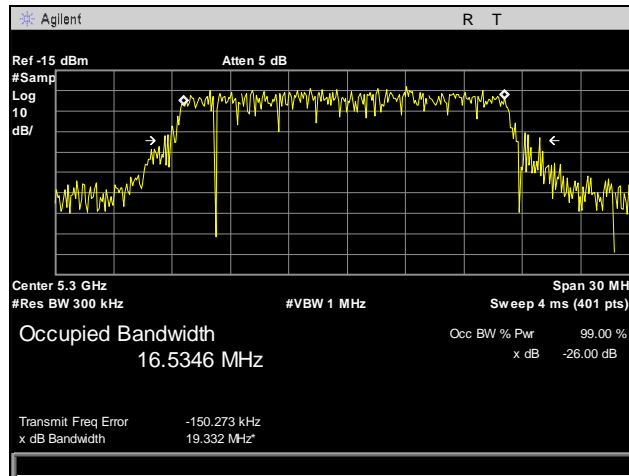


Plot 62. 26 dB Occupied Bandwidth, 802.11n 80 MHz, Port 3, Mid Channel, 5610 MHz

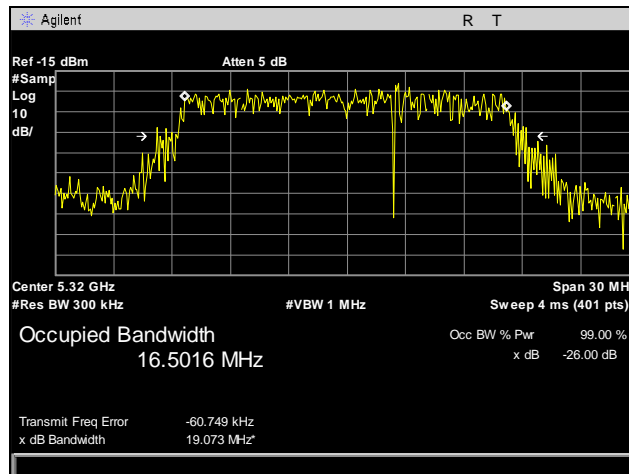
99% Occupied Bandwidth, 802.11a, Lower Band



Plot 63. 99% Occupied Bandwidth, 802.11a, Port 1, Low Channel, 5260 MHz

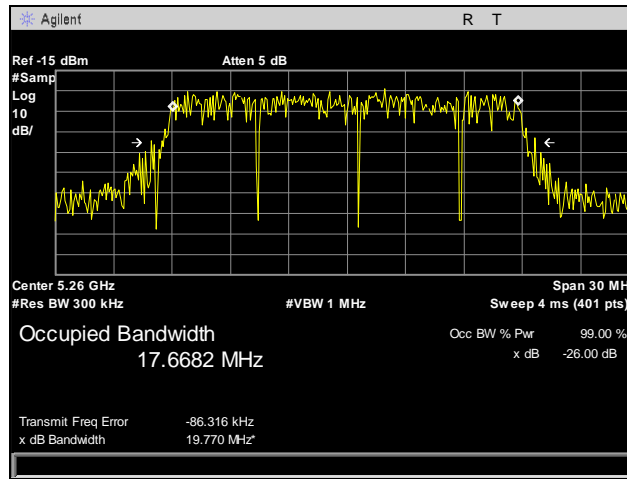


Plot 64. 99% Occupied Bandwidth, 802.11a, Port 1, Mid Channel, 5300 MHz

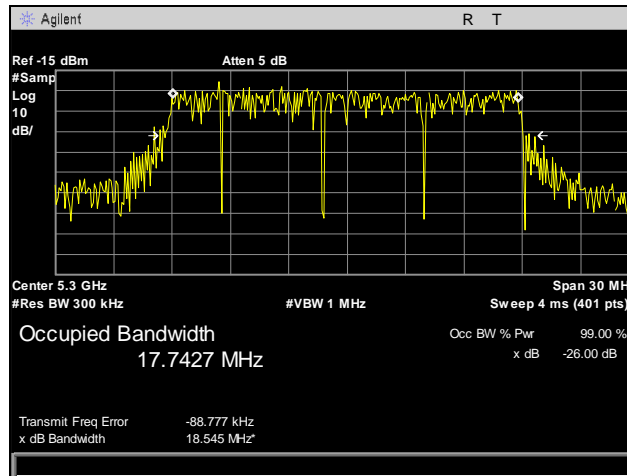


Plot 65. 99% Occupied Bandwidth, 802.11a, Port 1, High Channel, 5320 MHz

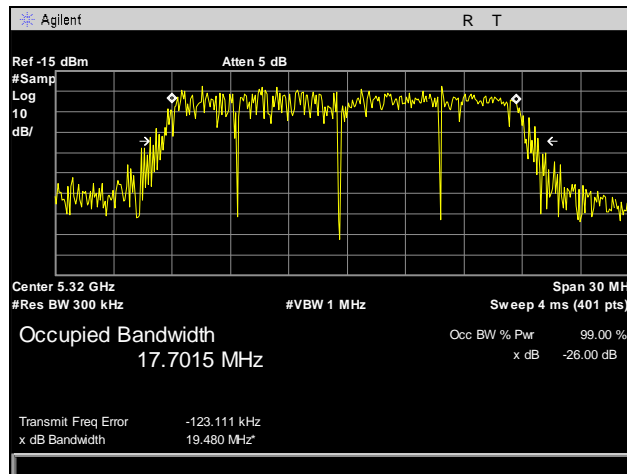
99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, Lower Band



Plot 66. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, Low Channel, 5260 MHz

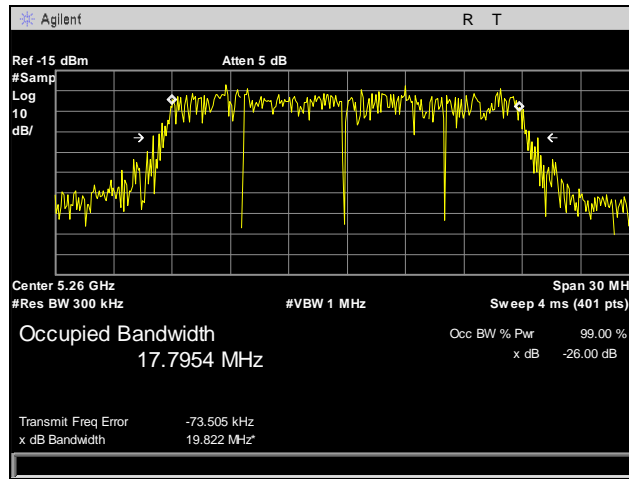


Plot 67. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, Mid Channel, 5300 MHz

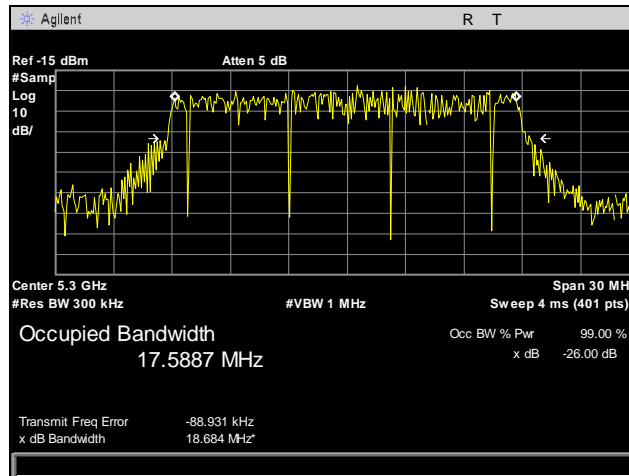


Plot 68. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, High Channel, 5320 MHz

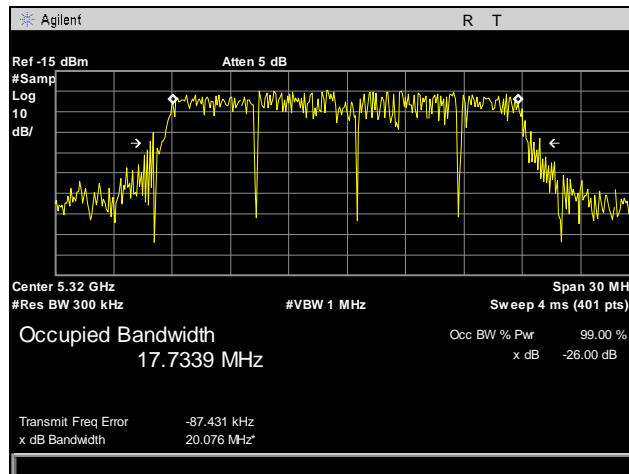
99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, Lower Band



Plot 69. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, Low Channel, 5260 MHz

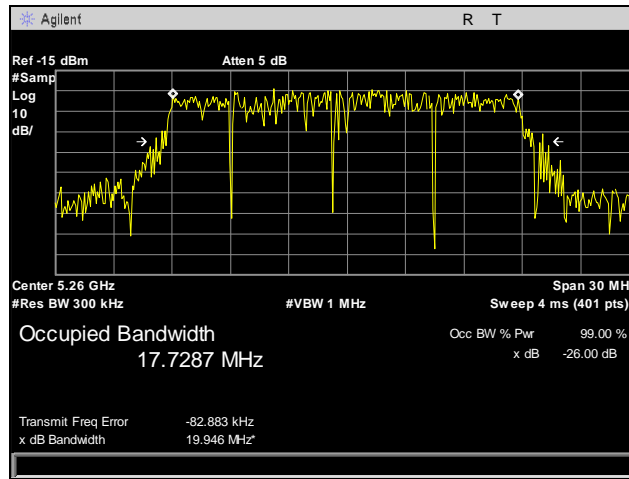


Plot 70. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, Mid Channel, 5300 MHz

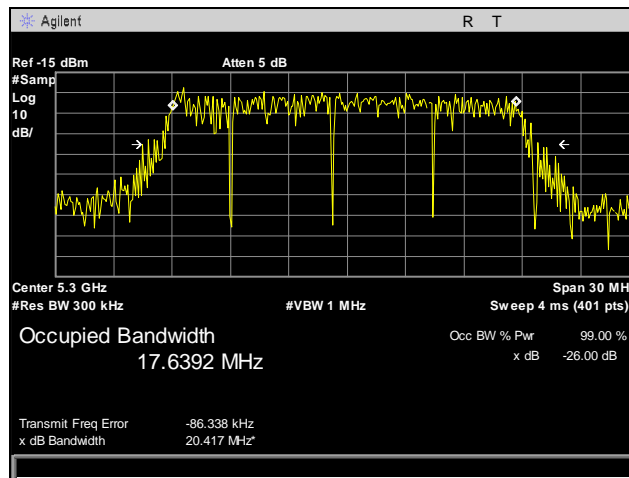


Plot 71. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, High Channel, 5320 MHz

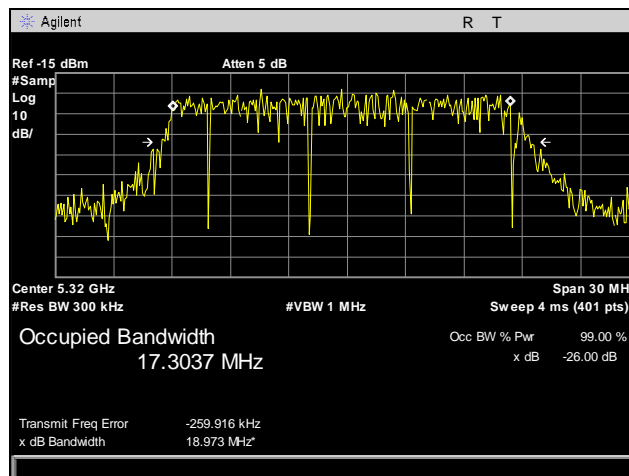
99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, Lower Band



Plot 72. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, Low Channel, 5260 MHz

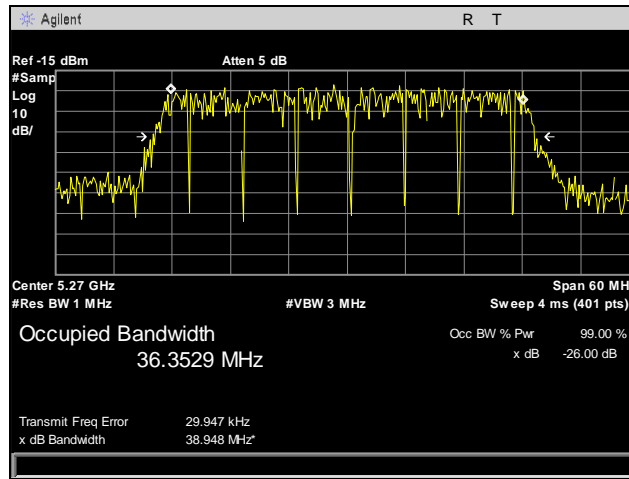


Plot 73. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, Mid Channel, 5300 MHz

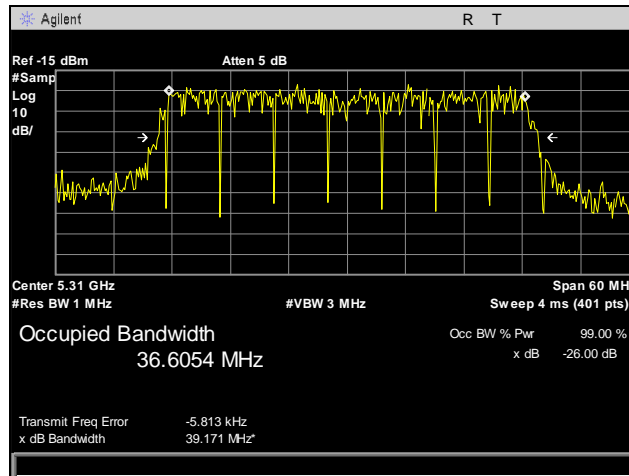


Plot 74. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, High Channel, 5320 MHz

99% Occupied Bandwidth, 802.11n 40 MHz, Port 1, Lower Band

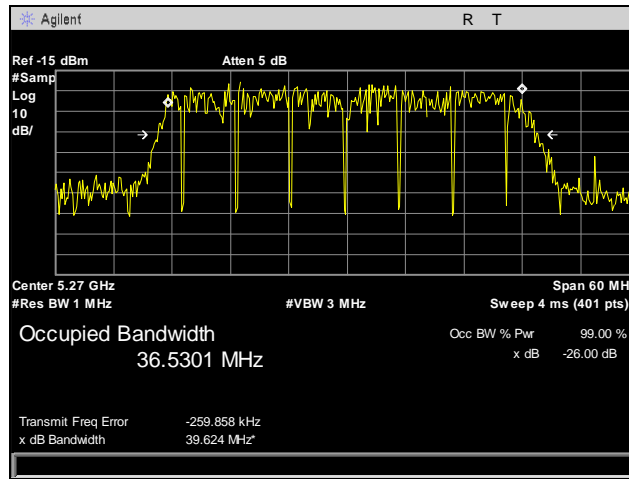


Plot 75. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 1, Low Channel, 5270 MHz

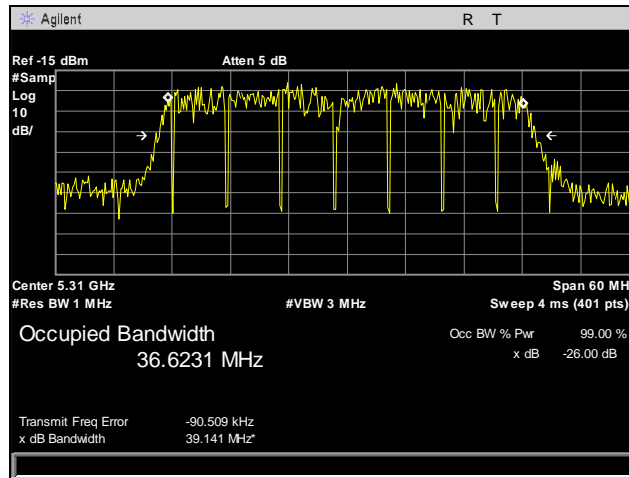


Plot 76. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 1, High Channel, 5310 MHz

99% Occupied Bandwidth, 802.11n 40 MHz, Port 2, Lower Band

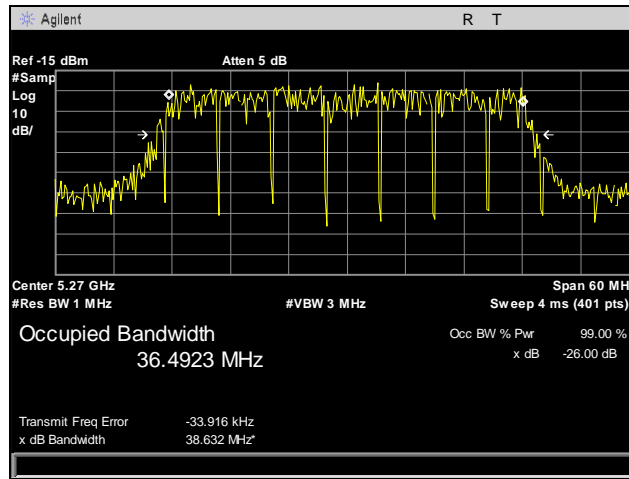


Plot 77. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 2, Low Channel, 5270 MHz

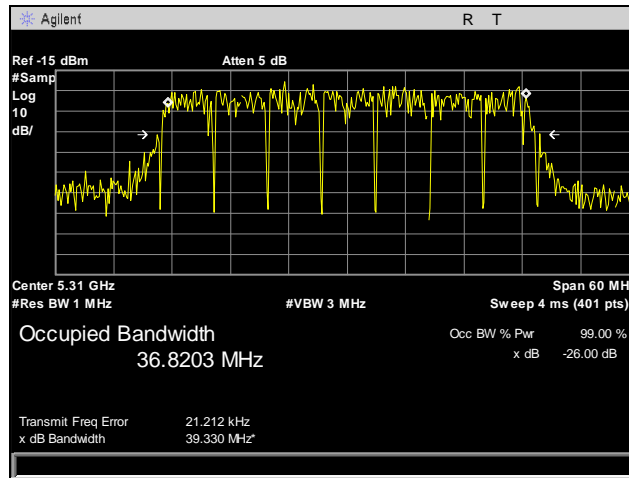


Plot 78. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 2, High Channel, 5310 MHz

99% Occupied Bandwidth, 802.11n 40 MHz, Port 3, Lower Band

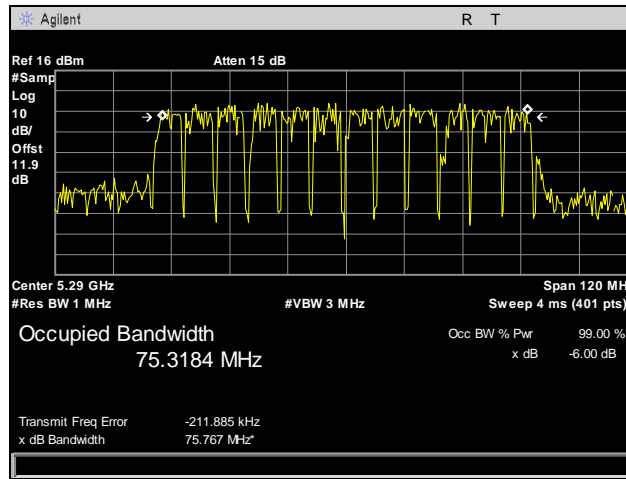


Plot 79. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 3, Low Channel, 5270 MHz

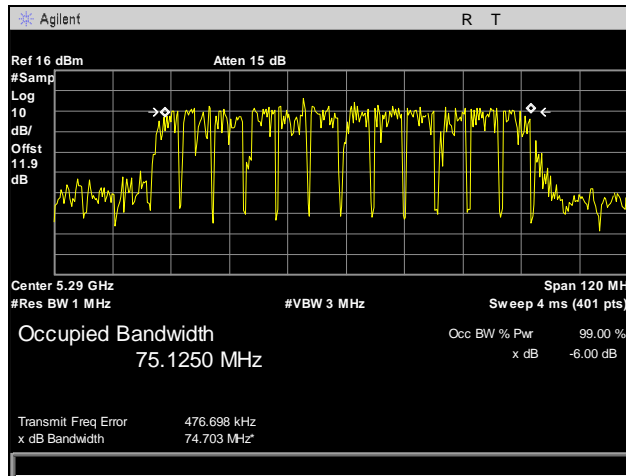


Plot 80. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 3, High Channel, 5310 MHz

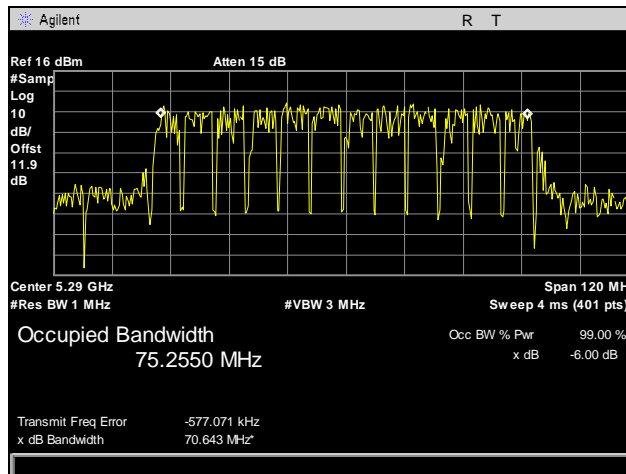
99% Occupied Bandwidth, 802.11n 80 MHz, Port 1, Lower Band



Plot 81 99% Occupied Bandwidth, 802.11n 80 MHz, Port 1, 5290 MHz

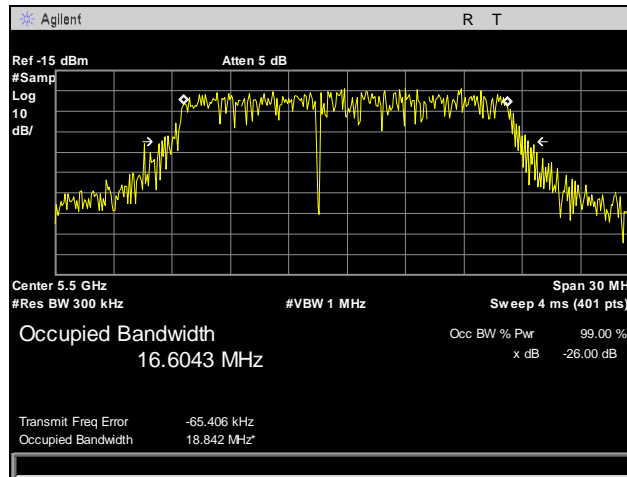


Plot 82. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 2, 5290 MHz

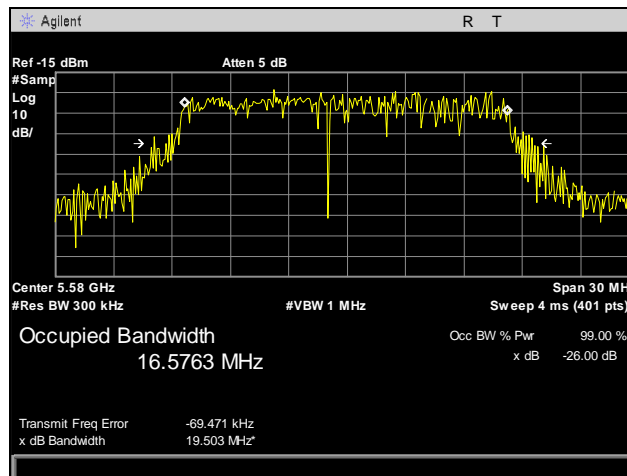


Plot 83. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 3, 5290 MHz

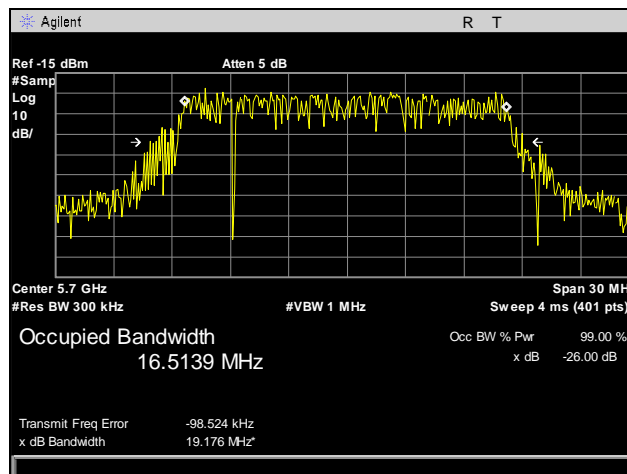
99% Occupied Bandwidth, 802.11a, Upper Band



Plot 84. 99% Occupied Bandwidth, 802.11a, Port 1, Low Channel, 5500 MHz

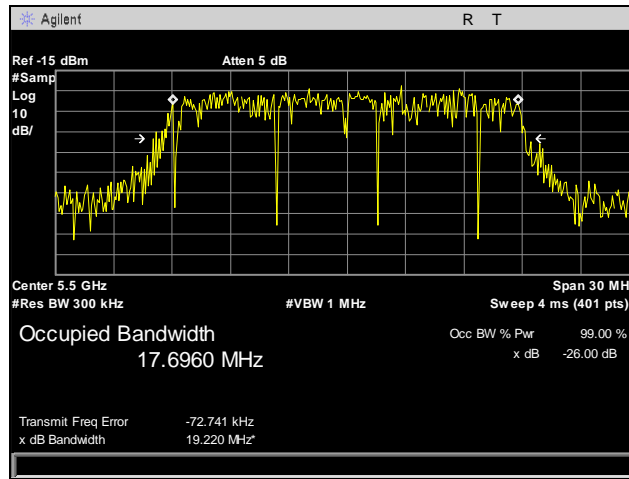


Plot 85. 99% Occupied Bandwidth, 802.11a, Port 1, Mid Channel, 5580 MHz

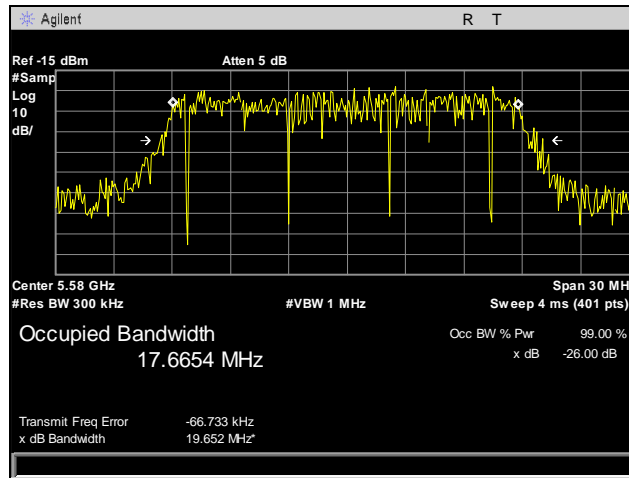


Plot 86. 99% Occupied Bandwidth, 802.11a, Port 1, High Channel, 5700 MHz

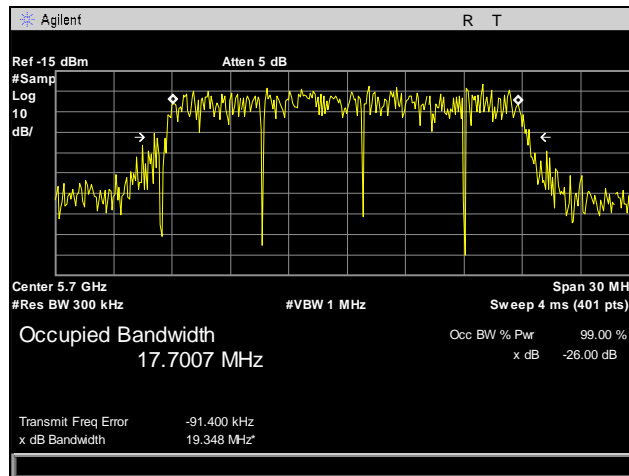
99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, Upper Band



Plot 87. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, Low Channel, 5500 MHz

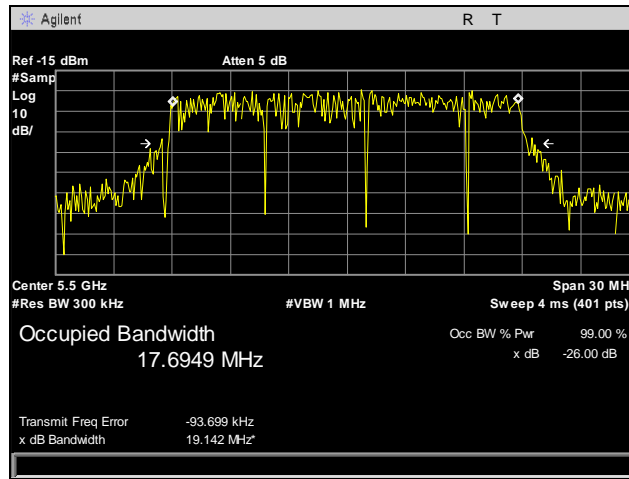


Plot 88. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, Mid Channel, 5580 MHz

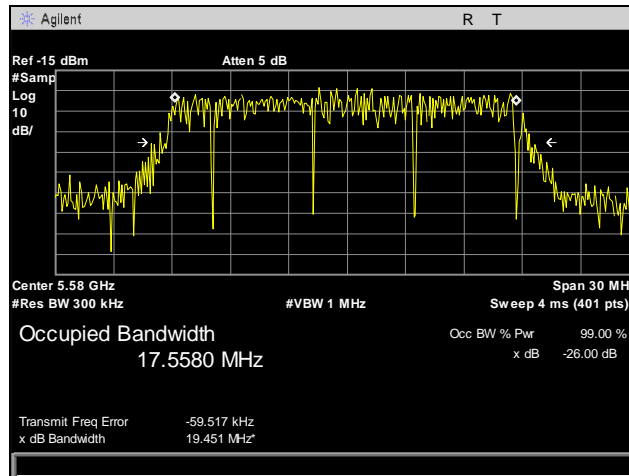


Plot 89. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 1, High Channel, 5700 MHz

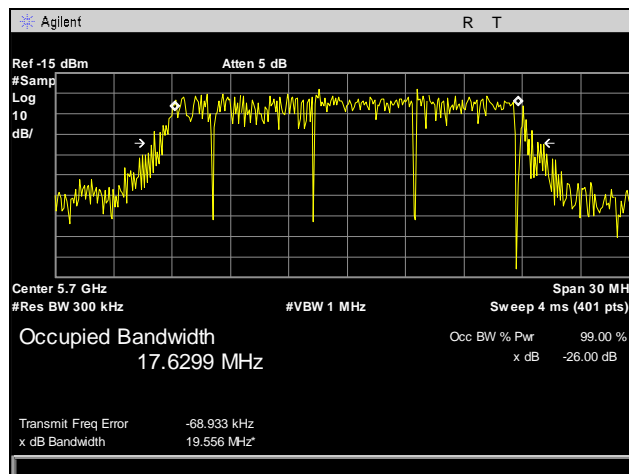
99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, Upper Band



Plot 90. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, Low Channel, 5500 MHz

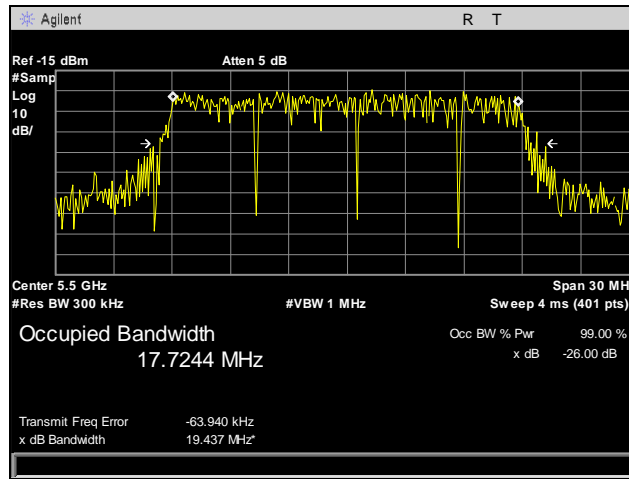


Plot 91. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, Mid Channel, 5580 MHz

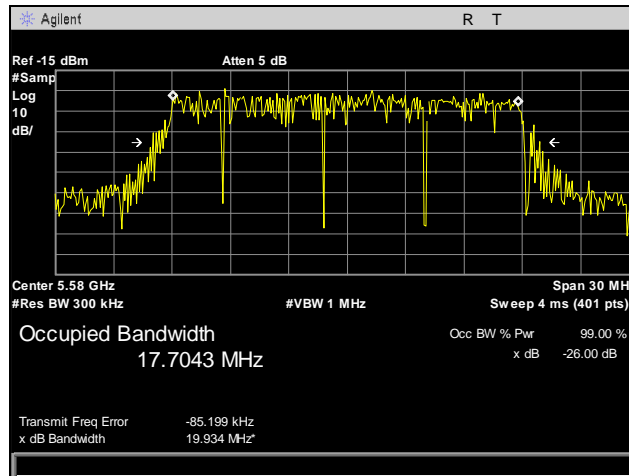


Plot 92. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 2, High Channel, 5700 MHz

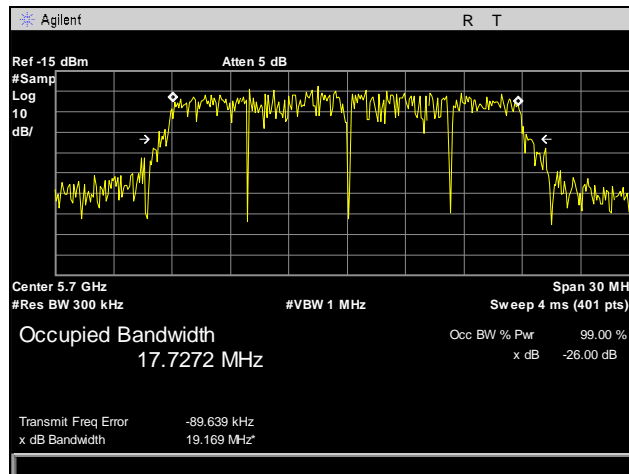
99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, Upper Band



Plot 93. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, Low Channel, 5500 MHz

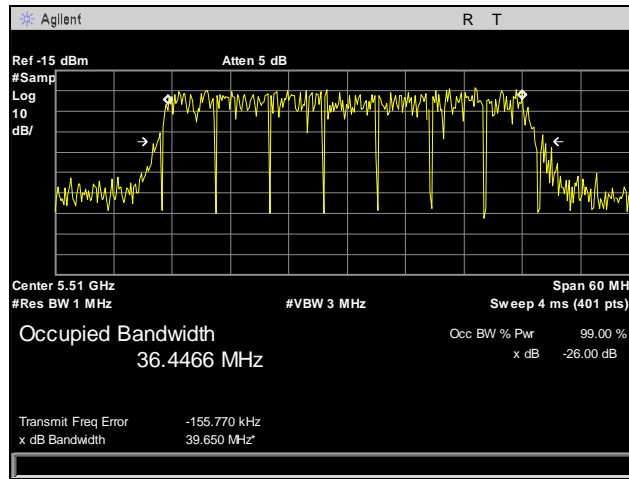


Plot 94. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, Mid Channel, 5580 MHz

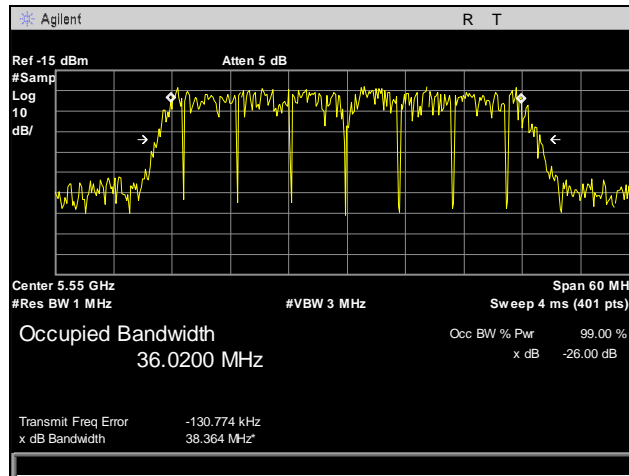


Plot 95. 99% Occupied Bandwidth, 802.11n 20 MHz, Port 3, High Channel, 5700 MHz

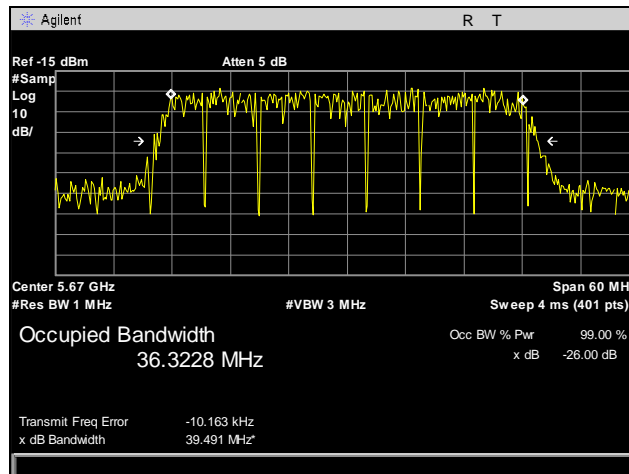
99% Occupied Bandwidth, 802.11n 40 MHz, Port 1, Upper Band



Plot 96. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 1, Low Channel, 5510 MHz

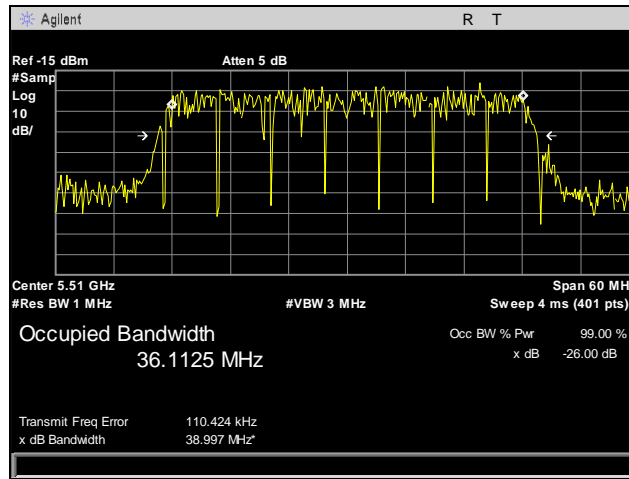


Plot 97. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 1, Mid Channel, 5550 MHz

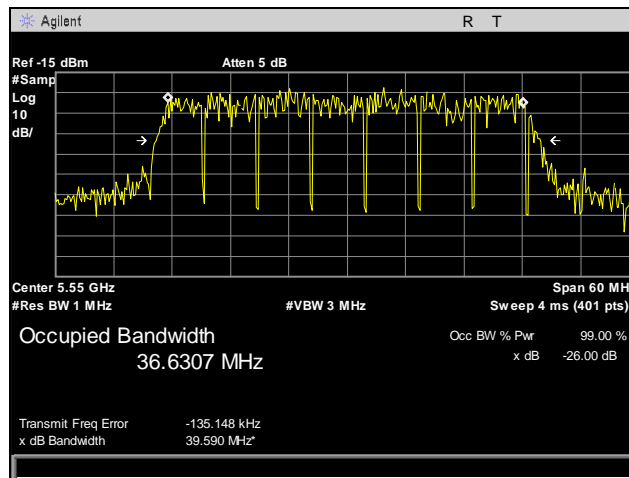


Plot 98. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 1, High Channel, 5670 MHz

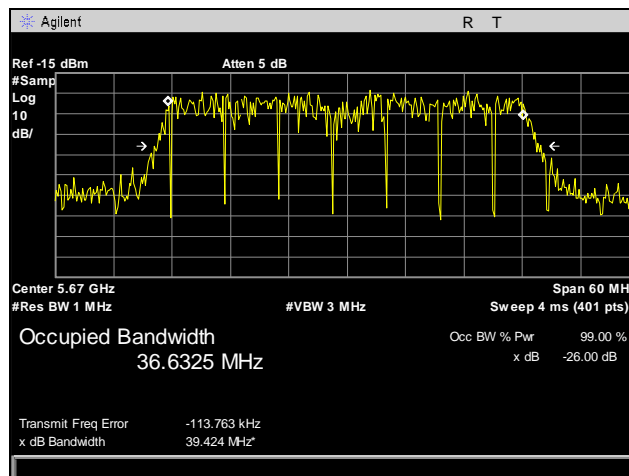
99% Occupied Bandwidth, 802.11n 40 MHz, Port 2, Upper Band



Plot 99. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 2, Low Channel, 5510 MHz

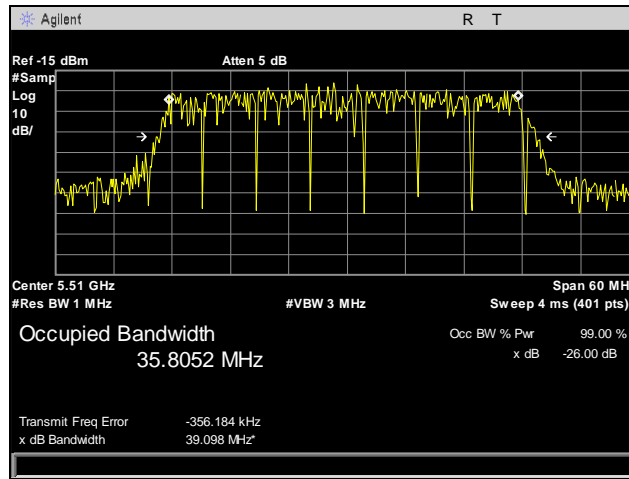


Plot 100. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 2, Mid Channel, 5550 MHz

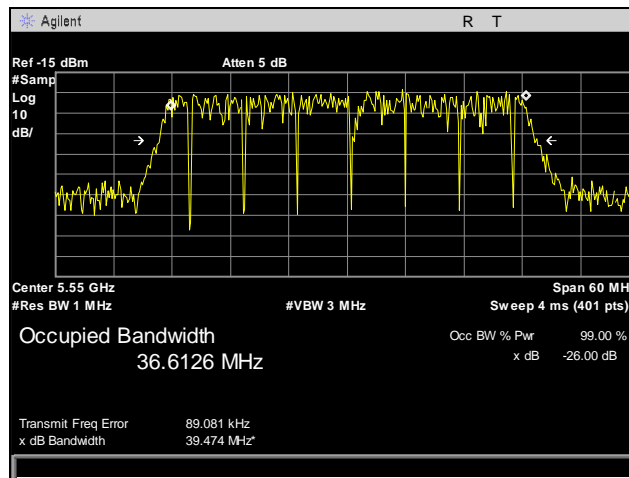


Plot 101. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 2, High Channel, 5670 MHz

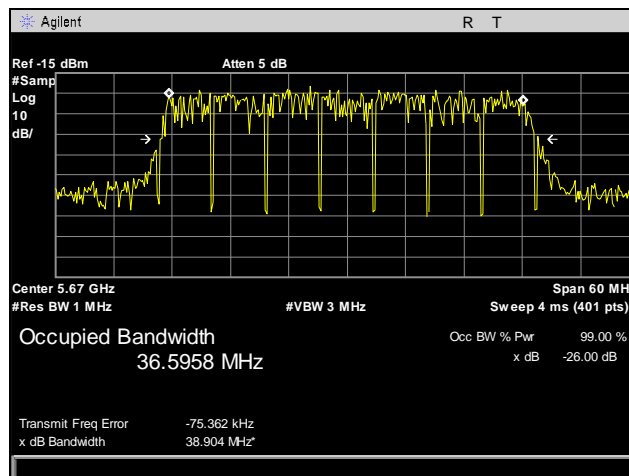
99% Occupied Bandwidth, 802.11n 40 MHz, Port 3, Upper Band



Plot 102. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 3, Low Channel, 5510 MHz

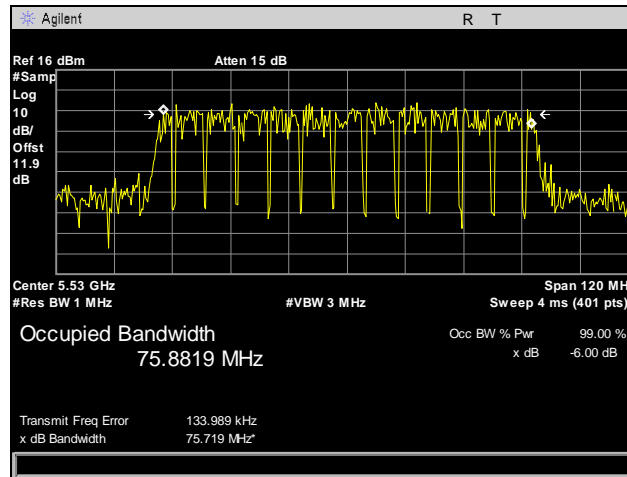


Plot 103. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 3, Mid Channel, 5550 MHz

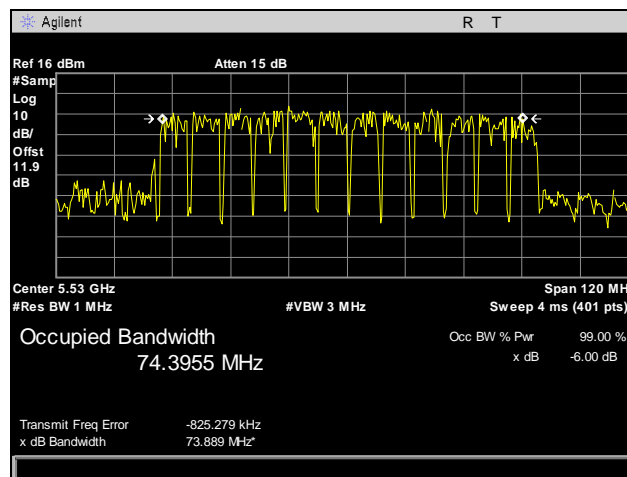


Plot 104. 99% Occupied Bandwidth, 802.11n 40 MHz, Port 3, High Channel, 5670 MHz

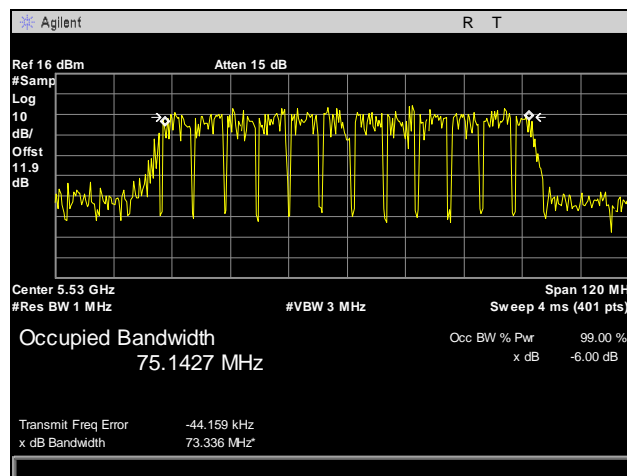
99% Occupied Bandwidth, 802.11n 80 MHz, Upper Band



Plot 105. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 1, Low Channel, 5530 MHz

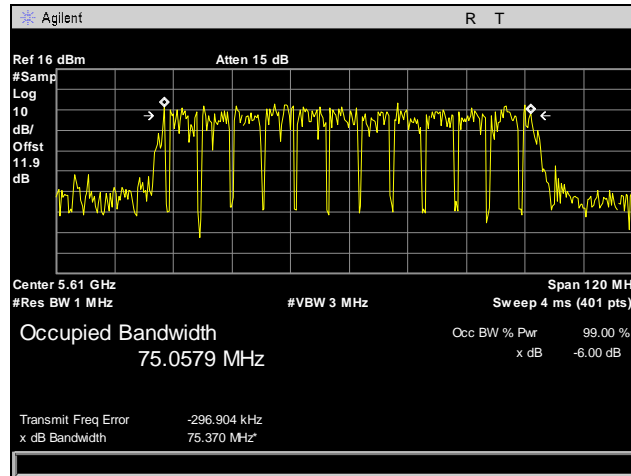


Plot 106. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 2, Low Channel, 5530 MHz

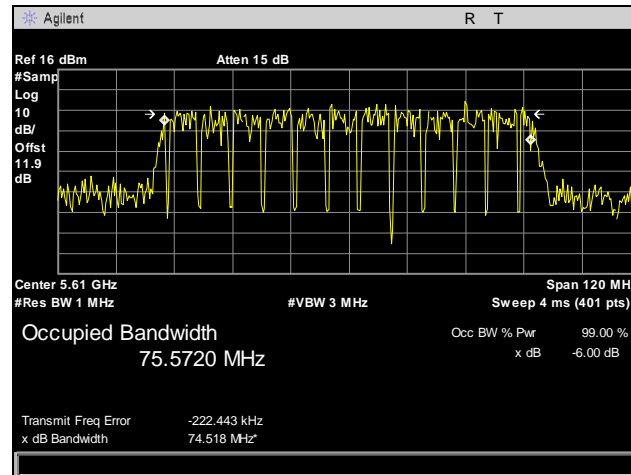


Plot 107. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 3, Low Channel, 5530 MHz

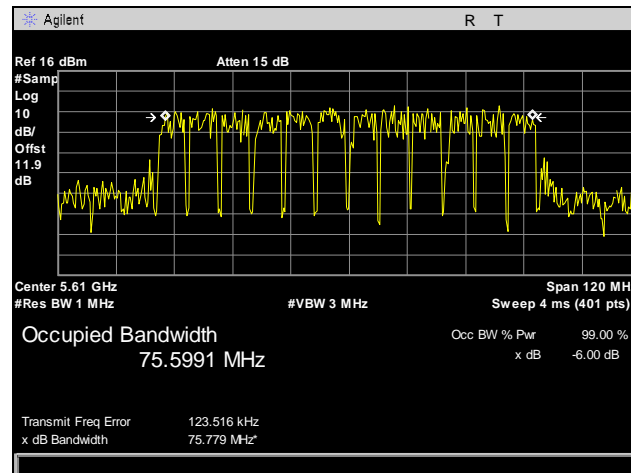
99% Occupied Bandwidth, 802.11n 80 MHz, Upper Band



Plot 108. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 1, Low Channel, 5610 MHz



Plot 109. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 2, Low Channel, 5610 MHz



Plot 110. 99% Occupied Bandwidth, 802.11n 80 MHz, Port 3, Low Channel, 5610 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 407(a)(1) RF Power Output

Test Requirements: §15.407(a)(2): For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

Test Procedure: The EUT was connected to a spectrum analyzer through an attenuator and set to transmit continuously on the low, mid, and high channels. Its power was measured according to measurement method SA-1, as described in 789033 D01 General UNII Test Procedures v01r02. Plots were corrected for attenuator and cable loss.

Test Results: Equipment was compliant with the Peak Power Output limits of § 15.401(a)(2). Array gain of 3x3 MIMO = 4+10log (3) = 8.77 dBi. Therefore, the limit is 24- 2.77 = 21.23 dBm.

Test Engineer(s): Jonathan Chao

Test Date(s): 02/18/13

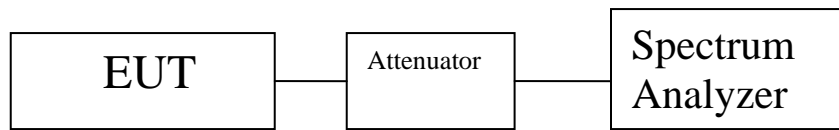


Figure 3. Power Output Test Setup

Frequency (MHz)	Mode/Modulation Type	Port 1 (dBm)	Port 2 (dBm)	Port 3 (dBm)	Sum power (dBm)
5260	802.11a	16.12	NA	NA	NA
5300		16.63	NA	NA	NA
5320		16.71	NA	NA	NA
5260	802.11n HT20	16.24	15.49	16.33	20.81
5300		16.29	16.00	16.44	21.02
5320		16.70	15.73	16.11	20.97
5270	802.11n HT40	16.04	16.03	16.41	20.93
5310		16.14	16.19	16.16	20.93
5290	802.11n HT80	16.43	16.15	16.27	19.35
5500	802.11a	16.70	NA	NA	NA
5580		16.28	NA	NA	NA
5700		16.51	NA	NA	NA
5500	802.11n HT20	15.5	15.61	15.89	20.44
5580		16.1	16.0	16.14	20.85
5700		16.49	16.42	16.41	21.21
5510	802.11n HT40	16.38	16.60	16.23	21.18
5550		16.23	16.15	16.33	21.01
5670		16.17	16.12	16.07	20.89
5530	802.11n HT80	15.06	15.04	15.38	18.12
5610		14.97	15.40	15.33	18.26

Table 23. RF Output Power, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

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

Test Requirements: § 15.407(a)(2): In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer through an attenuator. The power level was set to the maximum level on the EUT. The RBW was set to 1MHz and the VBW was set to 3MHz. The method of measurement used was method SA-1 from 789033 D01 General UNII Test Procedures v01r02. Plots are correct for attenuators and cable loss.

Test Results: Equipment was compliant with the peak power spectral density limits of § 15.407 (a)(2). The peak power spectral density was determined from plots on the following page(s). Only plots for 4dBi antenna were taken.

Test Engineer(s): Jonathan Chao

Test Date(s): 02/18/13

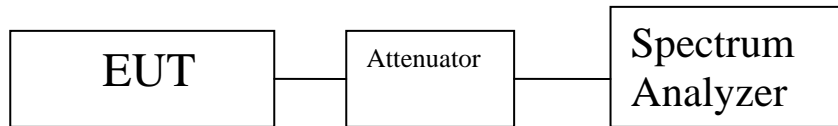
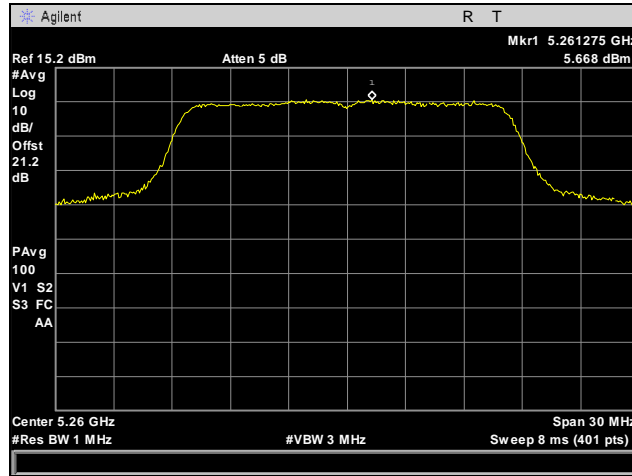


Figure 4. Power Spectral Density Test Setup

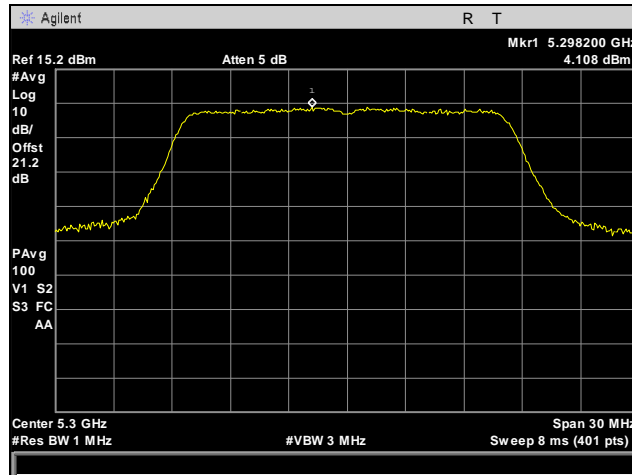
Frequency (MHz)	Mode/Modulation Type	Port 1 (dBm)	Port 2 (dBm)	Port 3 (dBm)	Sum(dBm)
5260	802.11a	5.668	NA	NA	NA
5300		4.108	NA	NA	NA
5320		6.138	NA	NA	NA
5260	802.11n HT20	3.485	3.523	3.343	8.22
5300		3.366	3.521	3.45	8.22
5320		3.459	3.431	3.328	8.18
5270	802.11n HT40	0.683	0.634	0.669	5.433
5310		1.467	0.831	0.737	5.795
5290	802.11n HT80	3.623	3.39	3.36	8.23
5500	802.11a	4.949	NA	NA	NA
5580		4.686	NA	NA	NA
5700		4.902	NA	NA	NA
5500	802.11n HT20	3.096	3.26	3.439	8.04
5580		3.086	3.362	3.345	8.04
5700		3.22	3.167	3.347	8.02
5510	802.11n HT40	0.939	1.171	0.722	5.719
5550		0.864	0.849	1.389	5.813
5670		1.205	0.739	1.386	5.890
5530	802.11n HT80	3.474	3.315	3.085	8.07

Table 24. Peak Power Spectral Density, Test Results

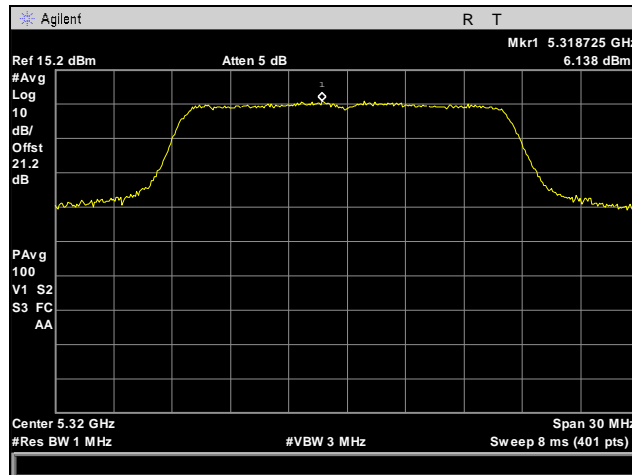
Power Spectral Density, 802.11a, Lower Band



Plot 111. Power Spectral Density, Low Channel, 802.11a, 5260 MHz

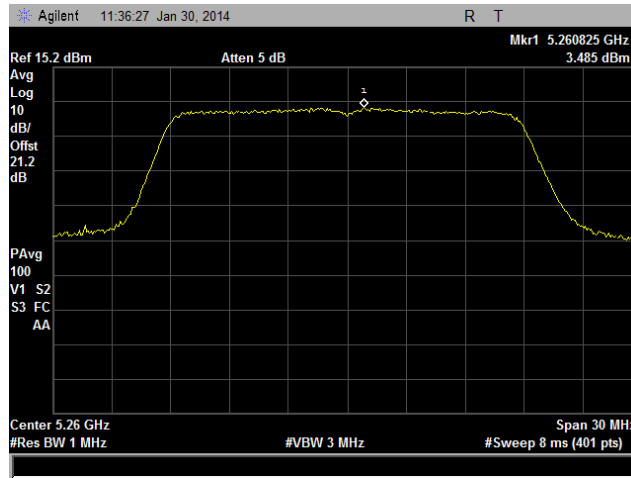


Plot 112. Power Spectral Density, Mid Channel, 802.11a, 5300 MHz

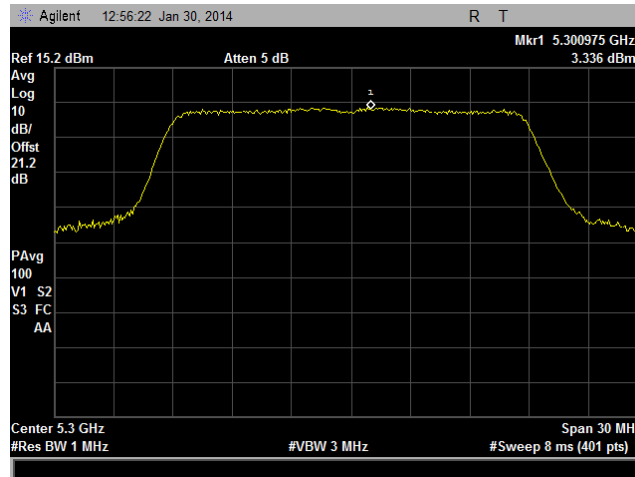


Plot 113. Power Spectral Density, High Channel, 802.11a, 5320 MHz

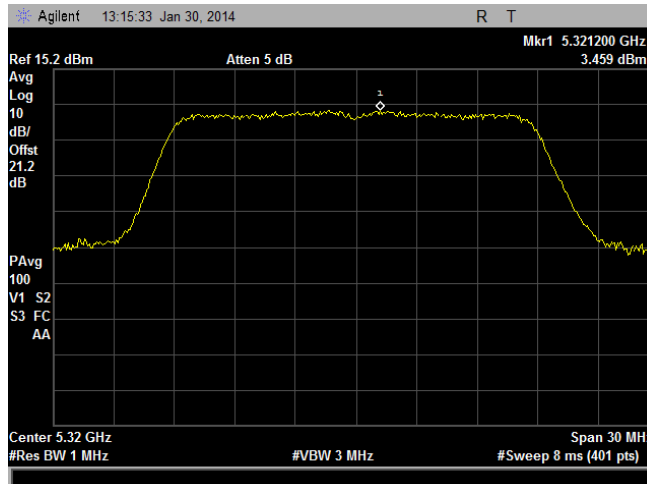
Power Spectral Density, 802.11n 20 MHz, Port 1, Lower Band



Plot 114. Power Spectral Density, Low Channel, 802.11n 20 MHz, Port 1, 5260 MHz

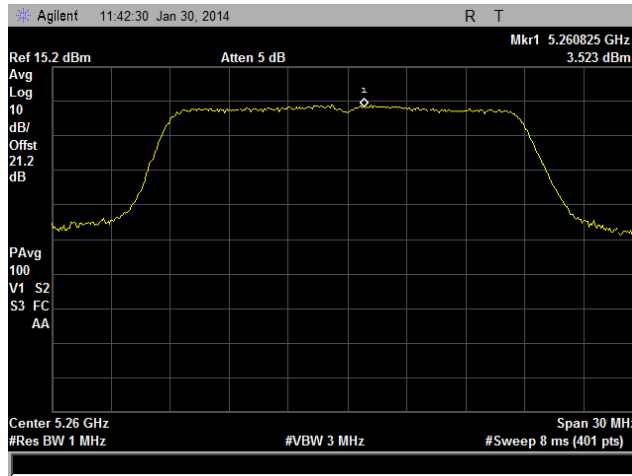


Plot 115. Power Spectral Density, Mid Channel, 802.11n 20 MHz, Port 1, 5300 MHz

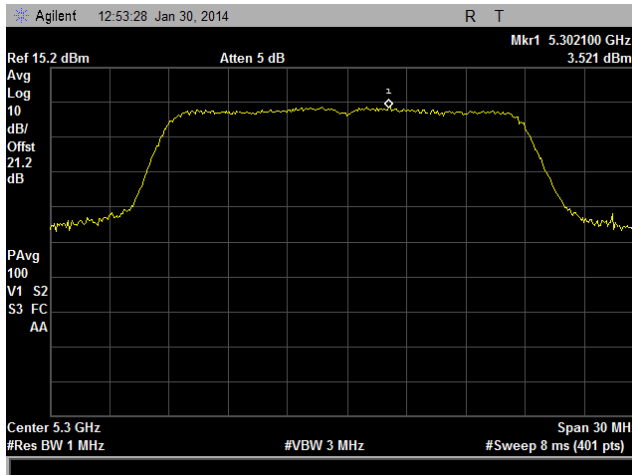


Plot 116. Power Spectral Density, High Channel, 802.11n 20 MHz, Port 1, 5320 MHz

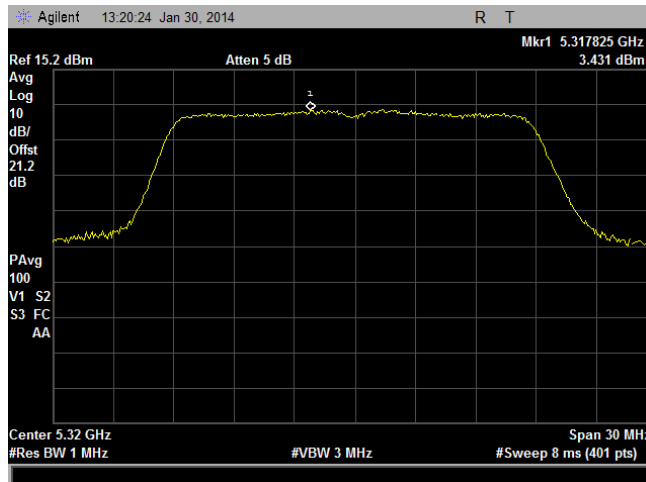
Power Spectral Density, 802.11n 20 MHz, Port 2, Lower Band



Plot 117. Power Spectral Density, Low Channel, 802.11n 20 MHz, Port 2, 5260 MHz

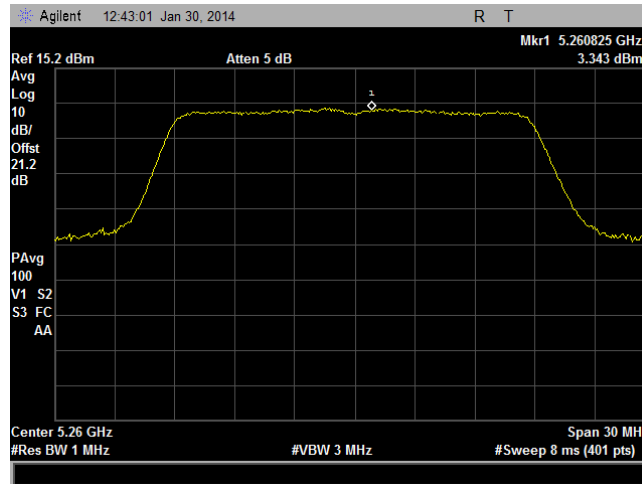


Plot 118. Power Spectral Density, Mid Channel, 802.11n 20 MHz, Port 2, 5300 MHz

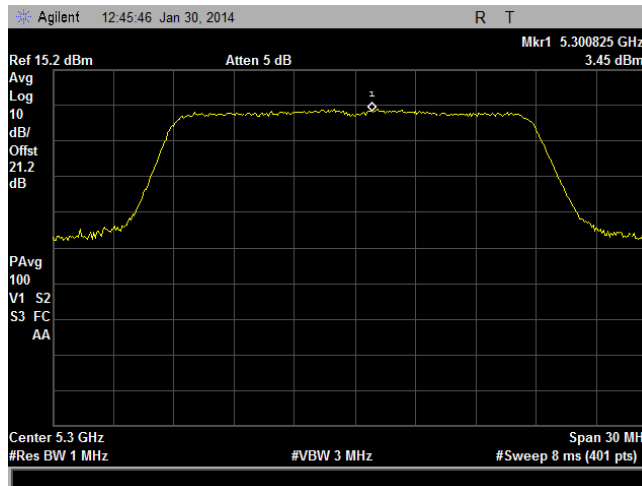


Plot 119. Power Spectral Density, High Channel, 802.11n 20 MHz, Port 2, 5320 MHz

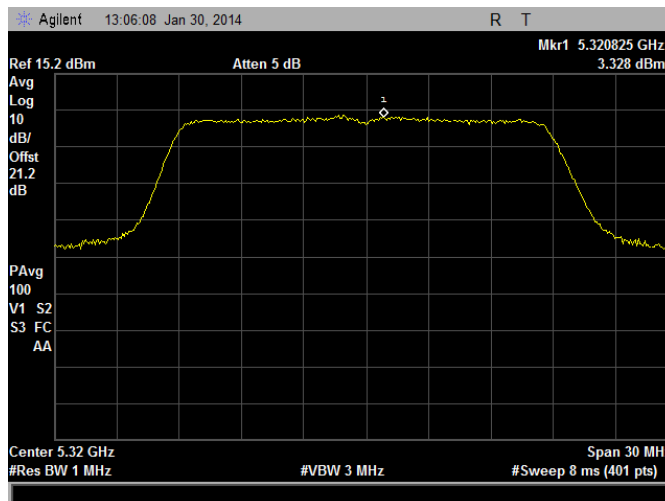
Power Spectral Density, 802.11n 20 MHz, Port 3, Lower Band



Plot 120. Power Spectral Density, Low Channel, 802.11n 20 MHz, Port 3, 5260 MHz

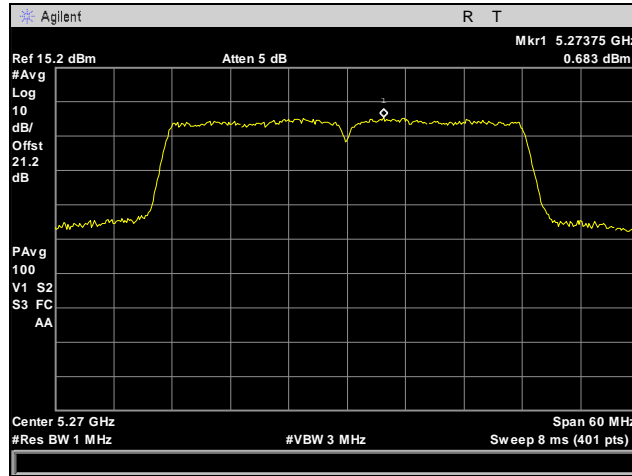


Plot 121. Power Spectral Density, Mid Channel, 802.11n 20 MHz, Port 3, 5300 MHz

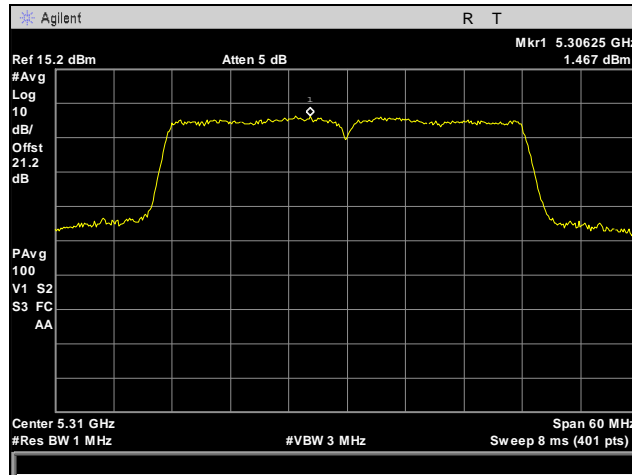


Plot 122. Power Spectral Density, High Channel, 802.11n 20 MHz, Port 3, 5320 MHz

Power Spectral Density, 802.11n 40 MHz, Port 1, Lower Band

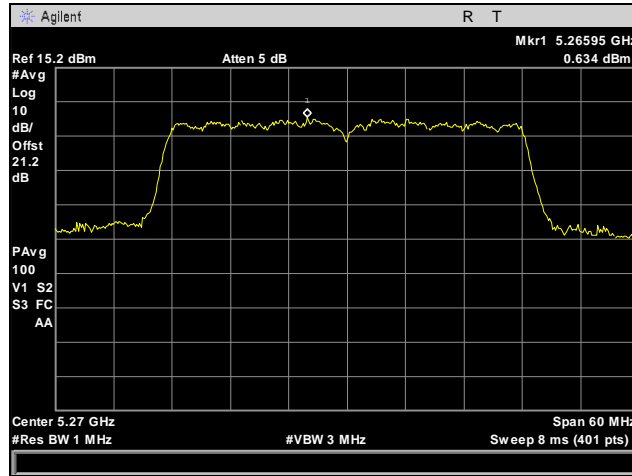


Plot 123. Power Spectral Density, Low Channel, 802.11n 40 MHz, Port 1, 5270 MHz

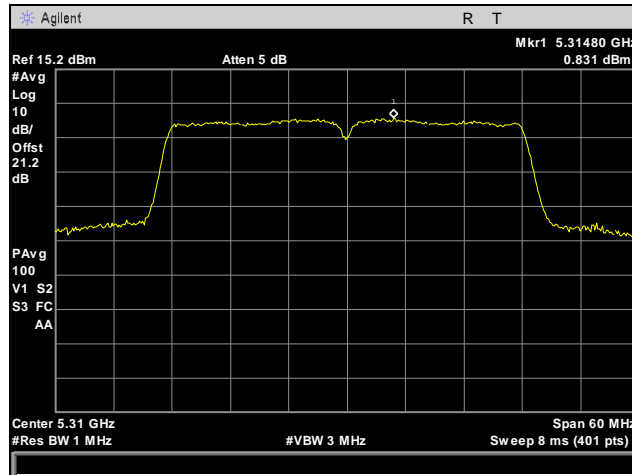


Plot 124. Power Spectral Density, High Channel, 802.11n 40 MHz, Port 1, 5310 MHz

Power Spectral Density, 802.11n 40 MHz, Port 2, Lower Band

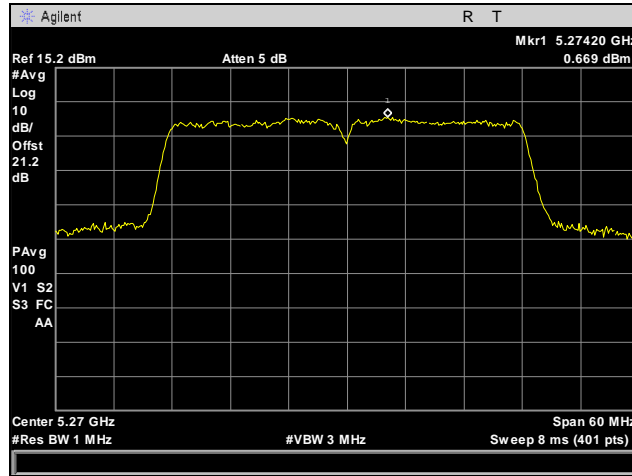


Plot 125. Power Spectral Density, Low Channel, 802.11n 40 MHz, Port 2, 5270 MHz

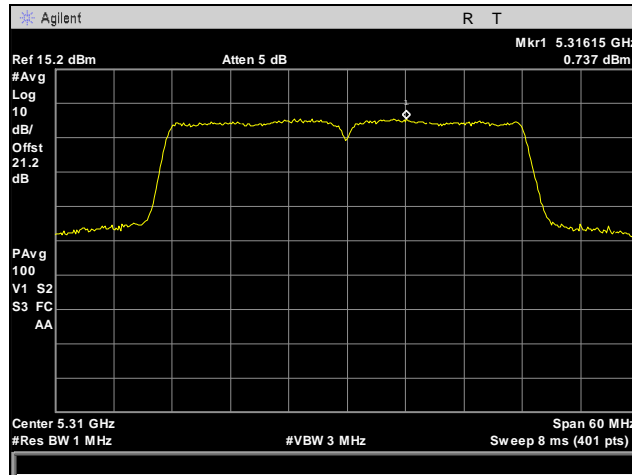


Plot 126. Power Spectral Density, High Channel, 802.11n 40 MHz, Port 2, 5310 MHz

Power Spectral Density, 802.11n 40 MHz, Port 3, Lower Band

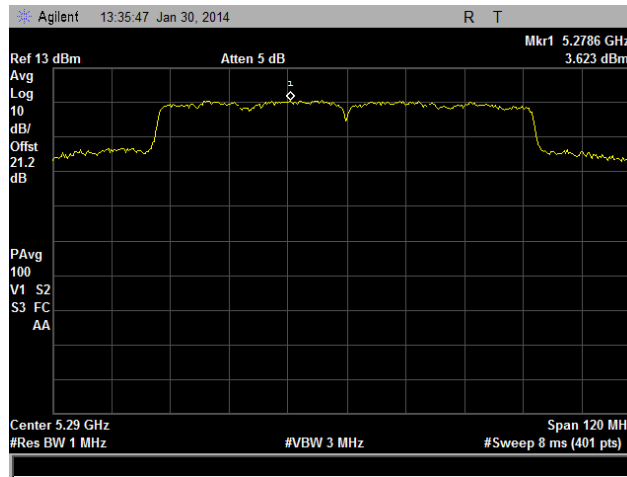


Plot 127. Power Spectral Density, Low Channel, 802.11n 40 MHz, Port 3, 5270 MHz

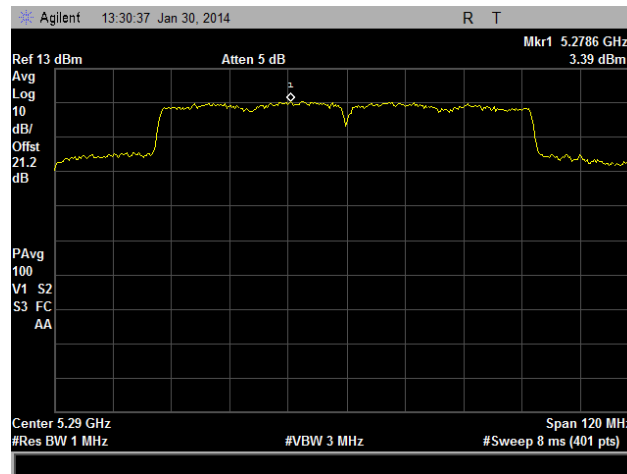


Plot 128. Power Spectral Density, High Channel, 802.11n 40 MHz, Port 3, 5310 MHz

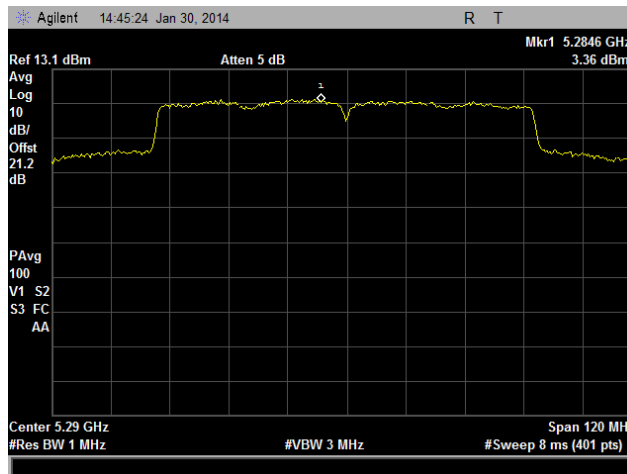
Power Spectral Density, 802.11n 80 MHz, Lower Band



Plot 129. Power Spectral Density, 802.11n 80 MHz, Port 1, 5290 MHz

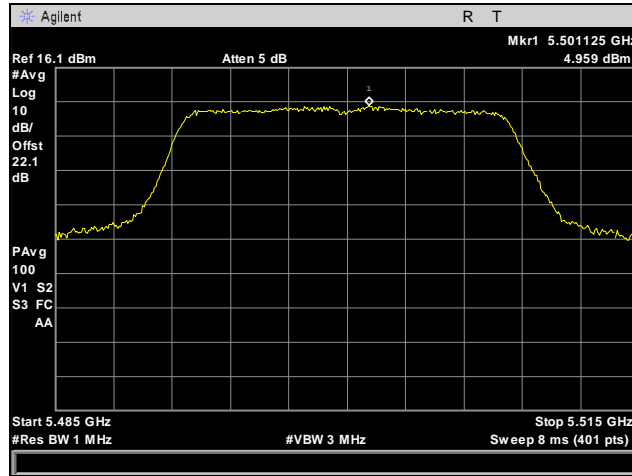


Plot 130. Power Spectral Density, 802.11n 80 MHz, Port 2, 5290 MHz

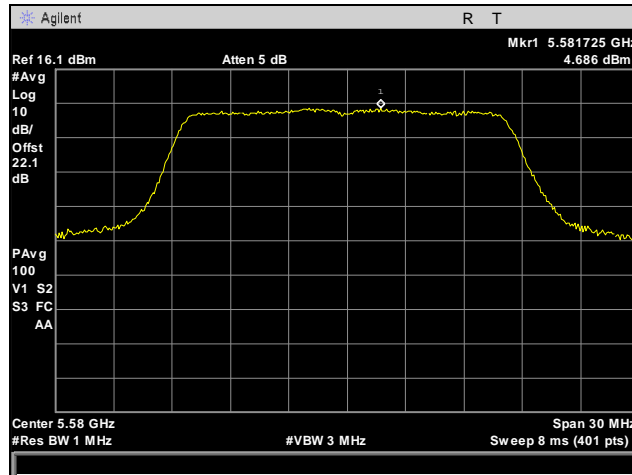


Plot 131. Power Spectral Density, 802.11n 80 MHz, Port 3, 5290 MHz

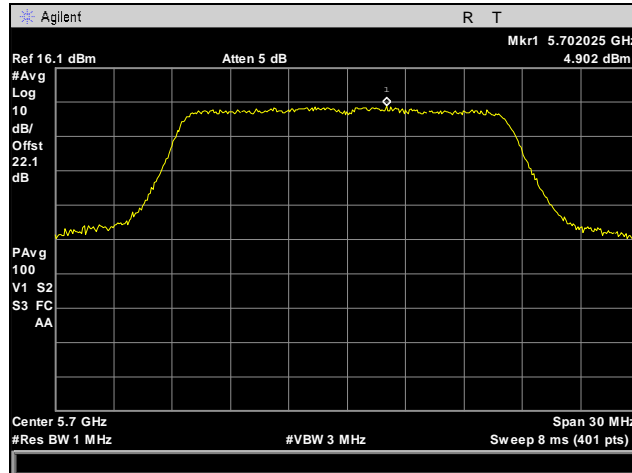
Power Spectral Density, 802.11a, Upper Band



Plot 132. Power Spectral Density, Low Channel, 802.11a, 5500 MHz

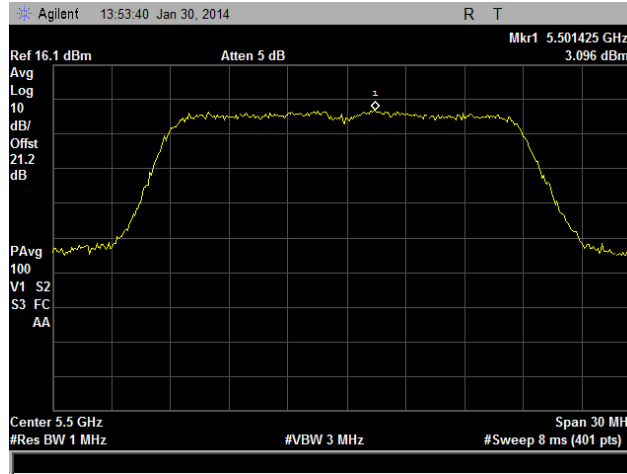


Plot 133. Power Spectral Density, Mid Channel, 802.11a, 5580 MHz

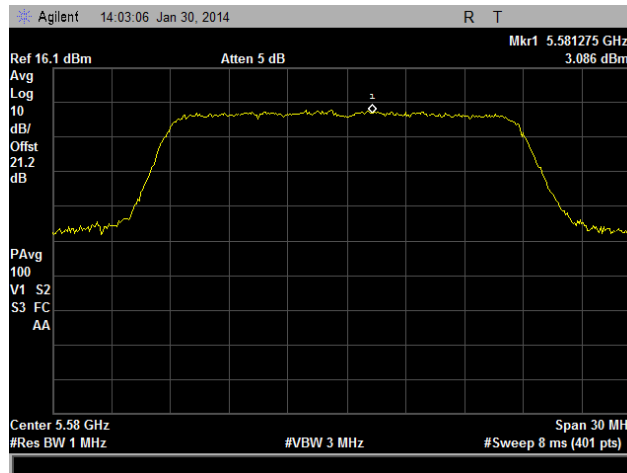


Plot 134. Power Spectral Density, High Channel, 802.11a, 5700 MHz

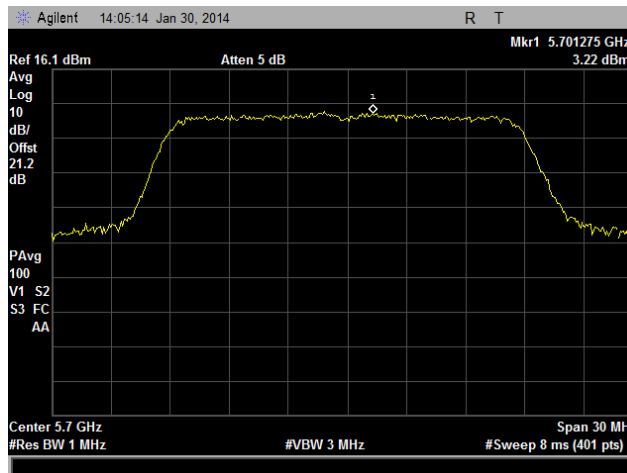
Power Spectral Density, 802.11n 20 MHz, Port 1, Upper Band



Plot 135. Power Spectral Density, Low Channel, 802.11n 20 MHz, Port 1, 5500 MHz

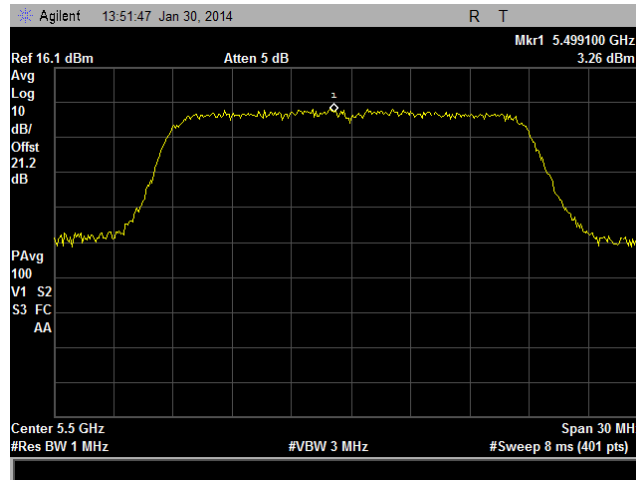


Plot 136. Power Spectral Density, Mid Channel, 802.11n 20 MHz, Port 1, 5580 MHz

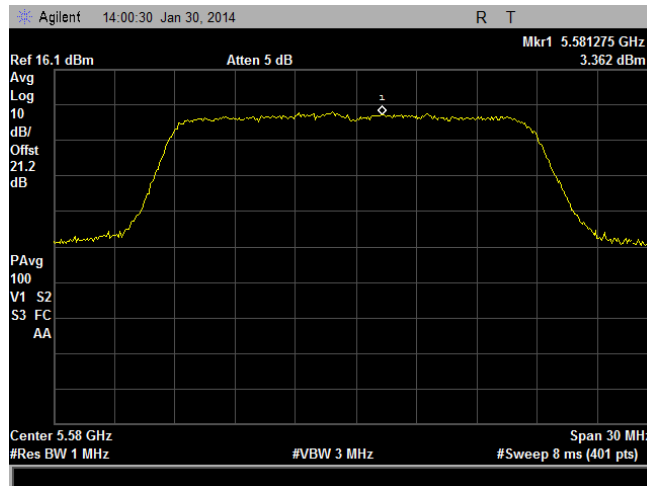


Plot 137. Power Spectral Density, High Channel, 802.11n 20 MHz, Port 1, 5700 MHz

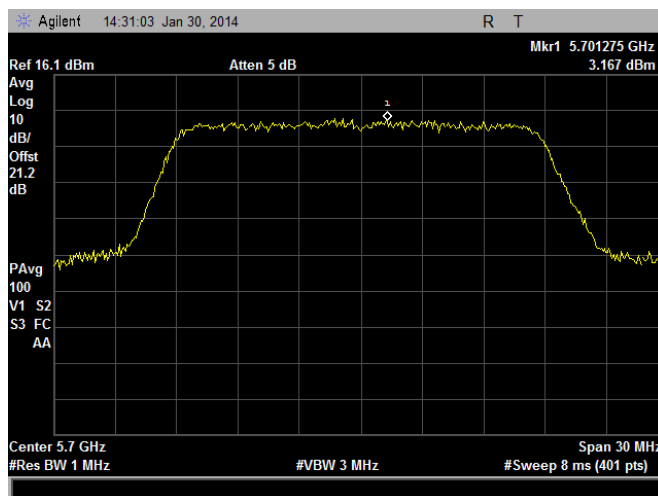
Power Spectral Density, 802.11n 20 MHz, Port 2, Upper Band



Plot 138. Power Spectral Density, Low Channel, 802.11n 20 MHz, Port 2, 5500 MHz

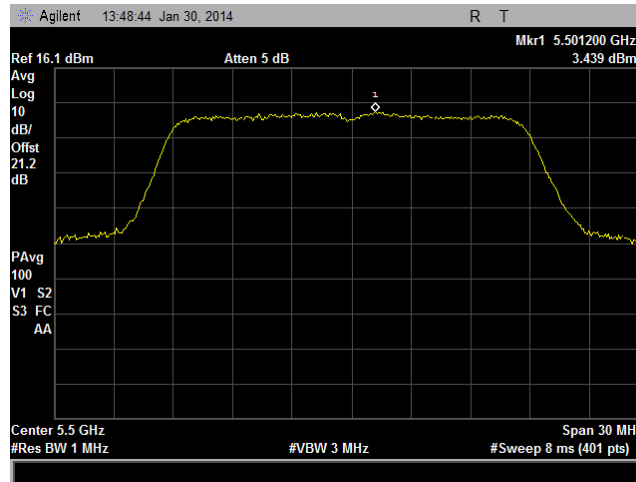


Plot 139. Power Spectral Density, Mid Channel, 802.11n 20 MHz, Port 2, 5580 MHz

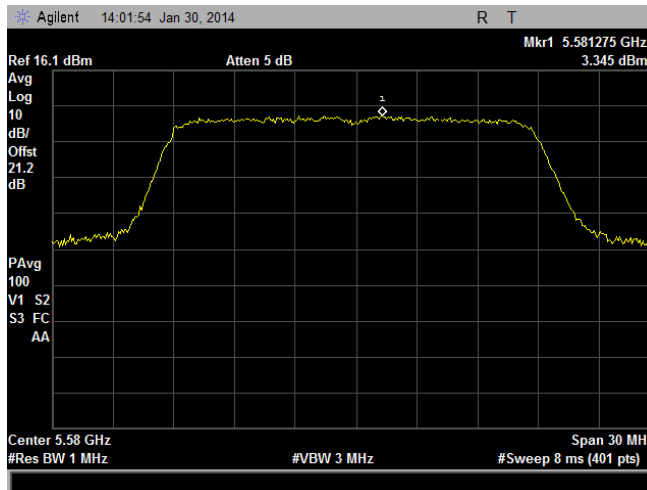


Plot 140. Power Spectral Density, High Channel, 802.11n 20 MHz, Port 2, 5700 MHz

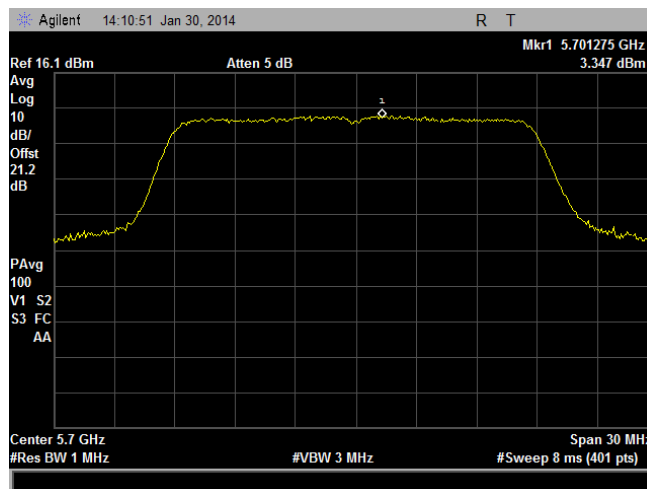
Power Spectral Density, 802.11n 20 MHz, Port 3, Upper Band



Plot 141. Power Spectral Density, Low Channel, 802.11n 20 MHz, Port 3, 5500 MHz

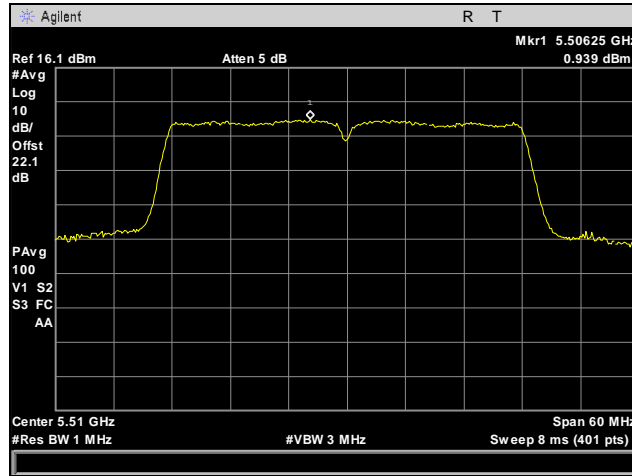


Plot 142. Power Spectral Density, Mid Channel, 802.11n 20 MHz, Port 3, 5580 MHz

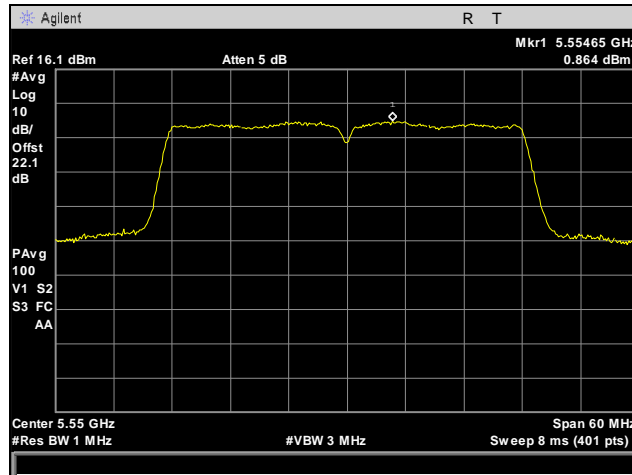


Plot 143. Power Spectral Density, High Channel, 802.11n 20 MHz, Port 3, 5700 MHz

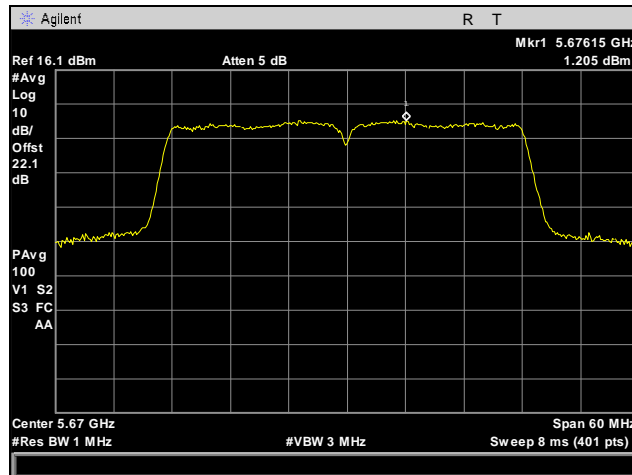
Power Spectral Density, 802.11n 40 MHz, Port 1, Upper Band



Plot 144. Power Spectral Density, Low Channel, 802.11n 40 MHz, Port 1, 5510 MHz

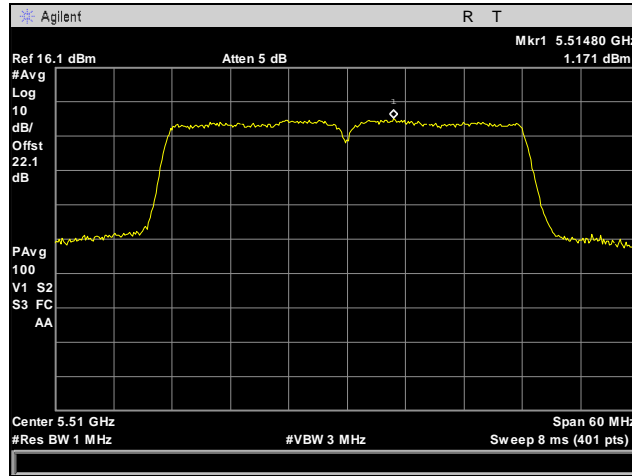


Plot 145. Power Spectral Density, Mid Channel, 802.11n 40 MHz, Port 1, 5550 MHz

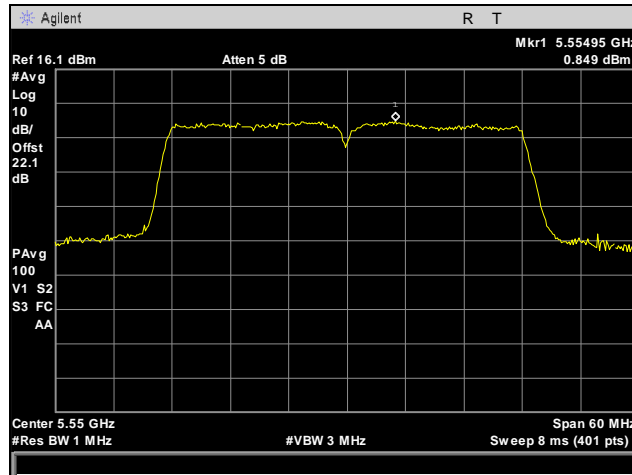


Plot 146. Power Spectral Density, High Channel, 802.11n 40 MHz, Port 1, 5670 MHz

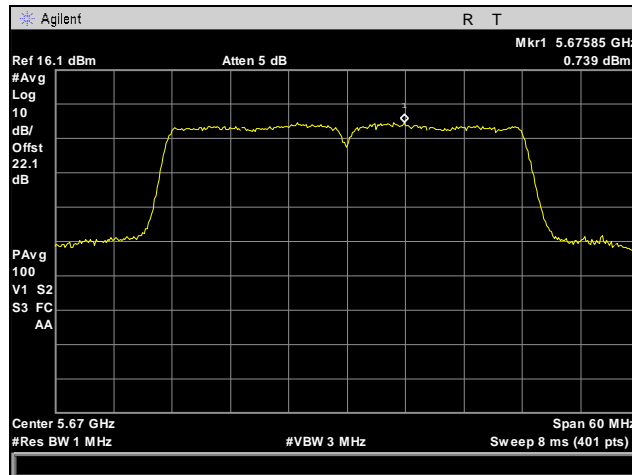
Power Spectral Density, 802.11n 40 MHz, Port 2, Upper Band



Plot 147. Power Spectral Density, Low Channel, 802.11n 40 MHz, Port 2, 5510 MHz

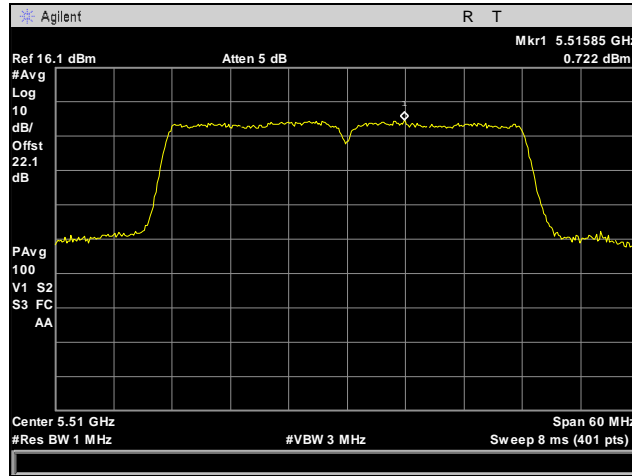


Plot 148. Power Spectral Density, Mid Channel, 802.11n 40 MHz, Port 2, 5550 MHz

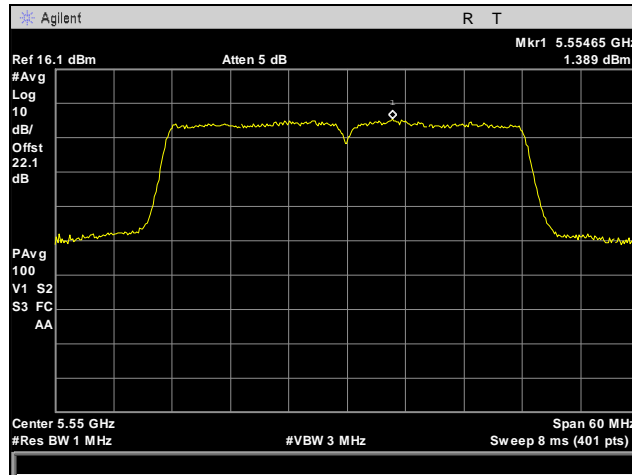


Plot 149. Power Spectral Density, High Channel, 802.11n 40 MHz, Port 2, 5670 MHz

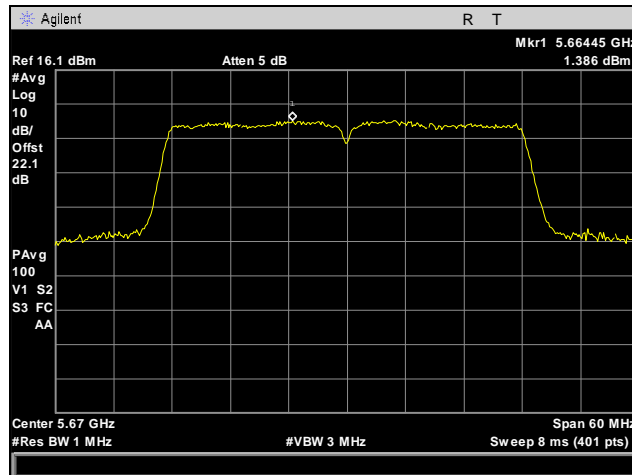
Power Spectral Density, 802.11n 40 MHz, Port 3, Upper Band



Plot 150. Power Spectral Density, Low Channel, 802.11n 40 MHz, Port 3, 5510 MHz

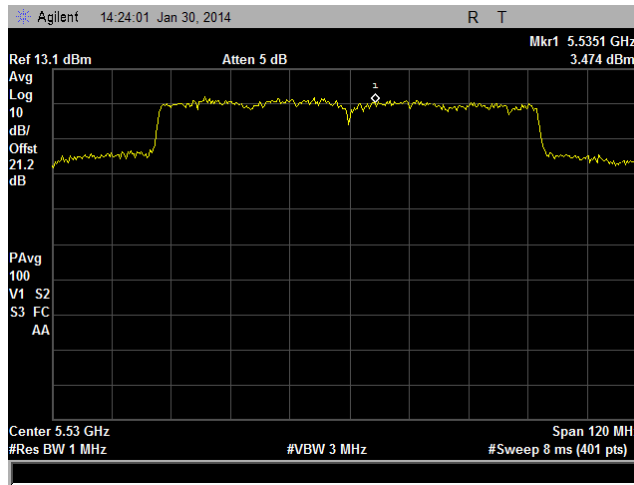


Plot 151. Power Spectral Density, Mid Channel, 802.11n 40 MHz, Port 3, 5550 MHz

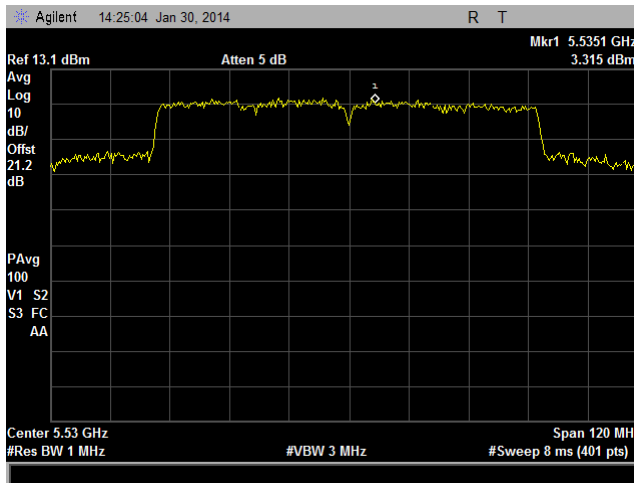


Plot 152. Power Spectral Density, High Channel, 802.11n 40 MHz, Port 3, 5670 MHz

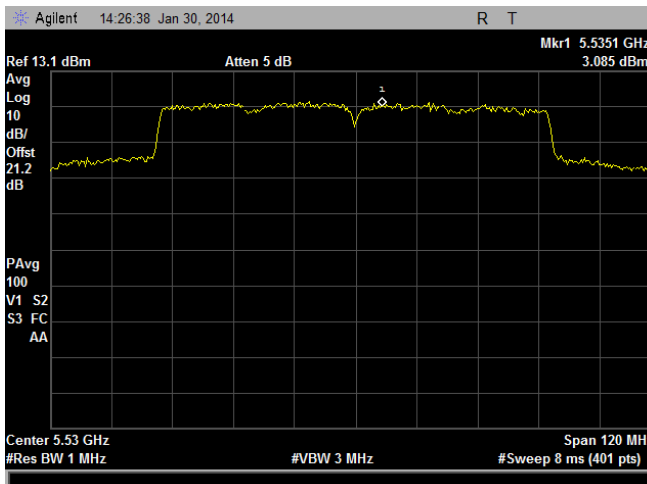
Power Spectral Density, 802.11n 80 MHz, Upper Band



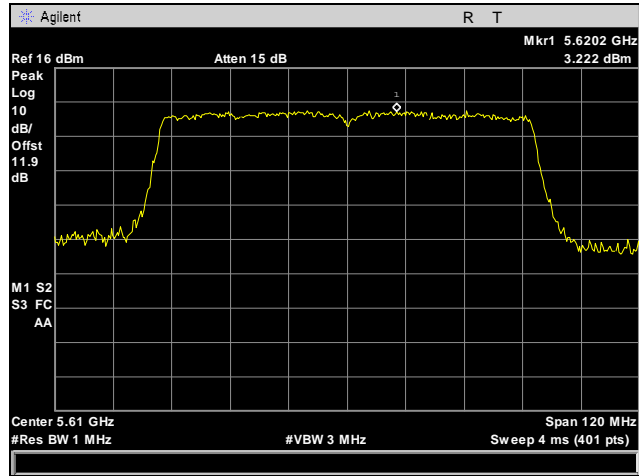
Plot 153. Power Spectral Density, Low Channel, 802.11n 80 MHz, Port 1, 5530 MHz



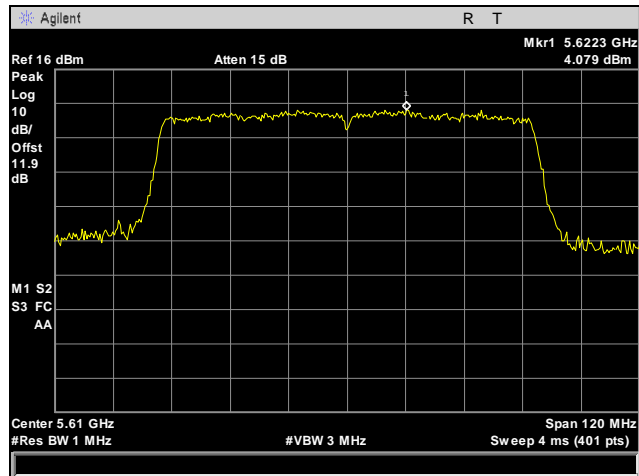
Plot 154. Power Spectral Density, Low Channel, 802.11n 80 MHz, Port 2, 5530 MHz



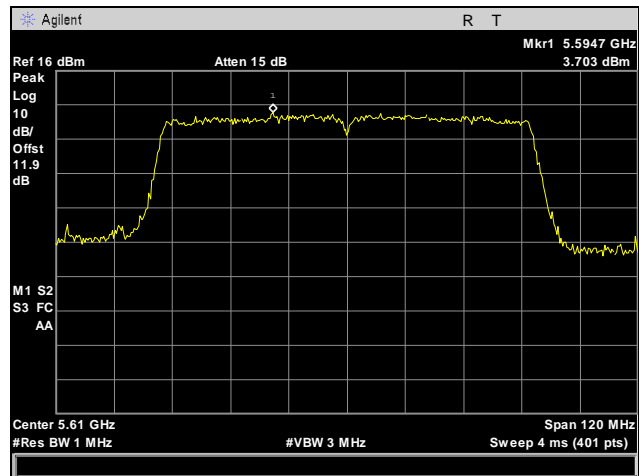
Plot 155. Power Spectral Density, Low Channel, 802.11n 80 MHz, Port 3, 5530 MHz



Plot 156. Power Spectral Density, Low Channel, 802.11n 80 MHz, Port 1, 5610 MHz



Plot 157. Power Spectral Density, Low Channel, 802.11n 80 MHz, Port 2, 5610 MHz



Plot 158. Power Spectral Density, Low Channel, 802.11n 80 MHz, Port 3, 5610 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(a)(6) Peak Excursion Ratio

- Test Requirements:** § 15.407(a)(6): The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.
- Test Procedure:** The EUT was connected directly to the spectrum analyzer through cabling and attenuation. The 1st trace on the spectrum analyzer was set to RBW=1MHz, VBW=3MHz. A peak detector was used and the trace max held. The 2nd trace on the spectrum analyzer was set according to measurement Method SA-1 from 789033 D01 General UNII Test Procedures v01r02 for making conducted power measurements
- Test Results:** Equipment was compliant with the peak excursion ratio limits of § 15.407(a)(6). The peak excursion ratio was determined from plots on the following page(s).
- Test Engineer(s):** Jonathan Chao
- Test Date(s):** 02/18/13

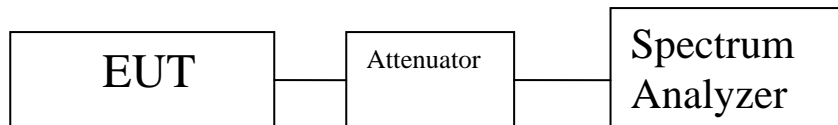
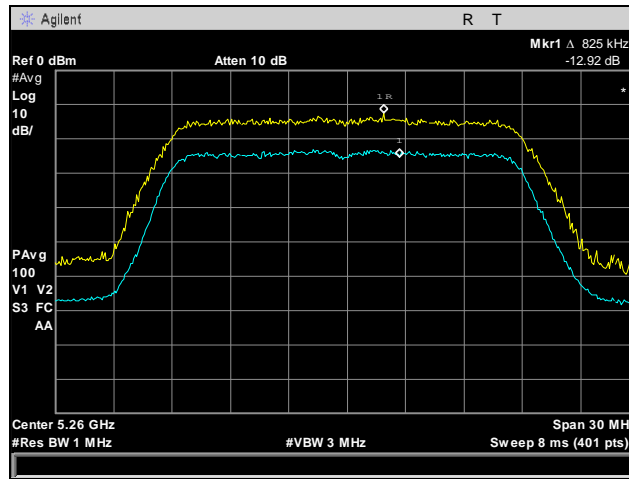
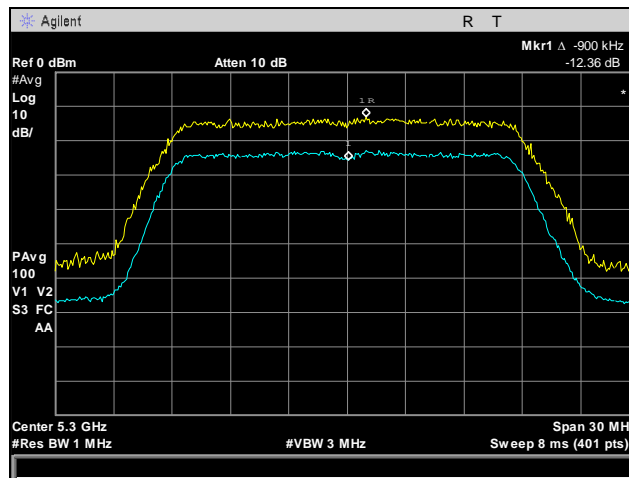


Figure 5. Peak Excursion Ration Test Setup

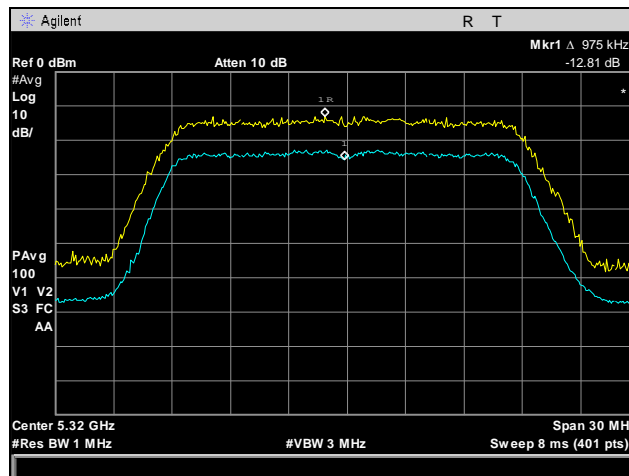
Peak Excursion Ratio, 802.11a, Lower Band



Plot 159. Peak Excursion Ratio, Low Channel, 802.11a, 5260 MHz

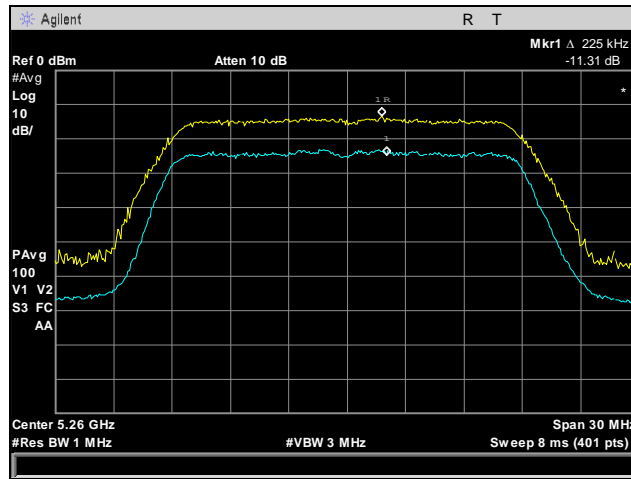


Plot 160. Peak Excursion Ratio, Mid Channel, 802.11a, 5300 MHz

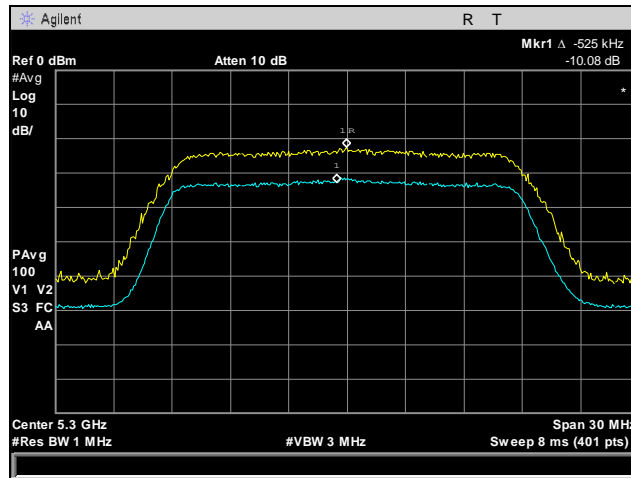


Plot 161. Peak Excursion Ratio, High Channel, 802.11a, 5320 MHz

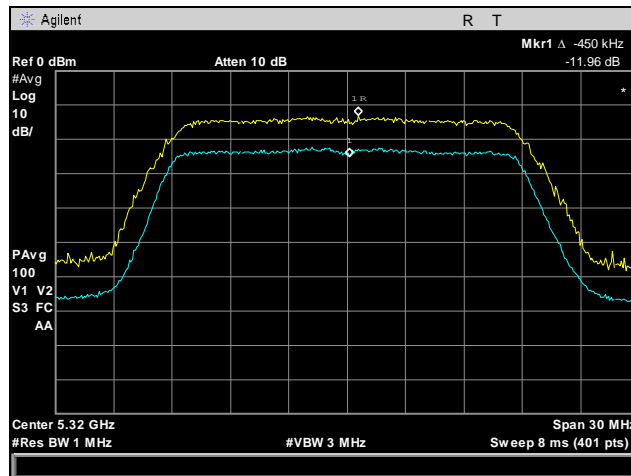
Peak Excursion Ratio, 802.11n 20 MHz, Port 1, Lower Band



Plot 162. Peak Excursion Ratio, Low Channel, 802.11n 20 MHz, Port 1, 5260 MHz

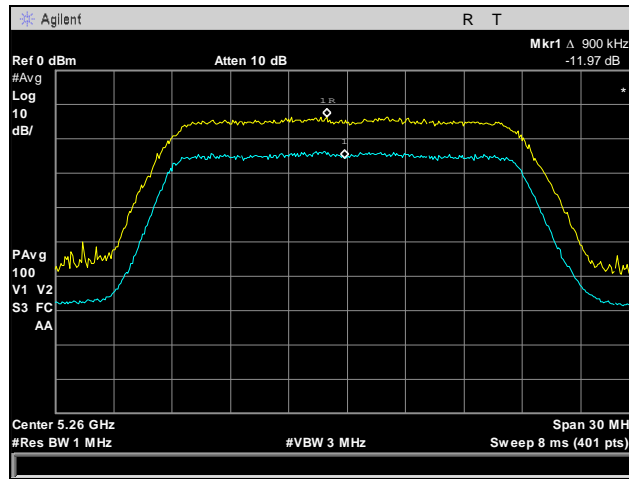


Plot 163. Peak Excursion Ratio, Mid Channel, 802.11n 20 MHz, Port 1, 5300 MHz

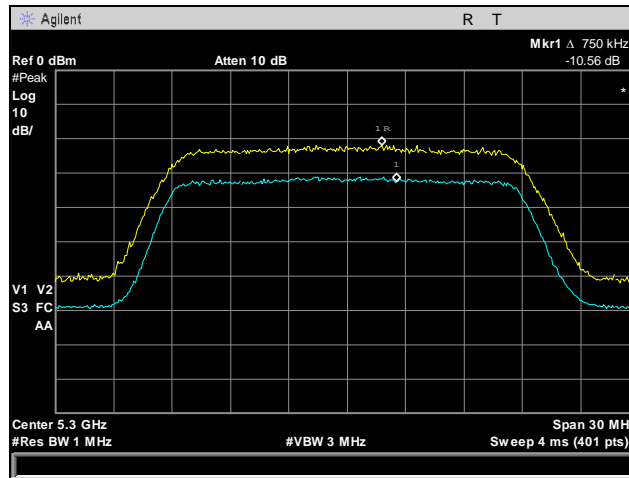


Plot 164. Peak Excursion Ratio, High Channel, 802.11n 20 MHz, Port 1, 5320 MHz

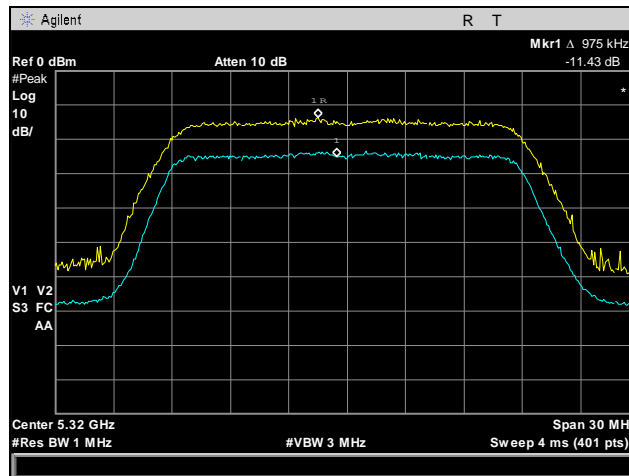
Peak Excursion Ratio, 802.11n 20 MHz, Port 2, Lower Band



Plot 165. Peak Excursion Ratio, Low Channel, 802.11n 20 MHz, Port 2, 5260 MHz

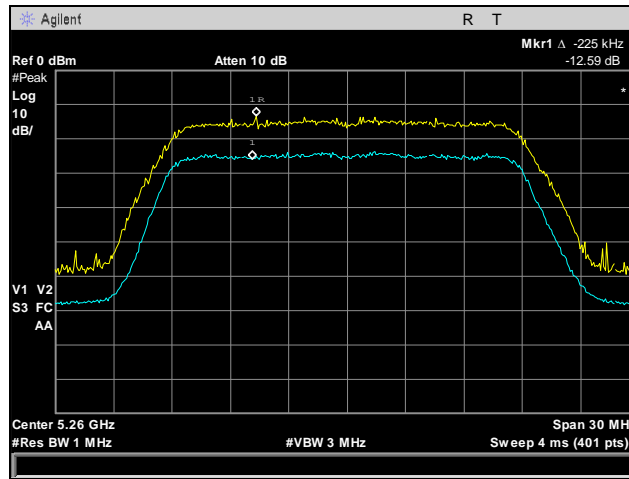


Plot 166. Peak Excursion Ratio, Mid Channel, 802.11n 20 MHz, Port 2, 5300 MHz

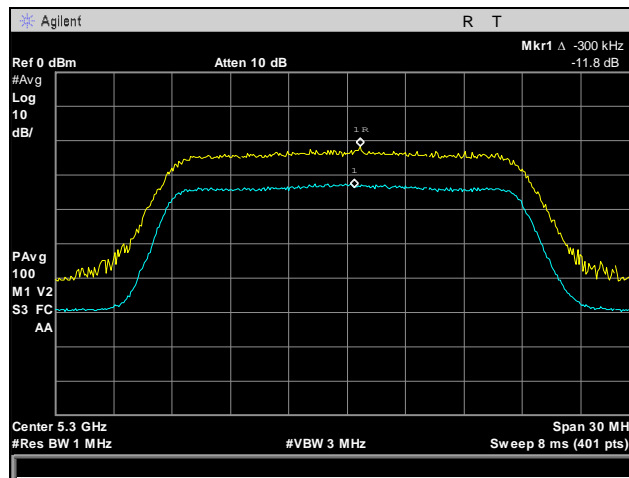


Plot 167. Peak Excursion Ratio, High Channel, 802.11n 20 MHz, Port 2, 5320 MHz

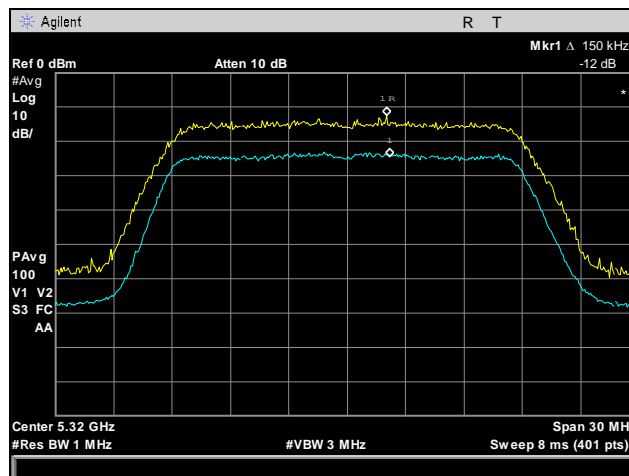
Peak Excursion Ratio, 802.11n 20 MHz, Port 3, Lower Band



Plot 168. Peak Excursion Ratio, Low Channel, 802.11n 20 MHz, Port 3, 5260 MHz

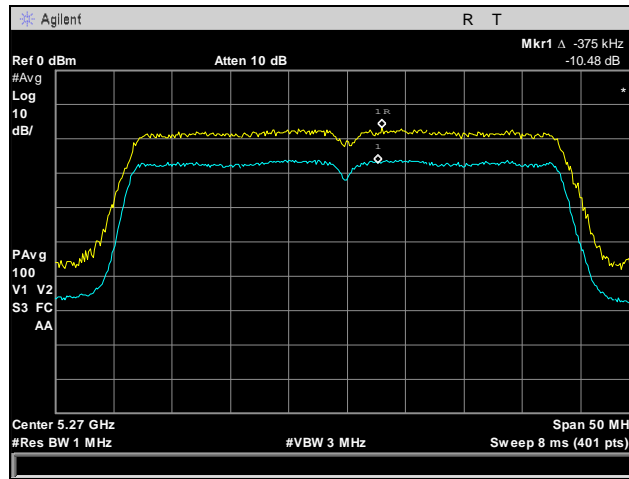


Plot 169. Peak Excursion Ratio, Mid Channel, 802.11n 20 MHz, Port 3, 5300 MHz

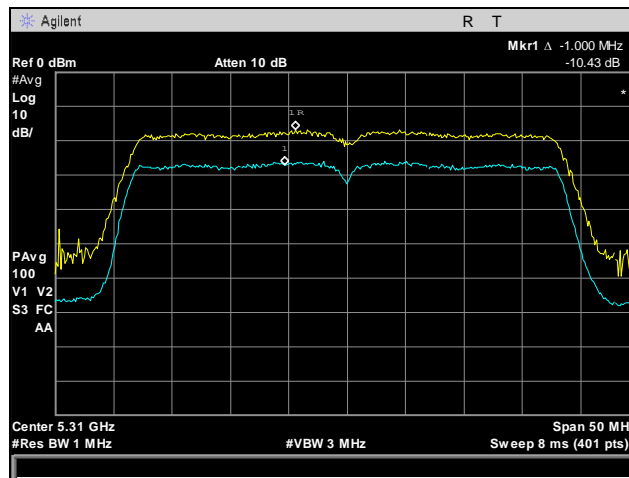


Plot 170. Peak Excursion Ratio, High Channel, 802.11n 20 MHz, Port 3, 5320 MHz

Peak Excursion Ratio, 802.11n 40 MHz, Port 1, Lower Band

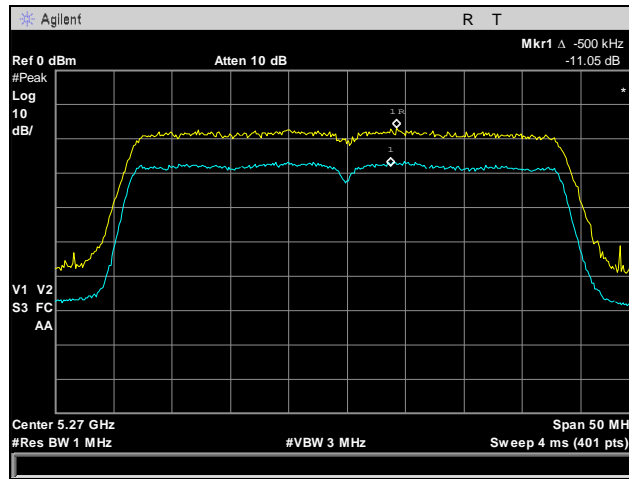


Plot 171. Peak Excursion Ratio, Low Channel, 802.11n 40 MHz, Port 1, 5270 MHz

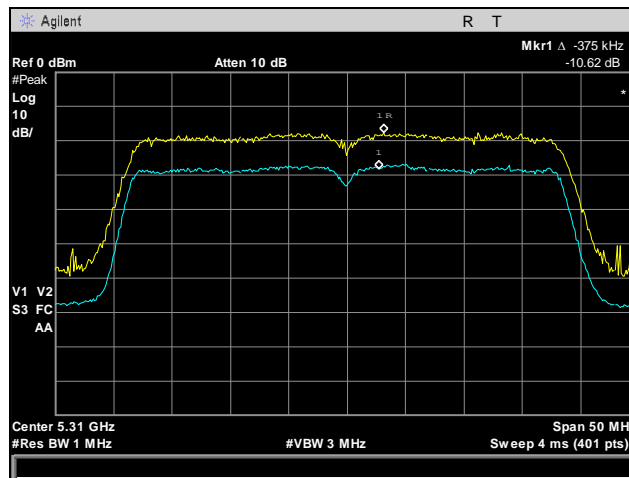


Plot 172. Peak Excursion Ratio, High Channel, 802.11n 40 MHz, Port 1, 5310 MHz

Peak Excursion Ratio, 802.11n 40 MHz, Port 2, Lower Band

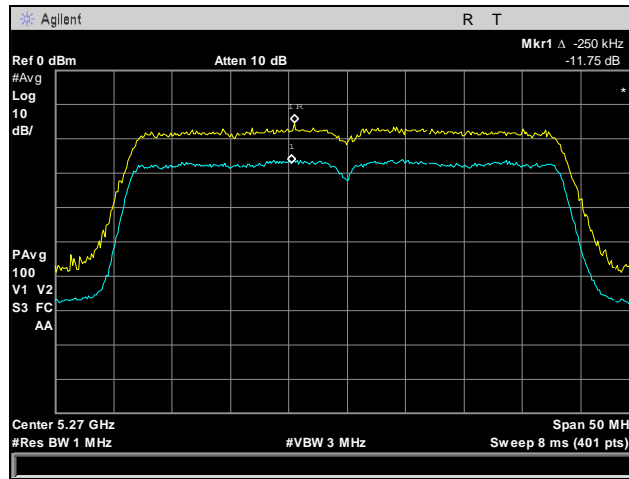


Plot 173. Peak Excursion Ratio, Low Channel, 802.11n 40 MHz, Port 2, 5270 MHz

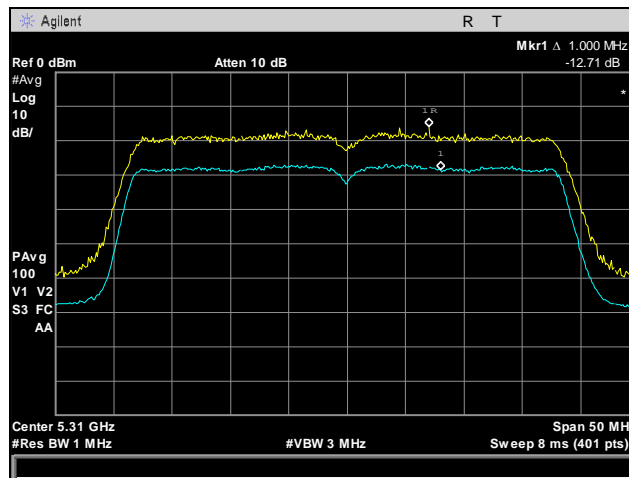


Plot 174. Peak Excursion Ratio, High Channel, 802.11n 40 MHz, Port 2, 5310 MHz

Peak Excursion Ratio, 802.11n 40 MHz, Port 3, Lower Band

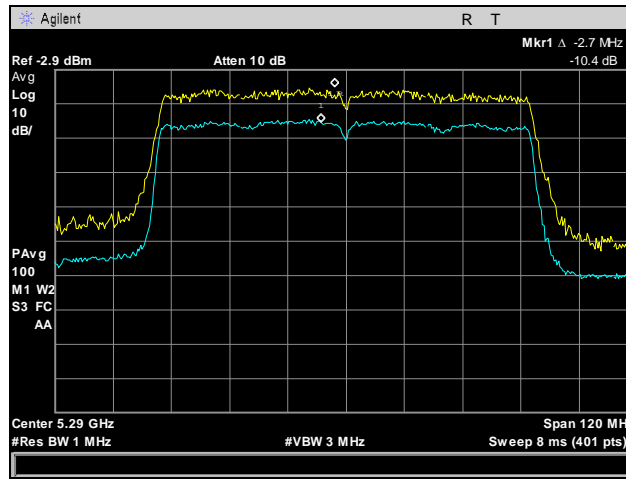


Plot 175. Peak Excursion Ratio, Low Channel, 802.11n 40 MHz, Port 3, 5270 MHz

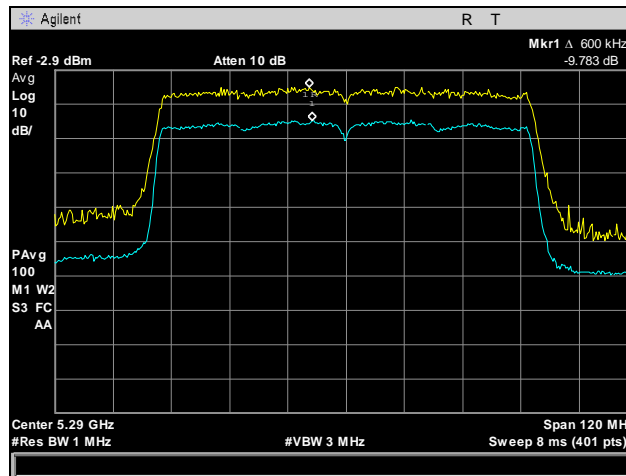


Plot 176. Peak Excursion Ratio, High Channel, 802.11n 40 MHz, Port 3, 5310 MHz

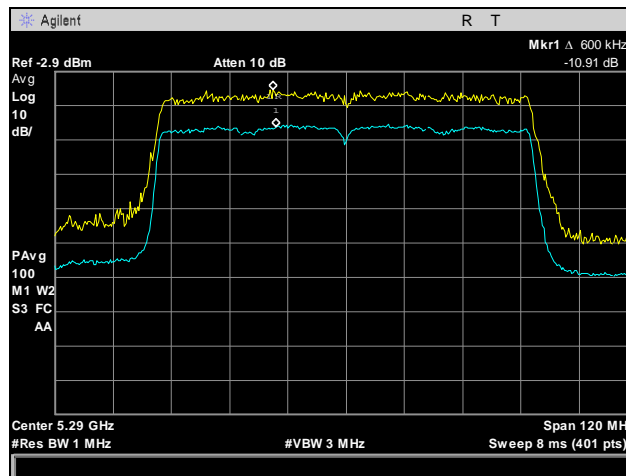
Peak Excursion Ratio, 802.11n 80 MHz, Lower Band



Plot 177. Peak Excursion Ratio, 802.11n 80 MHz, Port 1, 5290 MHz

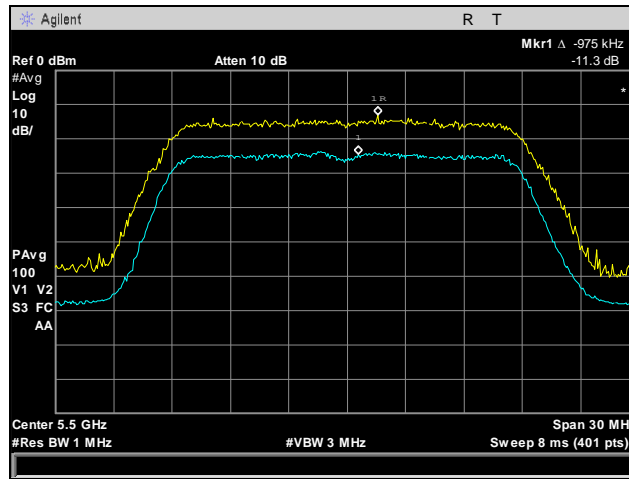


Plot 178. Peak Excursion Ratio, 802.11n 80 MHz, Port 2, 5290 MHz

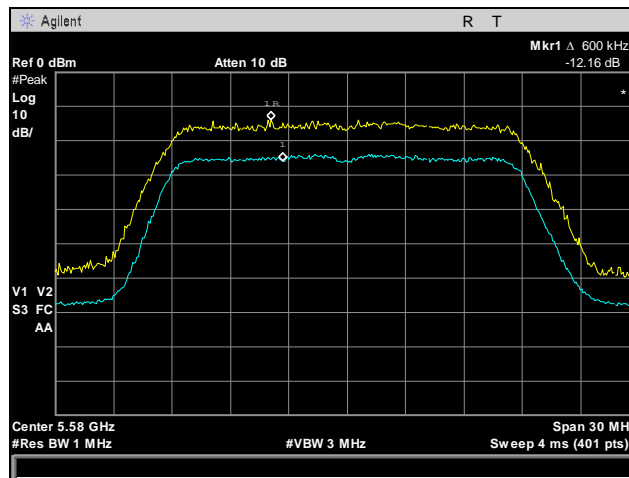


Plot 179. Peak Excursion Ratio, 802.11n 80 MHz, Port 3, 5290 MHz

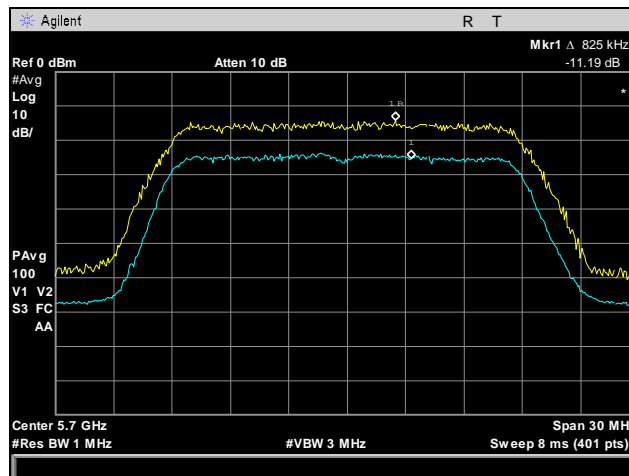
Peak Excursion Ratio, 802.11a, Upper Band



Plot 180. Peak Excursion Ratio, Low Channel, 802.11a, 5500 MHz

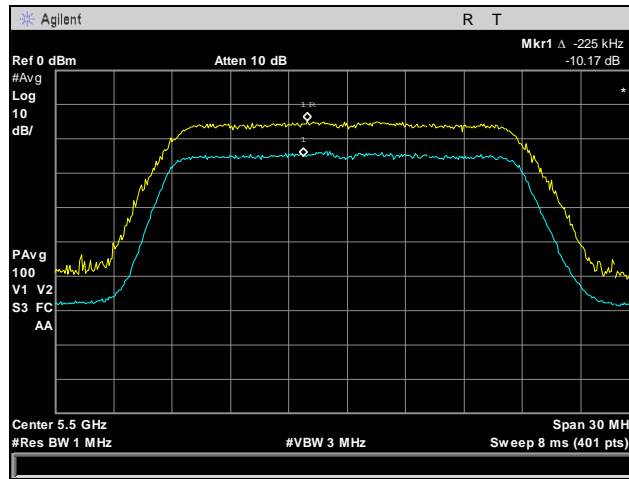


Plot 181. Peak Excursion Ratio, Mid Channel, 802.11a, 5580 MHz

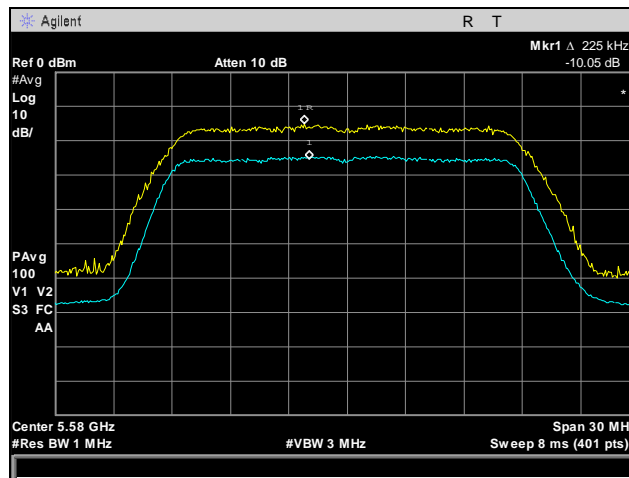


Plot 182. Peak Excursion Ratio, High Channel, 802.11a, 5700 MHz

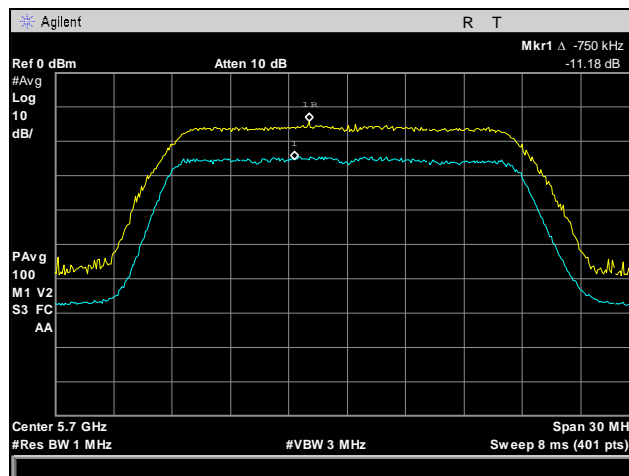
Peak Excursion Ratio, 802.11n 20 MHz, Port 1, Upper Band



Plot 183. Peak Excursion Ratio, Low Channel, 802.11n 20 MHz, Port 1, 5500 MHz

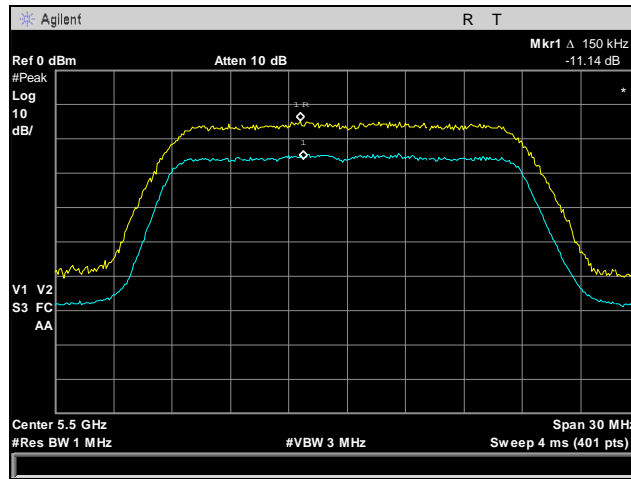


Plot 184. Peak Excursion Ratio, Mid Channel, 802.11n 20 MHz, Port 1, 5580 MHz

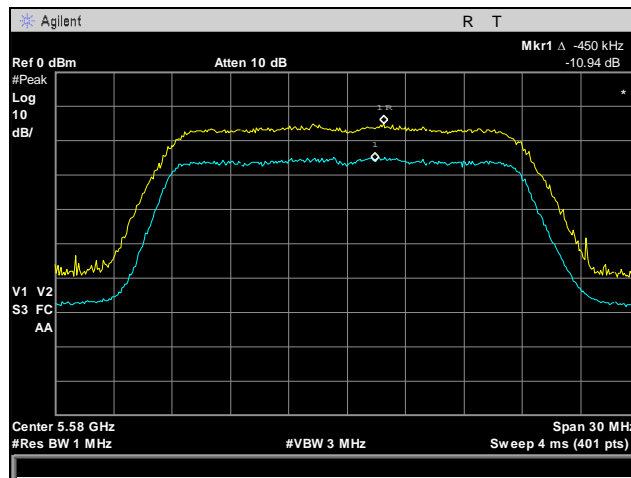


Plot 185. Peak Excursion Ratio, High Channel, 802.11n 20 MHz, Port 1, 5700 MHz

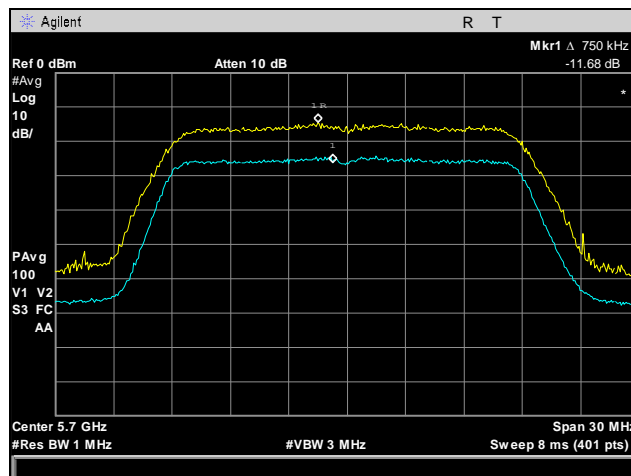
Peak Excursion Ratio, 802.11n 20 MHz, Port 2, Upper Band



Plot 186. Peak Excursion Ratio, Low Channel, 802.11n 20 MHz, Port 2, 5500 MHz

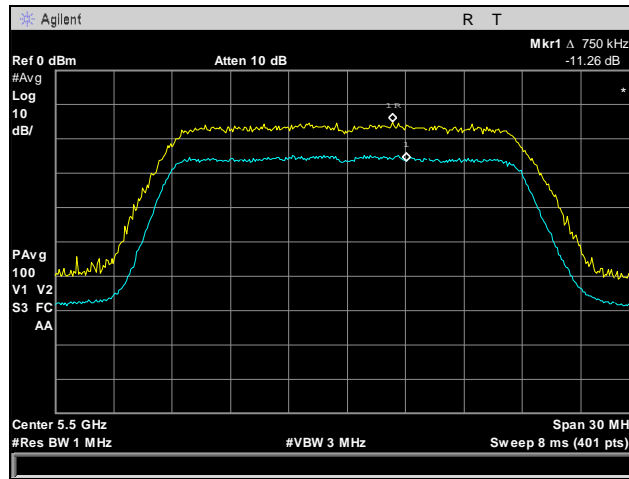


Plot 187. Peak Excursion Ratio, Mid Channel, 802.11n 20 MHz, Port 2, 5580 MHz

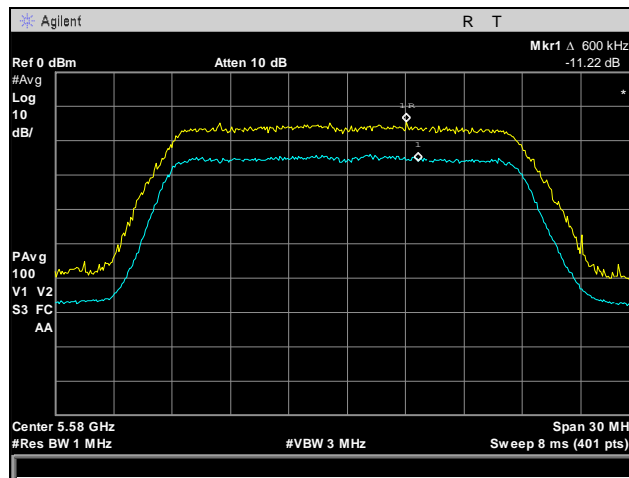


Plot 188. Peak Excursion Ratio, High Channel, 802.11n 20 MHz, Port 2, 5700 MHz

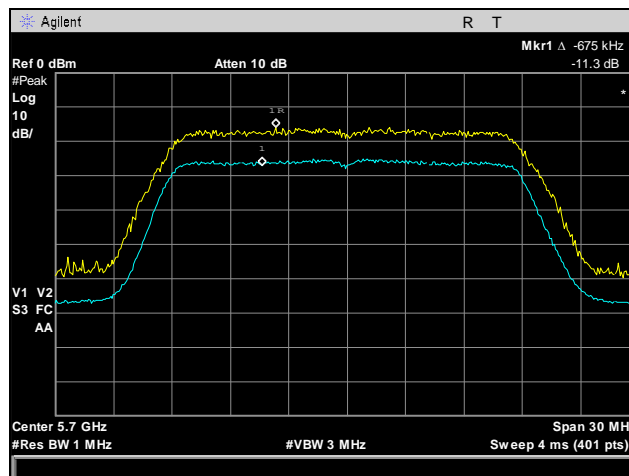
Peak Excursion Ratio, 802.11n 20 MHz, Port 3, Upper Band



Plot 189. Peak Excursion Ratio, Low Channel, 802.11n 20 MHz, Port 3, 5500 MHz

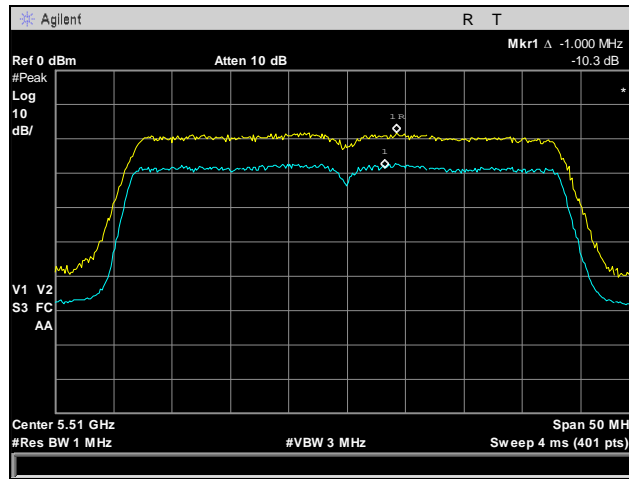


Plot 190. Peak Excursion Ratio, Mid Channel, 802.11n 20 MHz, Port 3, 5580 MHz

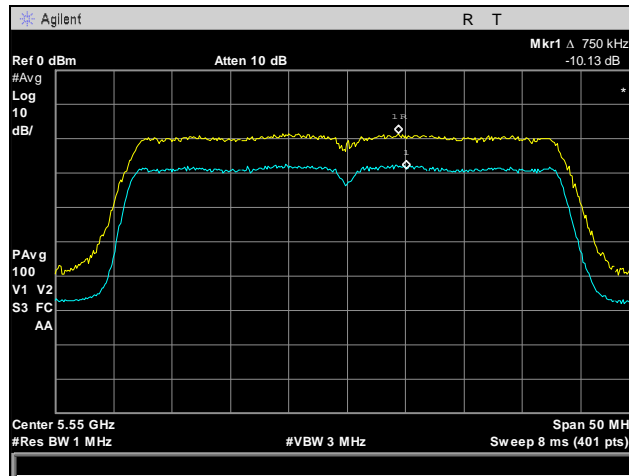


Plot 191. Peak Excursion Ratio, High Channel, 802.11n 20 MHz, Port 3, 5700 MHz

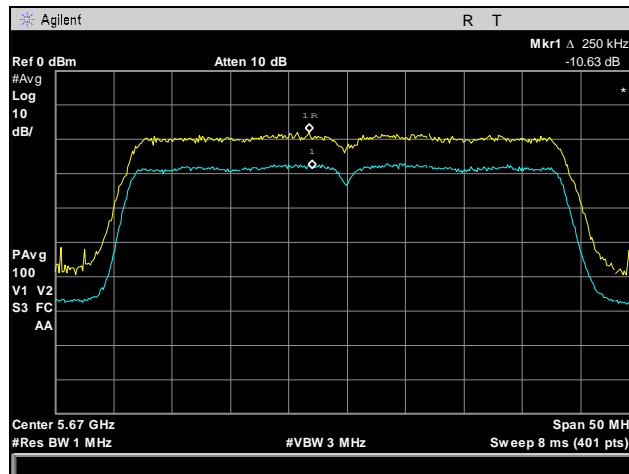
Peak Excursion Ratio, 802.11n 40 MHz, Port 1, Upper Band



Plot 192. Peak Excursion Ratio, Low Channel, 802.11n 40 MHz, Port 1, 5510 MHz

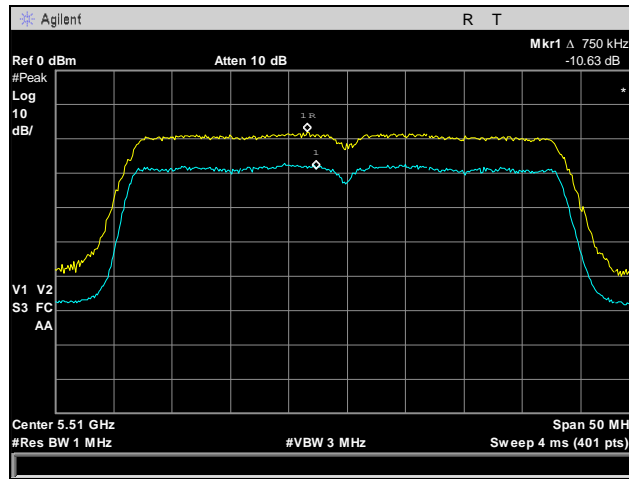


Plot 193. Peak Excursion Ratio, Mid Channel, 802.11n 40 MHz, Port 1, 5550 MHz

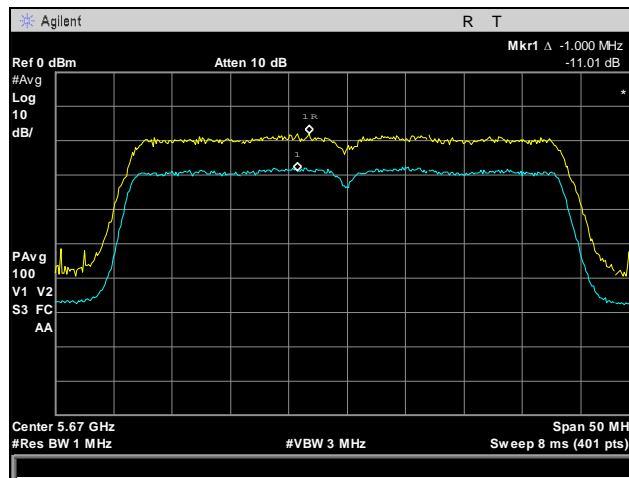


Plot 194. Peak Excursion Ratio, High Channel, 802.11n 40 MHz, Port 1, 5670 MHz

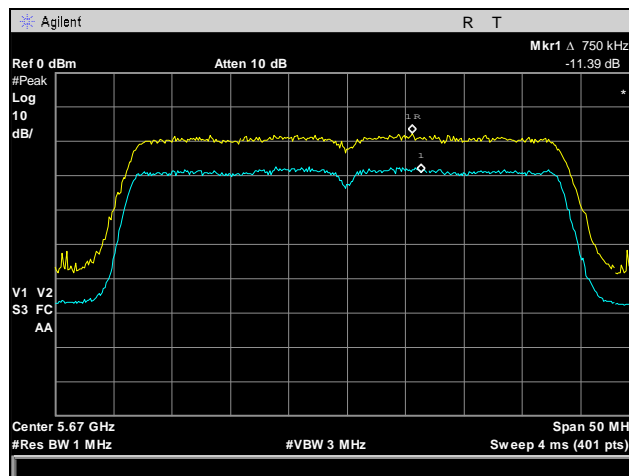
Peak Excursion Ratio, 802.11n 40 MHz, Port 2, Upper Band



Plot 195. Peak Excursion Ratio, Low Channel, 802.11n 40 MHz, Port 2, 5510 MHz

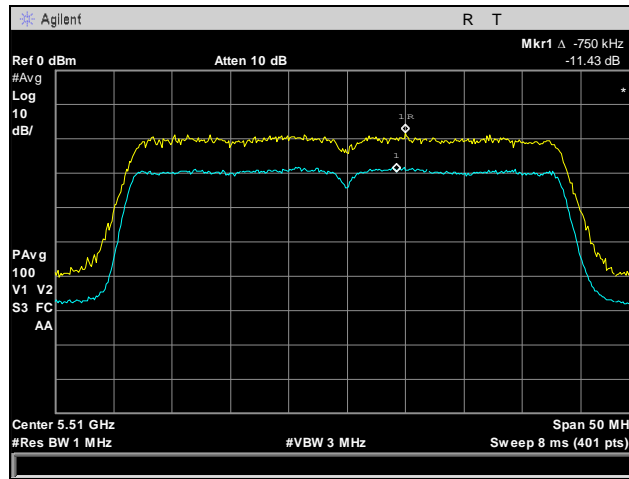


Plot 196. Peak Excursion Ratio, Mid Channel, 802.11n 40 MHz, Port 2, 5550 MHz

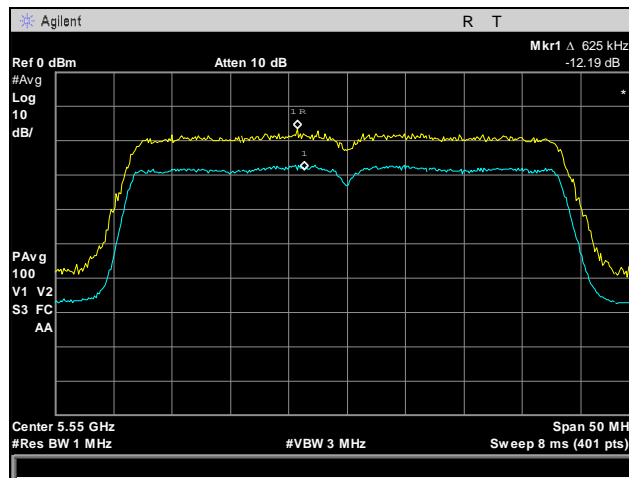


Plot 197. Peak Excursion Ratio, High Channel, 802.11n 40 MHz, Port 2, 5670 MHz

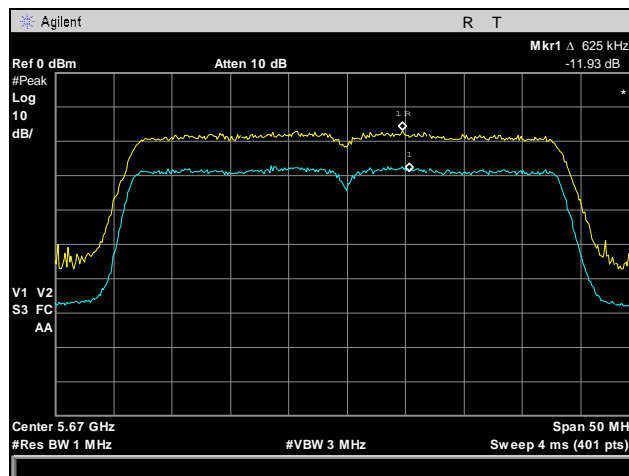
Peak Excursion Ratio, 802.11n 40 MHz, Port 3, Upper Band



Plot 198. Peak Excursion Ratio, Low Channel, 802.11n 40 MHz, Port 3, 5510 MHz

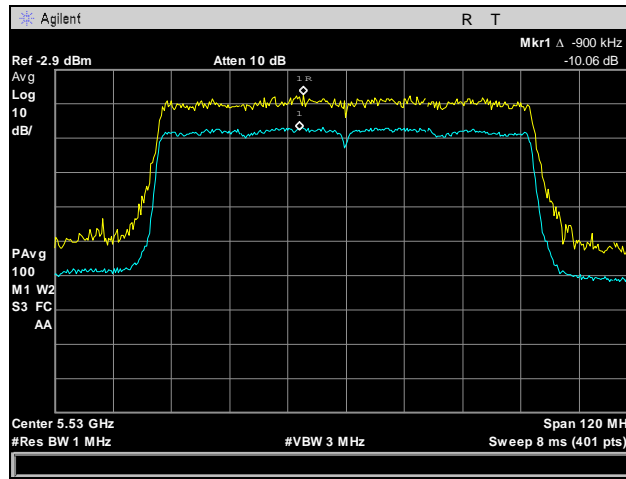


Plot 199. Peak Excursion Ratio, Mid Channel, 802.11n 40 MHz, Port 3, 5550 MHz

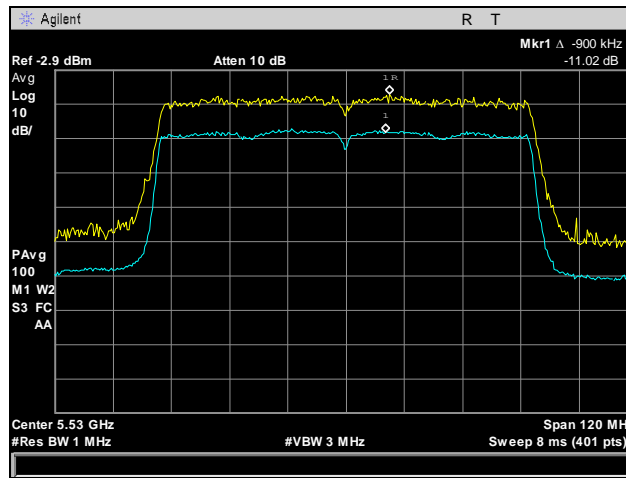


Plot 200. Peak Excursion Ratio, High Channel, 802.11n 40 MHz, Port 3, 5670 MHz

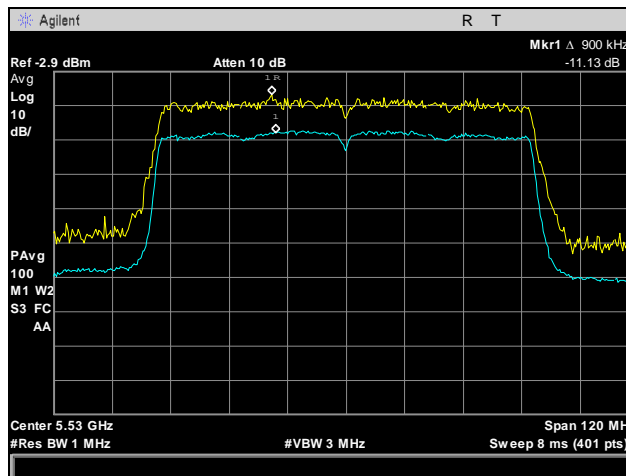
Peak Excursion Ratio, 802.11n 80 MHz, Upper Band



Plot 201. Peak Excursion Ratio, Low Channel, 802.11n 80 MHz, Port 1, 5530 MHz

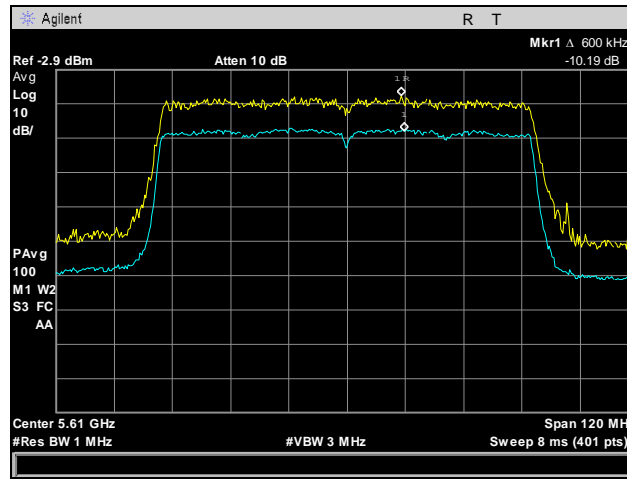


Plot 202. Peak Excursion Ratio, Low Channel, 802.11n 80 MHz, Port 2, 5530 MHz

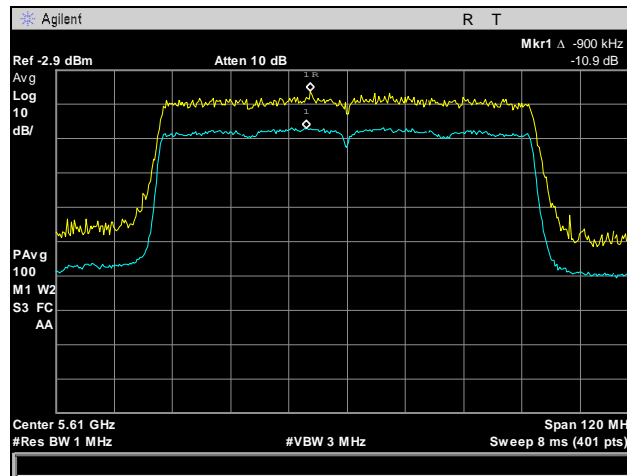


Plot 203. Peak Excursion Ratio, Low Channel, 802.11n 80 MHz, Port 3, 5530 MHz

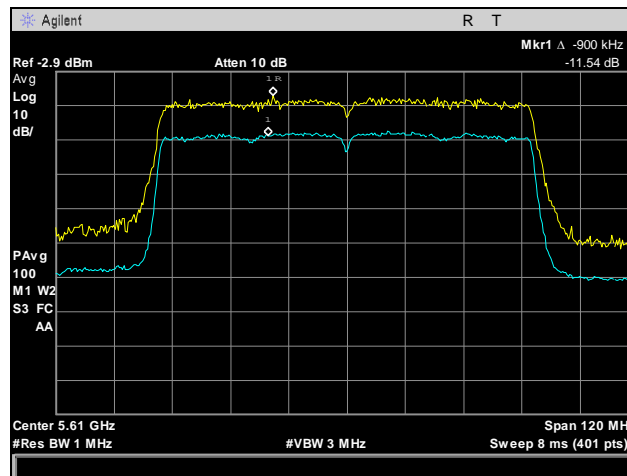
Peak Excursion Ratio, 802.11n 80 MHz, Upper Band



Plot 204. Peak Excursion Ratio, Mid Channel, 802.11n 80 MHz, Port 1, 5610 MHz



Plot 205. Peak Excursion Ratio, Mid Channel, 802.11n 80 MHz, Port 2, 5610 MHz



Plot 206. Peak Excursion Ratio, Mid Channel, 802.11n 80 MHz, Port 3, 5610 MHz

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 transmitter was placed on an 80cm non-metallic table inside in a semi-anechoic chamber. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast height to determine worst case orientation for maximum emissions. A preamp was used in the range from 7-18GHz to improve noise floor. Plots were corrected for cable loss, antenna, and preamp gain.

For frequencies from 30 MHz to 1 GHz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth. The procedure was used for average.

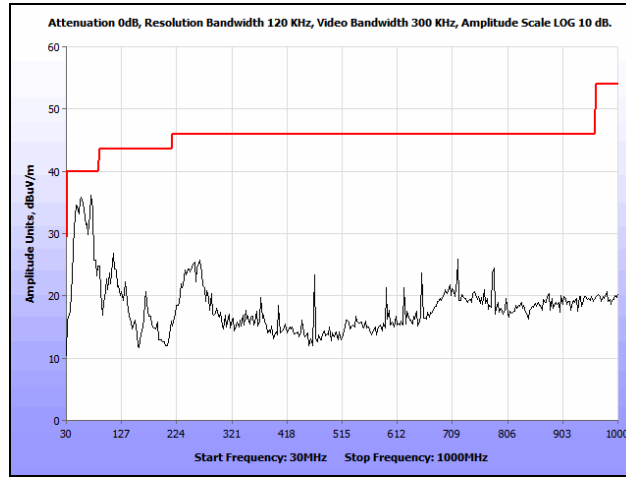
For measurements above 1 GHz, measurements were made with a Peak detector with 1 MHz resolution bandwidth. Where the spurious emissions fell into a restricted band, measurements were also made with an average detector to make sure they complied with 15.209 limits. Only noise floor was seen above 18 GHz.

Test Results: The EUT was compliant with the Radiated Emission limits for Intentional Radiators. See following pages for detailed test results.

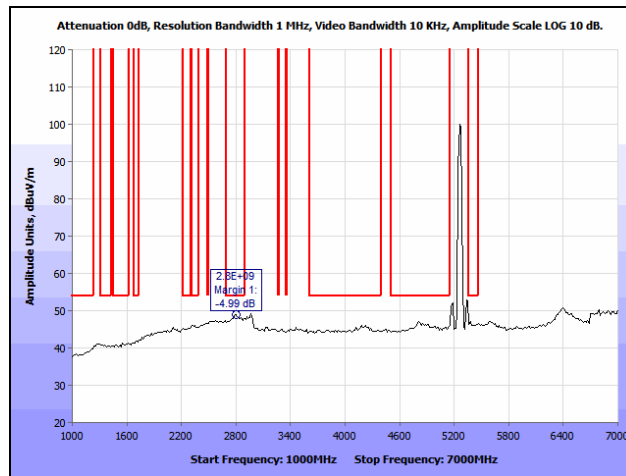
Test Engineer(s): Jonathan Chao

Test Date(s): 02/18/13

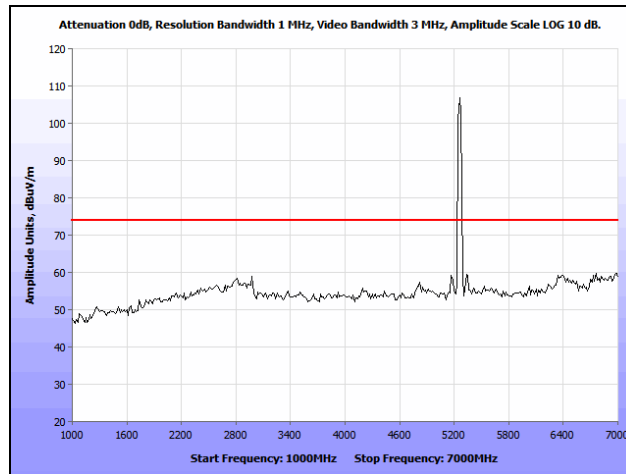
Radiated Spurious Emissions, 802.11a, Internal Antenna, Lower Band



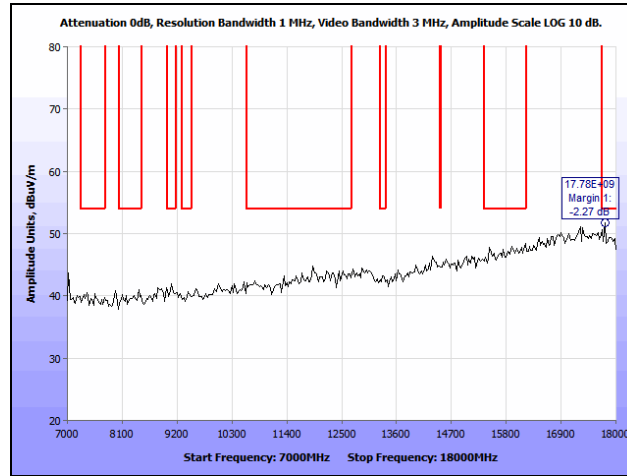
Plot 207. Radiated Spurious Emissions, 802.11a, Low Channel, 30 MHz – 1 GHz, Internal, 5260 MHz



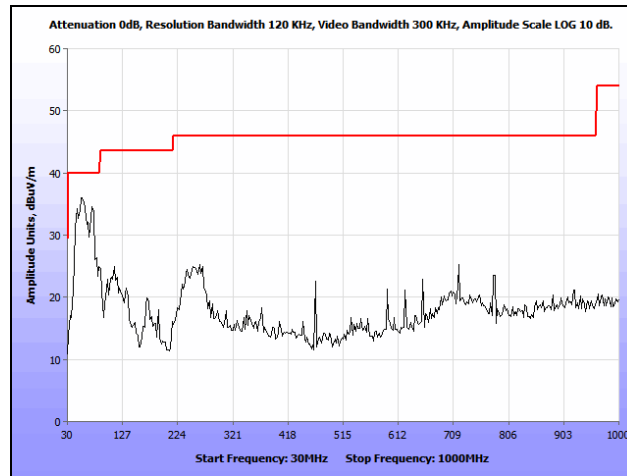
Plot 208. Radiated Spurious Emissions, 802.11a, Low Channel, 1 GHz – 7 GHz, Avg., Internal, 5260 MHz



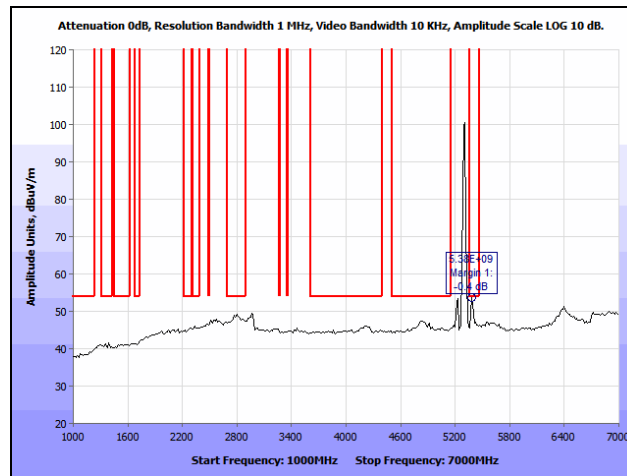
Plot 209. Radiated Spurious Emissions, 802.11a, Low Channel, 1 GHz – 7 GHz, Peak, Internal, 5260 MHz



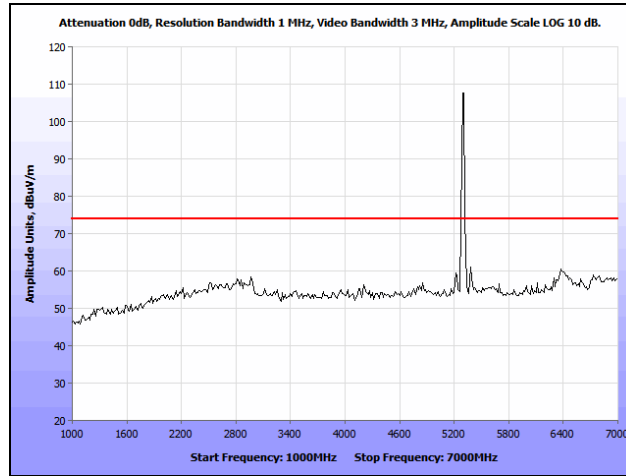
Plot 210. Radiated Spurious Emissions, 802.11a, Low Channel, 7 GHz – 18 GHz, Internal, 5260 MHz



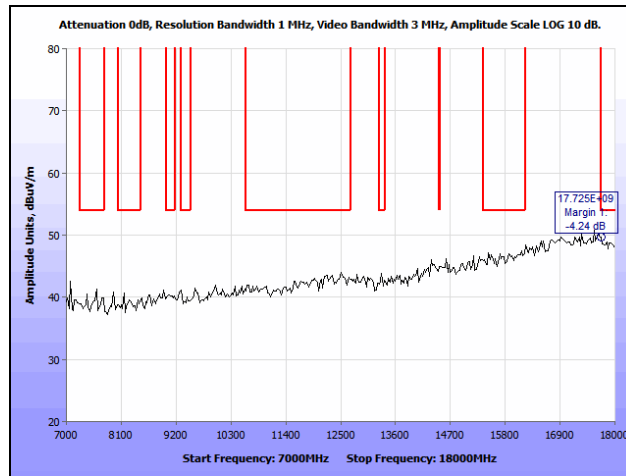
Plot 211. Radiated Spurious Emissions, 802.11a, Mid Channel, 30 MHz – 1 GHz, Internal, 5300 MHz



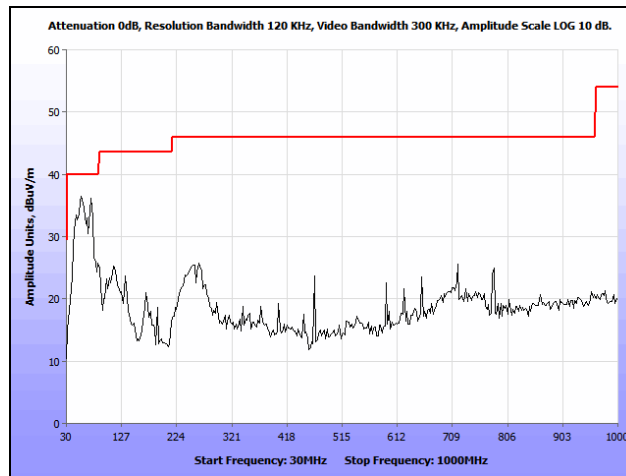
Plot 212. Radiated Spurious Emissions, 802.11a, Mid Channel, 1 GHz – 7 GHz, Avg., Internal, 5300 MHz



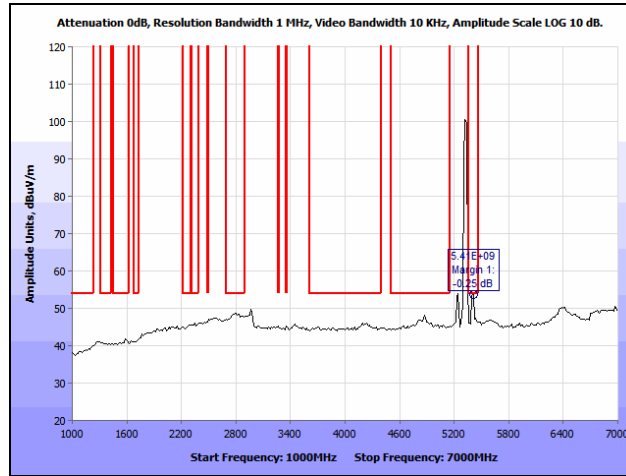
Plot 213. Radiated Spurious Emissions, 802.11a, Mid Channel, 1 GHz – 7 GHz, Peak, Internal, 5300 MHz



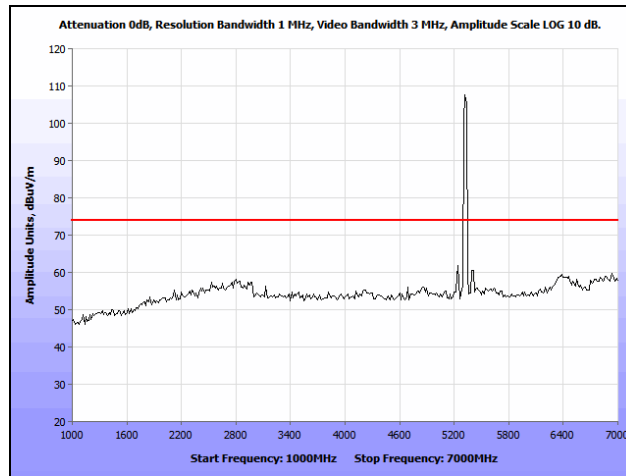
Plot 214. Radiated Spurious Emissions, 802.11a, Mid Channel, 7 GHz – 18 GHz, Internal, 5300 MHz



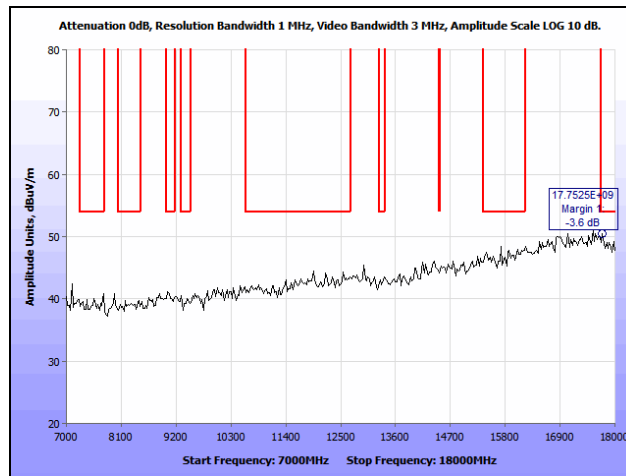
Plot 215. Radiated Spurious Emissions, 802.11a, High Channel, 30 MHz – 1 GHz, Internal, 5320 MHz



Plot 216. Radiated Spurious Emissions, 802.11a, High Channel, 1 GHz – 7 GHz, Avg., Internal, 5320 MHz

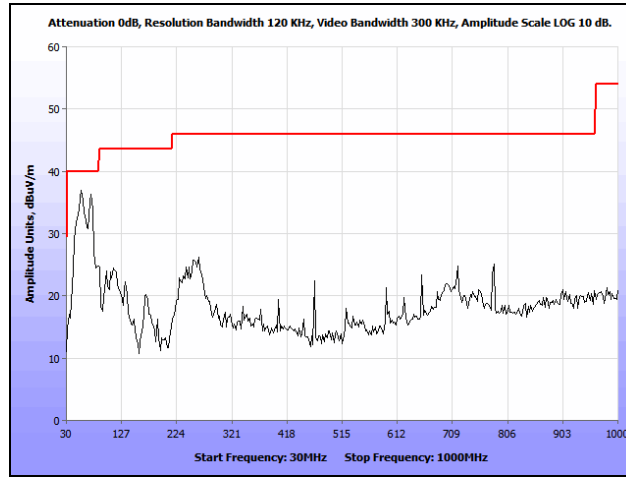


Plot 217. Radiated Spurious Emissions, 802.11a, High Channel, 1 GHz – 7 GHz, Peak, Internal, 5320 MHz

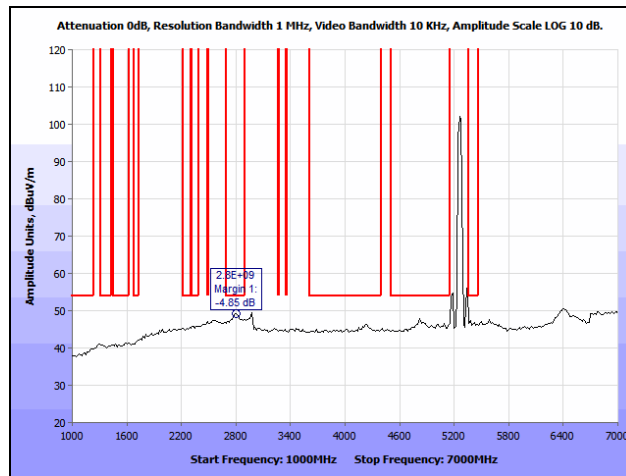


Plot 218. Radiated Spurious Emissions, 802.11a, High Channel, 7 GHz – 18 GHz, Internal, 5320 MHz

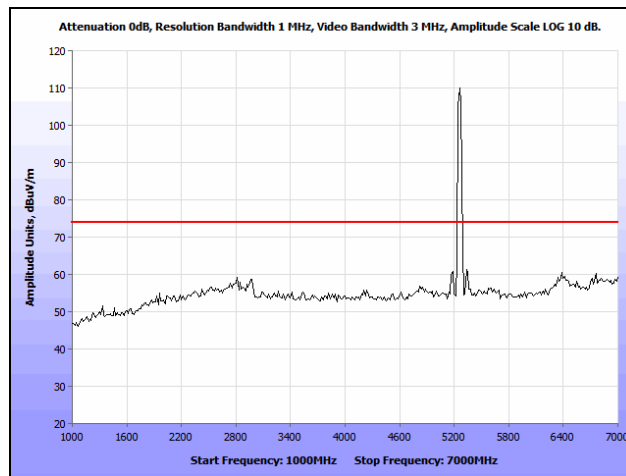
Radiated Spurious Emissions, 802.11n 20 MHz, Internal Antenna, Lower Band



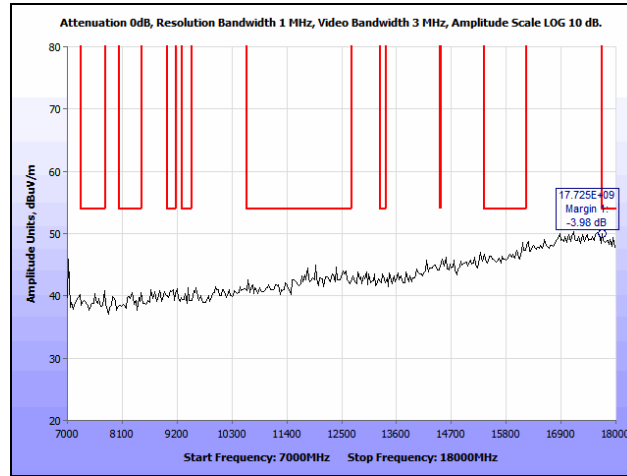
Plot 219. Radiated Spurious Emissions, 802.11n 20 MHz, Low Channel, 30 MHz – 1 GHz, Internal, 5260 MHz



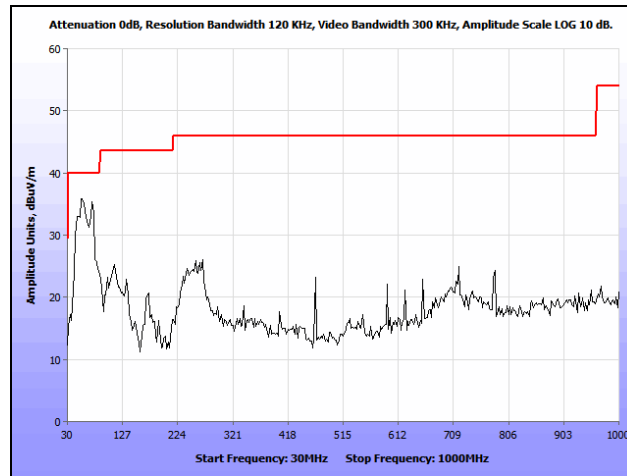
Plot 220. Radiated Spurious Emissions, 802.11n 20 MHz, Low Channel, 1 GHz – 7 GHz, Avg., Internal, 5260 MHz



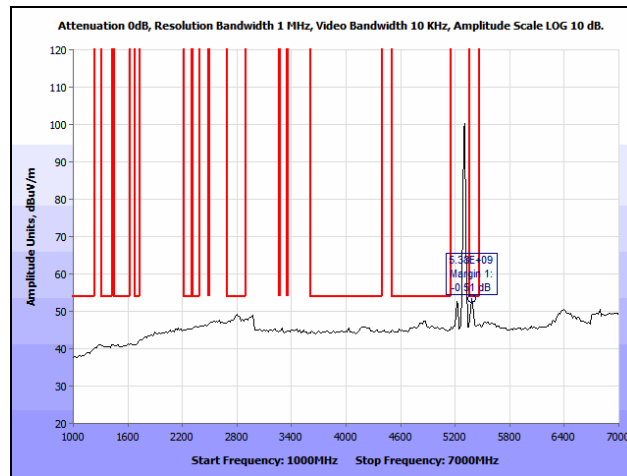
Plot 221. Radiated Spurious Emissions, 802.11n 20 MHz, Low Channel, 1 GHz – 7 GHz, Peak, Internal, 5260 MHz



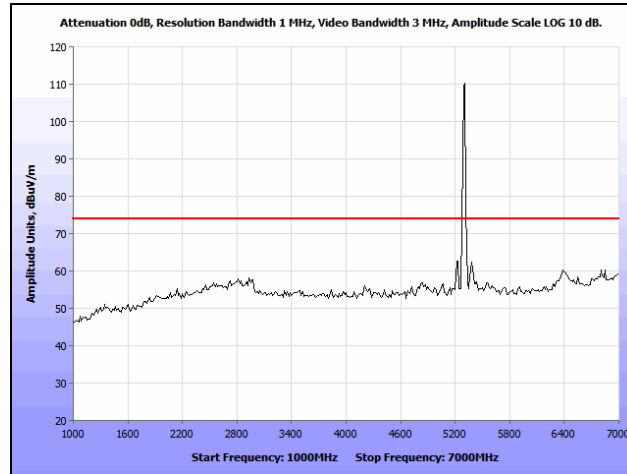
Plot 222. Radiated Spurious Emissions, 802.11n 20 MHz, Low Channel, 7 GHz – 18 GHz, Internal, 5260 MHz



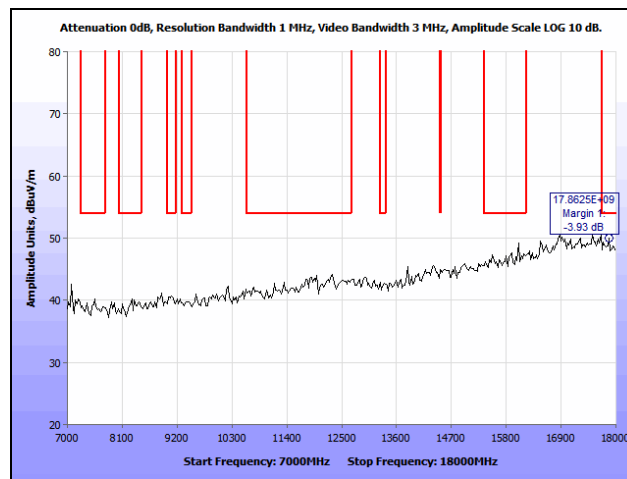
Plot 223. Radiated Spurious Emissions, 802.11n 20 MHz, Mid Channel, 30 MHz – 1 GHz, Internal, 5300 MHz



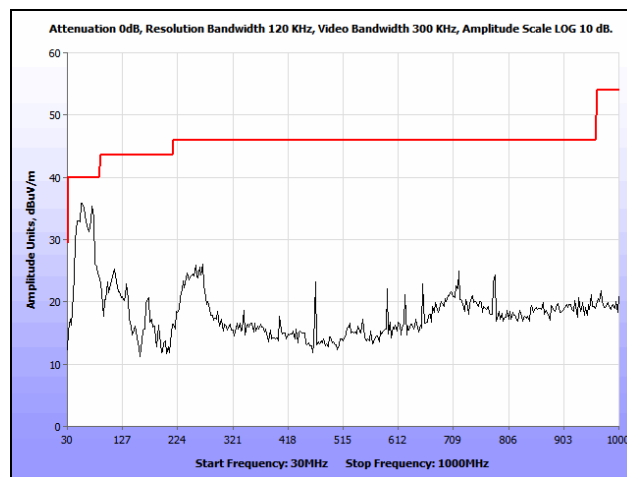
Plot 224. Radiated Spurious Emissions, 802.11n 20 MHz, Mid Channel, 1 GHz – 7 GHz, Avg., Internal, 5300 MHz



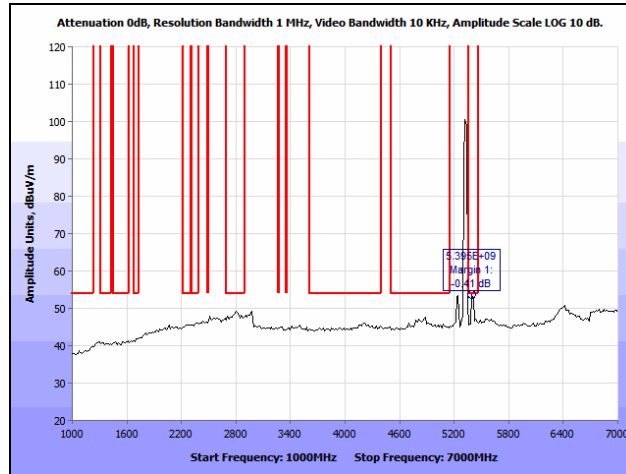
Plot 225. Radiated Spurious Emissions, 802.11n 20 MHz, Mid Channel, 1 GHz – 7 GHz, Peak, Internal, 5300 MHz



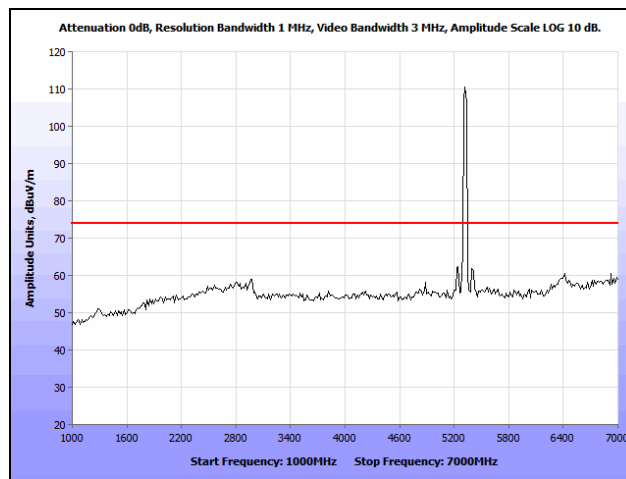
Plot 226. Radiated Spurious Emissions, 802.11n 20 MHz, Mid Channel, 7 GHz – 18 GHz, Internal, 5300 MHz



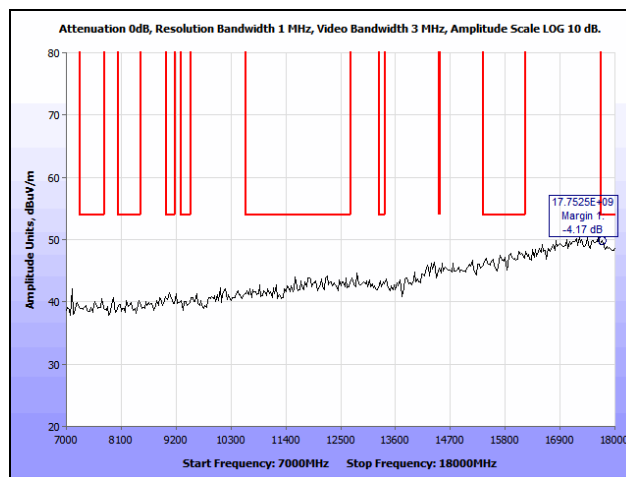
Plot 227. Radiated Spurious Emissions, 802.11n 20 MHz, High Channel, 30 MHz – 1 GHz, Internal, 5320 MHz



Plot 228. Radiated Spurious Emissions, 802.11n 20 MHz, High Channel, 1 GHz – 7 GHz, Avg., Internal, 5320 MHz

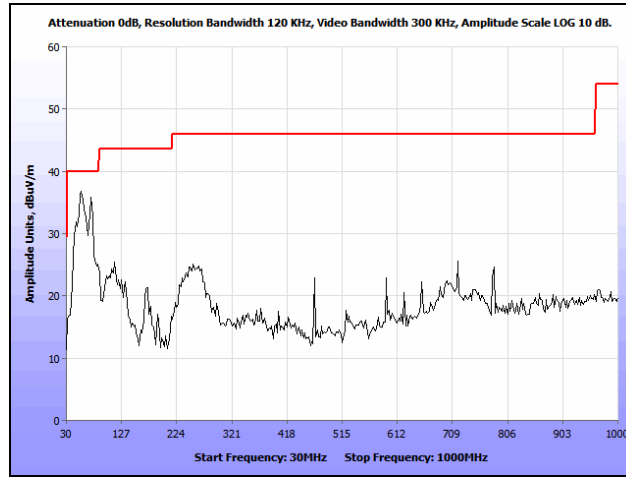


Plot 229. Radiated Spurious Emissions, 802.11n 20 MHz, High Channel, 1 GHz – 7 GHz, Peak, Internal, 5320 MHz

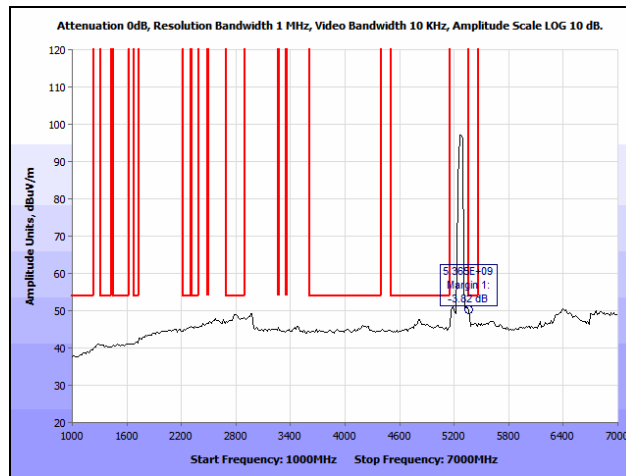


Plot 230. Radiated Spurious Emissions, 802.11n 20 MHz, High Channel, 7 GHz – 18 GHz, Internal, 5320 MHz

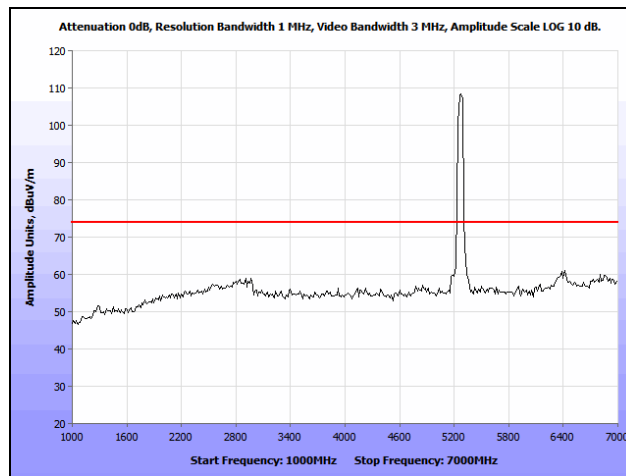
Radiated Spurious Emissions, 802.11n 40 MHz, Internal Antenna, Lower Band



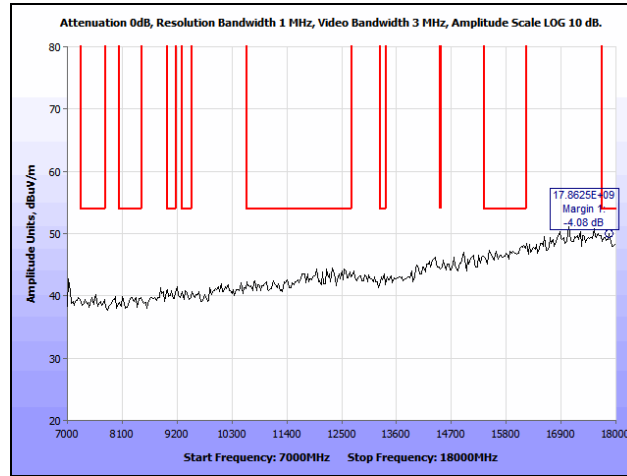
Plot 231. Radiated Spurious Emissions, 802.11n 40 MHz, Low Channel, 30 MHz – 1 GHz, Internal, 5270 MHz



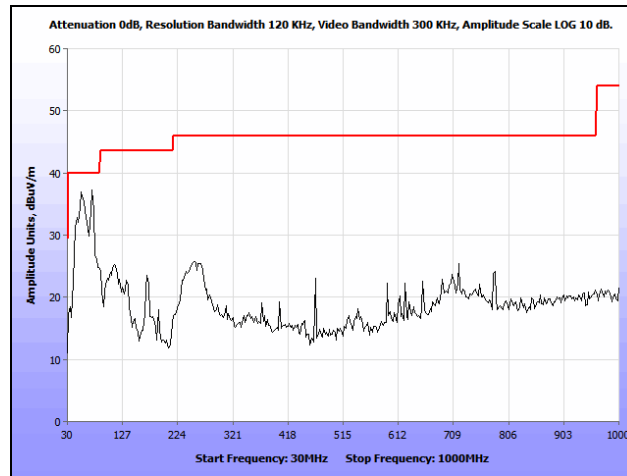
Plot 232. Radiated Spurious Emissions, 802.11n 40 MHz, Low Channel, 1 GHz – 7 GHz, Avg., Internal, 5270 MHz



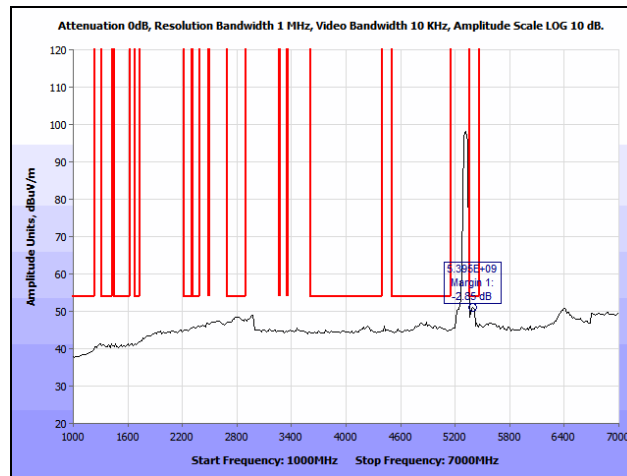
Plot 233. Radiated Spurious Emissions, 802.11n 40 MHz, Low Channel, 1 GHz – 7 GHz, Peak, Internal, 5270 MHz



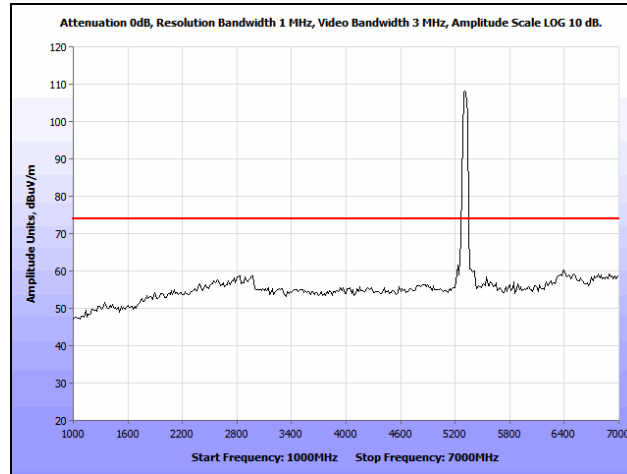
Plot 234. Radiated Spurious Emissions, 802.11n 40 MHz, Low Channel, 7 GHz – 18 GHz, Internal, 5270 MHz



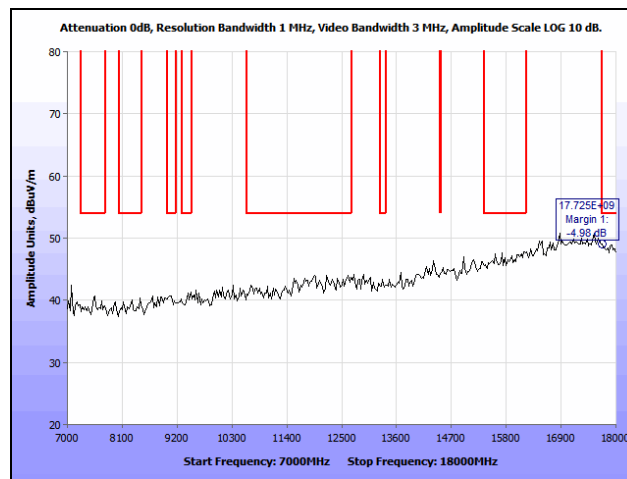
Plot 235. Radiated Spurious Emissions, 802.11n 40 MHz, High Channel, 30 MHz – 1 GHz, Internal, 5310 MHz



Plot 236. Radiated Spurious Emissions, 802.11n 40 MHz, High Channel, 1 GHz – 7 GHz, Avg., Internal, 5310 MHz

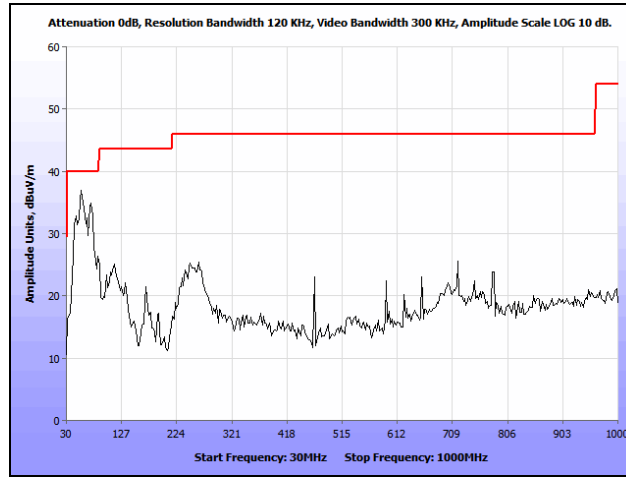


Plot 237. Radiated Spurious Emissions, 802.11n 40 MHz, High Channel, 1 GHz – 7 GHz, Peak, Internal, 5310 MHz

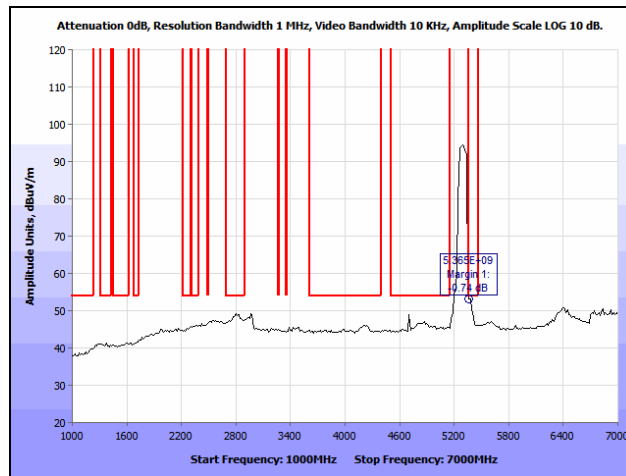


Plot 238. Radiated Spurious Emissions, 802.11n 40 MHz, High Channel, 7 GHz – 18 GHz, Internal, 5310 MHz

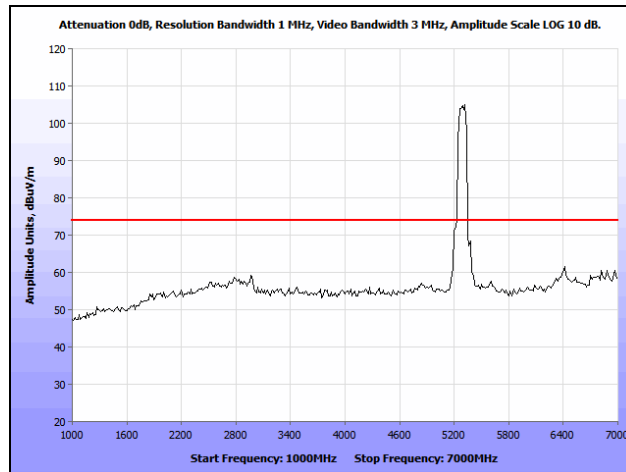
Radiated Spurious Emissions, 802.11n 80 MHz, Internal Antenna, Lower Band



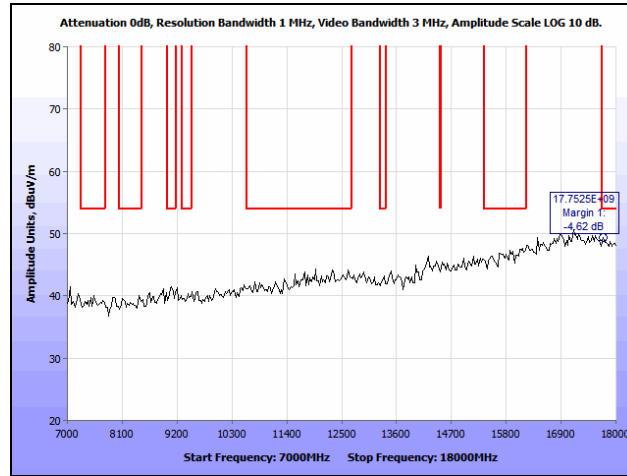
Plot 239. Radiated Spurious Emissions, 802.11n 80 MHz, 30 MHz – 1 GHz, Internal, 5290 MHz



Plot 240. Radiated Spurious Emissions, 802.11n 80 MHz, 1 GHz – 7 GHz, Avg., Internal, 5290 MHz

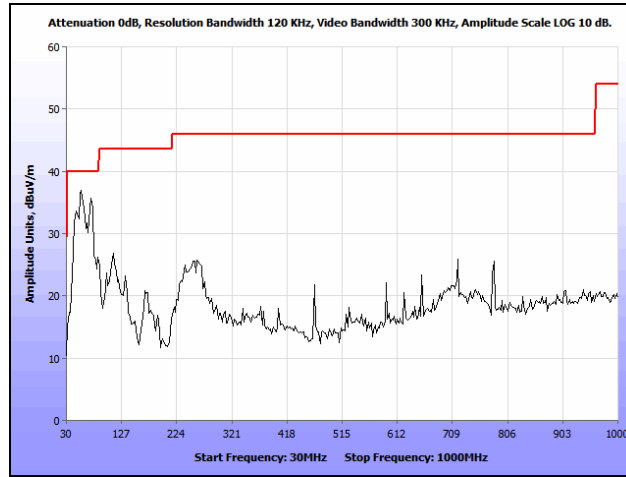


Plot 241. Radiated Spurious Emissions, 802.11n 80 MHz, 1 GHz – 7 GHz, Peak, Internal, 5290 MHz

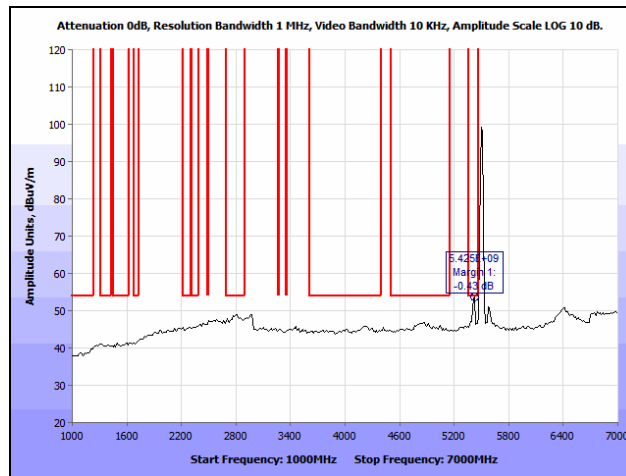


Plot 242. Radiated Spurious Emissions, 802.11n 80 MHz, 7 GHz – 18 GHz, Peak, Internal, 5290 MHz

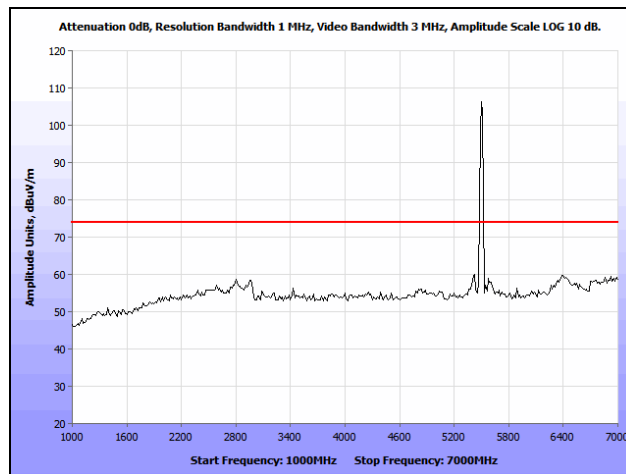
Radiated Spurious Emissions, 802.11a, Internal Antenna, Upper Band



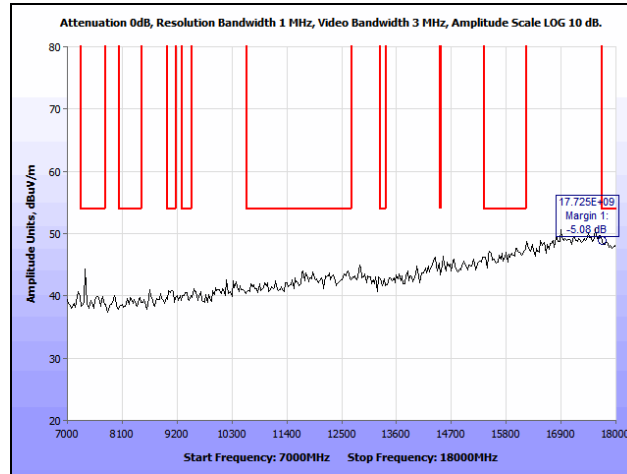
Plot 243. Radiated Spurious Emissions, 802.11a, Low Channel, 30 MHz – 1 GHz, Internal, 5500 MHz



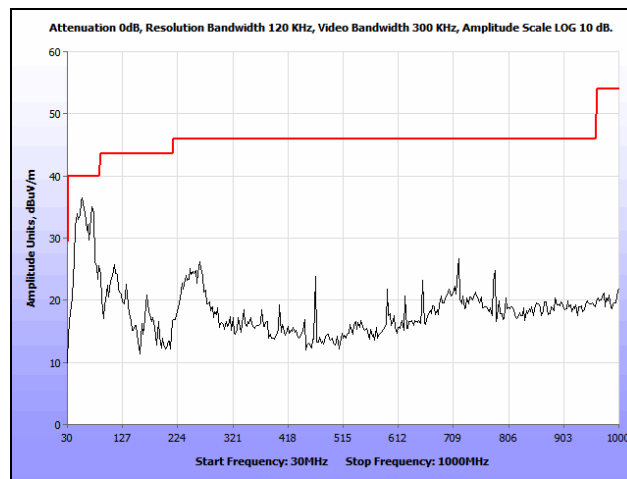
Plot 244. Radiated Spurious Emissions, 802.11a, Low Channel, 1 GHz – 7 GHz, Avg., Internal, 5500 MHz



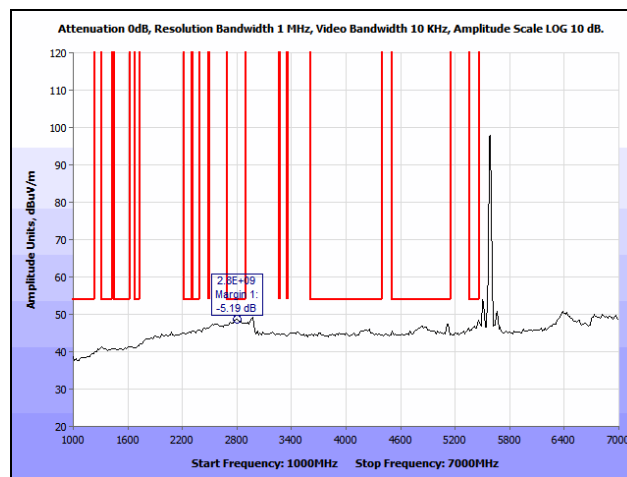
Plot 245. Radiated Spurious Emissions, 802.11a, Low Channel, 1 GHz – 7 GHz, Peak, Internal, 5500 MHz



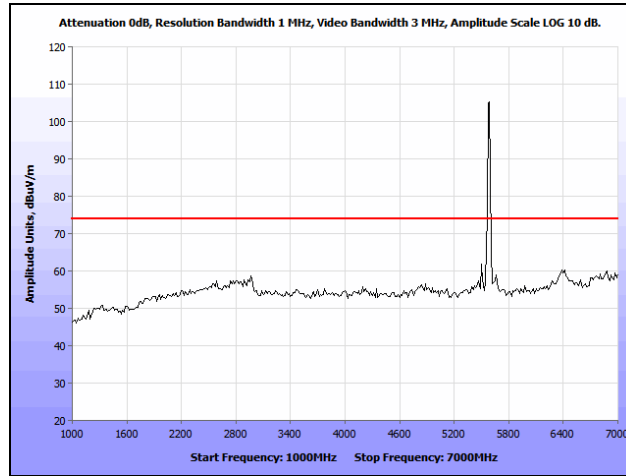
Plot 246. Radiated Spurious Emissions, 802.11a, Low Channel, 7 GHz – 18 GHz, Internal, 5500 MHz



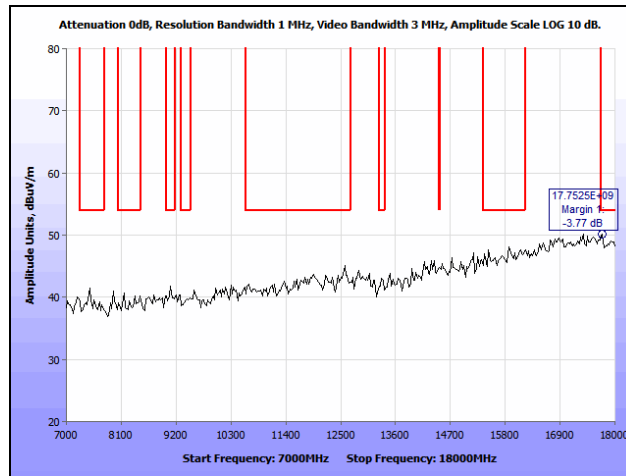
Plot 247. Radiated Spurious Emissions, 802.11a, Mid Channel, 30 MHz – 1 GHz, Internal, 5580 MHz



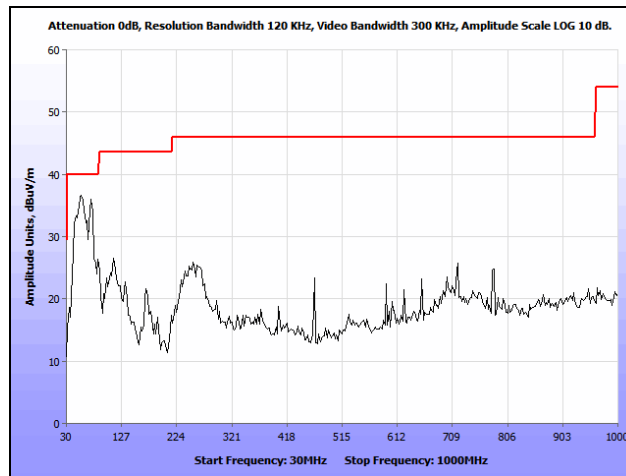
Plot 248. Radiated Spurious Emissions, 802.11a, Mid Channel, 1 GHz – 7 GHz, Avg., Internal, 5580 MHz



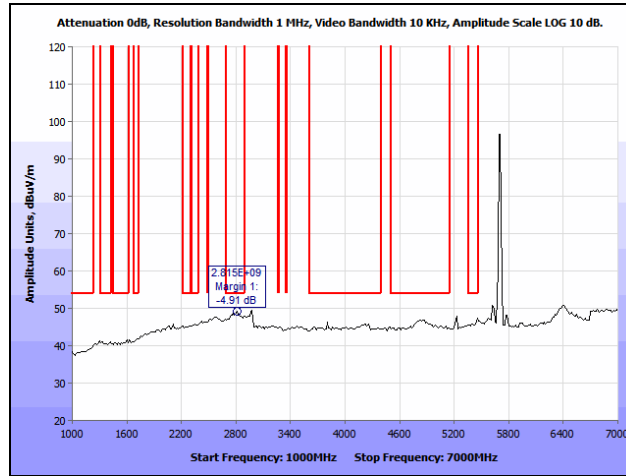
Plot 249. Radiated Spurious Emissions, 802.11a, Mid Channel, 1 GHz – 7 GHz, Peak, Internal, 5580 MHz



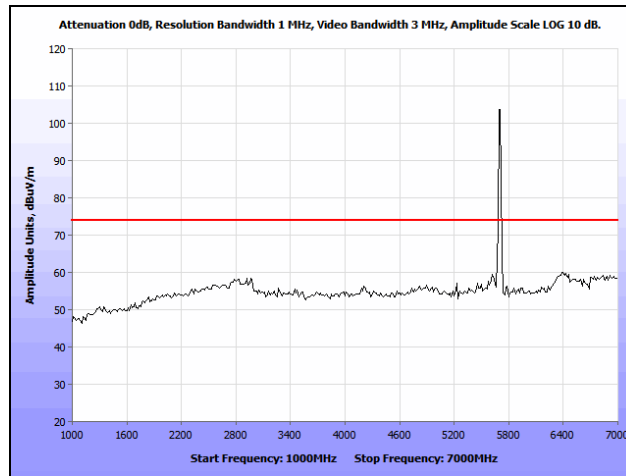
Plot 250. Radiated Spurious Emissions, 802.11a, Mid Channel, 7 GHz – 18 GHz, Internal, 5580 MHz



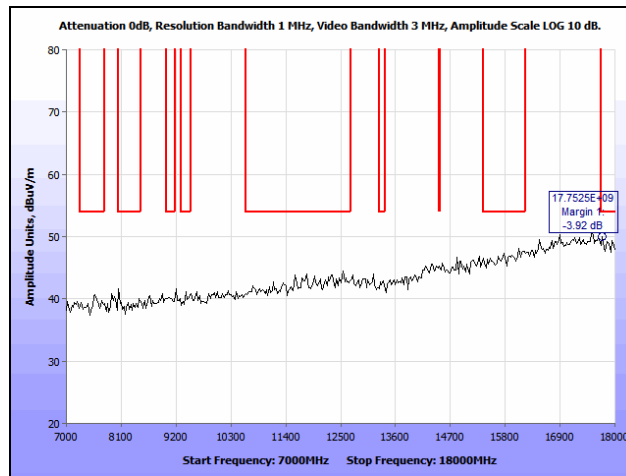
Plot 251. Radiated Spurious Emissions, 802.11a, High Channel, 30 MHz – 1 GHz, Internal, 5700 MHz



Plot 252. Radiated Spurious Emissions, 802.11a, High Channel, 1 GHz – 7 GHz, Avg., Internal, 5700 MHz



Plot 253. Radiated Spurious Emissions, 802.11a, High Channel, 1 GHz – 7 GHz, Peak, Internal, 5700 MHz



Plot 254. Radiated Spurious Emissions, 802.11a, High Channel, 7 GHz – 18 GHz, Internal, 5700 MHz