MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE ● BALTIMORE, MARYLAND 21230-3432 ● PHONE (410) 354-3300 ● FAX (410) 354-3313
33439 WESTERN AVENUE ● UNION CITY, CALIFORNIA 94587 ● PHONE (510) 489-6300 ● FAX (510) 489-6372
3162 BELICK STREET ● SANTA CLARA, CALIFORNIA 95054 ● PHONE (408 748-3585 ● FAX (510) 489-6372

January 24, 2012

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

Dear Bob Greenway,

Enclosed is the EMC Wireless test report for compliance testing of the Motorola Solutions, Inc., AP-7161 as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15, Subpart B, ICES-003, Issue 4 February 2004 for a Class B Digital Device, and FCC Part 15.407 and Industry Canada RSS-210, Annex 9, Issue 7, June 2007 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: (\Motorola Solutions, Inc.\EMC30461-FCC407 Rev. 1)

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Electromagnetic Compatibility Criteria Test Report

for the

Motorola Solutions, Inc.
AP-7161

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: EMC30461-FCC407 Rev. 1

January 24, 2012

Prepared For:

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

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

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for Intentional Radiators

Jeff Pratt, 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 FCC Rules Parts 15B, Part 15.407 and Industry Canada standards ICES-003, Issue 4 February 2004, RSS-210 Annex 9 under normal use and maintenance.

Shawn McMillen, Wireless Manager
Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	August 11, 2011	Initial Issue.
1	January 24, 2012	Revised to reflect engineer corrections.

Table of Contents

List of Tables

List of Figures

List of Photographs

List of Plots

List of Terms and Abbreviations

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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Motorola Solutions, Inc. AP-7161, with the requirements of FCC Part 15, §15.407 and Industry Canada RSS-210 Annex 9. 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 AP-7161. Motorola Solutions, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the AP-7161, 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 FCC Part 15, §15.407 and Industry Canada RSS-210, Annex 9, in accordance with Motorola Solutions, Inc., purchase order number NP5280921. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference	Industry Canada Reference	Description	Results
47 CFR Part 15.107 (a)	ICES-003 Issue 4 February 2004	Conducted Emission Limits for a Class B Digital Device	Compliant
47 CFR Part 15.109 (a)	ICES-003 Issue 4 February 2004	Radiated Emission Limits for a Class B Digital Device	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)(3)	A9.2(3)	Conducted Transmitter Output Power	Compliant
15.407 (a)(3)	A9.2(3)	Power Spectral Density	Compliant
15.407 (a)(6)	N/A	Peak Excursion	Compliant
15.407 (b)(4), (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

Table 1. Executive Summary of EMC Part 15.407 & RSS-210 Annex 9 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Motorola Solutions, Inc. to perform testing on the AP-7161, under Motorola Solutions, Inc.' quote number 9FIR2707R3.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Motorola Solutions, Inc. AP-7161.

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

Model(s) Tested:	AP-7161	
Model(s) Covered:	AP-7161	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: QJEAP716102 IC: 4602A-AP716102	
	Type of Modulations:	OFDM
	Frequency Range:	5280 - 5320 MHz and 5510 – 5670 MHz
	Equipment Code:	NII
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Jeff Pratt	
Report Date(s):	January 24, 2012	

Table 2. EUT Summary

B. References

RSS-210, Issue 7, June 2007	Low-power License-exempt Radiocommunications Devices (All Frequency Bands): Category I Equipment
CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure Devices (UNII)
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

All radio testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. All digital testing was performed at MET Laboratories, Inc., 3162 Belick Street, 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 Motorola Solutions, Inc. AP-7161, Equipment Under Test (EUT), is an Outdoor 802.11n access point.

Photograph 1. Motorola Solutions, Inc. AP-7161

E. Equipment Configuration

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

Ref. ID	Name / Description	Model Number
1	AP 7161	AP-7161
2	Power Cable	N/A

Table 4. Equipment Configuration

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number
1	Laptop with ART software	Dell	D600

Table 5. Support Equipment

G. Ports and Cabling Information

Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
GE1 (LAN)	Cat5	1	N/A	Y	N/A
GE2 (WAN)	Cat5	1	N/A	Y	N/A
Console (Serial)	RJ-45	1	N/A	N	N/A
Power	16 AWG Power Cable	1	6	N/A	N/A

Table 6. Ports and Cabling Information

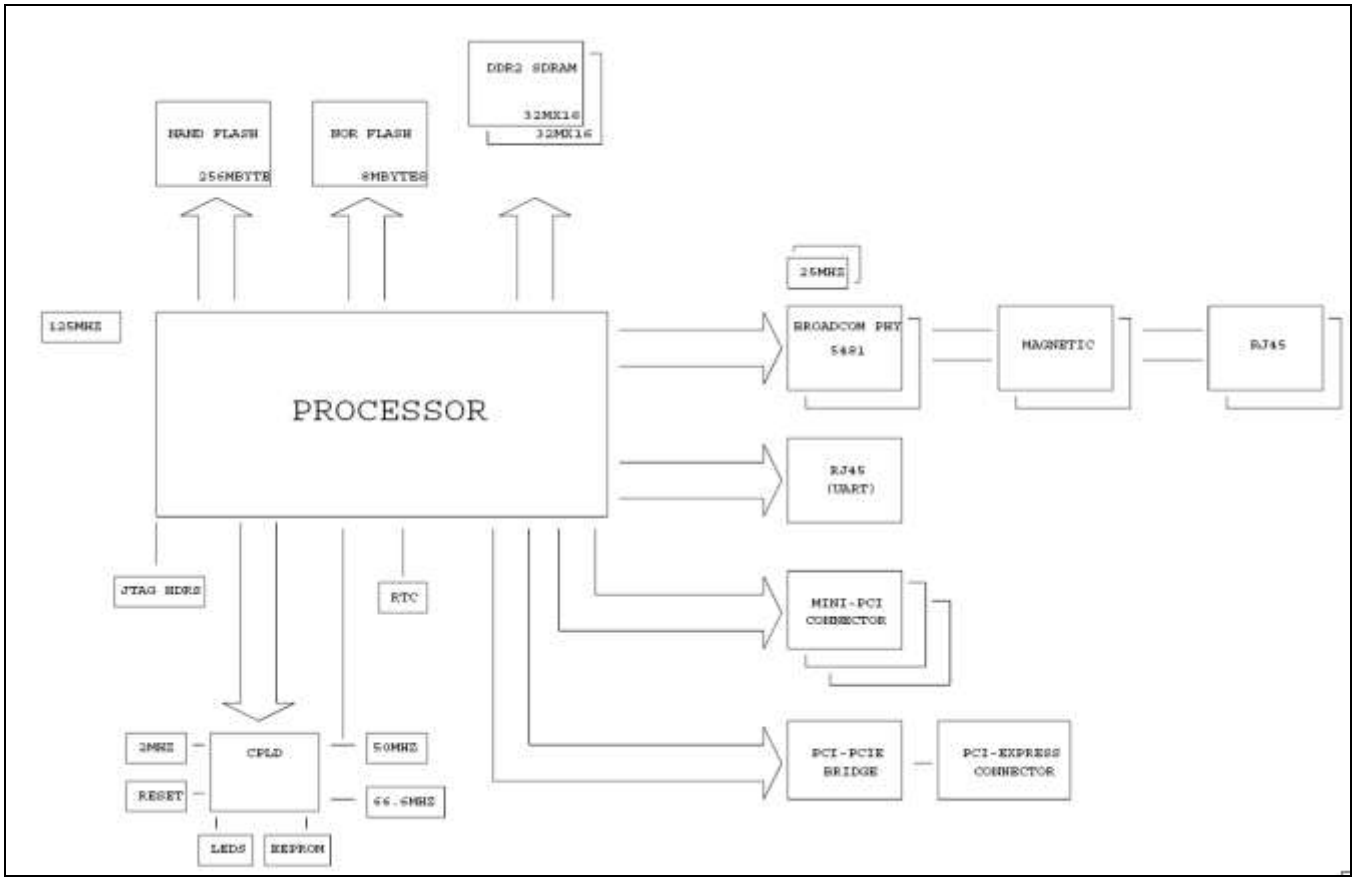


Figure 1. Block Diagram of Test Configuration

H. Mode of Operation

Test software (ART – Atheros Radio Test) running on laptop and EUT which communicate over Ethernet.

I. Method of Monitoring

Wireless radios are monitored in the intended frequency bands.

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 Motorola Solutions, Inc. upon completion of testing.

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

Electromagnetic Compatibility Criteria

§ 15.107 Conducted Emissions Limits

Test Requirement(s):

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

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

15.207(a), Except as shown in paragraphs (b) and (c) of this section*, charging, AC adapters or battery eliminators the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the Table 7, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency range (MHz)	Class A Conducted Limits (dBµV)		*Class B Conducted Limits (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
* 0.15- 0.45	79	66	66 - 56	56 - 46
0.45 - 0.5	79	66	56	46
0.5 - 30	73	60	60	50
Note 1 — The lower limit shall apply at the transition frequencies. Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz. * -- Limits per Subsection 15.207(a).				

Table 7. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b) and 15.207(a)

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

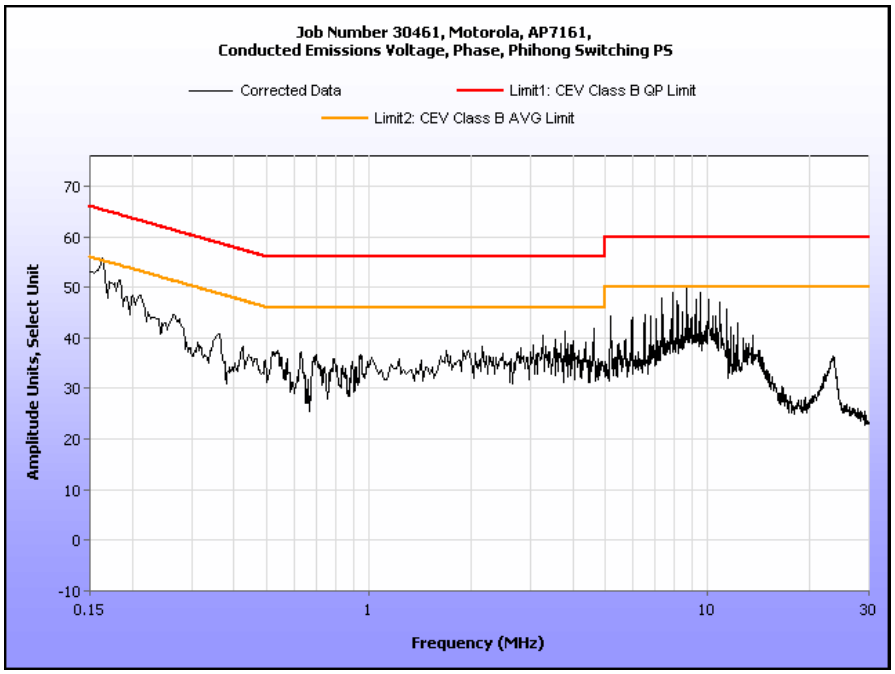
Test Engineer(s): Darrell Robinson

Test Date(s): 04/14/11

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

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.1602	46.73	0	46.73	65.45	-18.72	41.37	0	41.37	55.45	-14.08
0.1804	31.78	0	31.78	64.47	-32.69	27.13	0	27.13	54.47	-27.34
8.7012	45.5	0.36	45.86	60	-14.14	44.61	0.36	44.97	50	-5.03
9.244	45.62	0.37	45.99	60	-14.01	41.85	0.37	42.22	50	-7.78
5.165	40.9	0.31	41.21	60	-18.79	37.57	0.31	37.88	50	-12.12
4.622	40.16	0.26	40.42	56	-15.58	36.65	0.26	36.91	46	-9.09

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

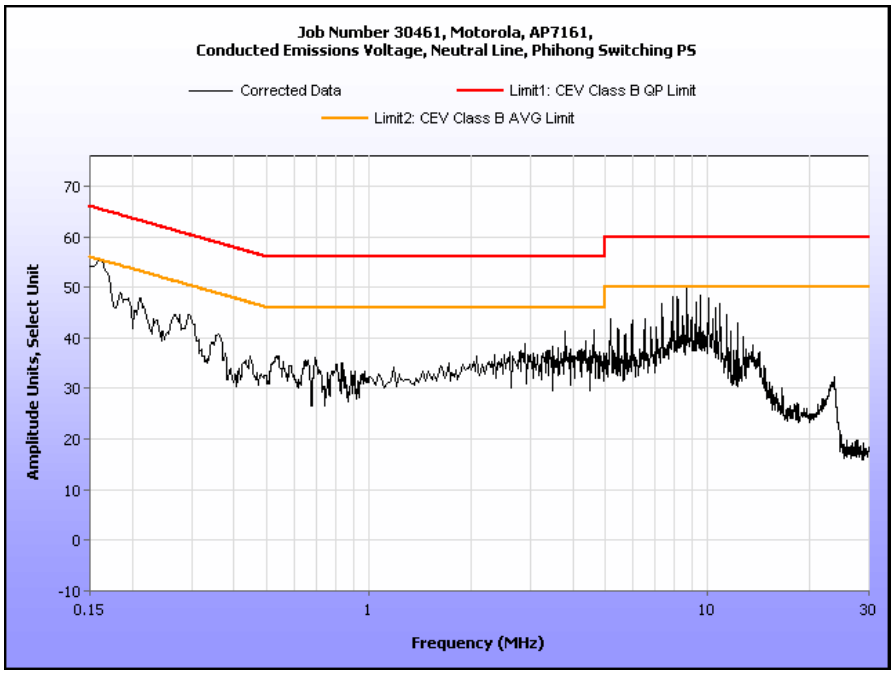


Plot 1. Conducted Emission, Phase Line Plot

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

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.1599	52.83	0	52.83	65.47	-12.64	42.07	0	42.07	55.47	-13.4
8.699	47.85	0.36	48.21	60	-11.79	44.98	0.36	45.34	50	-4.66
9.517	45.68	0.38	46.06	60	-13.94	42.67	0.38	43.05	50	-6.95
8.158	45.29	0.35	45.64	60	-14.36	42.65	0.35	43	50	-7
4.621	39.32	0.26	39.58	56	-16.42	36.33	0.26	36.59	46	-9.41
0.2142	37.89	0.02	37.91	63.04	-25.13	33.38	0.02	33.4	53.04	-19.64

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



Plot 2. Conducted Emission, Neutral Line Plot, FSP040-DGAA5

Conducted Emission Limits Test Setup

Photograph 2. Conducted Emissions, Test Setup

Radiated Emission Limits

§ 15.109 Radiated Emissions Limits

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

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

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

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

Test Procedures: The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3m 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): Jeff Pratt

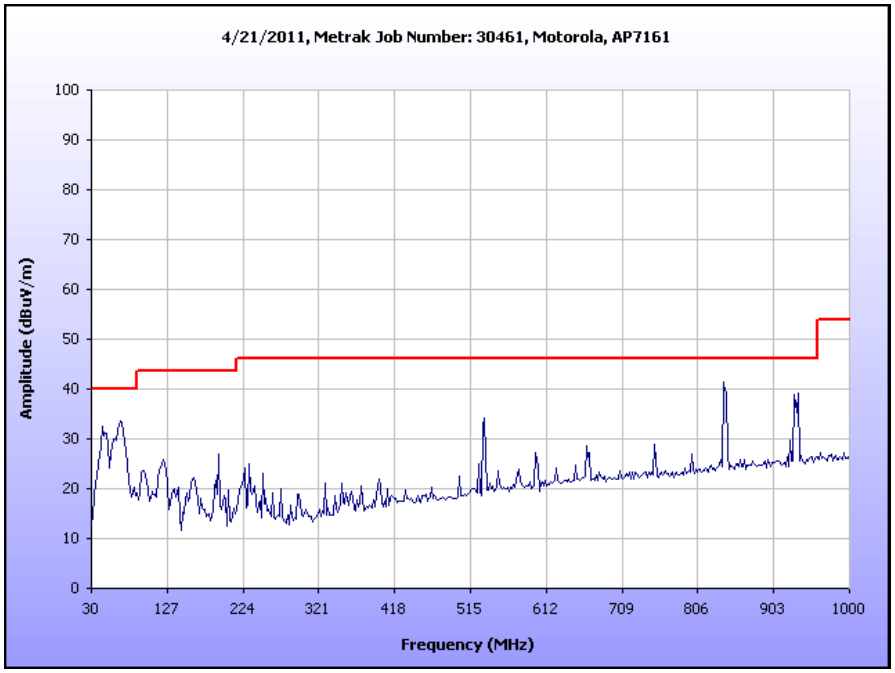
Test Date(s): 04/21/11

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
66.943587	135	H	1.05	-0.50	7.90	0.23	0.00	7.63	40.00	-32.37
66.943587	127	V	0.99	11.06	7.90	0.23	0.00	19.19	40.00	-20.81
44.775182	321	H	2.00	-0.81	10.93	0.23	0.00	10.35	40.00	-29.65
44.775182	73	V	1.40	11.51	10.93	0.23	0.00	22.67	40.00	-17.33
121.11951	325	H	2.28	3.41	13.80	0.23	0.00	17.44	43.50	-26.06
121.11951	36	V	1.01	10.22	13.80	0.23	0.00	24.25	43.50	-19.25
95.657688	329	H	1.56	6.02	9.00	0.23	0.00	15.25	43.50	-28.25
95.657688	28	V	1.11	12.93	9.00	0.23	0.00	22.16	43.50	-21.34
192.89923	293	H	1.59	12.93	11.79	0.23	0.00	24.95	43.50	-18.55
192.89923	331	V	1.01	17.44	11.79	0.23	0.00	29.46	43.50	-14.04
530.79409	289	H	1.00	9.82	18.50	1.00	0.00	29.32	46.00	-16.68
530.79409	236	V	1.01	14.03	18.50	1.00	0.00	33.53	46.00	-12.47

Table 11. Radiated Emissions Limits, Test Results, FCC Limits

Note: The EUT was tested at 3 m.

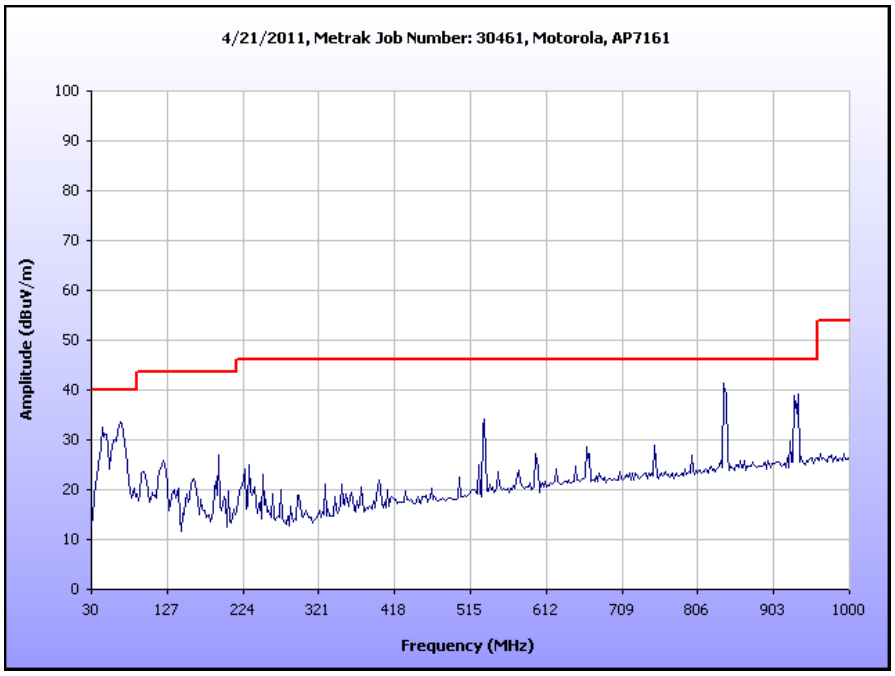


Plot 3. Radiated Emissions, 30 MHz - 1 GHz, FCC Limits

Radiated Emissions Limits Test Results, Class B

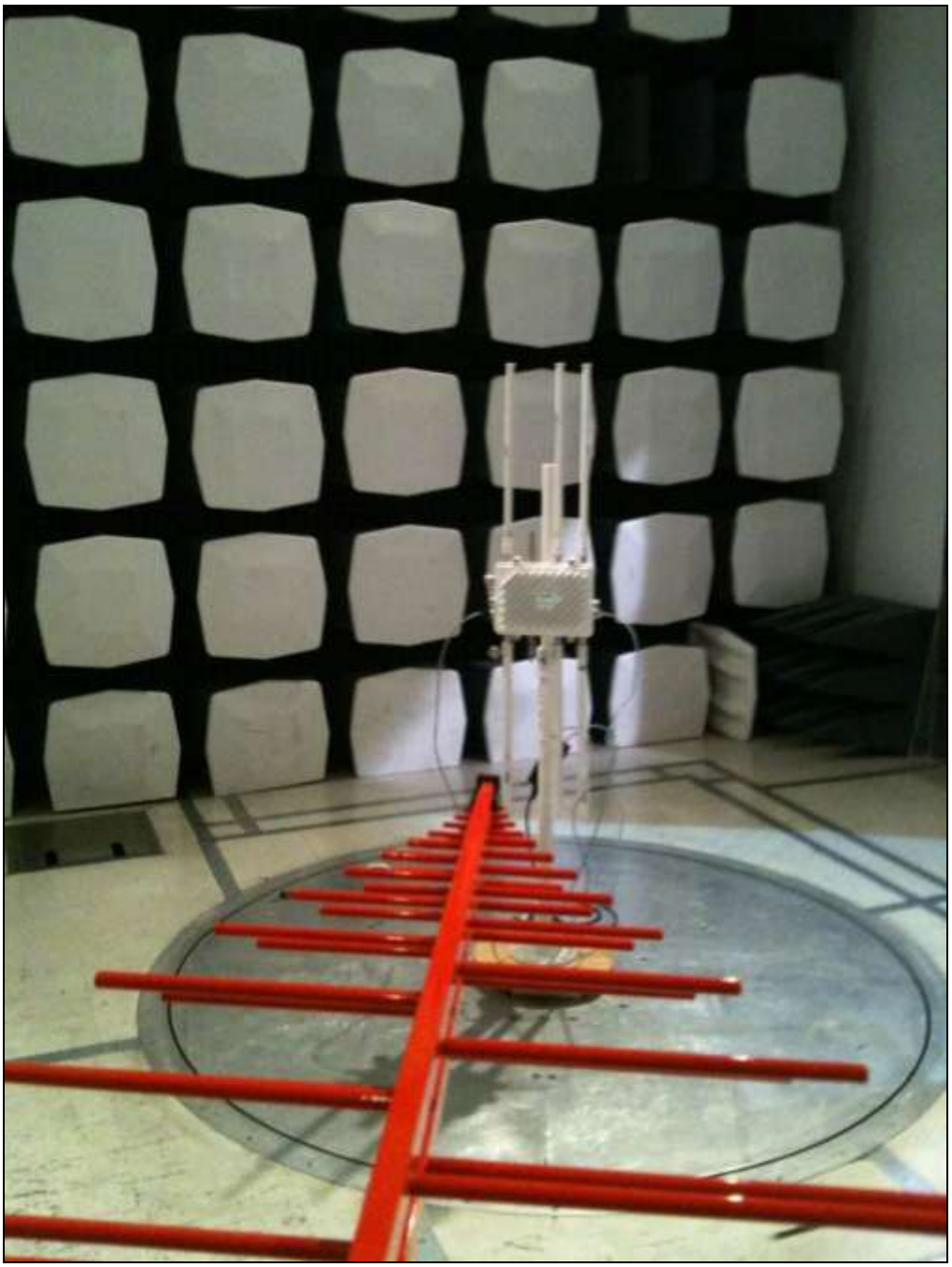
Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
66.943587	135	H	1.05	-0.50	7.90	0.23	10.46	-2.83	30.00	-32.83
66.943587	127	V	0.99	11.06	7.90	0.23	10.46	8.73	30.00	-21.27
44.775182	321	H	2.00	-0.81	10.93	0.23	10.46	-0.11	30.00	-30.11
44.775182	73	V	1.40	11.51	10.93	0.23	10.46	12.21	30.00	-17.79
121.11951	325	H	2.28	3.41	13.80	0.23	10.46	6.98	30.00	-23.02
121.11951	36	V	1.01	10.22	13.80	0.23	10.46	13.79	30.00	-16.21
95.657688	329	H	1.56	6.02	9.00	0.23	10.46	4.79	30.00	-25.21
95.657688	28	V	1.11	12.93	9.00	0.23	10.46	11.70	30.00	-18.30
192.89923	293	H	1.59	12.93	11.79	0.23	10.46	14.49	30.00	-15.51
192.89923	331	V	1.01	17.44	11.79	0.23	10.46	19.00	30.00	-11.00
530.79409	289	H	1.00	9.82	18.50	1.00	10.46	18.86	37.00	-18.14
530.79409	236	V	1.01	14.03	18.50	1.00	10.46	23.07	37.00	-13.93

Table 12. Radiated Emissions Limits, Test Results, ICES-003 Limits



Plot 4. Radiated Emissions Limits, ICES-003 Limits

Radiated Emission Limits Test Setup



Photograph 3. Radiated Emission, Test Setup

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.

Test Engineer(s): Jeff Pratt

Test Date(s): 03/31/11

Gain	Type	Model	Manufacturer
8	Omni	S2406BFNM	Cushcraft
10	Omni	S4908WBF	Laird
5	Omni	R05805NM	Pulse/Larsen

Table 13. Antenna List

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

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

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

Table 14. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-1992 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to an EMC/field intensity meter.

Test Results: The EUT was compliant with the Class B requirement(s) of this section. Pre-scans revealed that emissions profiles and amplitudes of emissions were similar when the EUT was transmitting on low, mid and high channels. Therefore, final measurements were taken when the EUT was transmitting on high channel (i.e. 5805 MHz)

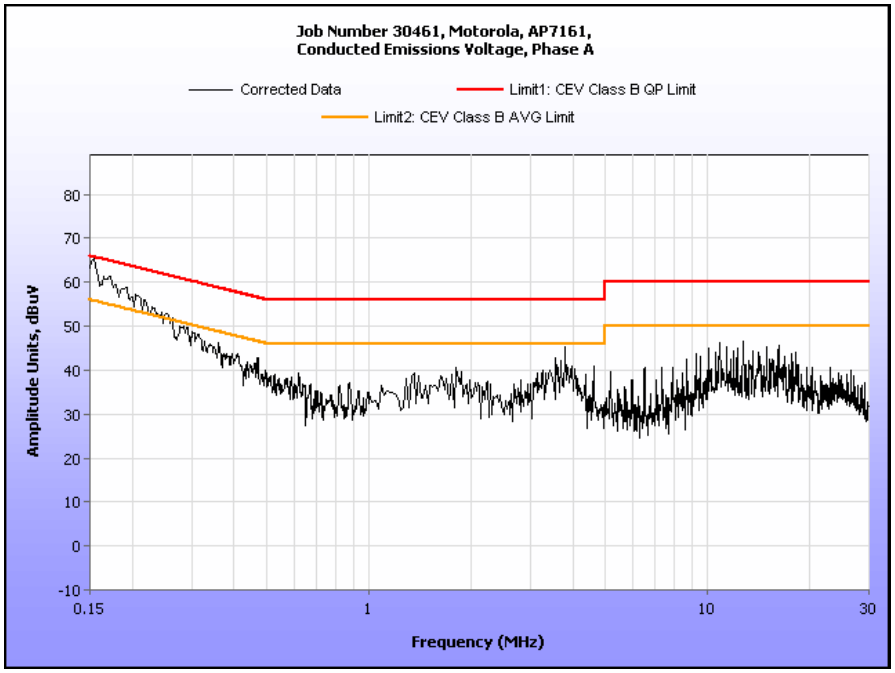
Test Engineer(s): Jeff Pratt

Test Date(s): 04/12/11

Conducted Emissions - Voltage, AC Power, (120V/60Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
10.08	49.82	0.41	50.23	60	-9.77	42.85	0.41	43.26	50	-6.74
12.76	50.31	0.44	50.75	60	-9.25	43.77	0.44	44.21	50	-5.79
14.18	48.62	0.45	49.07	60	-10.93	42.72	0.45	43.17	50	-6.83
3.81	41.22	0.23	41.45	56	-14.55	35.23	0.23	35.46	46	-10.54
11.94	49.05	0.43	49.48	60	-10.52	42.57	0.43	43	50	-7
9.33	44.81	0.38	45.19	60	-14.81	38.8	0.38	39.18	50	-10.82

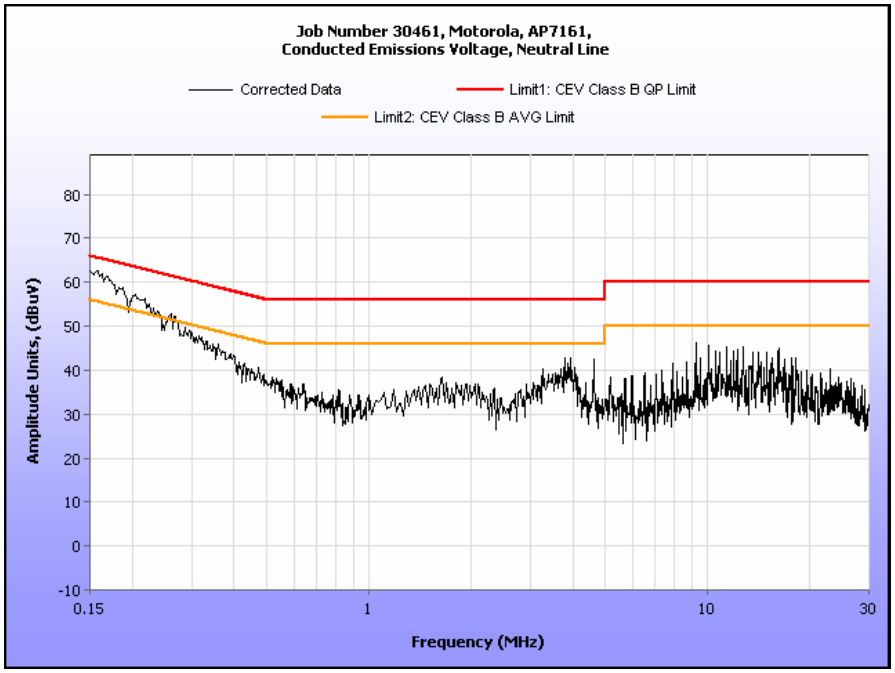
Table 15. Conducted Emissions - Voltage, AC Power, Phase Line



Plot 5. Conducted Emission, Phase Line Plot

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
13.43	48.93	0.44	49.37	60	-10.63	44.02	0.44	44.46	50	-6.74
12.76	49.89	0.44	50.33	60	-9.67	43.51	0.44	43.95	50	-5.79
10.08	49.51	0.41	49.92	60	-10.08	42.66	0.41	43.07	50	-6.83
14.18	48.23	0.45	48.68	60	-11.32	42.41	0.45	42.86	50	-10.54
16.19	44.95	0.48	45.43	60	-14.57	39.33	0.48	39.81	50	-7
11.94	48.88	0.43	49.31	60	-10.69	42.4	0.43	42.83	50	-10.82

Table 16. Conducted Emissions - Voltage, AC Power, Neutral Line



Plot 6. Conducted Emission, Neutral Line Plot

Conducted Emission Limits Test Setup

Photograph 4. Conducted Emissions, Test Setup

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): Jeff Pratt

Test Date(s): 03/07/11

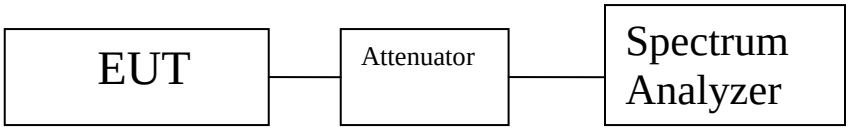


Figure 2. Occupied Bandwidth, Test Setup

Occupied Bandwidth				
Frequency (MHz)	Mode	Measured 26 dB Bandwidth (MHz)		
		R3-A	R3-B	R3-C
5260	802.11a	23.181	24.880	23.322
5300	802.11a	24.624	23.229	25.553
5320	802.11a	22.456	23.726	26.556
5500	802.11a	25.412	23.890	26.882
5580	802.11a	20.797	21.729	23.874
5660	802.11a	20.054	20.983	20.730
5700	802.11a	22.342	22.137	20.244

Table 17. 26 dB Occupied Bandwidth, Test Results, 802.11a

Occupied Bandwidth				
Frequency (MHz)	Mode	Measured 26 dB Bandwidth (MHz)		
		R3-A	R3-B	R3-C
5260	802.11n HT20	21.700	24.510	23.103
5300	802.11n HT20	22.807	21.860	25.440
5320	802.11n HT20	20.743	23.224	22.827
5500	802.11n HT20	26.285	24.351	24.160
5580	802.11n HT20	20.744	22.045	23.212
5660	802.11n HT20	21.955	21.029	21.828
5700	802.11n HT20	20.994	27.586	23.115

Table 18. 26 dB Occupied Bandwidth, Test Results, 802.11n HT20

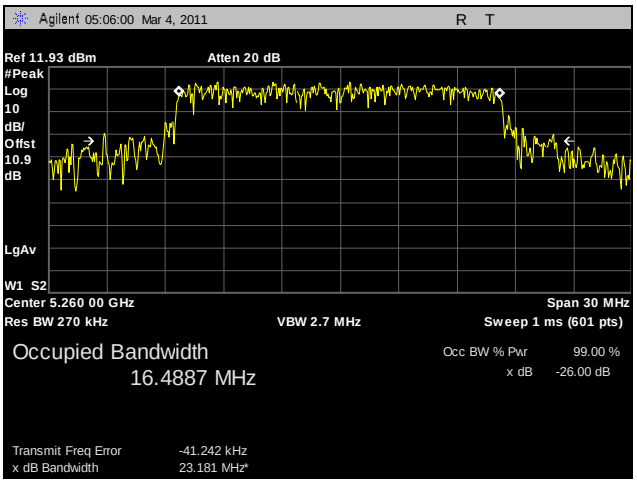
Occupied Bandwidth				
Frequency (MHz)	Mode	Measured 26 dB Bandwidth (MHz)		
		R3-A	R3-B	R3-C
5280	802.11n HT40	41.916	43.556	44.564
5310	802.11n HT40	44.783	42.214	44.700
5320	802.11n HT40	44.096	41.375	45.743
5510	802.11n HT40	43.336	47.383	44.631
5580	802.11n HT40	43.555	44.797	43.196
5670	802.11n HT40	42.070	42.202	43.737
5680	802.11n HT40	41.894	42.724	40.737

Table 19. 26 dB Occupied Bandwidth, Test Results, 802.11n HT40

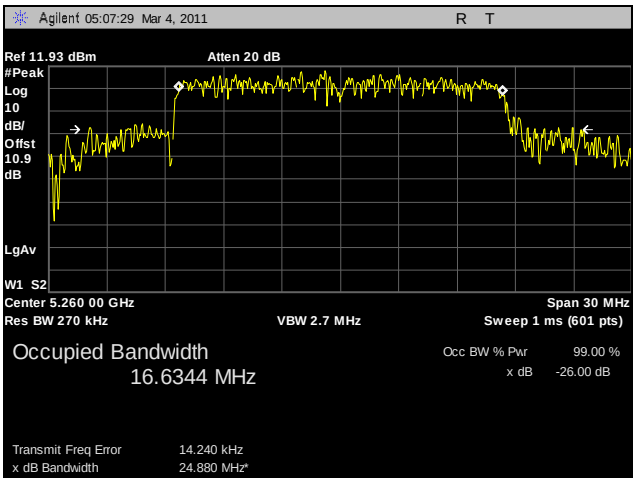
Occupied Bandwidth				
Frequency (MHz)	Mode	Measured 99% Bandwidth (MHz)		
		R3-A	R3-B	R3-C
5260	802.11a	16.4708	16.5578	16.5033
5260	802.11n HT20	17.6308	17.7245	17.6919
5280	802.11n HT40	36.2431	36.2243	36.2763
5300	802.11a	16.5375	16.5626	16.6250
5300	802.11n HT20	17.7144	17.6887	17.6798
5310	802.11n HT40	36.2635	36.3319	36.2636
5320	802.11a	16.5140	16.4252	16.4341
5320	802.11n HT20	17.6675	17.7527	17.2755
5320	802.11n HT40	36.3351	36.2262	36.2940
5500	802.11a	16.5065	16.4448	16.5848
5500	802.11n HT20	17.7439	17.4497	17.6257
5510	802.11n HT40	36.1163	36.2551	36.2684
5580	802.11a	16.5765	16.4868	16.4958
5580	802.11n HT20	17.6924	17.6816	17.5951
5670	802.11n HT40	36.3675	36.3159	36.1024
5700	802.11a	16.3852	16.6111	16.4459
5700	802.11n HT20	17.6526	17.8140	17.7083

Table 20. 99% Occupied Bandwidth, Test Results, Port 1

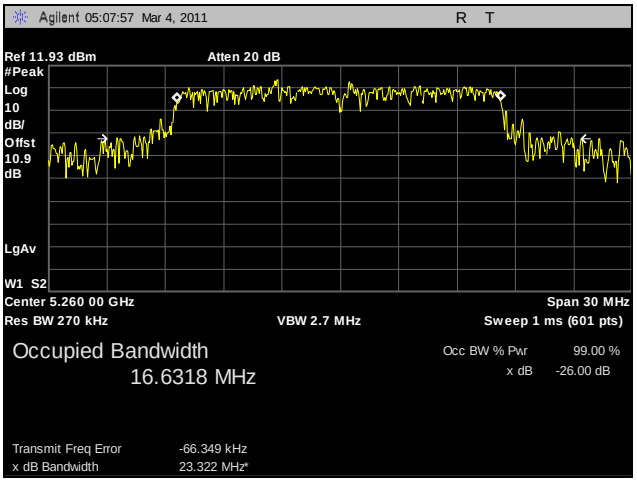
26 dB Occupied Bandwidth Test Results, 802.11a, 5260 MHz



Plot 7. 26 dB Occupied Bandwidth, 802.11a, 5260 MHz, R3-A

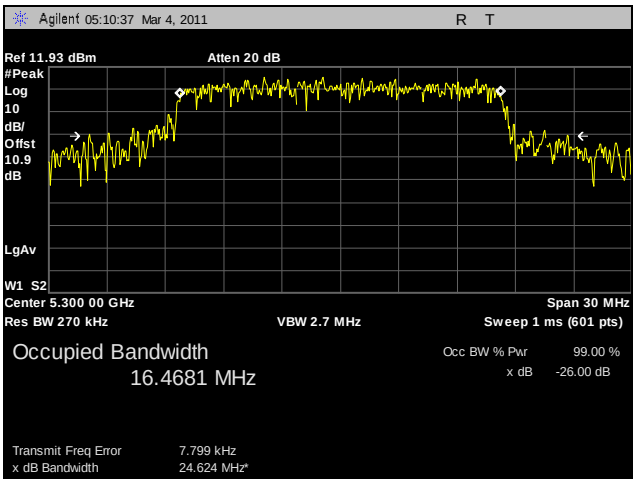


Plot 8. 26 dB Occupied Bandwidth, 802.11a, 5260 MHz, R3-B

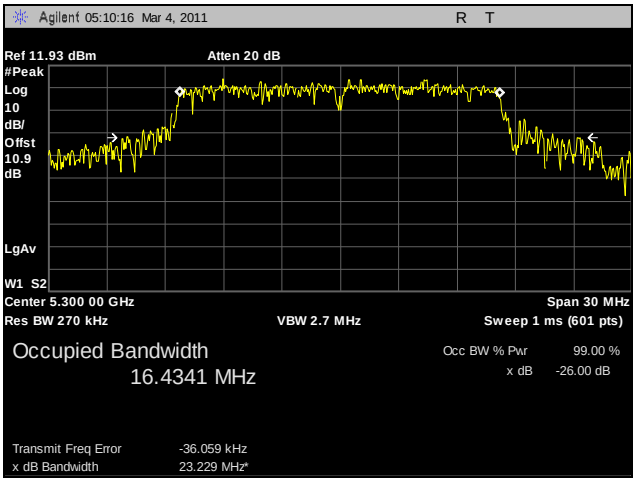


Plot 9. 26 dB Occupied Bandwidth, 802.11a, 5260 MHz, R3-C

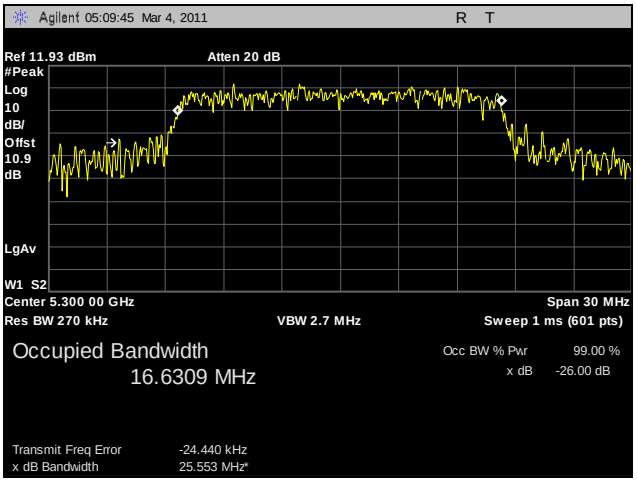
26 dB Occupied Bandwidth Test Results, 802.11a, 5300 MHz



Plot 10. 26 dB Occupied Bandwidth, 802.11a, 5300 MHz, R3-A

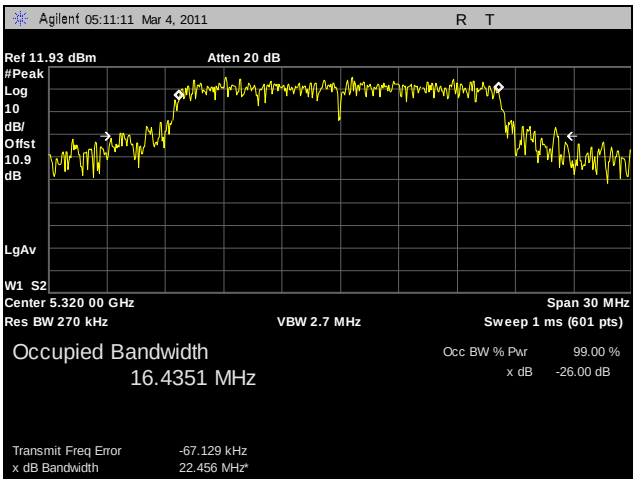


Plot 11. 26 dB Occupied Bandwidth, 802.11a, 5300 MHz, R3-B

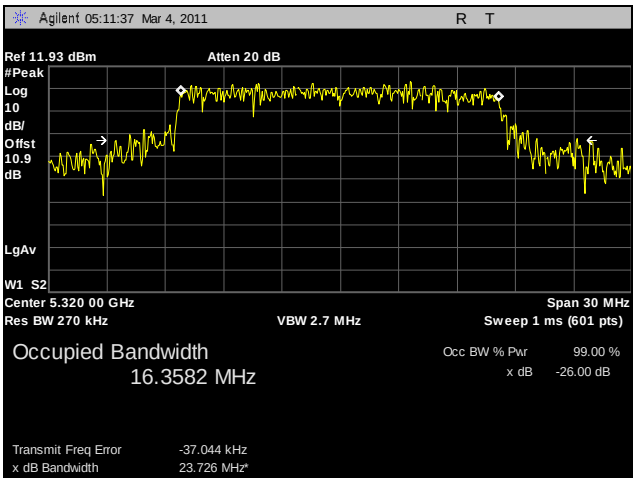


Plot 12. 26 dB Occupied Bandwidth, 802.11a, 5300 MHz, R3-C

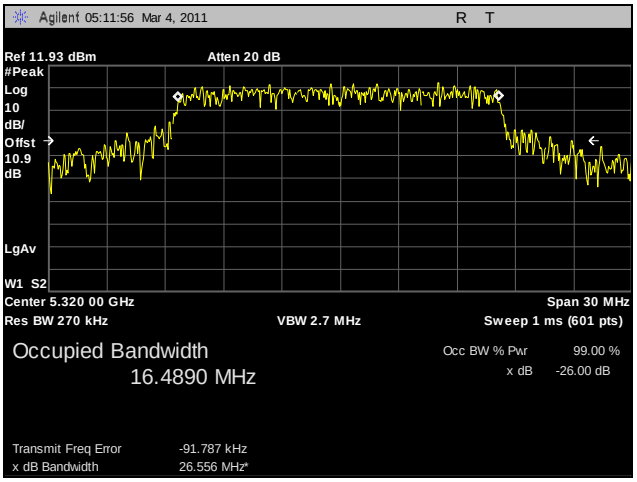
26 dB Occupied Bandwidth Test Results, 802.11a, 5320 MHz



Plot 13. 26 dB Occupied Bandwidth, 802.11a, 5320 MHz, R3-A

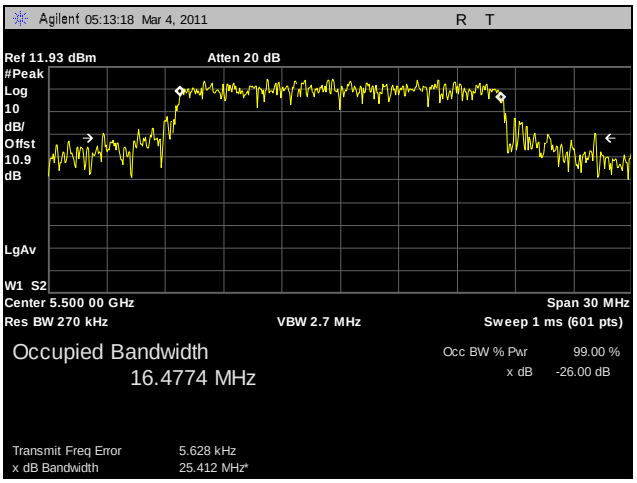


Plot 14. 26 dB Occupied Bandwidth, 802.11a, 5320 MHz, R3-B

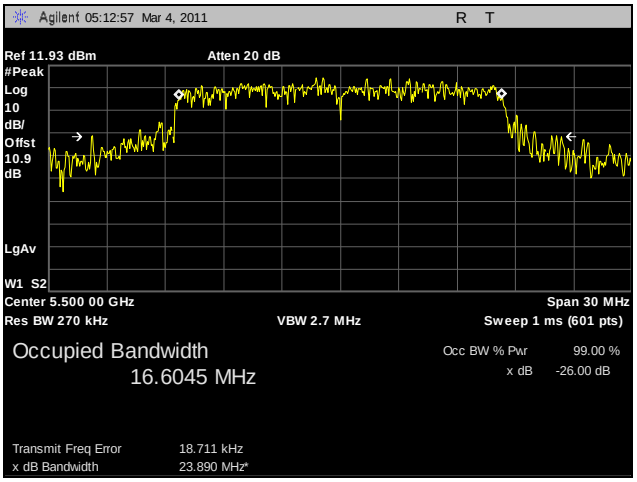


Plot 15. 26 dB Occupied Bandwidth, 802.11a, 5320 MHz, R3-C

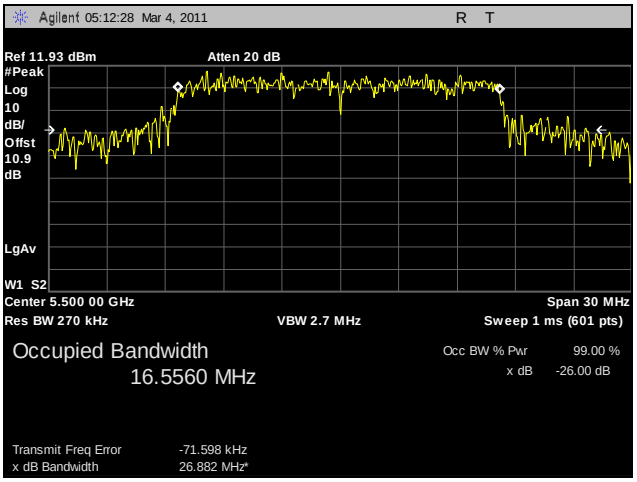
26 dB Occupied Bandwidth Test Results, 802.11a, 5500 MHz



Plot 16. 26 dB Occupied Bandwidth, 802.11a, 5500 MHz, R3-A

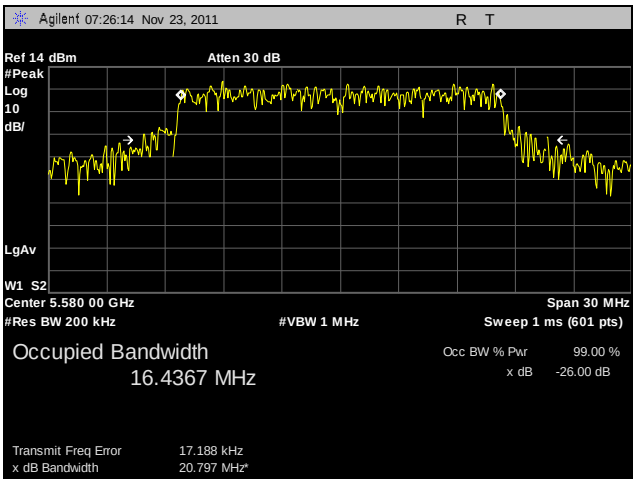


Plot 17. 26 dB Occupied Bandwidth, 802.11a, 5500 MHz, R3-B

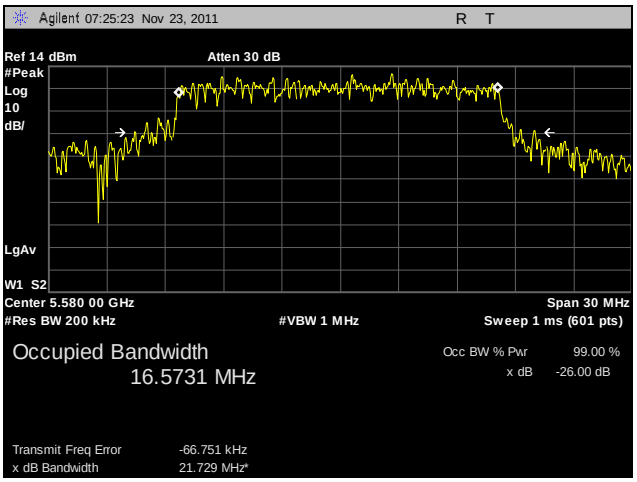


Plot 18. 26 dB Occupied Bandwidth, 802.11a, 5500 MHz, R3-C

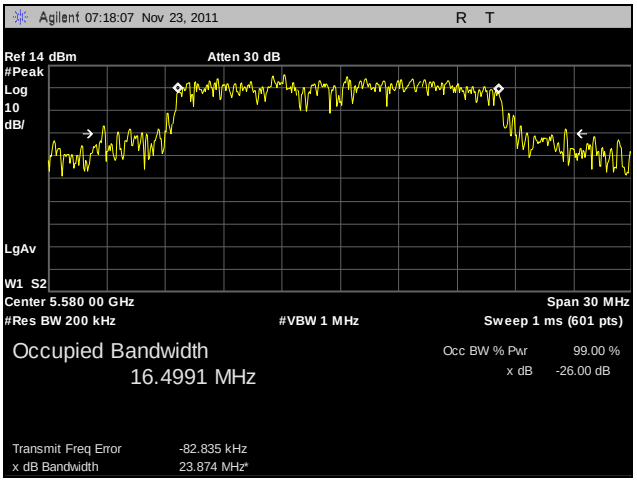
26 dB Occupied Bandwidth Test Results, 802.11a, 5580 MHz



Plot 19. 26 dB Occupied Bandwidth, 802.11a, 5580 MHz, R3-A

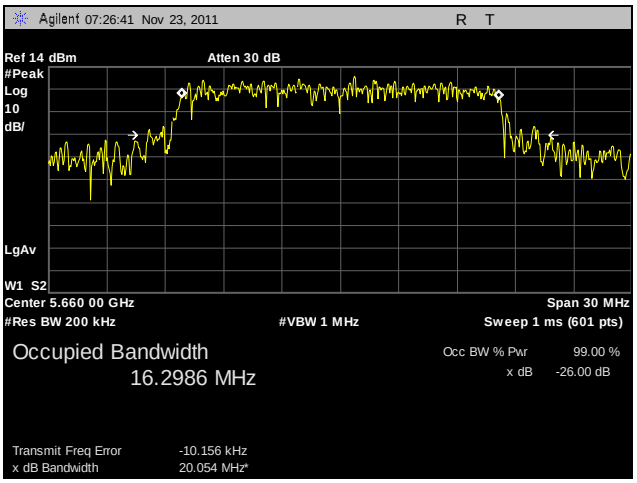


Plot 20. 26 dB Occupied Bandwidth, 802.11a, 5580 MHz, R3-B

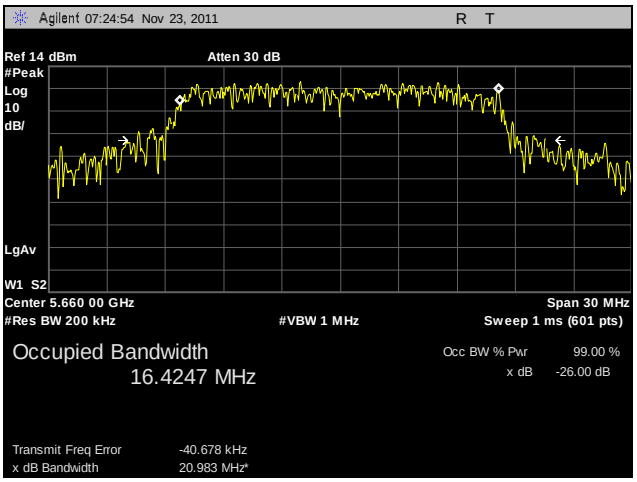


Plot 21. 26 dB Occupied Bandwidth, 802.11a, 5580 MHz, R3-C

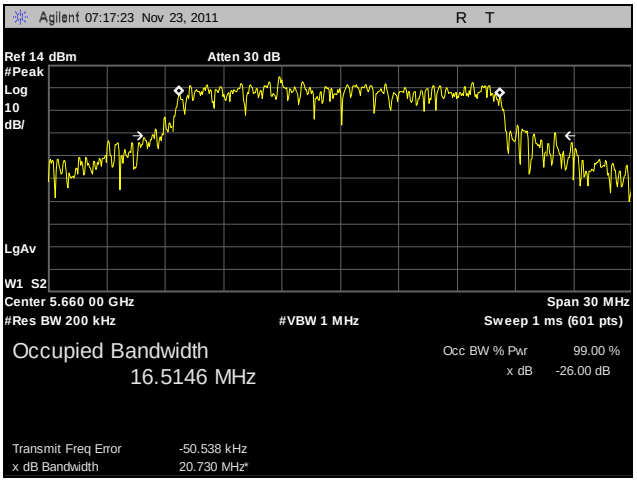
26 dB Occupied Bandwidth Test Results, 802.11a, 5660 MHz



Plot 22. 26 dB Occupied Bandwidth, 802.11a, 5660 MHz, R3-A

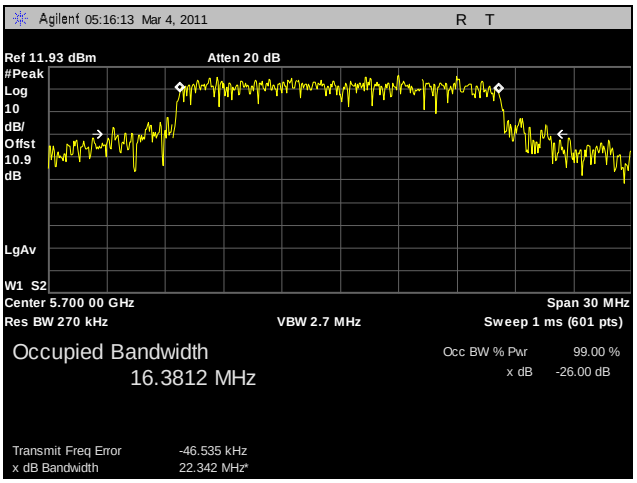


Plot 23. 26 dB Occupied Bandwidth, 802.11a, 5660 MHz, R3-B

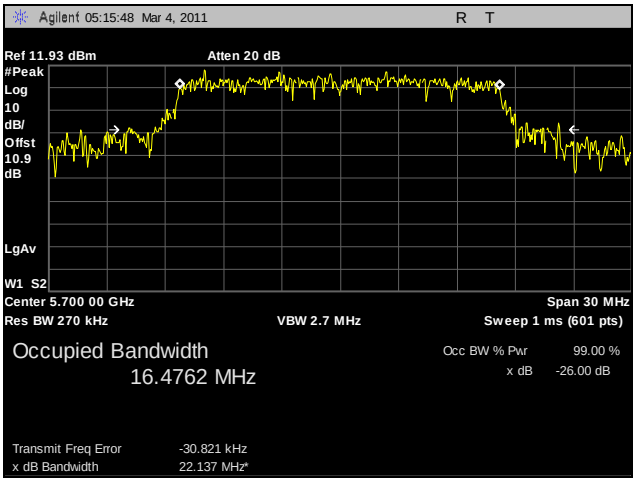


Plot 24. 26 dB Occupied Bandwidth, 802.11a, 5660 MHz, R3-C

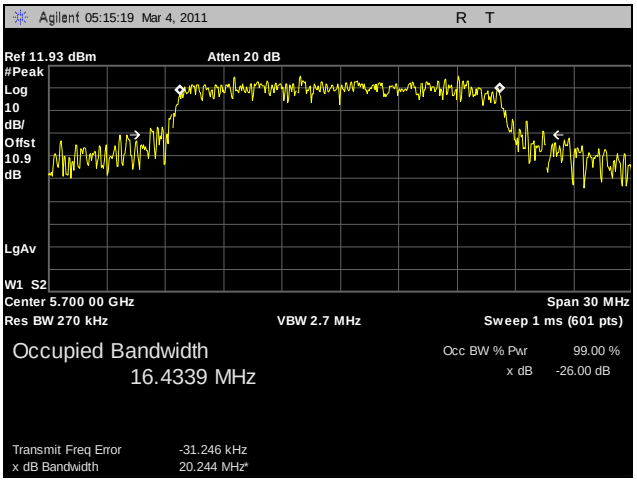
26 dB Occupied Bandwidth Test Results, 802.11a, 5700 MHz



Plot 25. 26 dB Occupied Bandwidth, 802.11a, 5700 MHz, R3-A

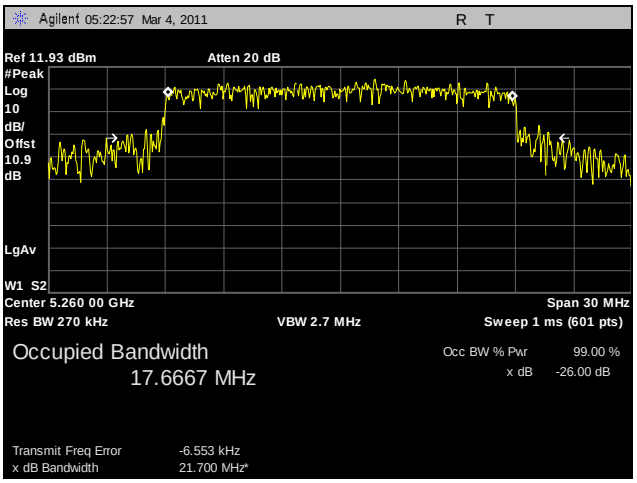


Plot 26. 26 dB Occupied Bandwidth, 802.11a, 5700 MHz, R3-B

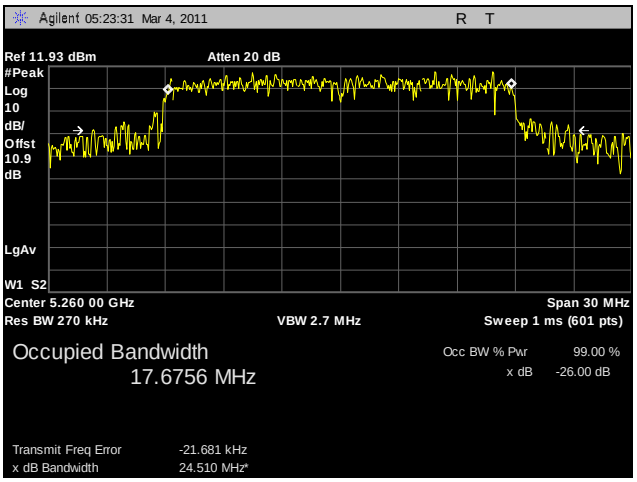


Plot 27. 26 dB Occupied Bandwidth, 802.11a, 5700 MHz, R3-C

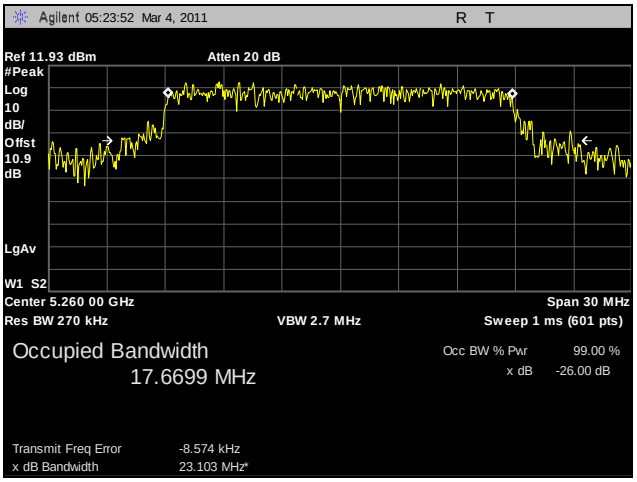
26 dB Occupied Bandwidth Test Results, 802.11n HT20, 5260 MHz



Plot 28. 26 dB Occupied Bandwidth, 802.11n HT20, 5260 MHz, R3-A

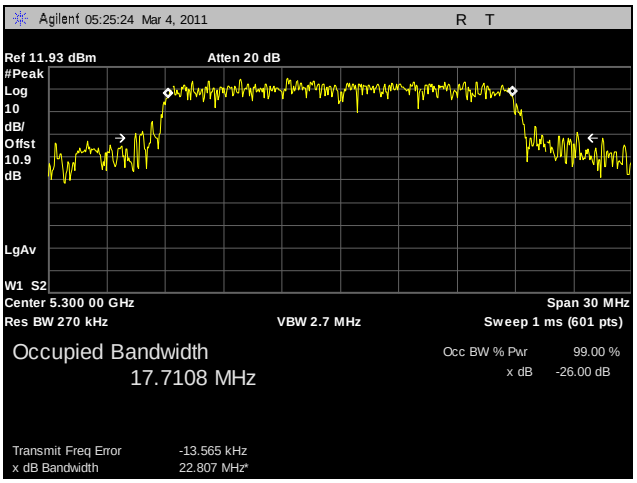


Plot 29. 26 dB Occupied Bandwidth, 802.11n HT20, 5260 MHz, R3-B

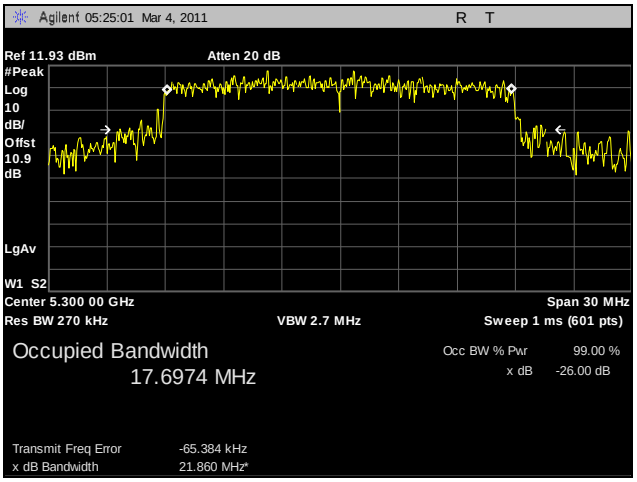


Plot 30. 26 dB Occupied Bandwidth, 802.11n HT20, 5260 MHz, R3-C

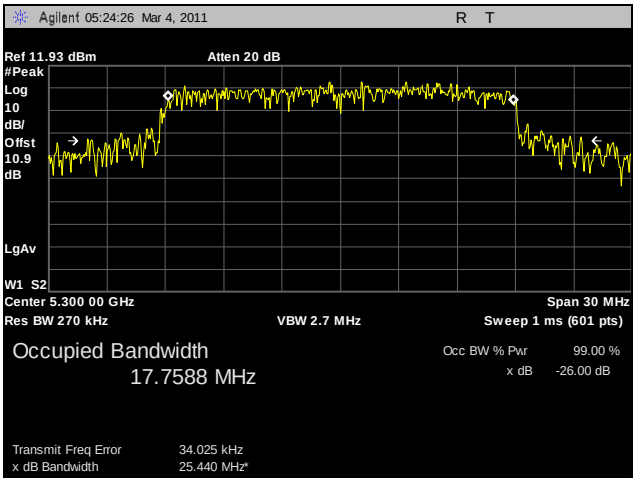
26 dB Occupied Bandwidth Test Results, 802.11n HT20, 5300 MHz



Plot 31. 26 dB Occupied Bandwidth, 802.11n HT20, 5300 MHz, R3-A

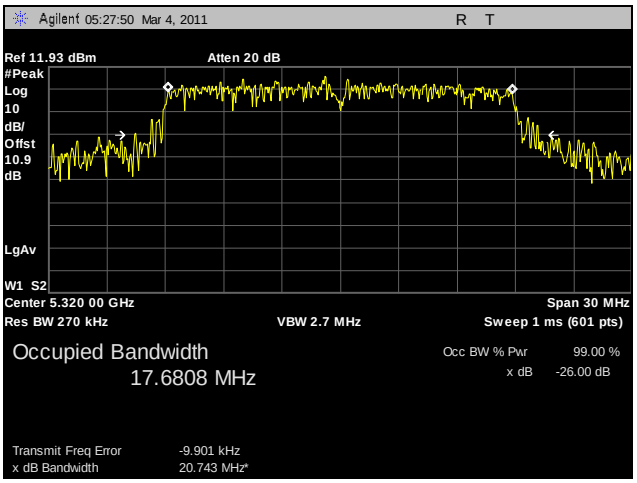


Plot 32. 26 dB Occupied Bandwidth, 802.11n HT20, 5300 MHz, R3-B

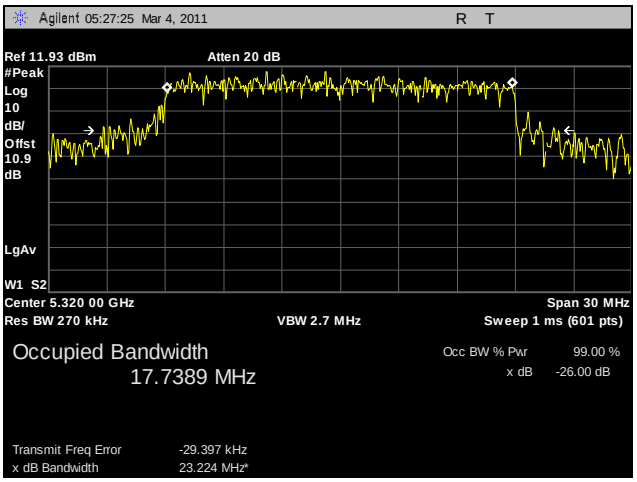


Plot 33. 26 dB Occupied Bandwidth, 802.11n HT20, 5300 MHz, R3-C

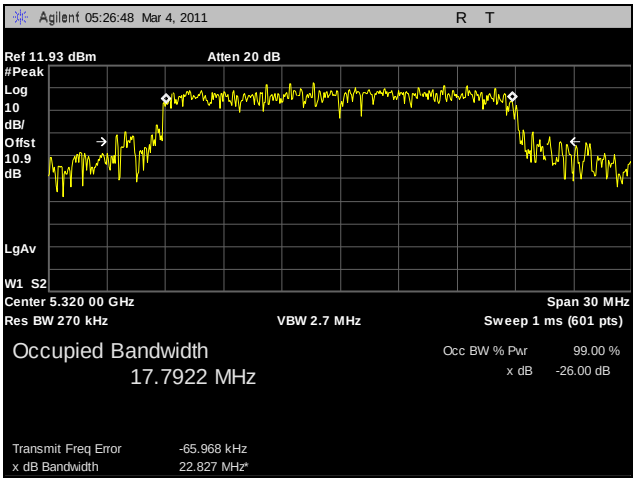
26 dB Occupied Bandwidth Test Results, 802.11n HT20, 5320 MHz



Plot 34. 26 dB Occupied Bandwidth, 802.11n HT20, 5320 MHz, R3-A

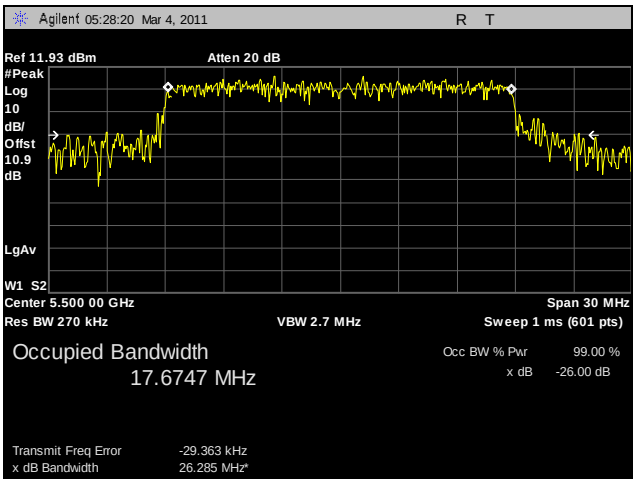


Plot 35. 26 dB Occupied Bandwidth, 802.11n HT20, 5320 MHz, R3-B

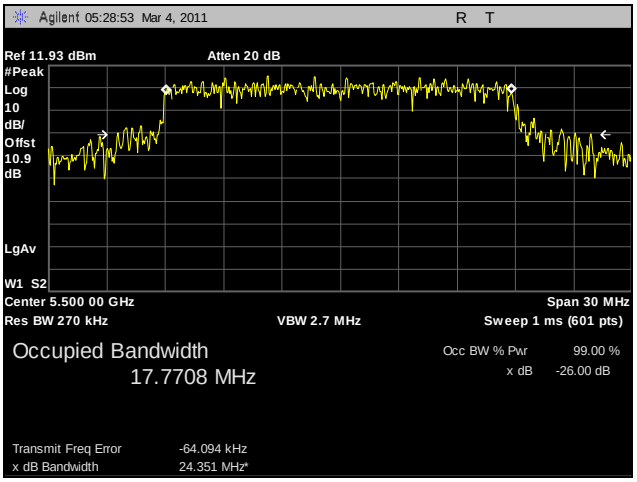


Plot 36. 26 dB Occupied Bandwidth, 802.11n HT20, 5320 MHz, R3-C

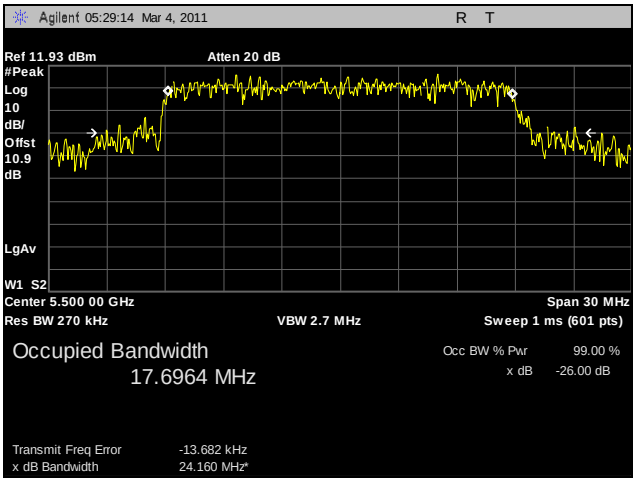
26 dB Occupied Bandwidth Test Results, 802.11n HT20, 5500 MHz



Plot 37. 26 dB Occupied Bandwidth, 802.11n HT20, 5500 MHz, R3-A

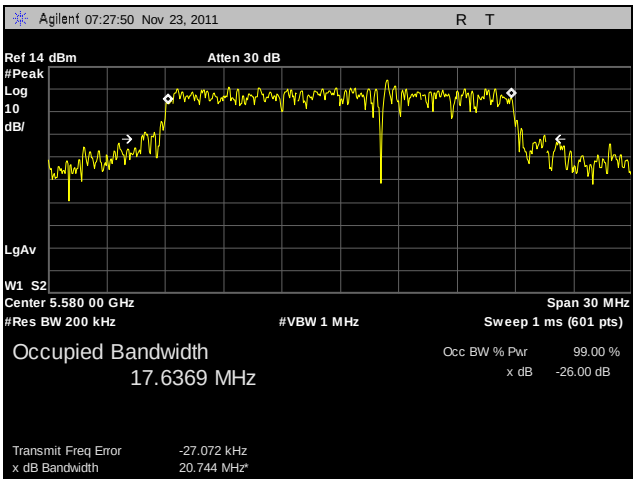


Plot 38. 26 dB Occupied Bandwidth, 802.11n HT20, 5500 MHz, R3-B

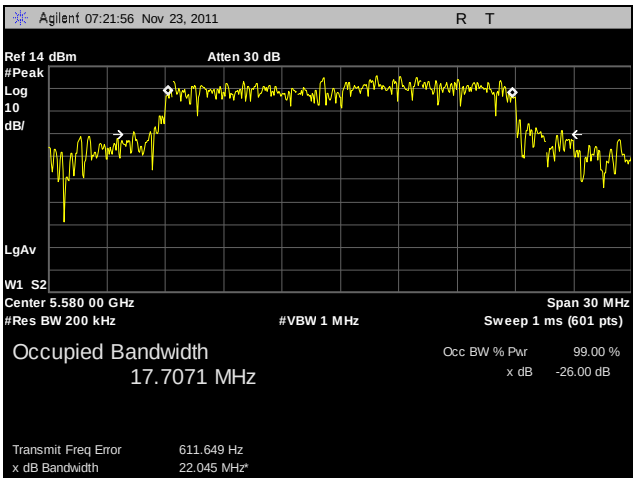


Plot 39. 26 dB Occupied Bandwidth, 802.11n HT20, 5500 MHz, R3-C

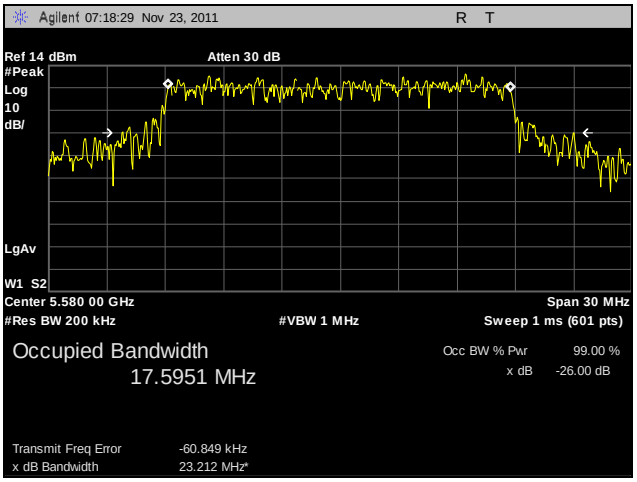
26 dB Occupied Bandwidth Test Results, 802.11n HT20, 5580 MHz



Plot 40. 26 dB Occupied Bandwidth, 802.11n HT20, 5580 MHz, R3-A

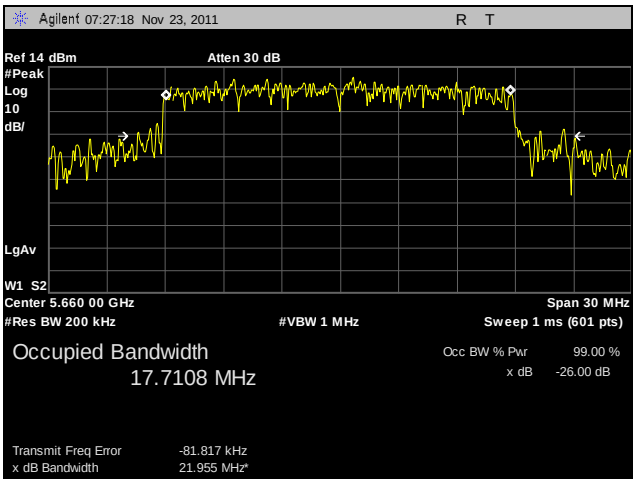


Plot 41. 26 dB Occupied Bandwidth, 802.11n HT20, 5580 MHz, R3-B

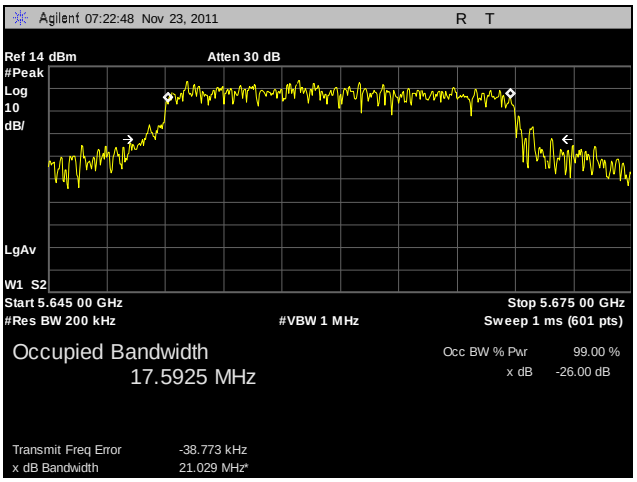


Plot 42. 26 dB Occupied Bandwidth, 802.11n HT20, 5580 MHz, R3-C

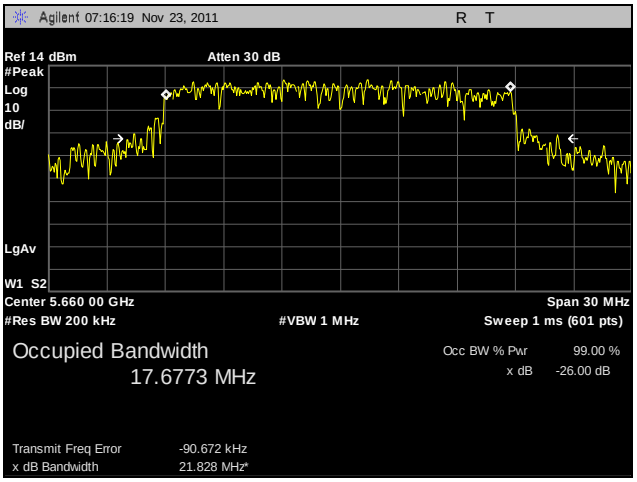
26 dB Occupied Bandwidth Test Results, 802.11n HT20, 5660 MHz



Plot 43. 26 dB Occupied Bandwidth, 802.11n HT20, 5660 MHz, R3-A

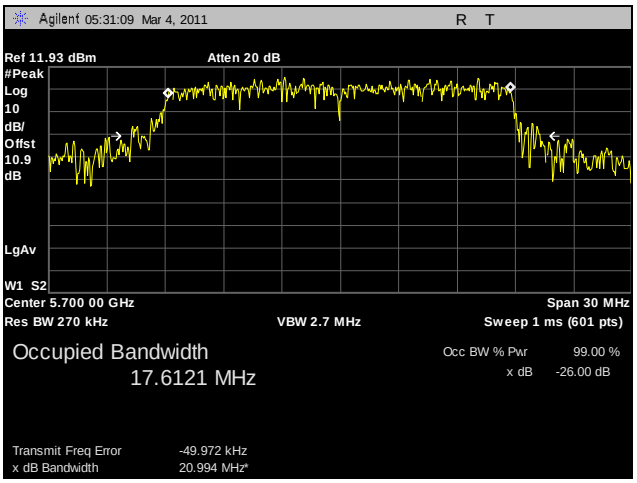


Plot 44. 26 dB Occupied Bandwidth, 802.11n HT20, 5660 MHz, R3-B

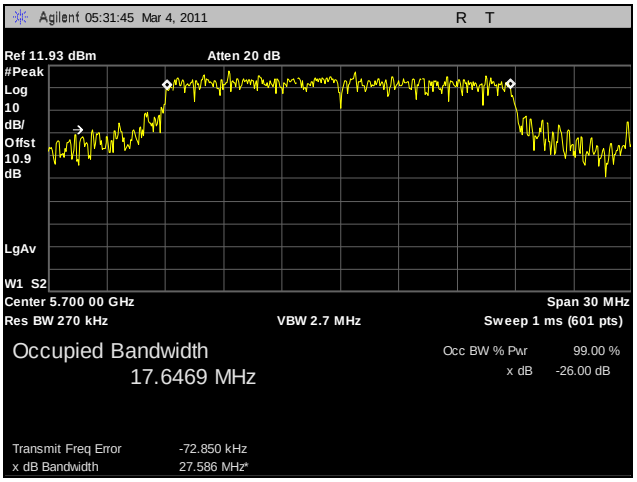


Plot 45. 26 dB Occupied Bandwidth, 802.11n HT20, 5660 MHz, R3-C

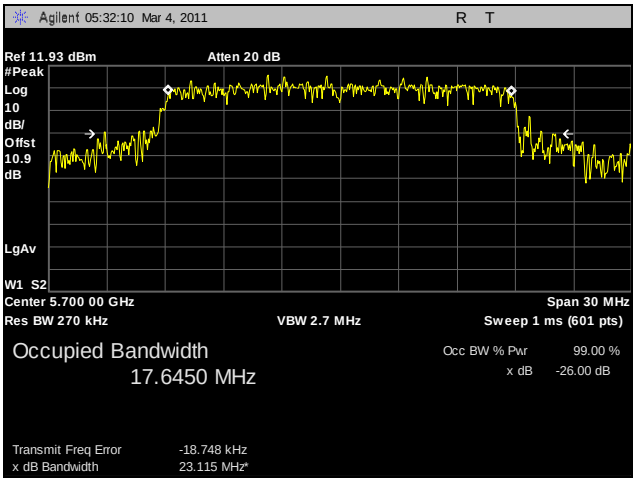
26 dB Occupied Bandwidth Test Results, 802.11n HT20, 5700 MHz



Plot 46. 26 dB Occupied Bandwidth, 802.11n HT20, 5700 MHz, R3-A

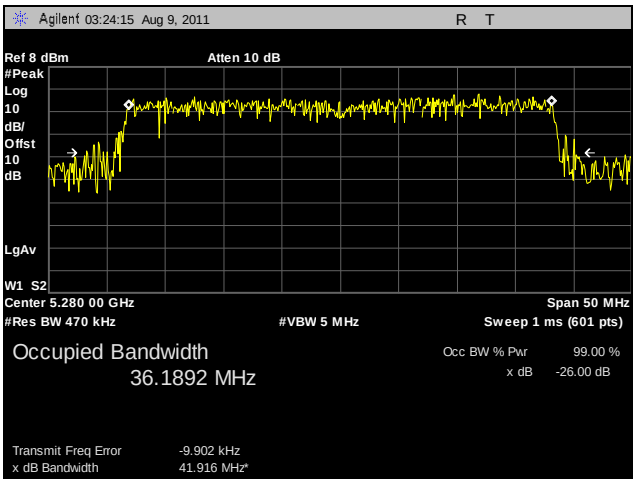


Plot 47. 26 dB Occupied Bandwidth, 802.11n HT20, 5700 MHz, R3-B

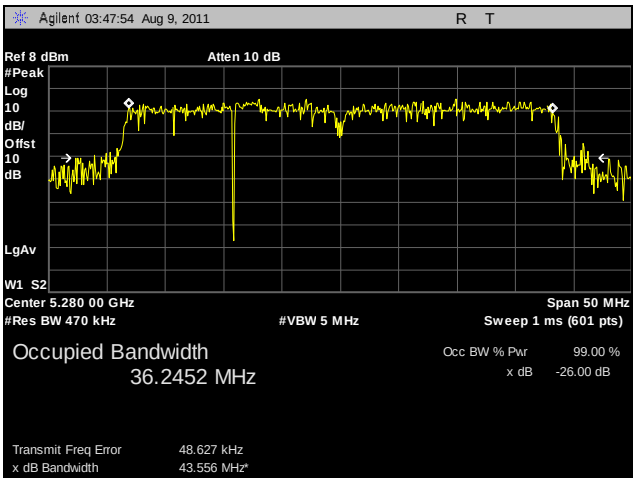


Plot 48. 26 dB Occupied Bandwidth, 802.11n HT20, 5700 MHz, R3-C

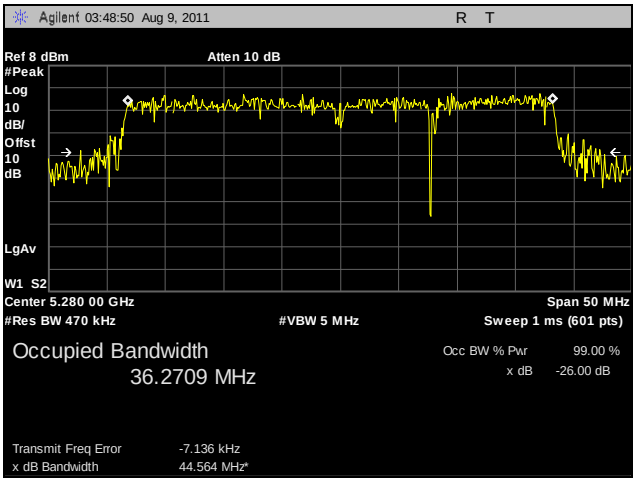
26 dB Occupied Bandwidth Test Results, 802.11n HT40, 5280 MHz



Plot 49. 26 dB Occupied Bandwidth, 802.11n HT40, 5280 MHz, R3-A

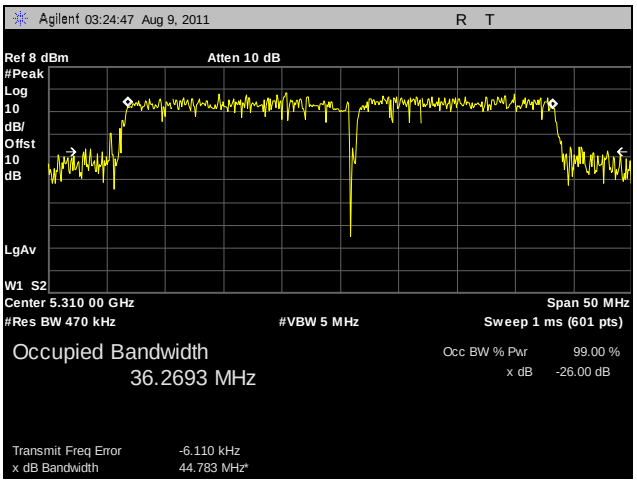


Plot 50. 26 dB Occupied Bandwidth, 802.11n HT40, 5280 MHz, R3-B

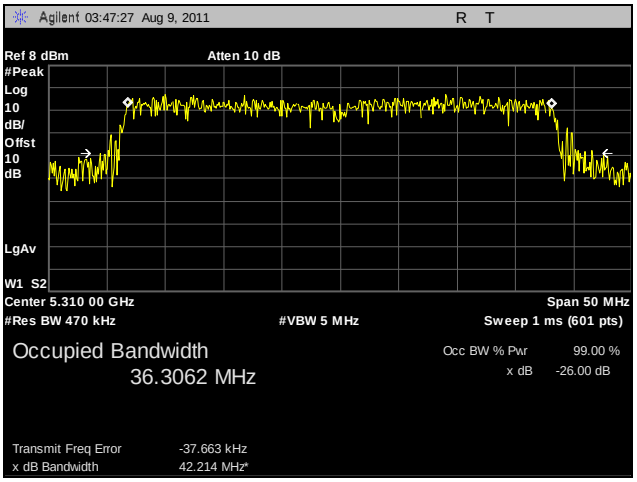


Plot 51. 26 dB Occupied Bandwidth, 802.11n HT40, 5280 MHz, R3-C

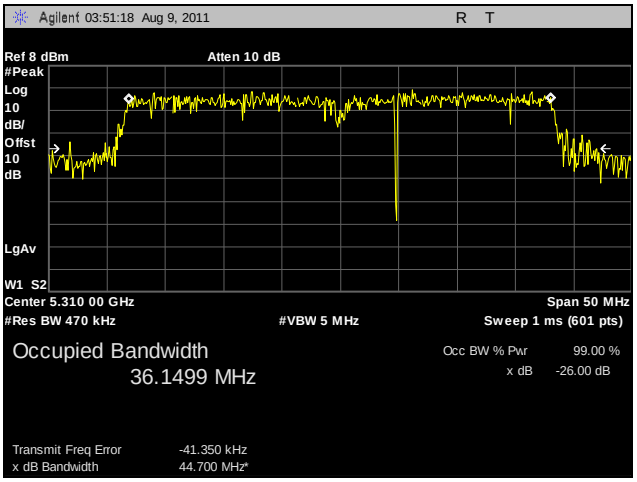
26 dB Occupied Bandwidth Test Results, 802.11n HT40, 5310 MHz



Plot 52. 26 dB Occupied Bandwidth, 802.11n HT40, 5310 MHz, R3-A

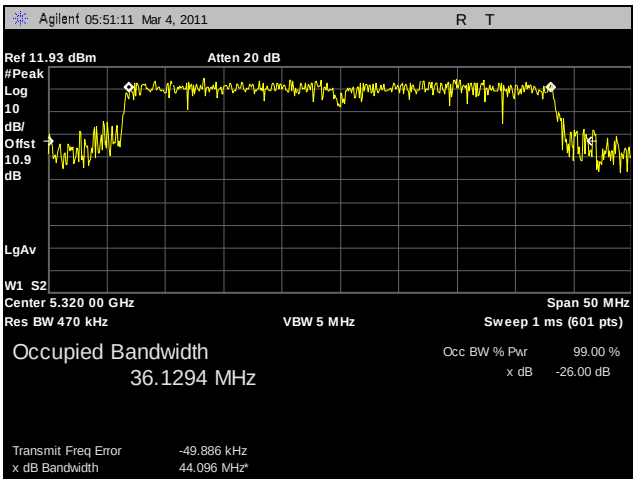


Plot 53. 26 dB Occupied Bandwidth, 802.11n HT40, 5310 MHz, R3-B

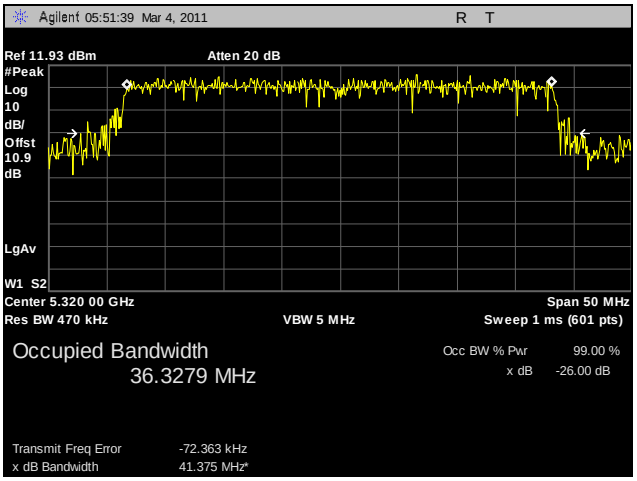


Plot 54. 26 dB Occupied Bandwidth, 802.11n HT40, 5310 MHz, R3-C

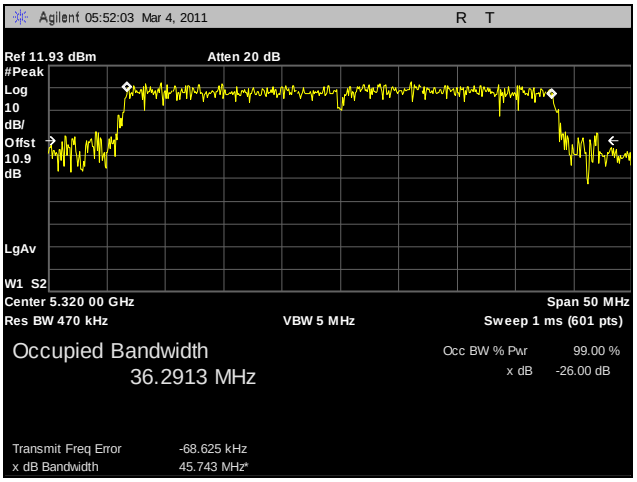
26 dB Occupied Bandwidth Test Results, 802.11n HT40, 5320 MHz



Plot 55. 26 dB Occupied Bandwidth, 802.11n HT40, 5320 MHz, R3-A

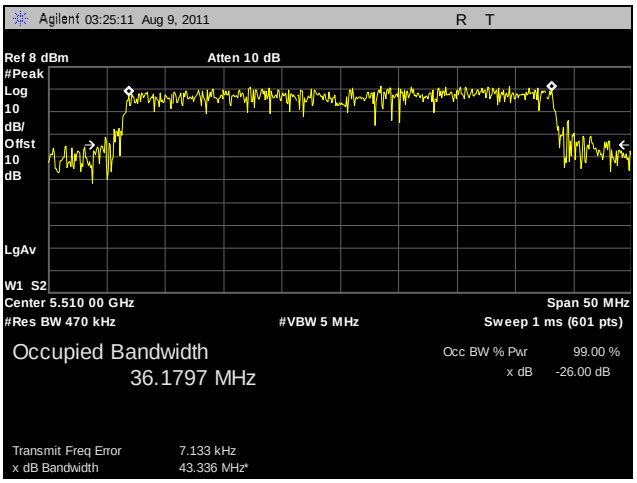


Plot 56. 26 dB Occupied Bandwidth, 802.11n HT40, 5320 MHz, R3-B

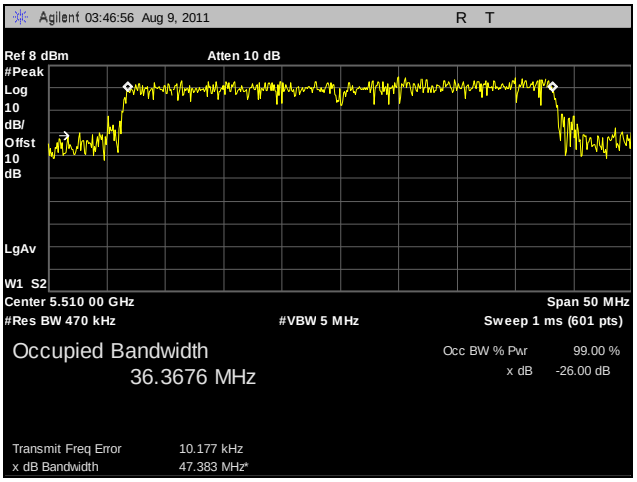


Plot 57. 26 dB Occupied Bandwidth, 802.11n HT40, 5320 MHz, R3-C

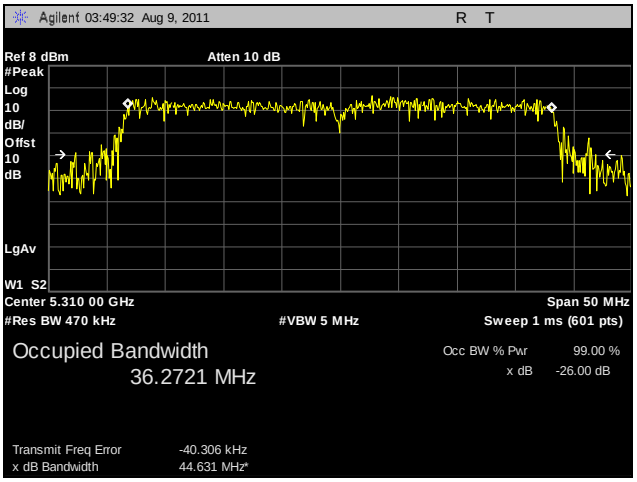
26 dB Occupied Bandwidth Test Results, 802.11n HT40, 5510 MHz



Plot 58. 26 dB Occupied Bandwidth, 802.11n HT40, 5510 MHz, R3-A

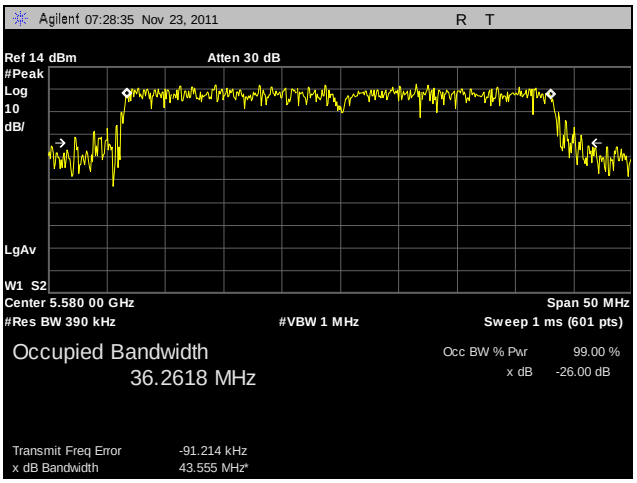


Plot 59. 26 dB Occupied Bandwidth, 802.11n HT40, 5510 MHz, R3-B

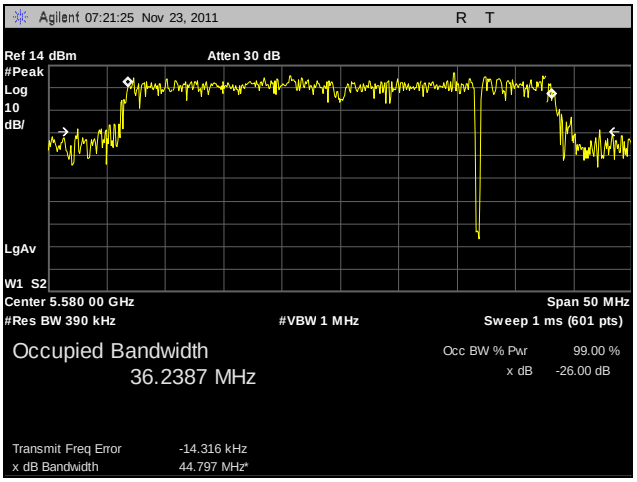


Plot 60. 26 dB Occupied Bandwidth, 802.11n HT40, 5510 MHz, R3-C

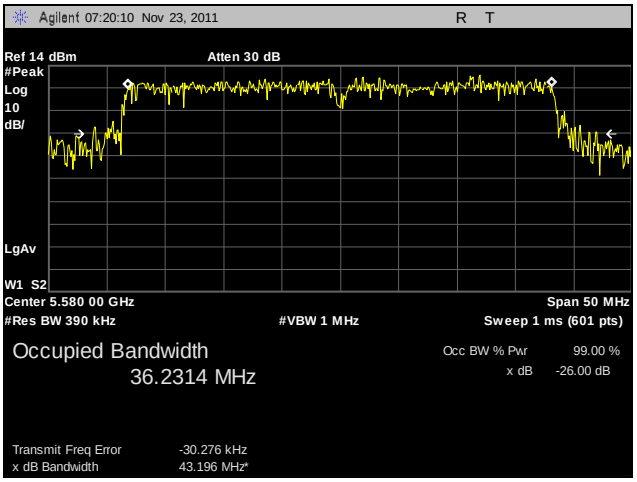
26 dB Occupied Bandwidth Test Results, 802.11n HT40, 5580 MHz



Plot 61. 26 dB Occupied Bandwidth, 802.11n HT40, 5580 MHz, R3-A

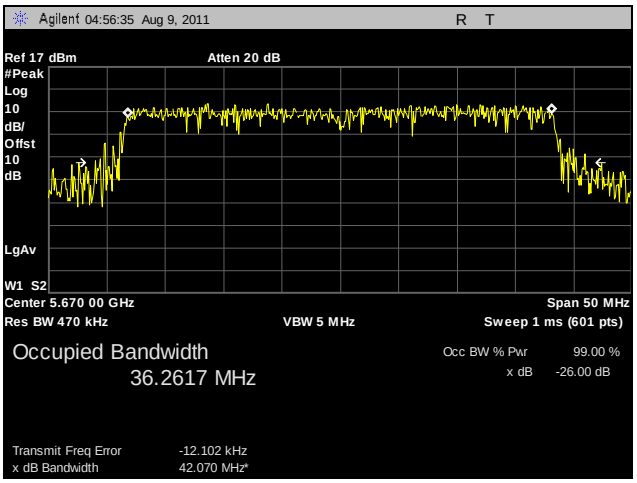


Plot 62. 26 dB Occupied Bandwidth, 802.11n HT40, 5580 MHz, R3-B

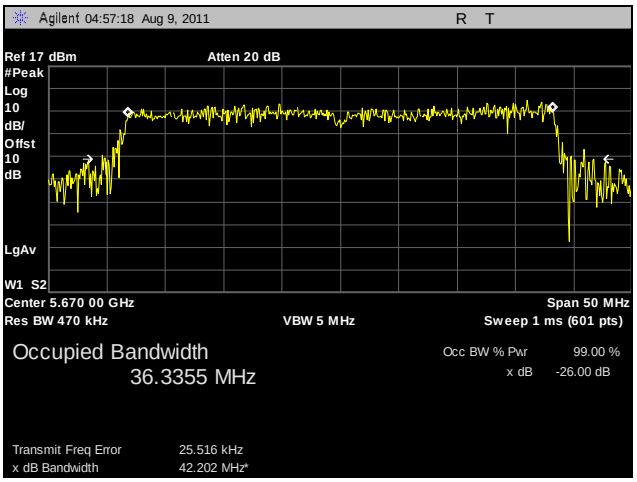


Plot 63. 26 dB Occupied Bandwidth, 802.11n HT40, 5580 MHz, R3-C

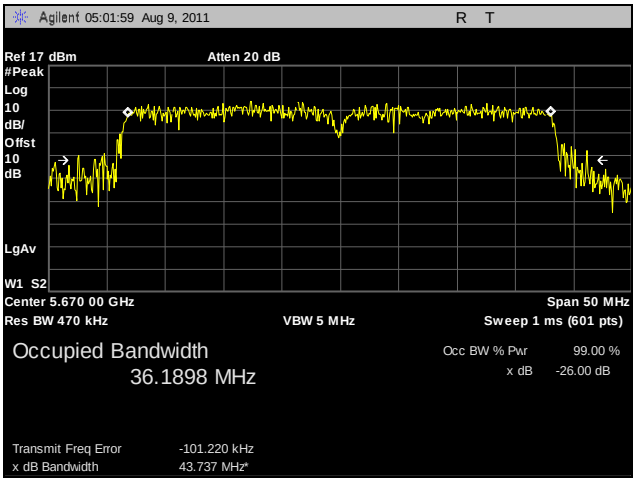
26 dB Occupied Bandwidth Test Results, 802.11n HT40, 5670 MHz



Plot 64. 26 dB Occupied Bandwidth, 802.11n HT40, 5670 MHz, R3-A

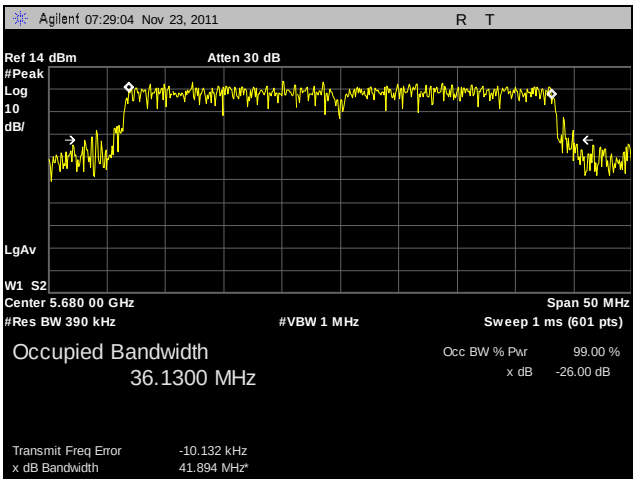


Plot 65. 26 dB Occupied Bandwidth, 802.11n HT40, 5670 MHz, R3-B

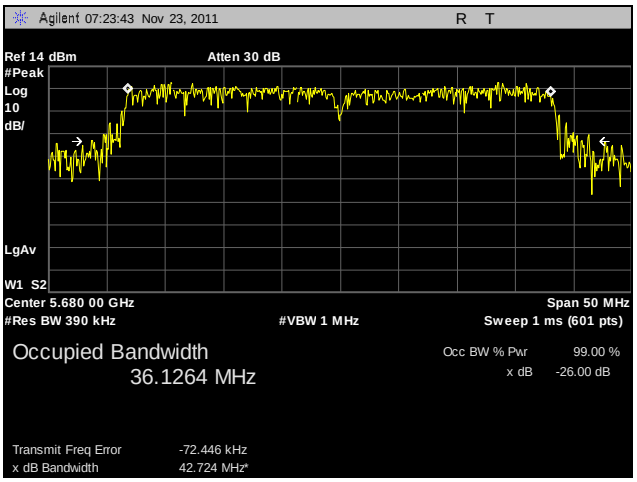


Plot 66. 26 dB Occupied Bandwidth, 802.11n HT40, 5670 MHz, R3-C

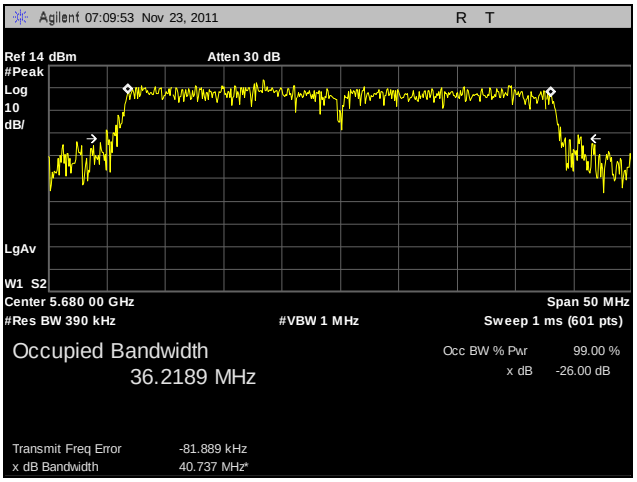
26 dB Occupied Bandwidth Test Results, 802.11n HT40, 5680 MHz



Plot 67. 26 dB Occupied Bandwidth, 802.11n HT40, 5680 MHz, R3-A

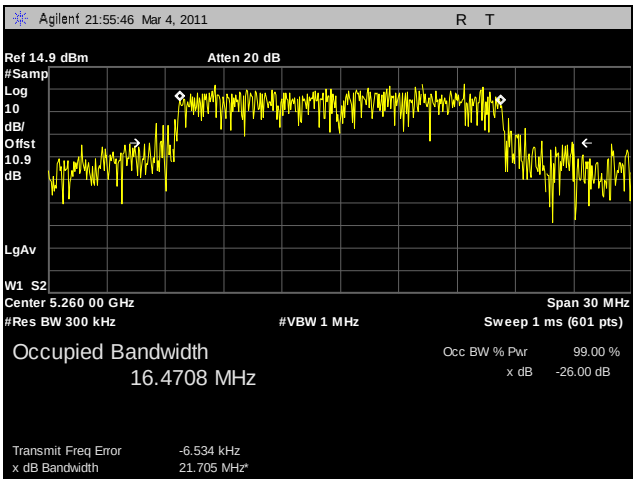


Plot 68. 26 dB Occupied Bandwidth, 802.11n HT40, 5680 MHz, R3-B

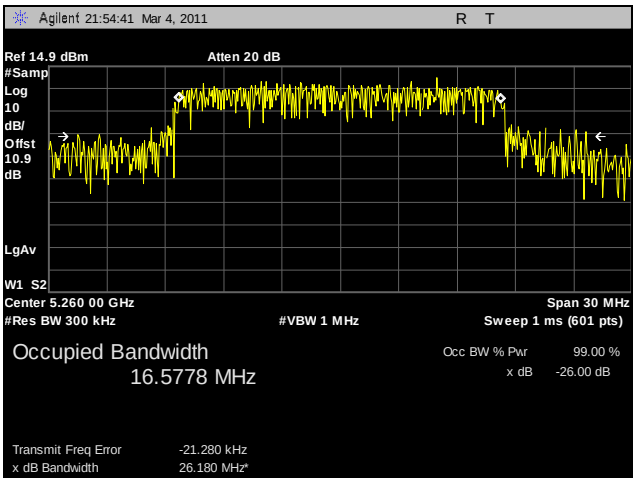


Plot 69. 26 dB Occupied Bandwidth, 802.11n HT40, 5680 MHz, R3-C

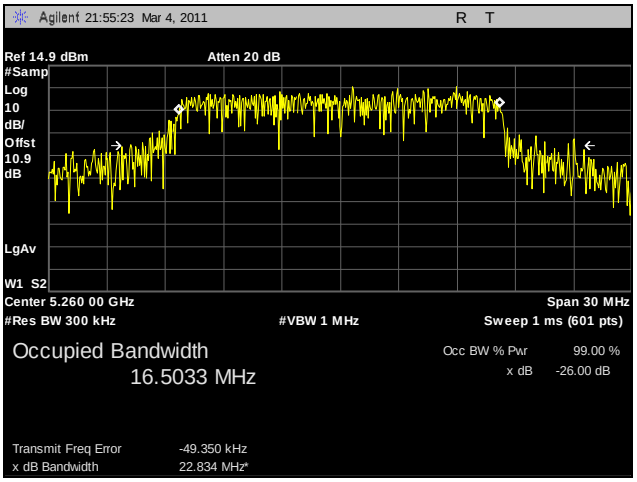
99% Occupied Bandwidth Test Results, 802.11a, 5260 MHz



Plot 70. 99% Occupied Bandwidth, 802.11a, 5260 MHz, R3-A

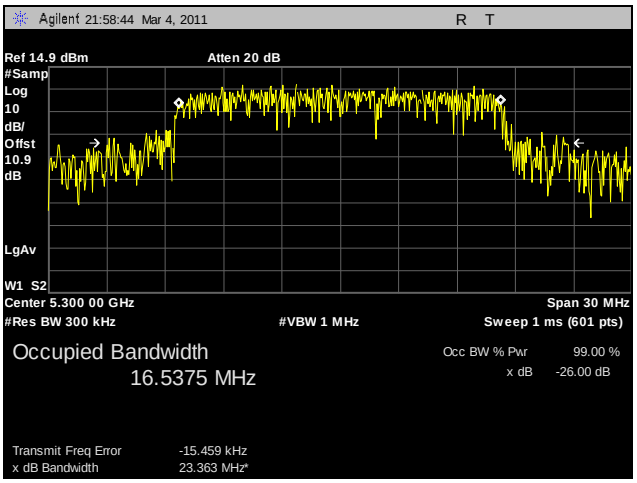


Plot 71. 99% Occupied Bandwidth, 802.11a, 5260 MHz, R3-B

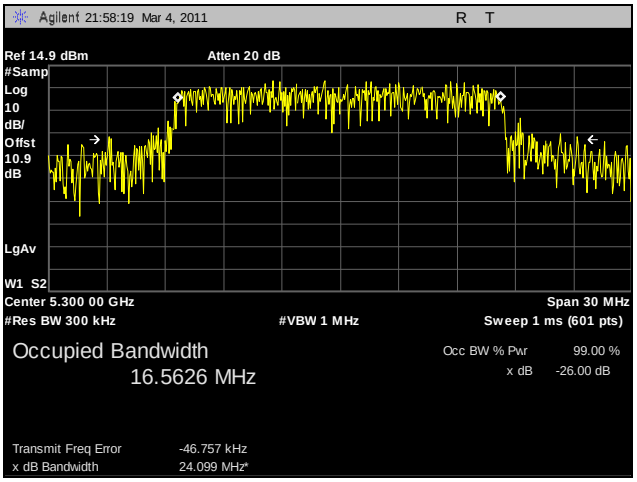


Plot 72. 99% Occupied Bandwidth, 802.11a, 5260 MHz, R3-C

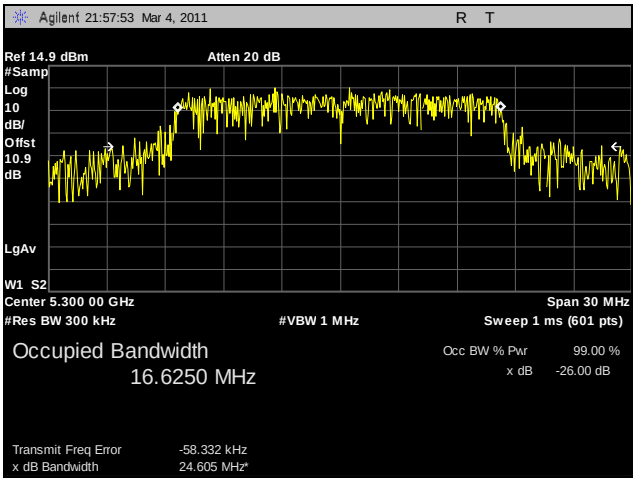
99% Occupied Bandwidth Test Results, 802.11a, 5300 MHz



Plot 73. 99% Occupied Bandwidth, 802.11a, 5300 MHz, R3-A

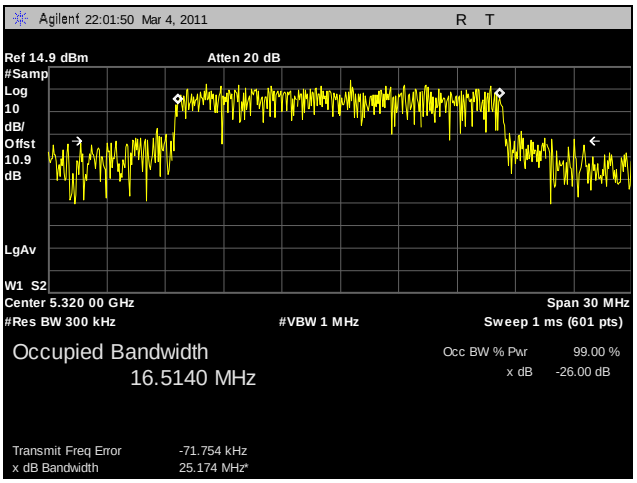


Plot 74. 99% Occupied Bandwidth, 802.11a, 5300 MHz, R3-B

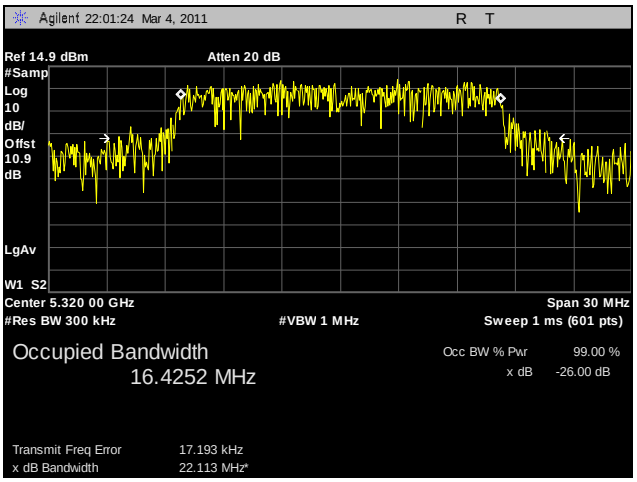


Plot 75. 99% Occupied Bandwidth, 802.11a, 5300 MHz, R3-C

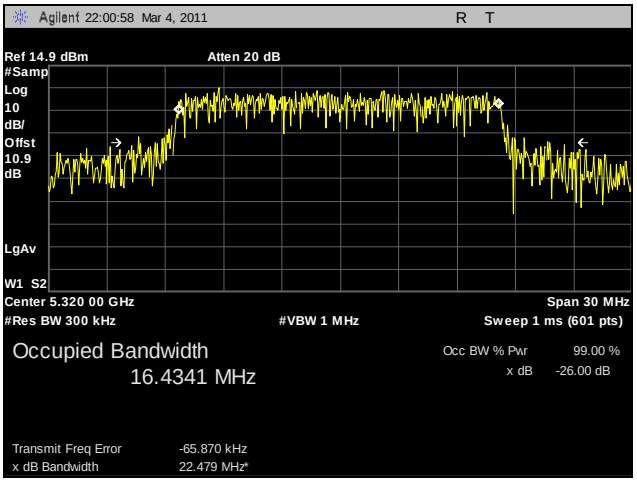
99% Occupied Bandwidth Test Results, 802.11a, 5320 MHz



Plot 76. 99% Occupied Bandwidth, 802.11a, 5320 MHz, R3-A

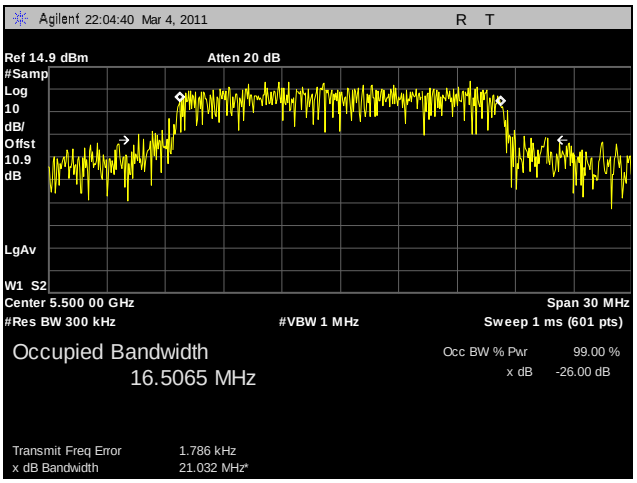


Plot 77. 99% Occupied Bandwidth, 802.11a, 5320 MHz, R3-B

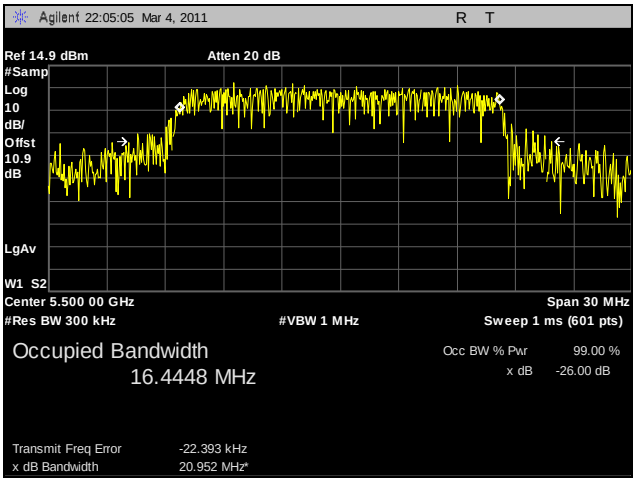


Plot 78. 99% Occupied Bandwidth, 802.11a, 5320 MHz, R3-C

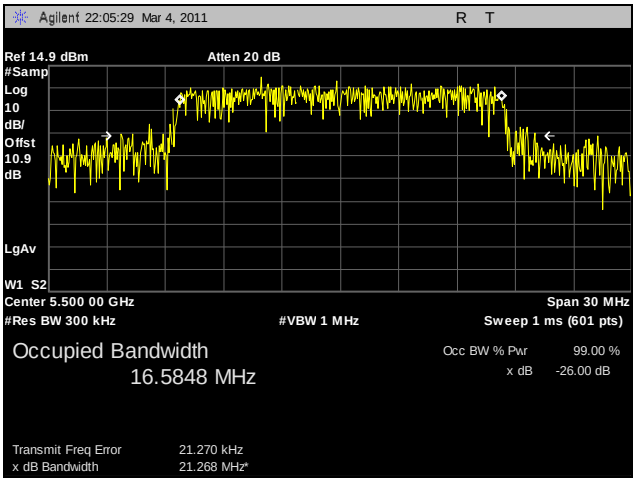
99% Occupied Bandwidth Test Results, 802.11a, 5500 MHz



Plot 79. 99% Occupied Bandwidth, 802.11a, 5500 MHz, R3-A

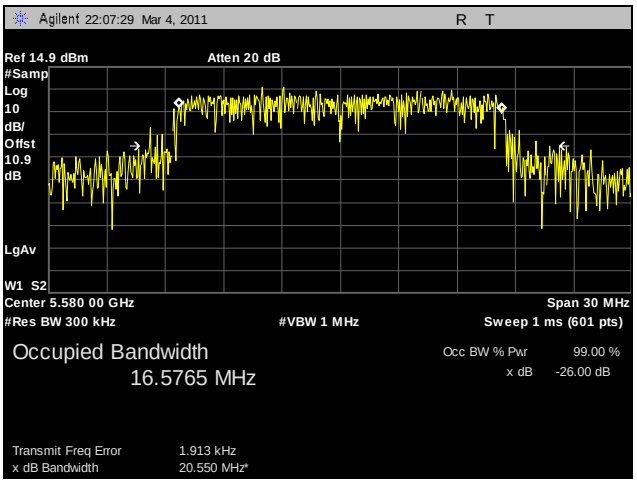


Plot 80. 99% Occupied Bandwidth, 802.11a, 5500 MHz, R3-B

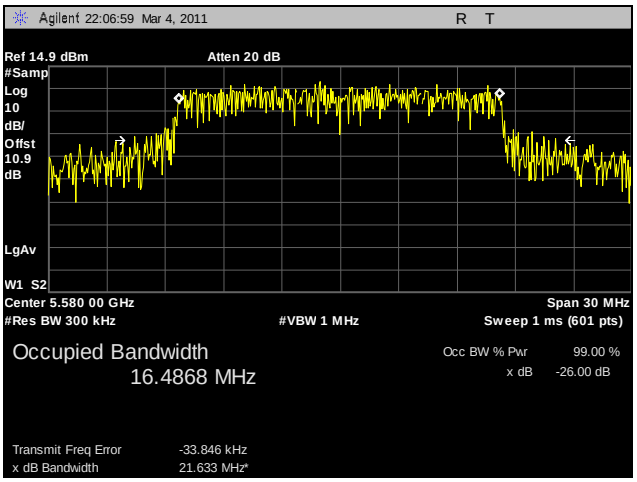


Plot 81. 99% Occupied Bandwidth, 802.11a, 5500 MHz, R3-C

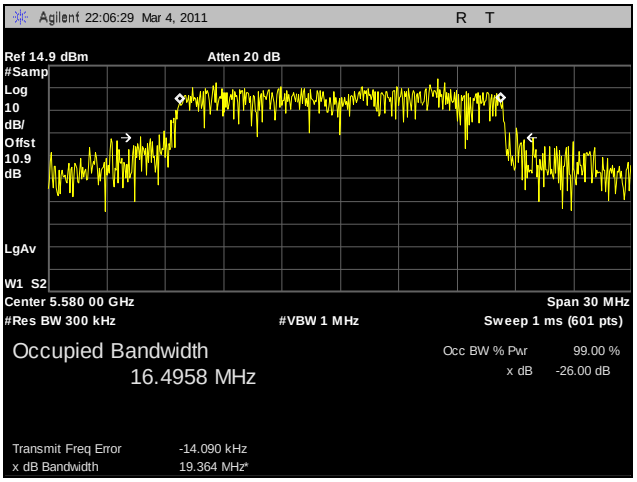
99% Occupied Bandwidth Test Results, 802.11a, 5580 MHz



Plot 82. 99% Occupied Bandwidth, 802.11a, 5580 MHz, R3-A

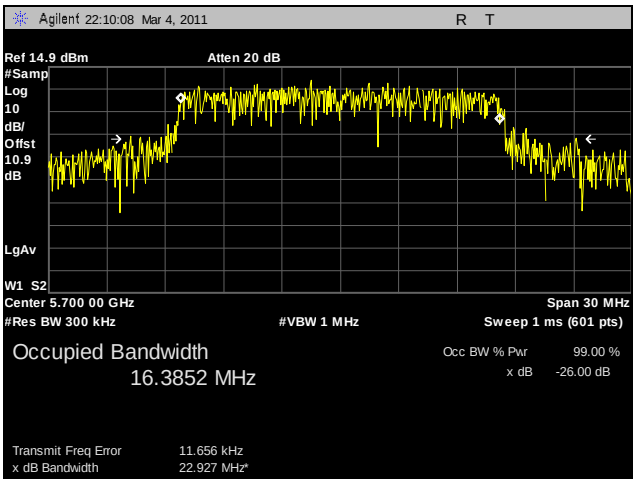


Plot 83. 99% Occupied Bandwidth, 802.11a, 5580 MHz, R3-B

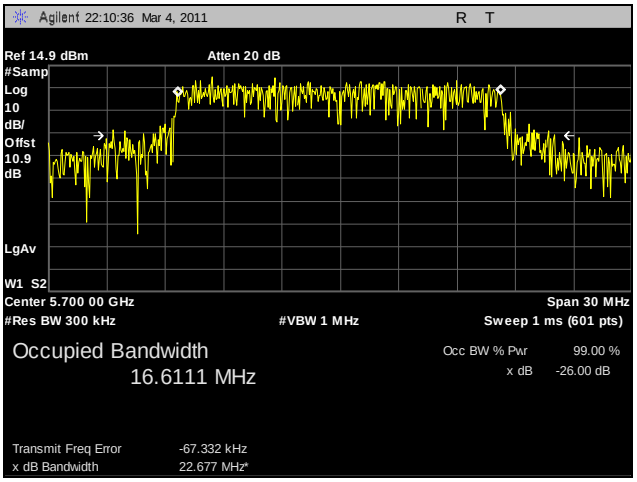


Plot 84. 99% Occupied Bandwidth, 802.11a, 5580 MHz, R3-C

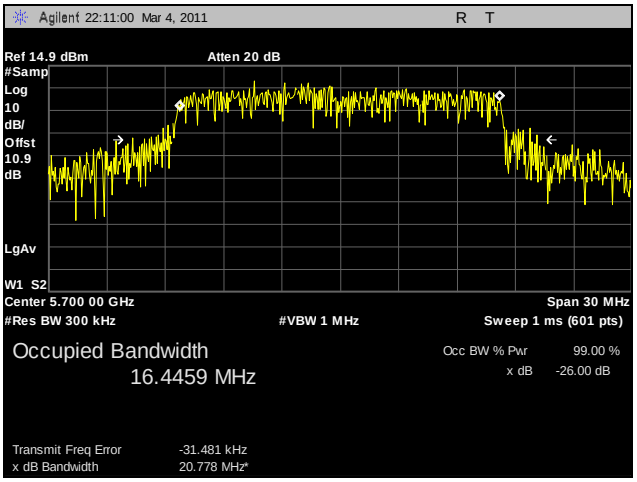
99% Occupied Bandwidth Test Results, 802.11a, 5700 MHz



Plot 85. 99% Occupied Bandwidth, 802.11a, 5700 MHz, R3-A

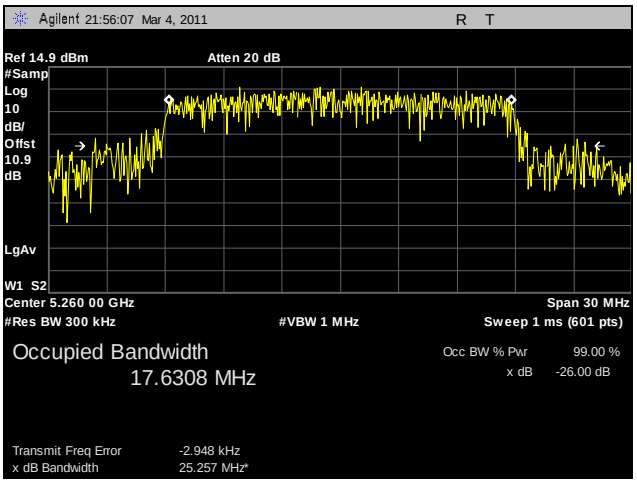


Plot 86. 99% Occupied Bandwidth, 802.11a, 5700 MHz, R3-B

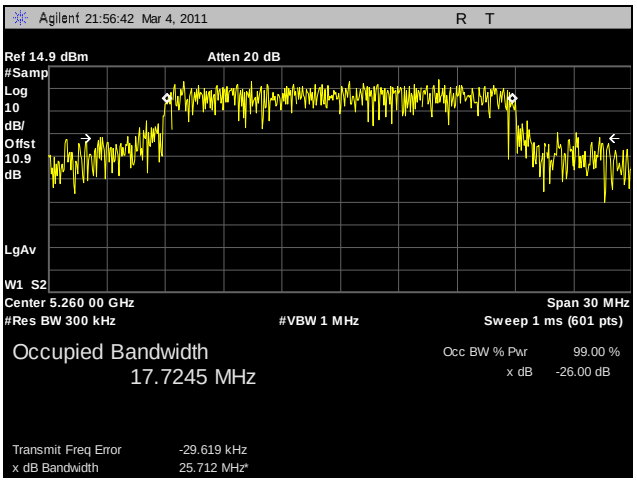


Plot 87. 99% Occupied Bandwidth, 802.11a, 5700 MHz, R3-C

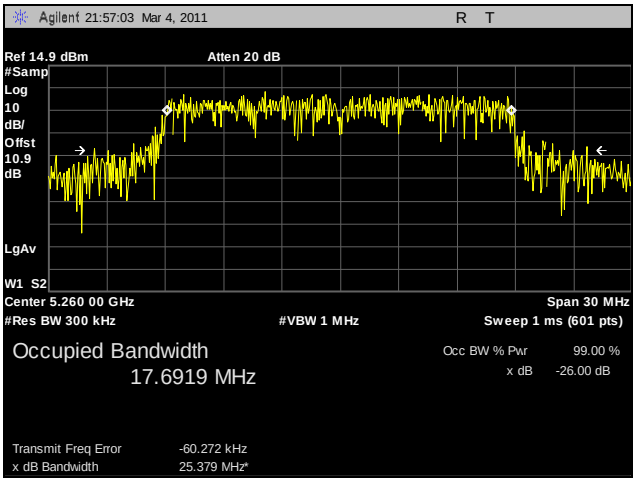
99% Occupied Bandwidth Test Results, 802.11n HT20, 5260 MHz



Plot 88. 99% Occupied Bandwidth, 802.11n HT20, 5260 MHz, R3-A

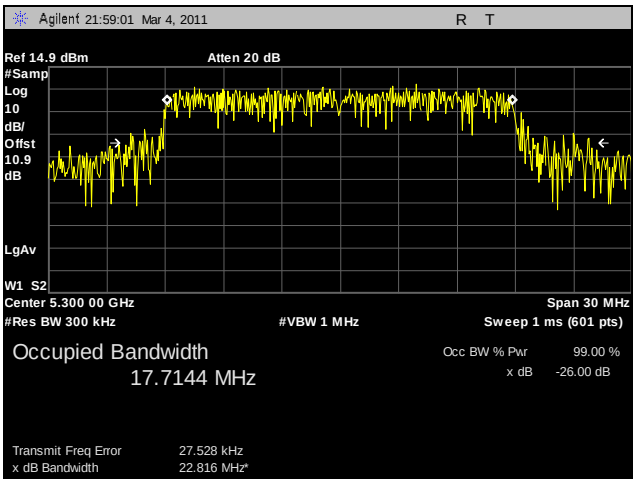


Plot 89. 99% Occupied Bandwidth, 802.11n HT20, 5260 MHz, R3-B

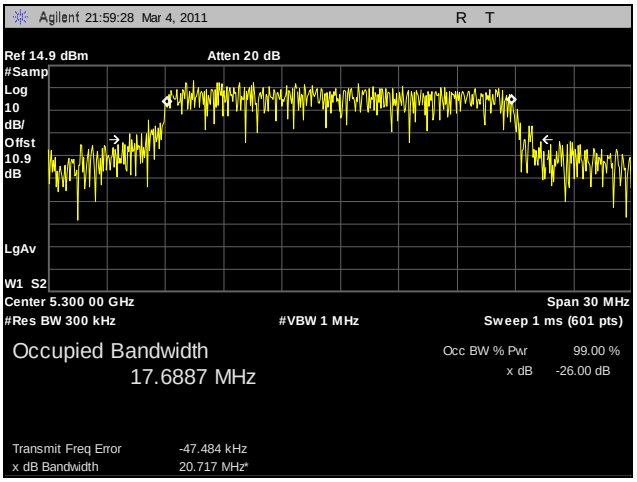


Plot 90. 99% Occupied Bandwidth, 802.11n HT20, 5260 MHz, R3-C

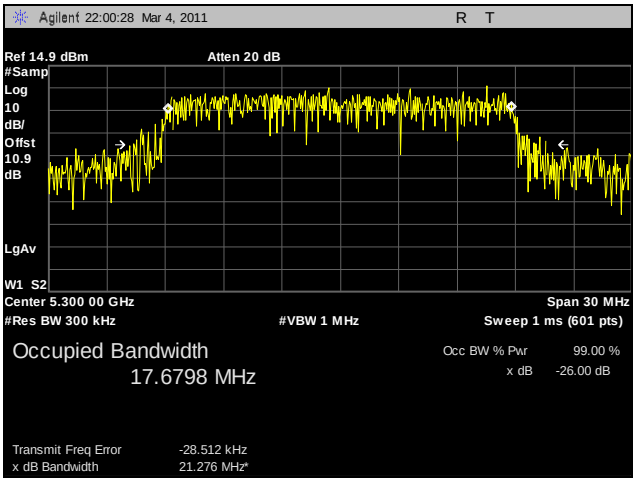
99% Occupied Bandwidth Test Results, 802.11n HT20, 5300 MHz



Plot 91. 99% Occupied Bandwidth, 802.11n HT20, 5300 MHz, R3-A

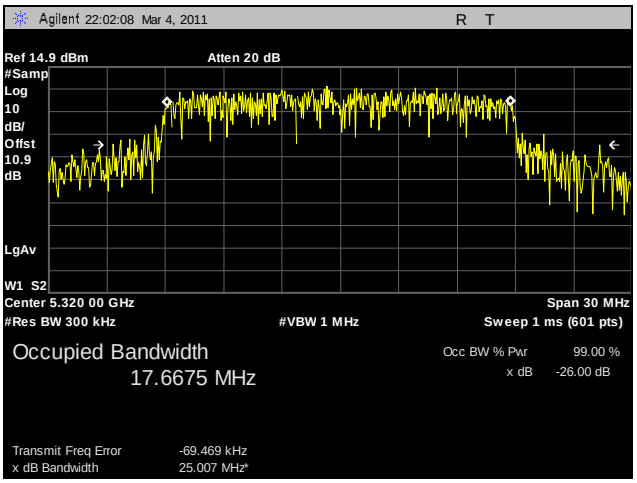


Plot 92. 99% Occupied Bandwidth, 802.11n HT20, 5300 MHz, R3-B

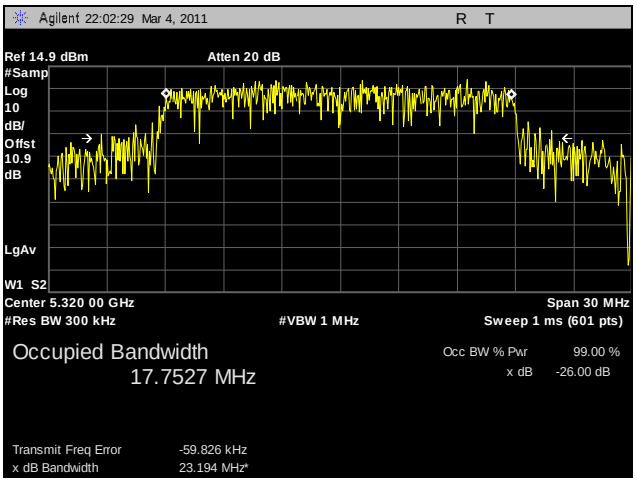


Plot 93. 99% Occupied Bandwidth, 802.11n HT20, 5300 MHz, R3-C

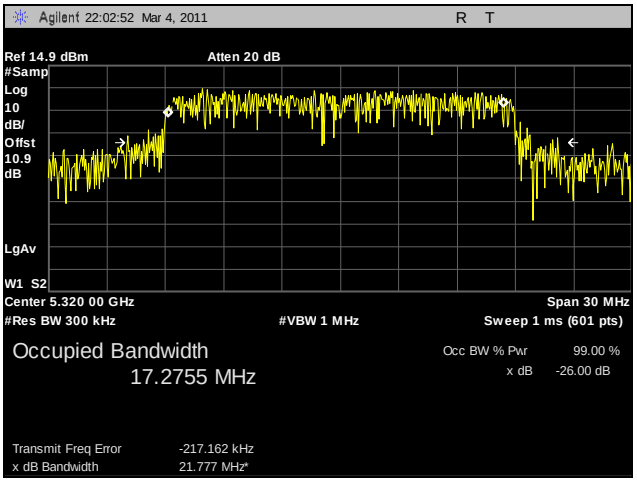
99% Occupied Bandwidth Test Results, 802.11n HT20, 5320 MHz



Plot 94. 99% Occupied Bandwidth, 802.11n HT20, 5320 MHz, R3-A

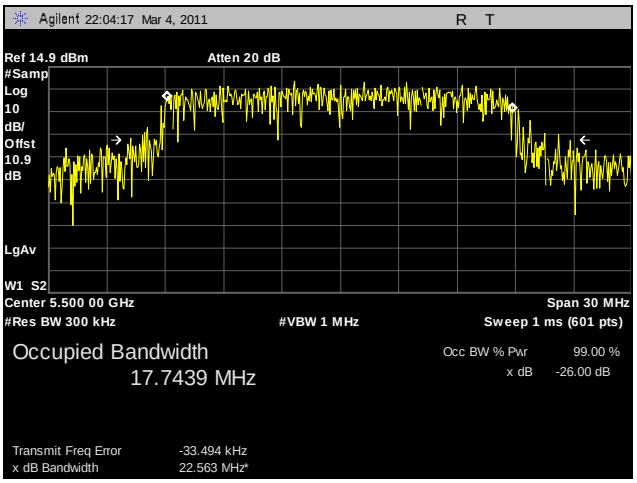


Plot 95. 99% Occupied Bandwidth, 802.11n HT20, 5320 MHz, R3-B

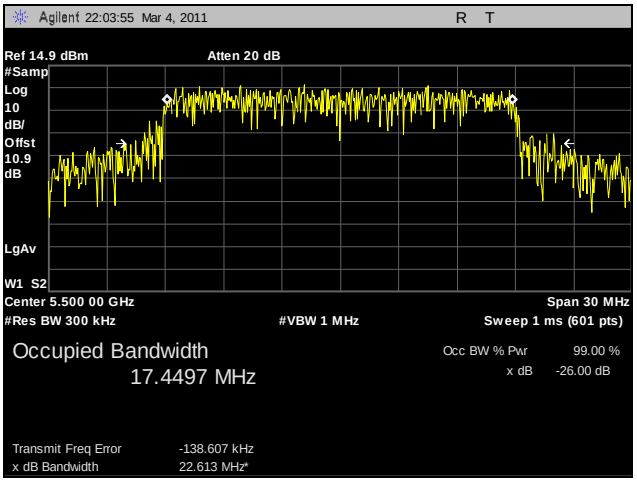


Plot 96. 99% Occupied Bandwidth, 802.11n HT20, 5320 MHz, R3-C

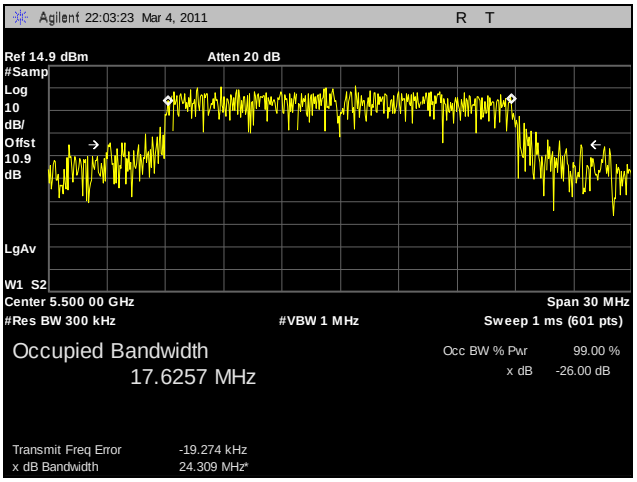
99% Occupied Bandwidth Test Results, 802.11n HT20, 5500 MHz



Plot 97. 99% Occupied Bandwidth, 802.11n HT20, 5500 MHz, R3-A

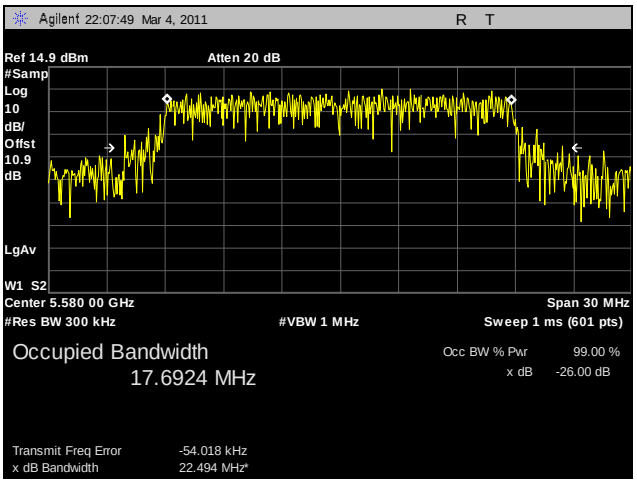


Plot 98. 99% Occupied Bandwidth, 802.11n HT20, 5500 MHz, R3-B

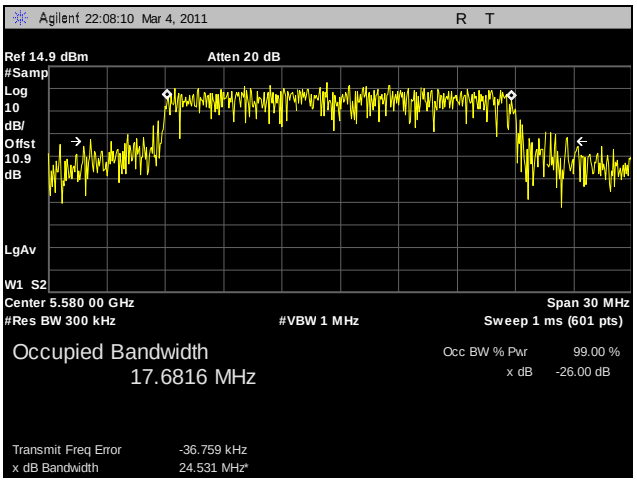


Plot 99. 99% Occupied Bandwidth, 802.11n HT20, 5500 MHz, R3-C

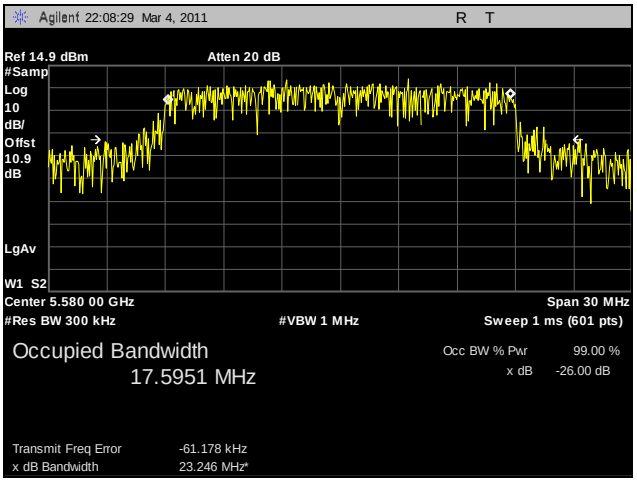
99% Occupied Bandwidth Test Results, 802.11n HT20, 5580 MHz



Plot 100. 99% Occupied Bandwidth, 802.11n HT20, 5580 MHz, R3-A

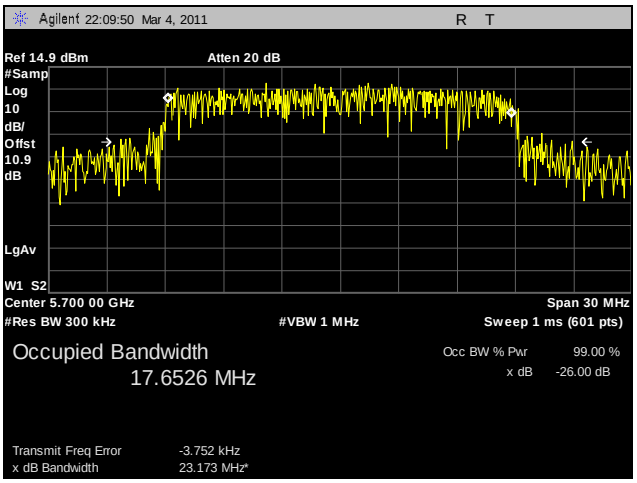


Plot 101. 99% Occupied Bandwidth, 802.11n HT20, 5580 MHz, R3-B

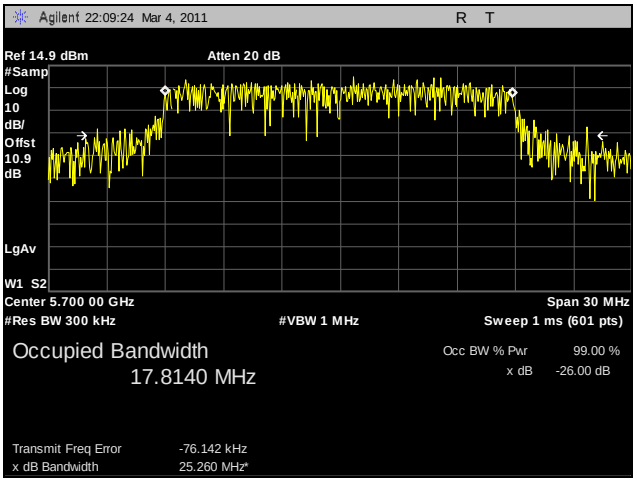


Plot 102. 99% Occupied Bandwidth, 802.11n HT20, 5580 MHz, R3-C

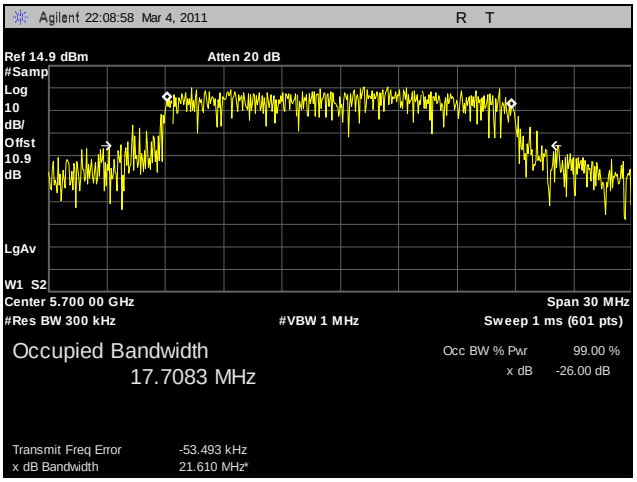
99% Occupied Bandwidth Test Results, 802.11n HT20, 5700 MHz



Plot 103. 99% Occupied Bandwidth, 802.11n HT20, 5700 MHz, R3-A

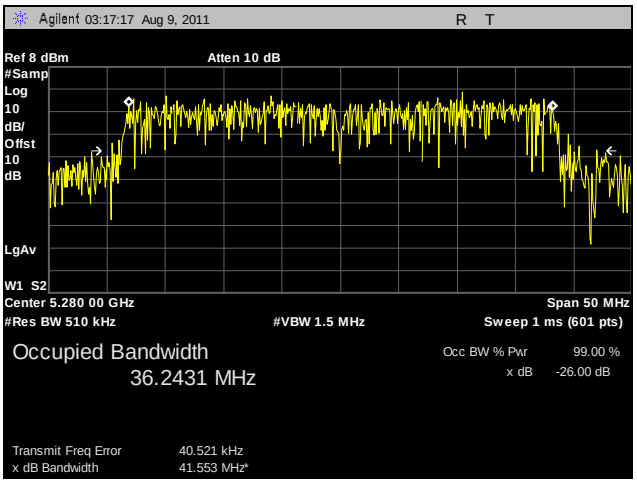


Plot 104. 99% Occupied Bandwidth, 802.11n HT20, 5700 MHz, R3-B

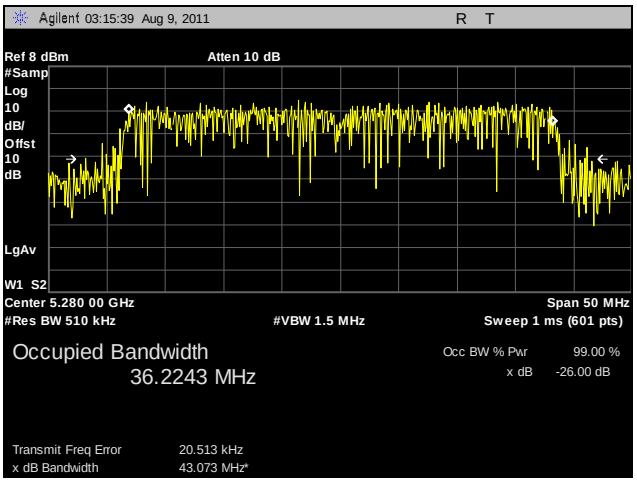


Plot 105. 99% Occupied Bandwidth, 802.11n HT20, 5700 MHz, R3-C

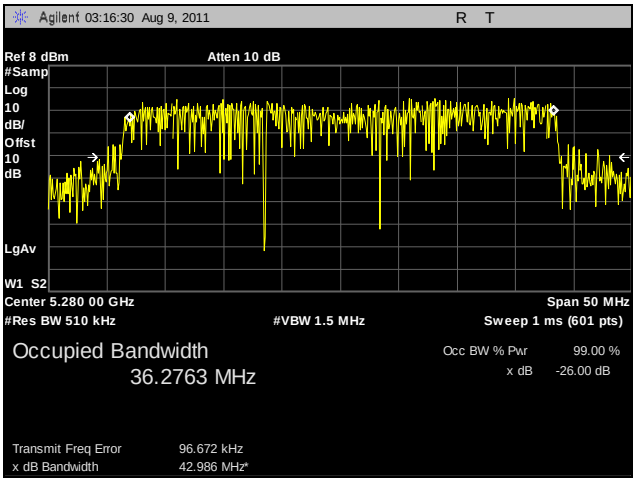
99% Occupied Bandwidth Test Results, 802.11n HT40, 5280 MHz



Plot 106. 99% Occupied Bandwidth, 802.11n HT40, 5280 MHz, R3-A

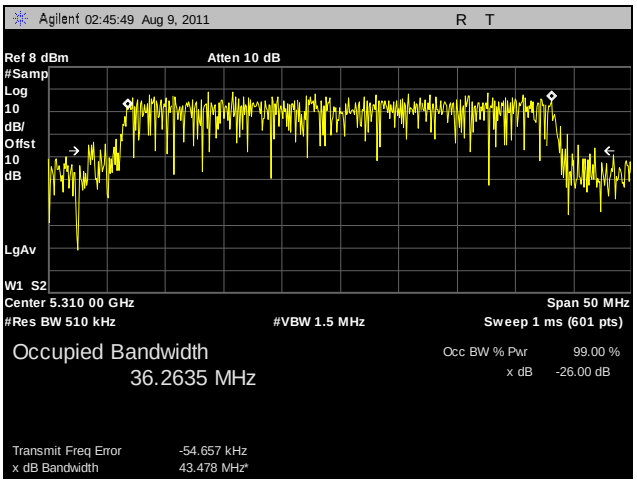


Plot 107. 99% Occupied Bandwidth, 802.11n HT40, 5280 MHz, R3-B

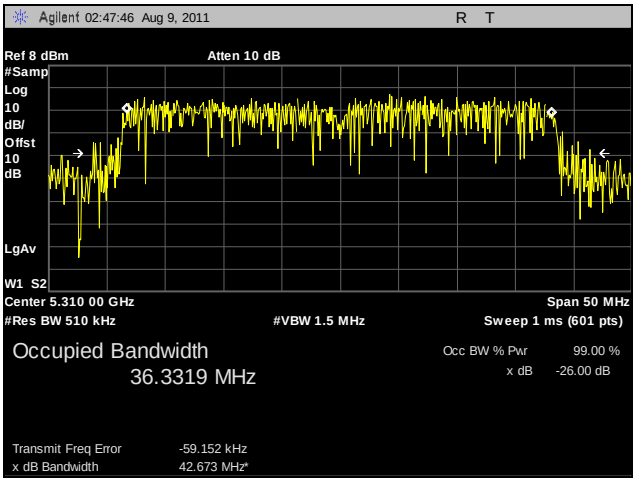


Plot 108. 99% Occupied Bandwidth, 802.11n HT40, 5280 MHz, R3-C

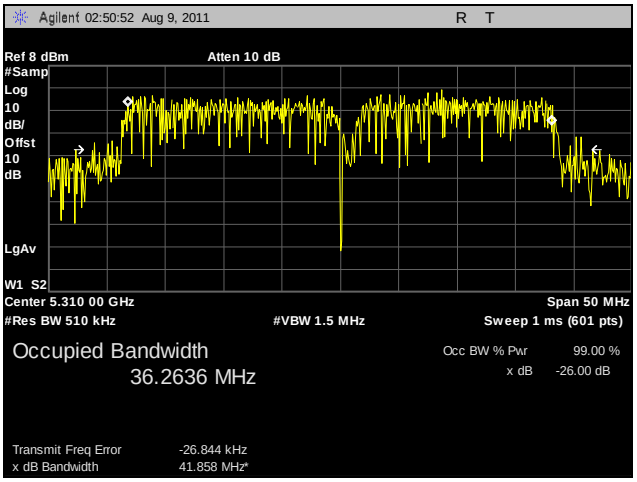
99% Occupied Bandwidth Test Results, 802.11n HT40, 5310 MHz



Plot 109. 99% Occupied Bandwidth, 802.11n HT40, 5310 MHz, R3-A

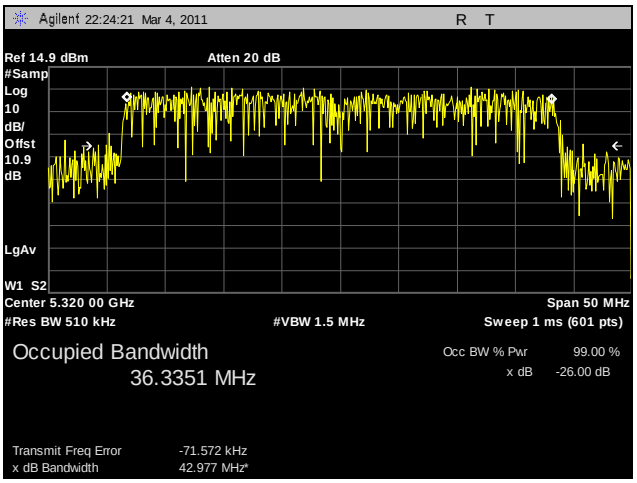


Plot 110. 99% Occupied Bandwidth, 802.11n HT40, 5310 MHz, R3-B

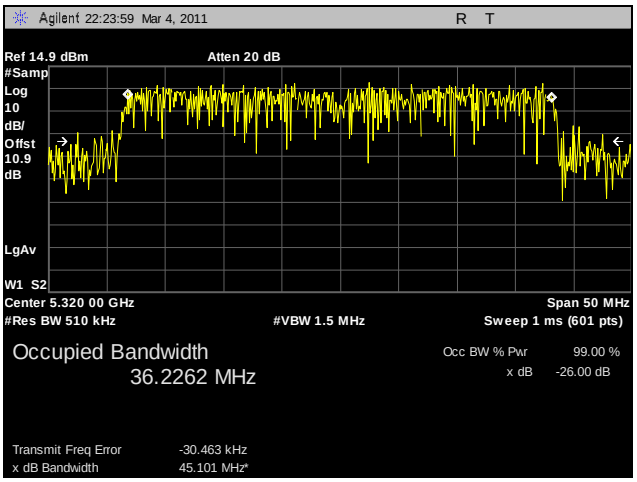


Plot 111. 99% Occupied Bandwidth, 802.11n HT40, 5310 MHz, R3-C

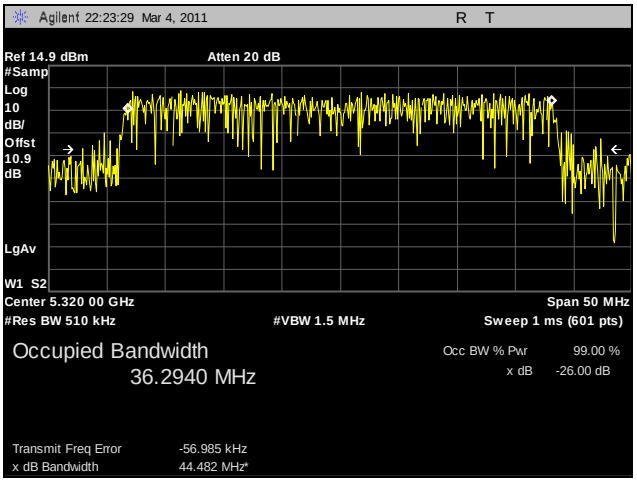
99% Occupied Bandwidth Test Results, 802.11n HT40, 5320 MHz



Plot 112. 99% Occupied Bandwidth, 802.11n HT40, 5320 MHz, R3-A

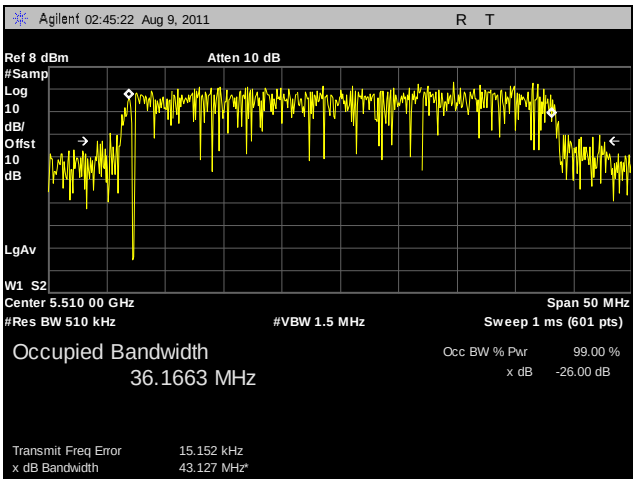


Plot 113. 99% Occupied Bandwidth, 802.11n HT40, 5320 MHz, R3-B

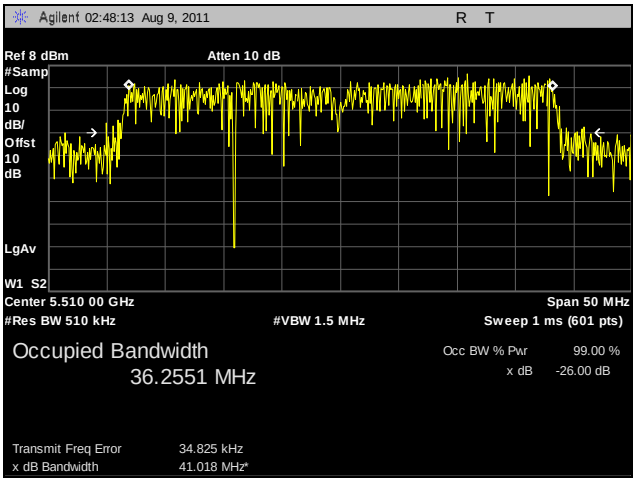


Plot 114. 99% Occupied Bandwidth, 802.11n HT40, 5320 MHz, R3-C

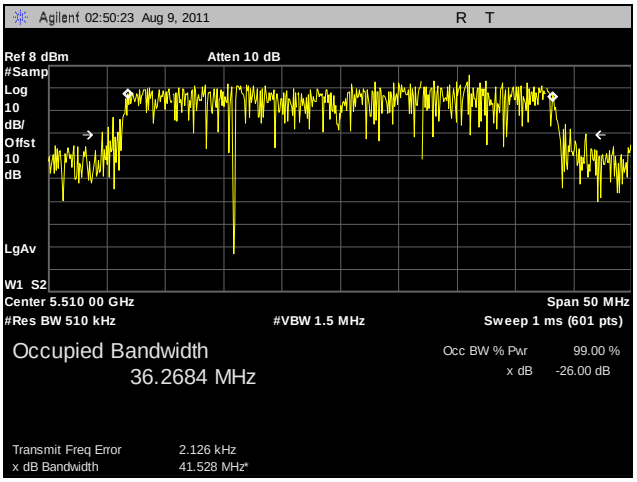
99% Occupied Bandwidth Test Results, 802.11n HT40, 5510 MHz



Plot 115. 99% Occupied Bandwidth, 802.11n HT40, 5510 MHz, R3-A

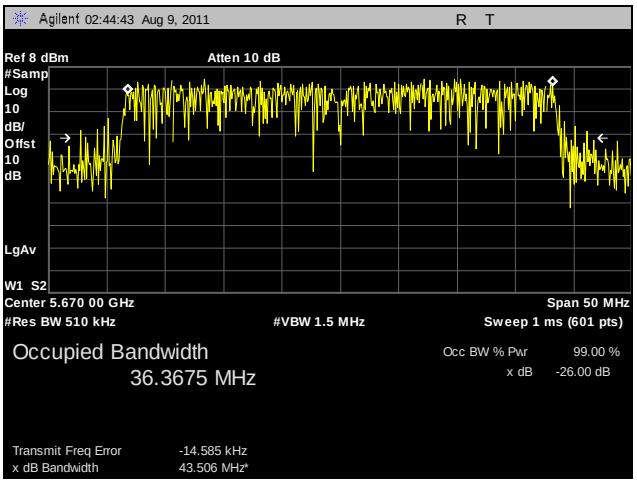


Plot 116. 99% Occupied Bandwidth, 802.11n HT40, 5510 MHz, R3-B

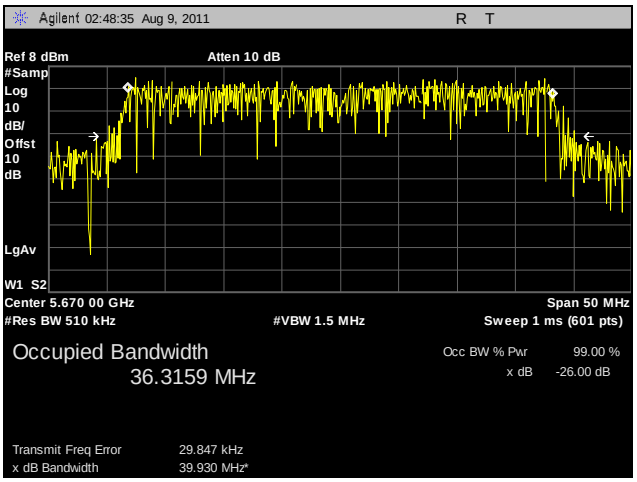


Plot 117. 99% Occupied Bandwidth, 802.11n HT40, 5510 MHz, R3-C

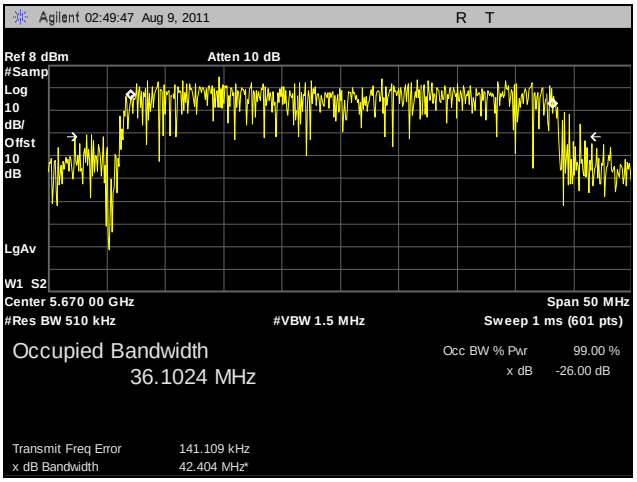
99% Occupied Bandwidth Test Results, 802.11n HT40, 5670 MHz



Plot 118. 99% Occupied Bandwidth, 802.11n HT40, 5670 MHz, R3-A



Plot 119. 99% Occupied Bandwidth, 802.11n HT40, 5670 MHz, R3-B



Plot 120. 99% Occupied Bandwidth, 802.11n HT40, 5670 MHz, R3-C

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 407(a)(3) RF Power Output

Test Requirements: **§15.407(a) (3):** The maximum output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit
5150-5250	50mW
5250-5350	250mW
5470–5725	250mW
5725–5825	1W

Table 21. Output Power Requirements from §15.407

§15.407(a) (3): For the band 5.725–5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz.

Test Procedure: The EUT was connected to a Spectrum Analyzer. The power was measured on three channels.

Test Results: Equipment was compliant with the Peak Power Output limits of **§ 15.401(a)(2)**.

Test Engineer(s): Jeff Pratt

Test Date(s): 04/04/11

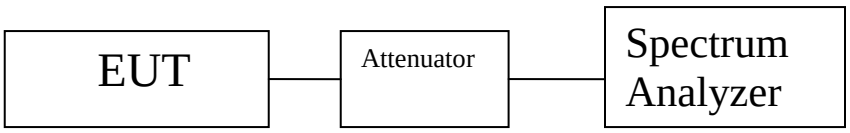
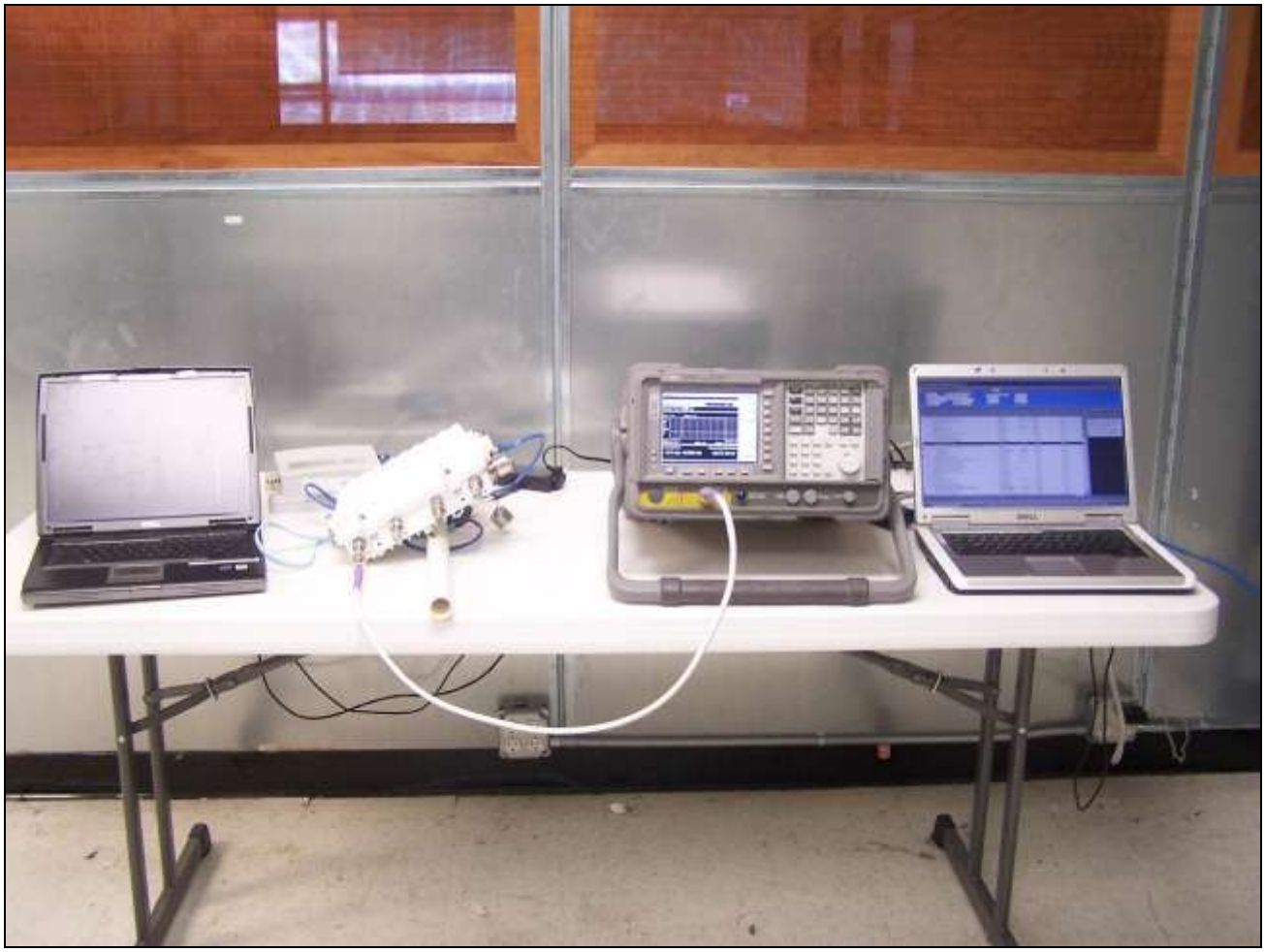


Figure 3. Power Output Test Setup

Freq. (MHz)	Mode / Modulation Type	Max. Antenna Gain (dBi)	Port A Conducted Power (dBm)	Port A Conducted Power (mW)	Port B Conducted Power (dBm)	Port B Conducted Power (mW)	Port C Conducted Power (dBm)	Port C Conducted Power (mW)	Summed Conducted Power (mW)	Summed Conducted Power (dBm)	Max. Conducted Power (dBm)	Margin (dB)
5260	802.11a	14.77	8.71	7.43	7.58	5.73	8.04	6.37	19.53	12.91	15.23	-2.32
5300	802.11a	14.77	7.92	6.19	7.26	5.32	7.98	6.28	17.80	12.50	15.23	-2.73
5320	802.11a	14.77	7.53	5.66	7.91	6.18	8.48	7.05	18.89	12.76	15.23	-2.47
5500	802.11a	14.77	7.92	6.19	6.15	4.12	9.64	9.20	19.52	12.90	15.23	-2.33
5580	802.11a	14.77	9.05	8.04	6.84	4.83	8.27	6.71	19.58	12.92	15.23	-2.31
5700	802.11a	14.77	8.56	7.18	8.93	7.82	6.85	4.84	19.84	12.97	15.23	-2.26
5260	802.11n HT20	14.77	9.02	7.98	7.94	6.22	8.57	7.19	21.40	13.30	15.23	-1.93
5300	802.11n HT20	14.77	8.34	6.82	8.11	6.47	8.52	7.11	20.41	13.10	15.23	-2.13
5320	802.11n HT20	14.77	7.97	6.27	8.49	7.06	8.86	7.69	21.02	13.23	15.23	-2.00
5500	802.11n HT20	14.77	8.53	7.13	6.56	4.53	10.07	10.16	21.82	13.39	15.23	-1.84
5580	802.11n HT20	14.77	9.18	8.28	7.27	5.33	8.77	7.53	21.15	13.25	15.23	-1.98
5700	802.11n HT20	14.77	8.55	7.16	9.14	8.20	7.25	5.31	20.67	13.15	15.23	-2.08
5280	802.11n HT40	14.77	10.46	11.12	9.90	9.77	10.16	10.38	31.26	14.95	15.23	-0.28
5300	802.11n HT40	14.77	10.37	10.89	10.12	10.28	10.57	11.40	32.57	15.13	15.23	-0.10
5320	802.11n HT40	14.77	9.66	9.25	10.19	10.45	10.38	10.91	30.61	14.86	15.23	-0.37
5510	802.11n HT40	14.77	9.87	9.71	7.73	5.93	11.98	15.78	31.41	14.97	15.23	-0.26
5580	802.11n HT40	14.77	10.44	11.07	9.27	8.45	10.61	11.51	31.03	14.92	15.23	-0.31
5670	802.11n HT40	14.77	10.14	10.33	10.67	11.67	9.07	8.07	30.07	14.78	15.23	-0.45

Table 22. RF Power Output, Test Results

RF Output Power Setup



Photograph 5. Test Setup for Conducted Power Measurements

§ 15.407(f) RF Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

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

MPE Limit Calculation: EUT's operating frequencies @ 5250-5350MHz and 5470-5725MHz; highest conducted power = *15.13dBm* (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

Gain of Antenna Elements @ 5.8GHz = 10 dBi
# of Antenna Elements = 3
EUT maximum antenna gain = 10dBi + 10*log(3)dBi = *14.77 dBi.*

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

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S = Power Density (1 mW/cm^2)
P = Power Input to antenna (32.58mW)
G = Antenna Gain (29.99 numeric)

$R = (32.58*29.99 / 4*3.14*1.0)^{1/2} = (977.18/12.56)^{1/2} = 8.82$ cm

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(a)(3) Peak Power Spectral Density

Test Requirements: **§ 15.407(a)(1), (a)(2):** For digitally modulated systems, the conducted peak power spectral density from the intentional radiator to the antenna shall not be greater than 4dBm/MHz in the frequency band 5.15-5.25 GHz and 11dBm/MHz in the frequency band 5.25-5.35GHz.

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 #2 from the FCC Public Notice DA 02-2138 was used. A combiner was used to measure spectral density in MIMO mode.

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).

Test Engineer(s): Jeff Pratt

Test Date(s): 03/07/11

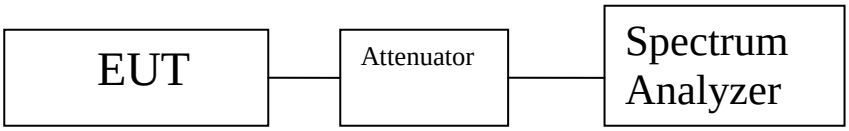
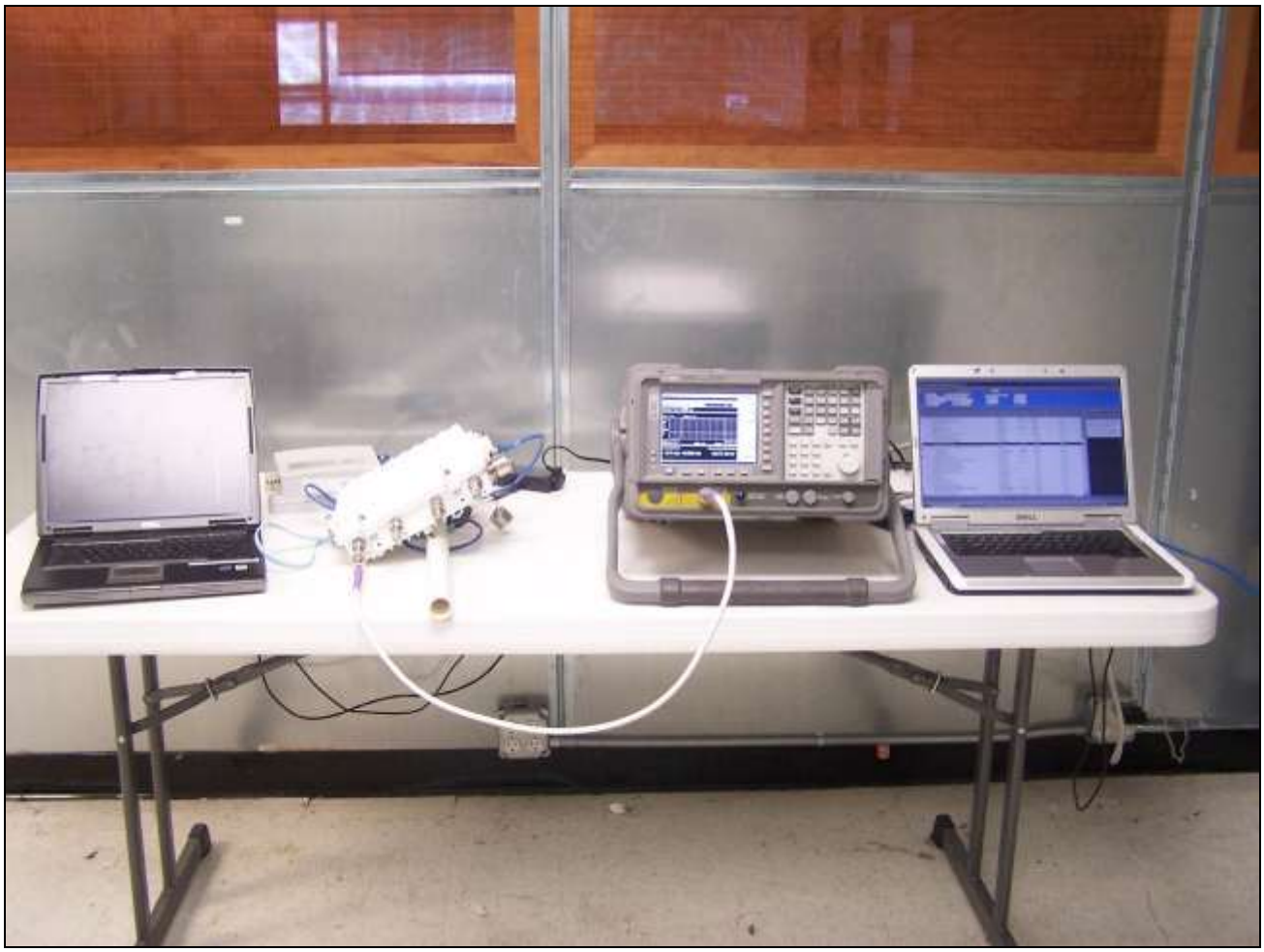


Figure 4. Power Spectral Density Test Setup

Freq. (MHz)	Mode / Modulation Type	Max. Antenna Gain (dBi)	Maximum Allowable Spectral Density (dBm)	Port A Spectral Density (dBm)	Port A Spectral Density (mW)	Port B Spectral Density (dBm)	Port B Spectral Density (mW)	Port C Spectral Density (dBm)	Port C Spectral Density (mW)	Summed Spectral Density (mW)	Summed Spectral Density (dBm)	Margin (dB)
5260	802.11a	14.77	2.23	-2.28	0.59	-3.48	0.45	-3.15	0.48	1.52	1.83	-0.40
5300	802.11a	14.77	2.23	-2.83	0.52	-3.69	0.43	-3.08	0.49	1.44	1.59	-0.64
5320	802.11a	14.77	2.23	-3.28	0.47	-3.14	0.49	-2.54	0.56	1.51	1.80	-0.43
5500	802.11a	14.77	2.23	-2.97	0.50	-4.73	0.34	-1.25	0.75	1.59	2.02	-0.21
5580	802.11a	14.77	2.23	-2.16	0.61	-3.84	0.41	-2.68	0.54	1.56	1.93	-0.30
5700	802.11a	14.77	2.23	-2.57	0.55	-1.72	0.67	-3.87	0.41	1.64	2.14	-0.09
5260	802.11n HT20	14.77	2.23	-2.09	0.62	-3.16	0.48	-2.62	0.55	1.65	2.17	-0.06
5300	802.11n HT20	14.77	2.23	-2.78	0.53	-3.25	0.47	-2.44	0.57	1.57	1.96	-0.27
5320	802.11n HT20	14.77	2.23	-3.17	0.48	-2.65	0.54	-2.03	0.63	1.65	2.18	-0.05
5500	802.11n HT20	14.77	2.23	-2.72	0.53	-4.52	0.35	-1.15	0.77	1.66	2.19	-0.04
5580	802.11n HT20	14.77	2.23	-2.15	0.61	-3.86	0.41	-2.44	0.57	1.59	2.02	-0.21
5700	802.11n HT20	14.77	2.23	-2.71	0.54	-2.36	0.58	-4.12	0.39	1.50	1.77	-0.46
5280	802.11n HT40	14.77	2.23	-3.81	0.42	-4.34	0.37	-4.37	0.37	1.15	0.61	-1.62
5300	802.11n HT40	14.77	2.23	-4.19	0.38	-4.07	0.39	-3.80	0.42	1.19	0.75	-1.48
5320	802.11n HT40	14.77	2.23	-4.63	0.34	-3.83	0.41	-3.97	0.40	1.16	0.64	-1.59
5510	802.11n HT40	14.77	2.23	-4.76	0.33	-6.31	0.23	-2.53	0.56	1.13	0.52	-1.71
5580	802.11n HT40	14.77	2.23	-3.89	0.41	-4.96	0.32	-3.74	0.42	1.15	0.61	-1.62
5670	802.11n HT40	14.77	2.23	-4.84	0.33	-4.53	0.35	-5.75	0.27	0.95	-0.24	-2.47

Table 23. Power Spectral Density, Test Results

Power Spectral Density Test Setup



Photograph 6. Test Setup for Spectral Density Measurements

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. The peak detector mode was used and the trace max held. The 2nd trace on the spectrum analyzer was set according to measurement method #1 from the FCC Public Notice DA 02-2138 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): Dan Youngcourt

Test Date(s): 04/04/11

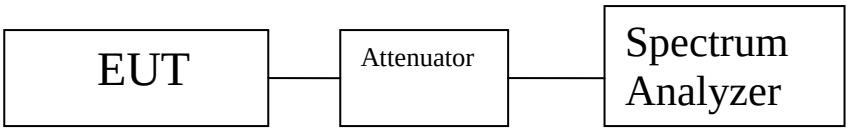
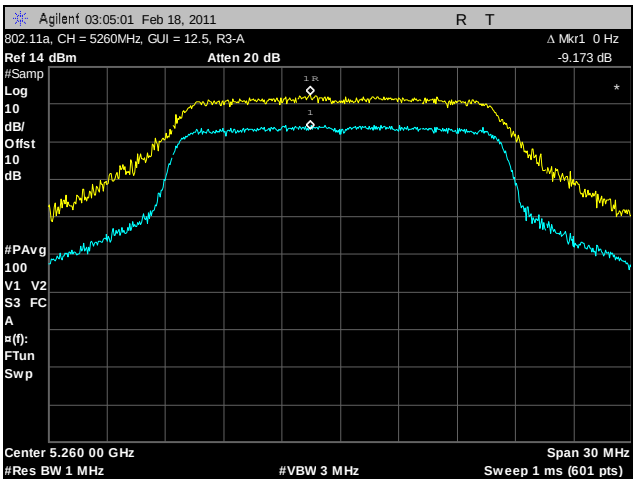
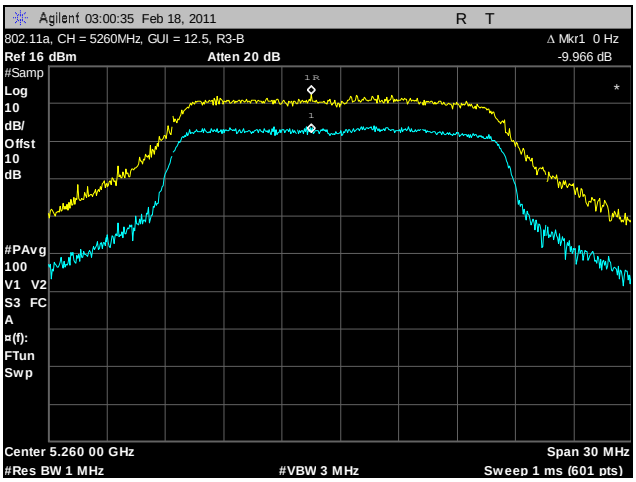


Figure 5. Peak Excursion Ration Test Setup

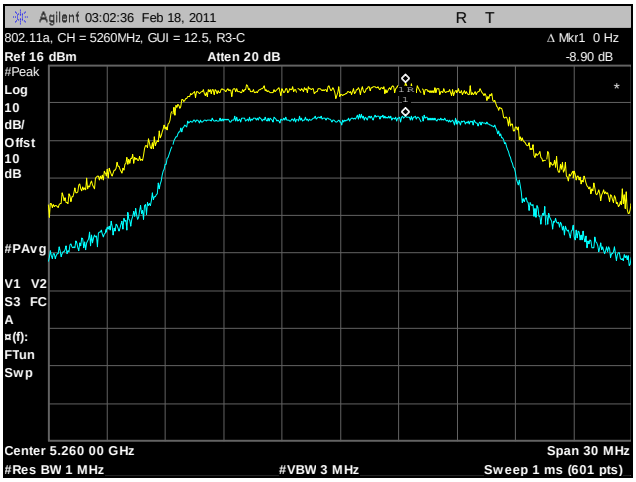
Peak Excursion Test Results, 802.11a, 5260 MHz



Plot 121. Peak Excursion Ratio, 802.11a, 5260 MHz, R3-A

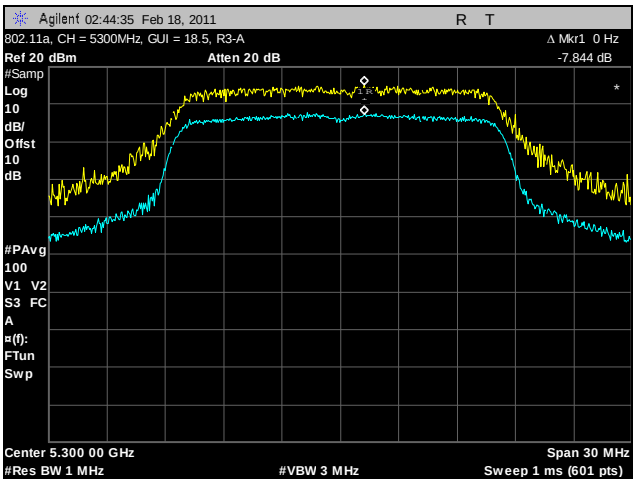


Plot 122. Peak Excursion Ratio, 802.11a, 5260 MHz, R3-B

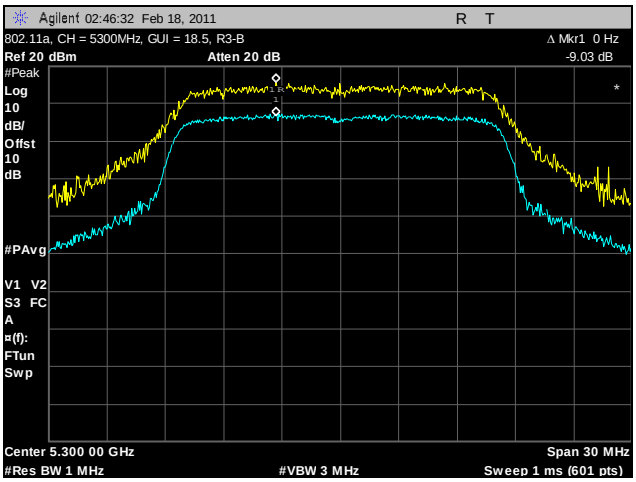


Plot 123. Peak Excursion Ratio, 802.11a, 5260 MHz, R3-C

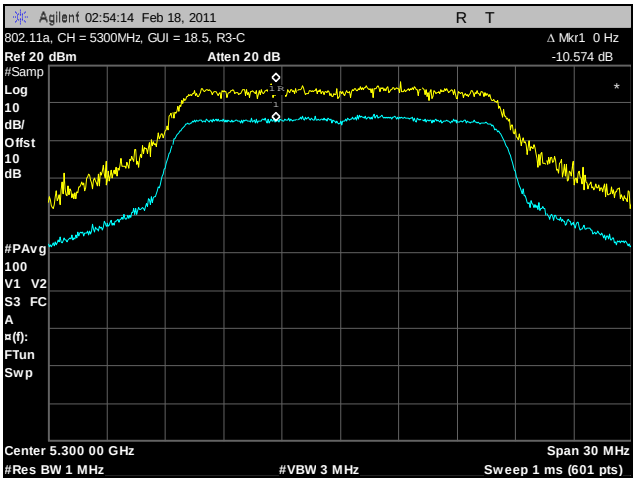
Peak Excursion Test Results, 802.11a, 5300 MHz



Plot 124. Peak Excursion Ratio, 802.11a, 5300 MHz, R3-A

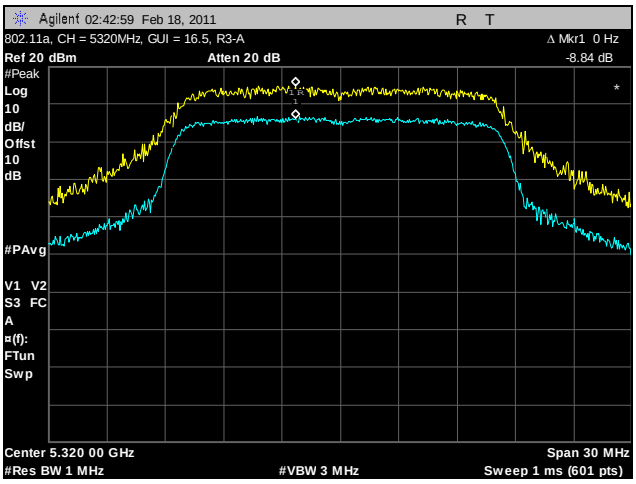


Plot 125. Peak Excursion Ratio, 802.11a, 5300 MHz, R3-B

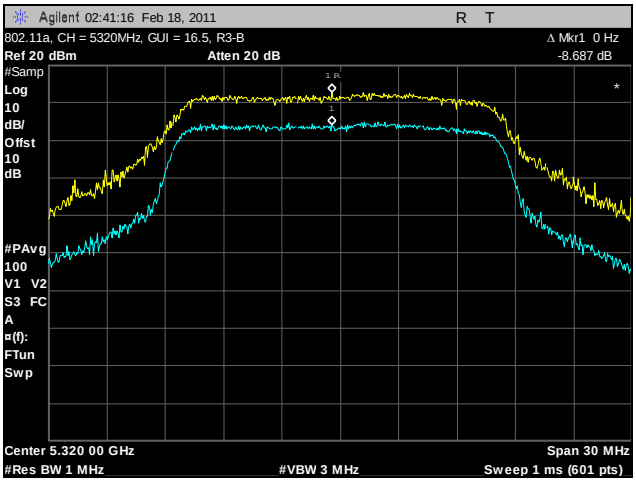


Plot 126. Peak Excursion Ratio, 802.11a, 5300 MHz, R3-C

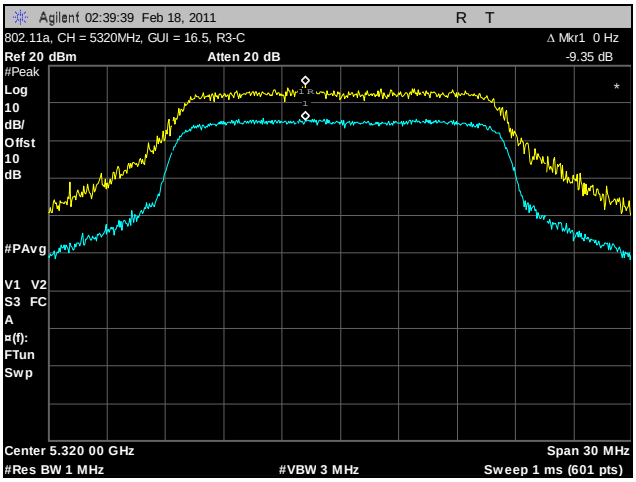
Peak Excursion Test Results, 802.11a, 5320 MHz



Plot 127. Peak Excursion Ratio, 802.11a, 5320 MHz, R3-A

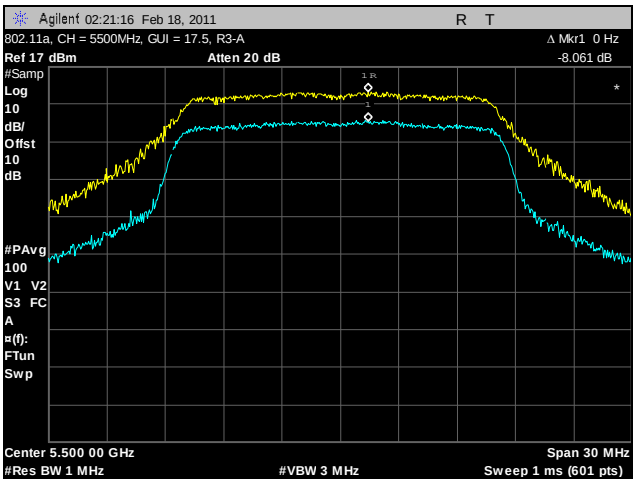


Plot 128. Peak Excursion Ratio, 802.11a, 5320 MHz, R3-B

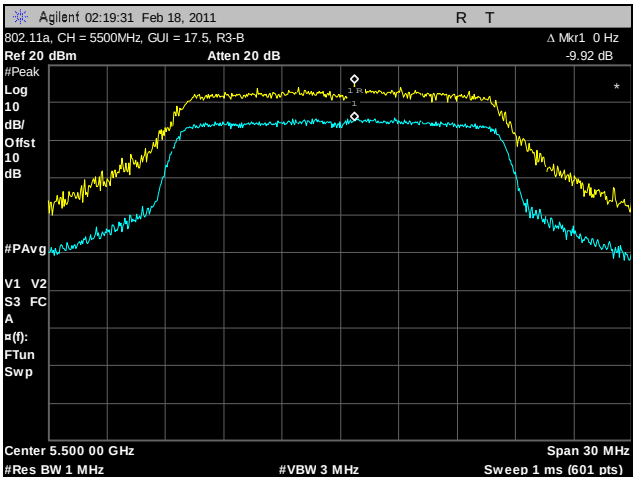


Plot 129. Peak Excursion Ratio, 802.11a, 5320 MHz, R3-C

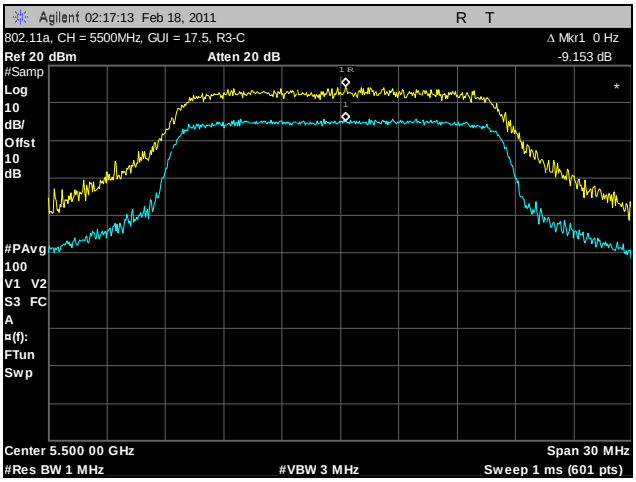
Peak Excursion Test Results, 802.11a, 5500 MHz



Plot 130. Peak Excursion Ratio, 802.11a, 5500 MHz, R3-A

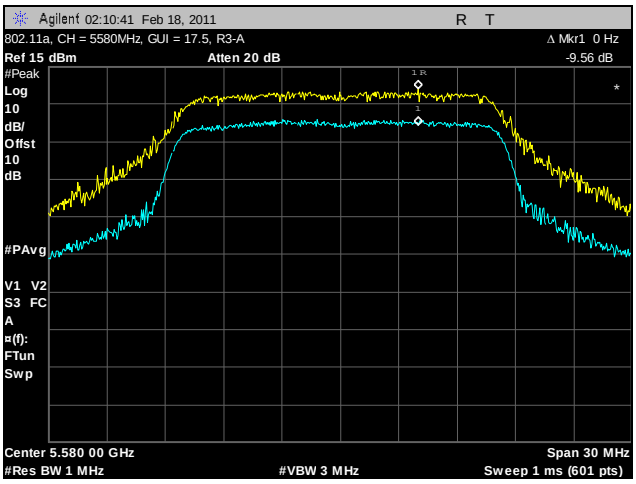


Plot 131. Peak Excursion Ratio, 802.11a, 5500 MHz, R3-B

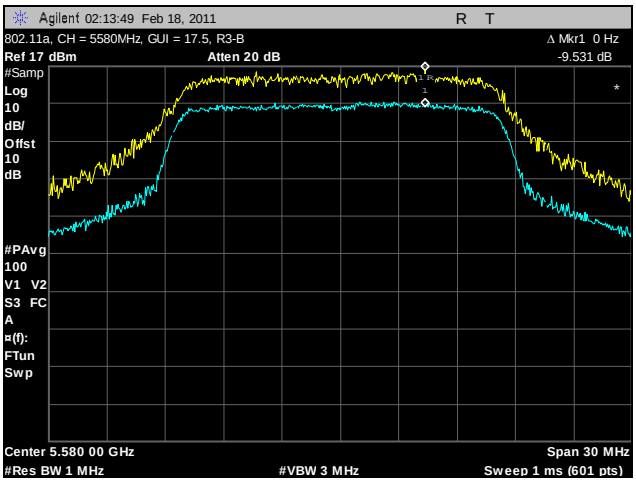


Plot 132. Peak Excursion Ratio, 802.11a, 5500 MHz, R3-C

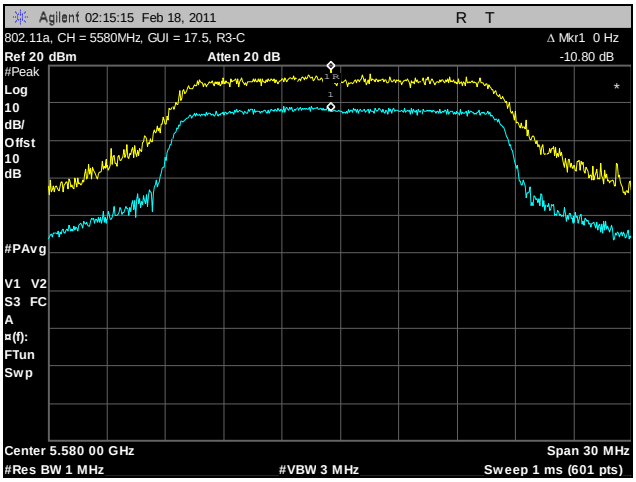
Peak Excursion Test Results, 802.11a, 5580 MHz



Plot 133. Peak Excursion Ratio, 802.11a, 5580 MHz, R3-A

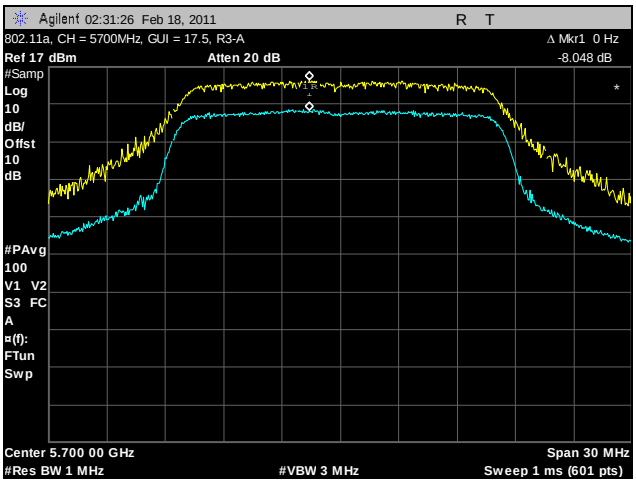


Plot 134. Peak Excursion Ratio, 802.11a, 5580 MHz, R3-B

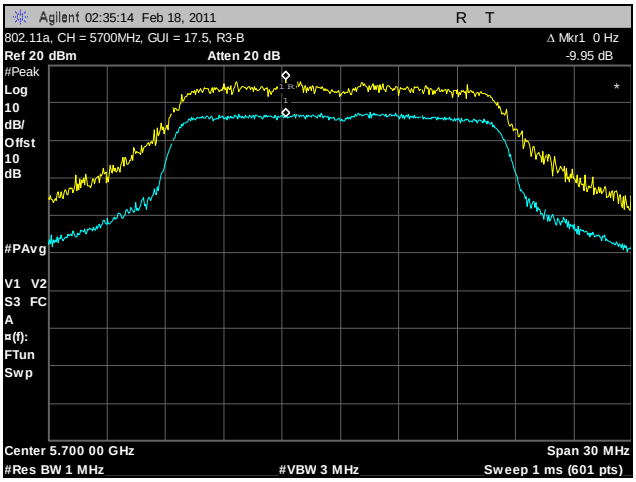


Plot 135. Peak Excursion Ratio, 802.11a, 5580 MHz, R3-C

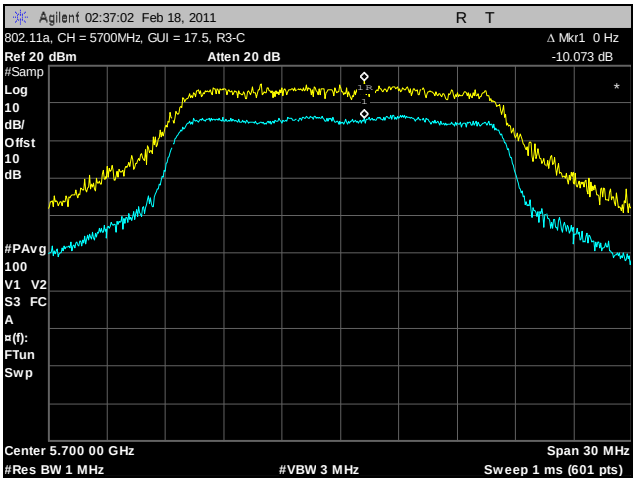
Peak Excursion Test Results, 802.11a, 5700 MHz



Plot 136. Peak Excursion Ratio, 802.11a, 5700 MHz, R3-A

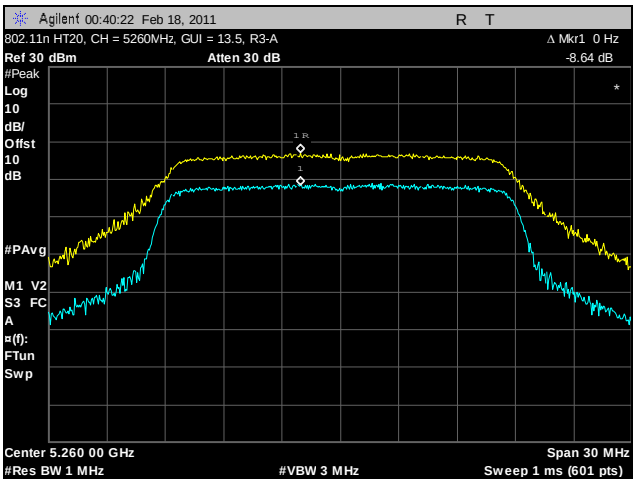


Plot 137. Peak Excursion Ratio, 802.11a, 5700 MHz, R3-B

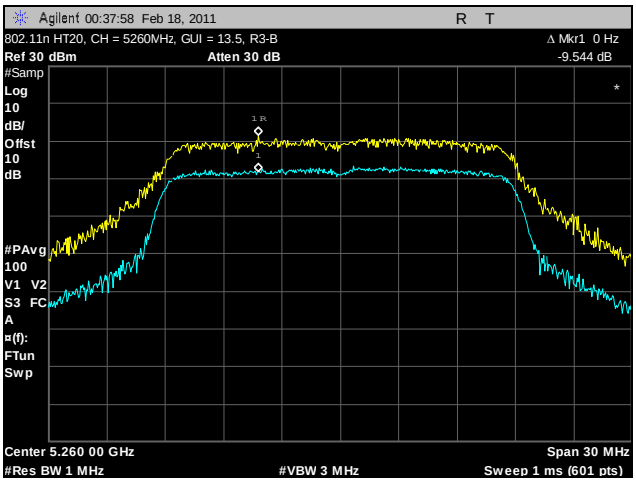


Plot 138. Peak Excursion Ratio, 802.11a, 5700 MHz, R3-C

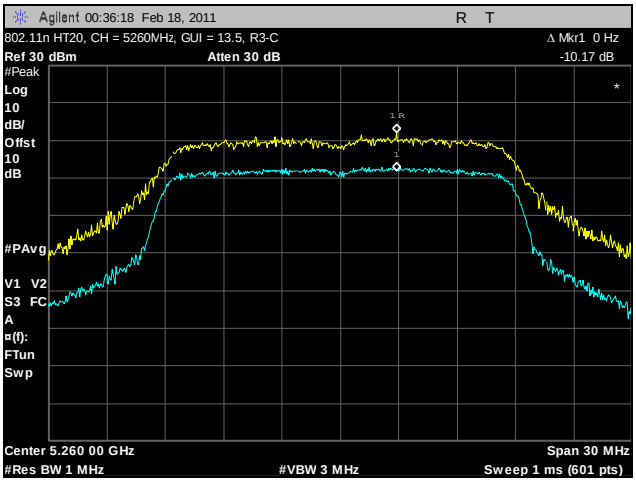
Peak Excursion Test Results, 802.11n HT20, 5260 MHz



Plot 139. Peak Excursion Ratio, 802.11n HT20, 5260 MHz, R3-A

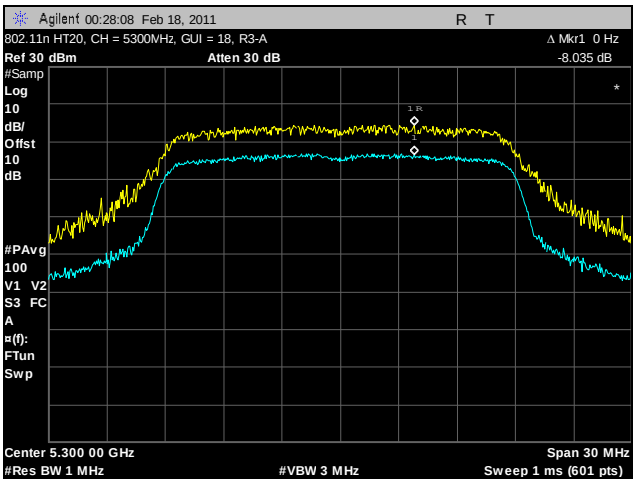


Plot 140. Peak Excursion Ratio, 802.11n HT20, 5260 MHz, R3-B

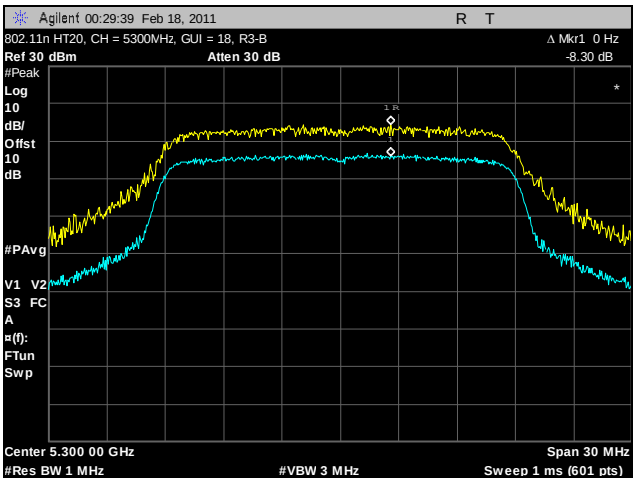


Plot 141. Peak Excursion Ratio, 802.11n HT20, 5260 MHz, R3-C

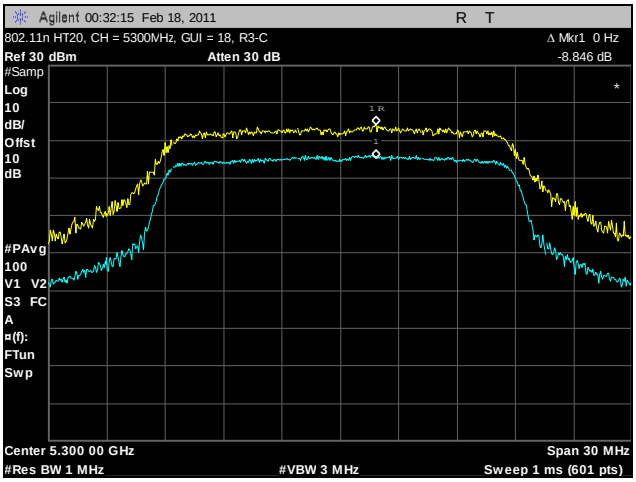
Peak Excursion Test Results, 802.11n HT20, 5300 MHz



Plot 142. Peak Excursion Ratio, 802.11n HT20, 5300 MHz, R3-A

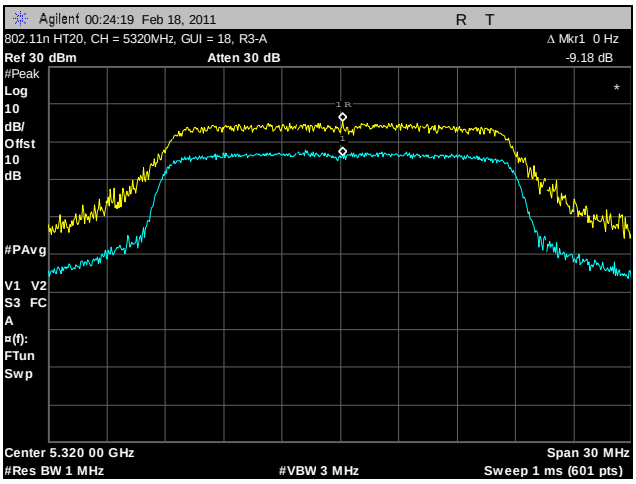


Plot 143. Peak Excursion Ratio, 802.11n HT20, 5300 MHz, R3-B

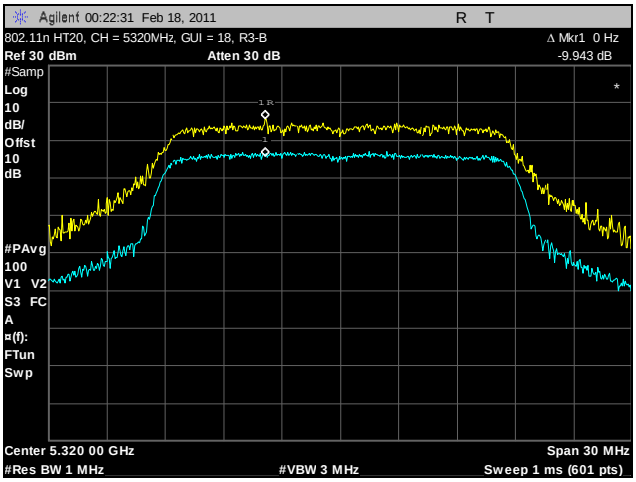


Plot 144. Peak Excursion Ratio, 802.11n HT20, 5300 MHz, R3-C

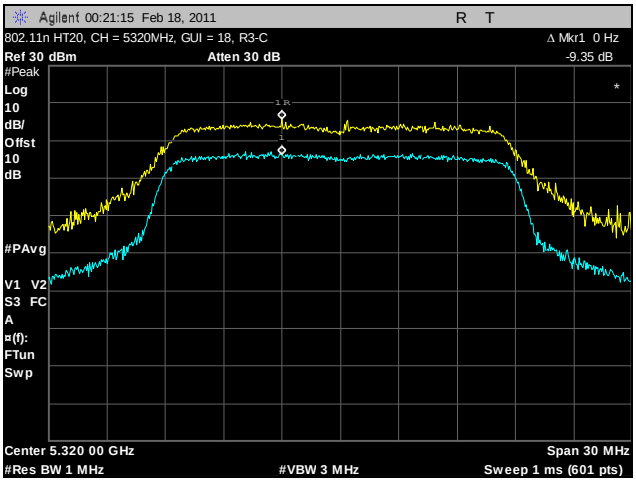
Peak Excursion Test Results, 802.11n HT20, 5320 MHz



Plot 145. Peak Excursion Ratio, 802.11n HT20, 5320 MHz, R3-A

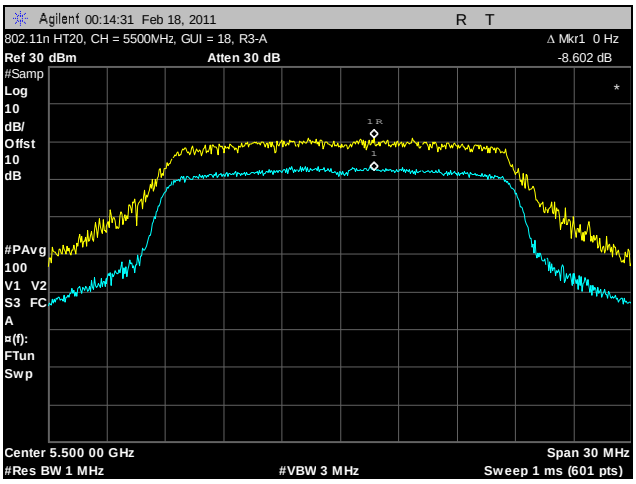


Plot 146. Peak Excursion Ratio, 802.11n HT20, 5320 MHz, R3-B

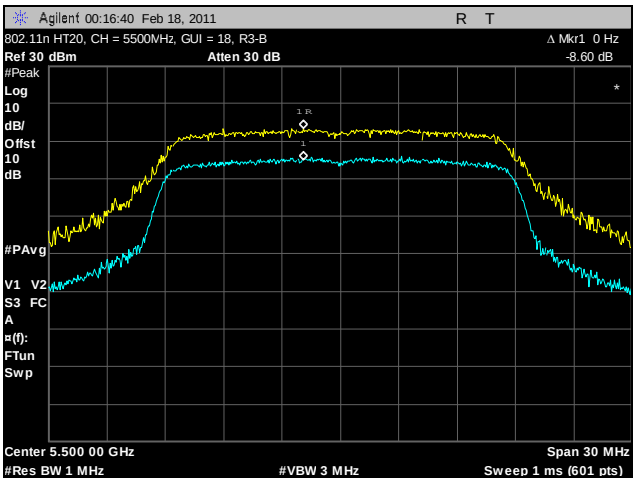


Plot 147. Peak Excursion Ratio, 802.11n HT20, 5320 MHz, R3-C

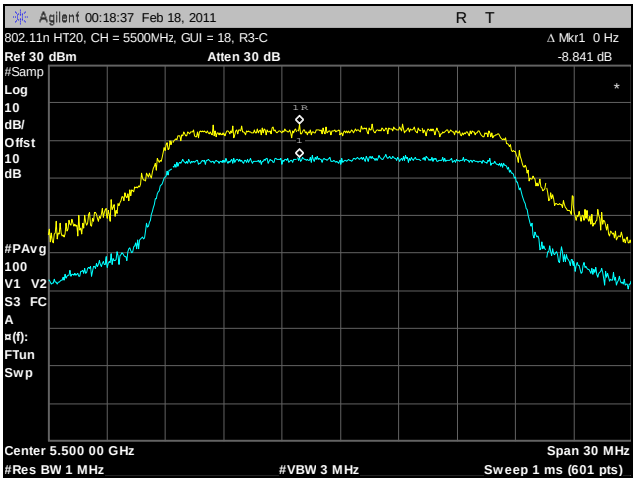
Peak Excursion Test Results, 802.11n HT20, 5500 MHz



Plot 148. Peak Excursion Ratio, 802.11n HT20, 5500 MHz, R3-A

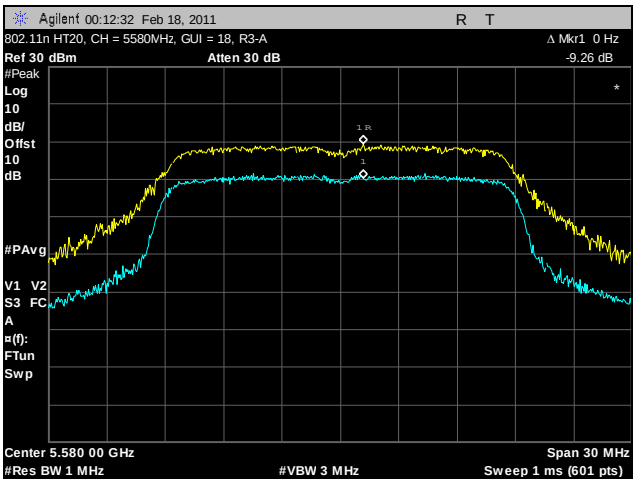


Plot 149. Peak Excursion Ratio, 802.11n HT20, 5500 MHz, R3-B

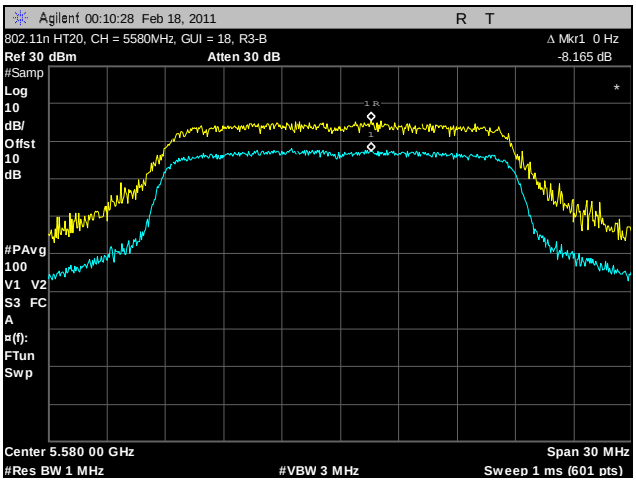


Plot 150. Peak Excursion Ratio, 802.11n HT20, 5500 MHz, R3-C

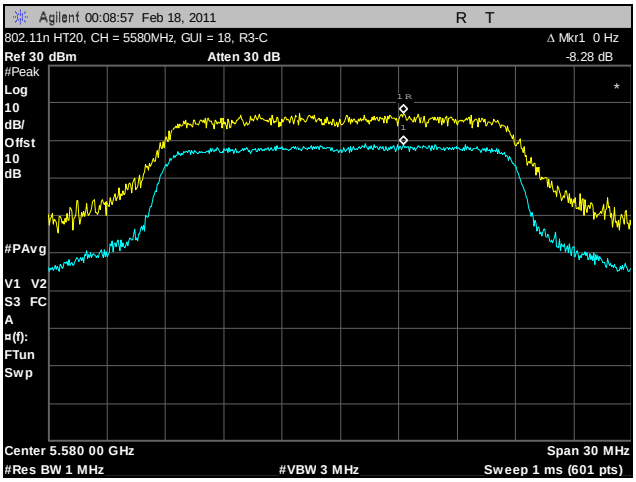
Peak Excursion Test Results, 802.11n HT20, 5580 MHz



Plot 151. Peak Excursion Ratio, 802.11n HT20, 5580 MHz, R3-A

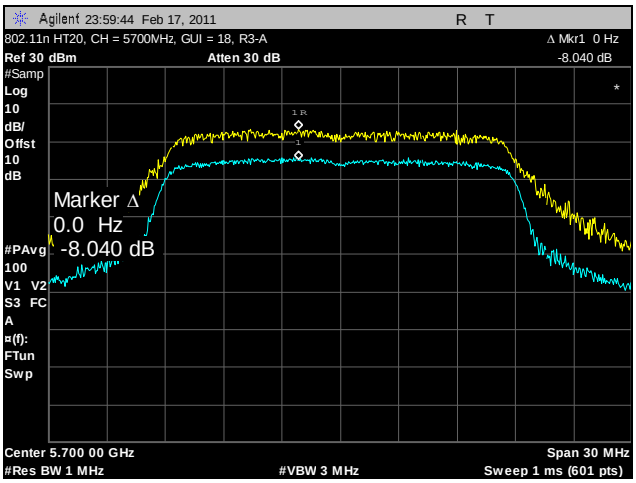


Plot 152. Peak Excursion Ratio, 802.11n HT20, 5580 MHz, R3-B

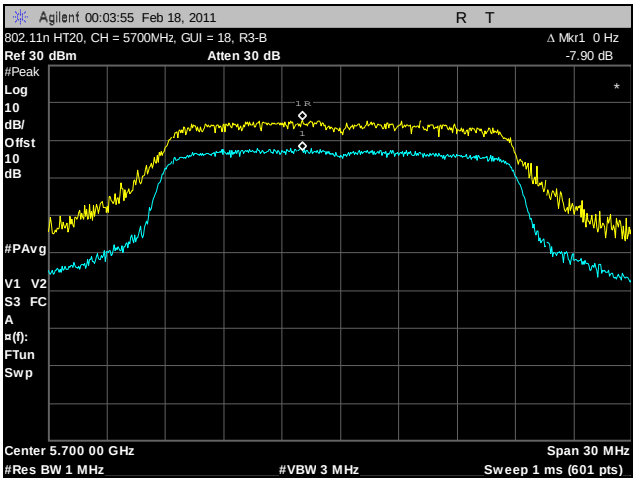


Plot 153. Peak Excursion Ratio, 802.11n HT20, 5580 MHz, R3-C

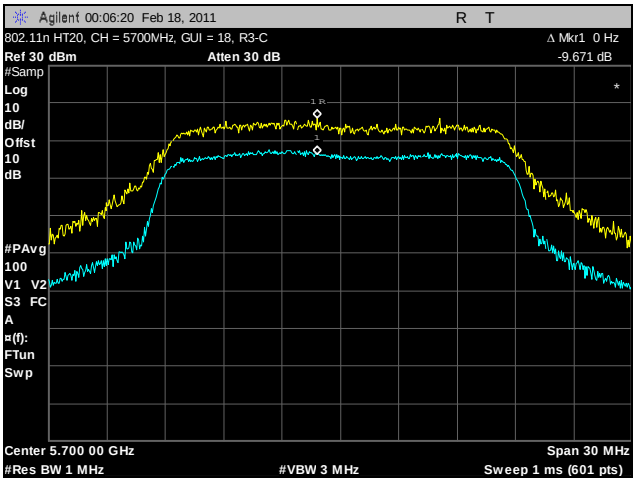
Peak Excursion Test Results, 802.11n HT20, 5700 MHz



Plot 154. Peak Excursion Ratio, 802.11n HT20, 5700 MHz, R3-A

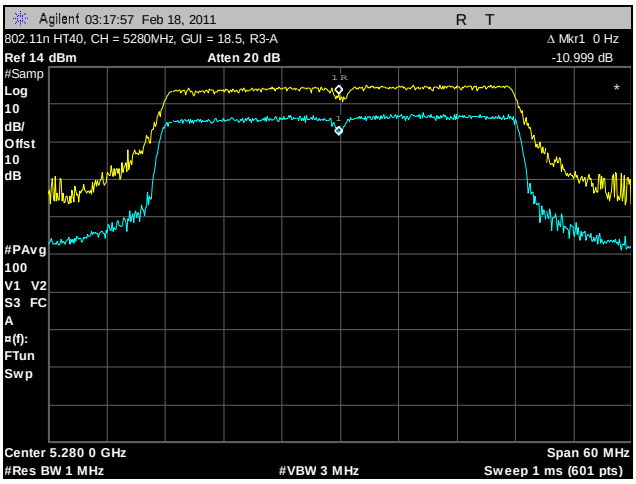


Plot 155. Peak Excursion Ratio, 802.11n HT20, 5700 MHz, R3-B

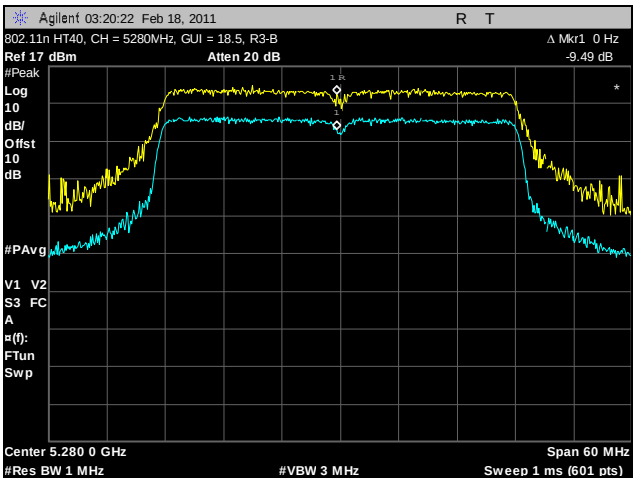


Plot 156. Peak Excursion Ratio, 802.11n HT20, 5700 MHz, R3-C

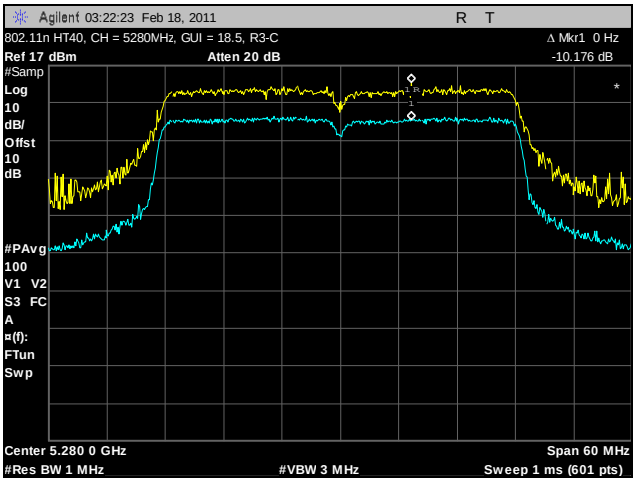
Peak Excursion Test Results, 802.11n HT40, 5280 MHz



Plot 157. Peak Excursion Ratio, 802.11n HT40, 5280 MHz, R3-A

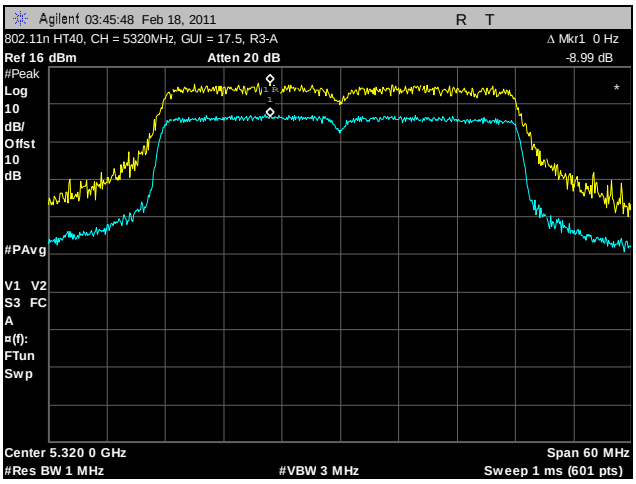


Plot 158. Peak Excursion Ratio, 802.11n HT40, 5280 MHz, R3-B

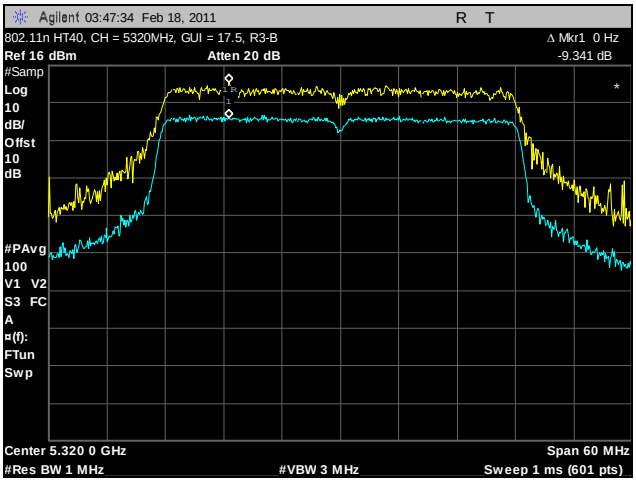


Plot 159. Peak Excursion Ratio, 802.11n HT40, 5280 MHz, R3-C

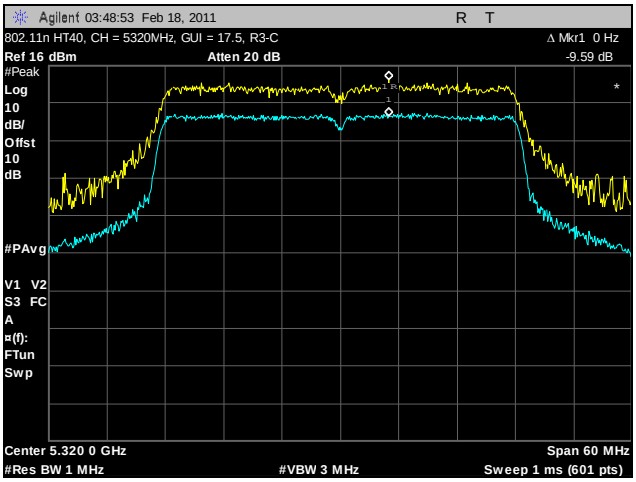
Peak Excursion Test Results, 802.11n HT40, 5320 MHz



Plot 160. Peak Excursion Ratio, 802.11n HT40, 5320 MHz, R3-A

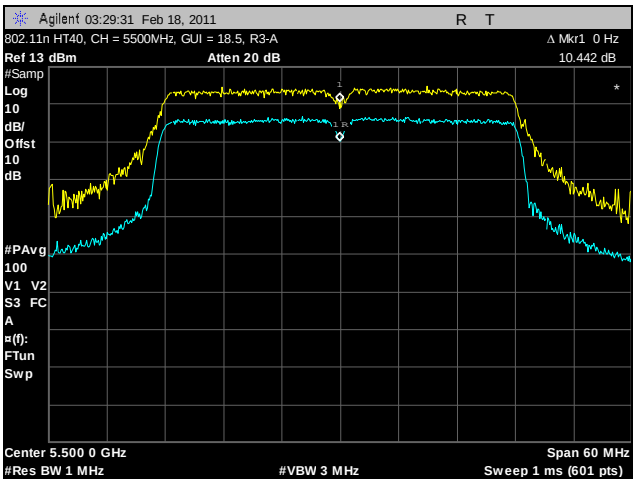


Plot 161. Peak Excursion Ratio, 802.11n HT40, 5320 MHz, R3-B

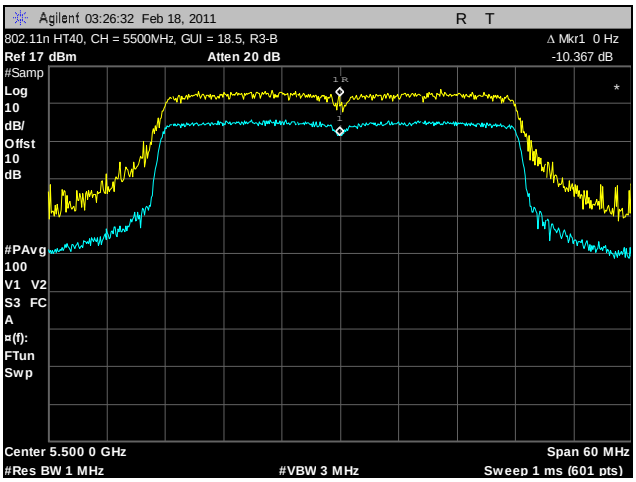


Plot 162. Peak Excursion Ratio, 802.11n HT40, 5320 MHz, R3-C

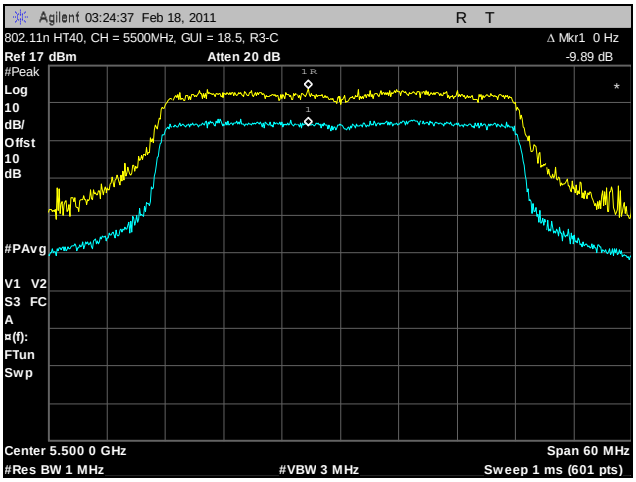
Peak Excursion Test Results, 802.11n HT40, 5510 MHz



Plot 163. Peak Excursion Ratio, 802.11n HT40, 5510 MHz, R3-A

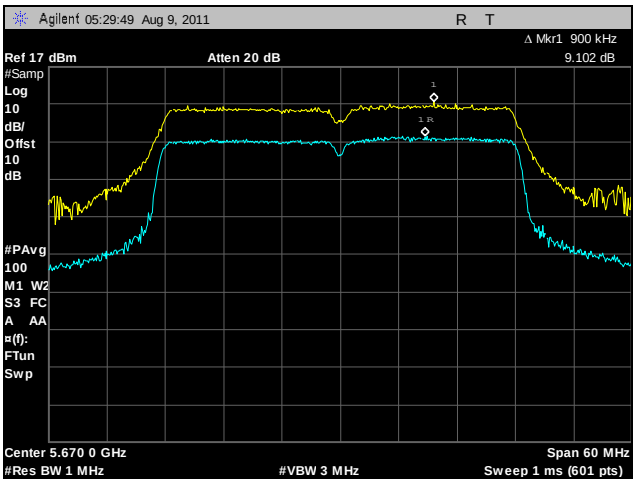


Plot 164. Peak Excursion Ratio, 802.11n HT40, 5510 MHz, R3-B

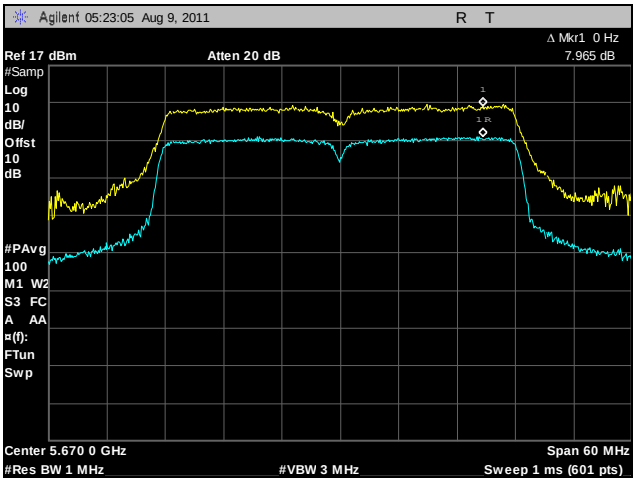


Plot 165. Peak Excursion Ratio, 802.11n HT40, 5510 MHz, R3-C

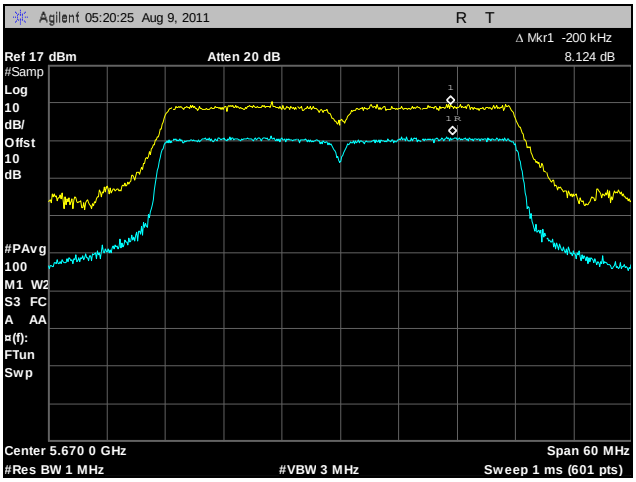
Peak Excursion Test Results, 802.11n HT40, 5670 MHz



Plot 166. Peak Excursion Ratio, 802.11n HT40, 5670 MHz, R3-A

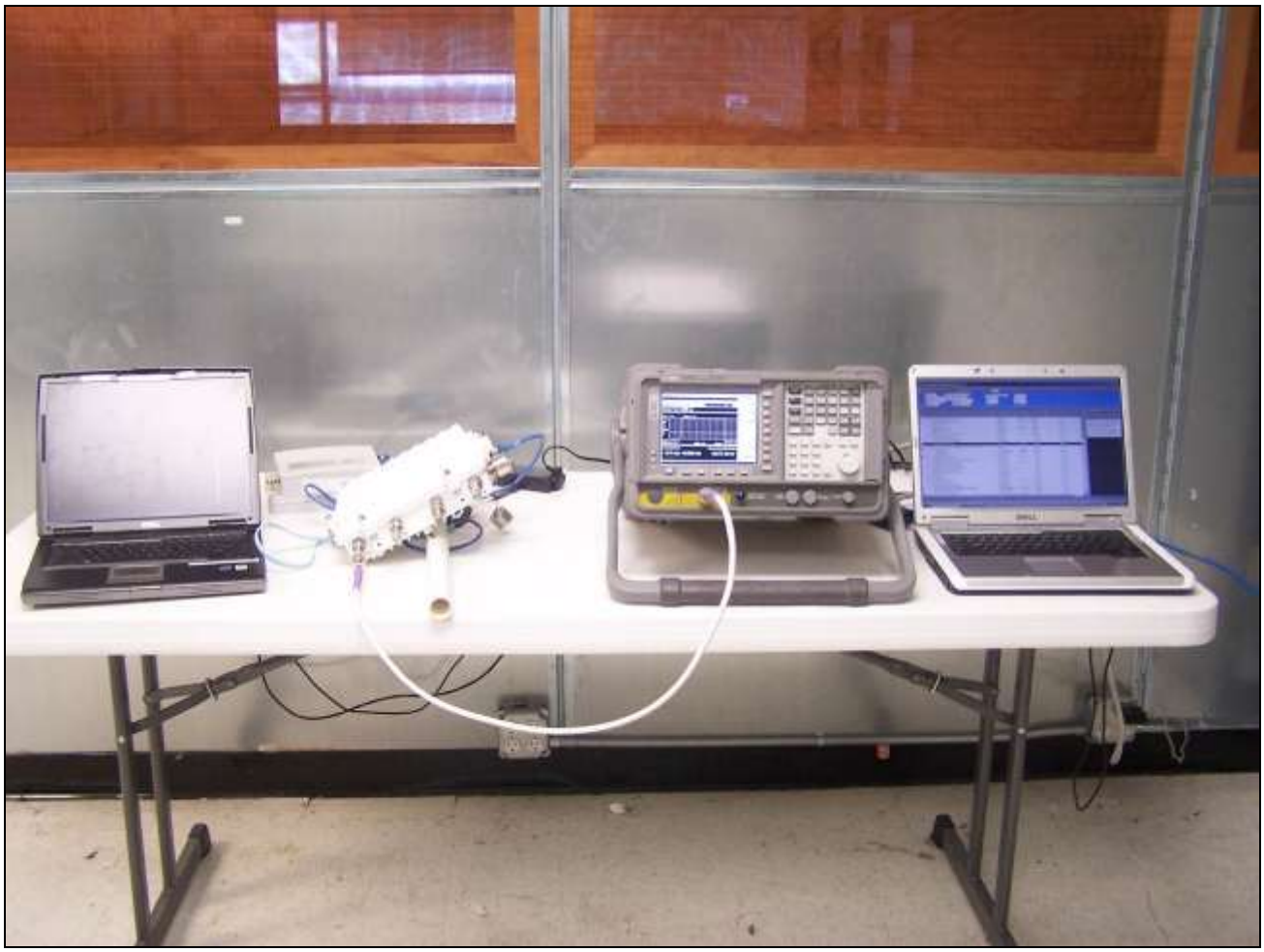


Plot 167. Peak Excursion Ratio, 802.11n HT40, 5670 MHz, R3-B



Plot 168. Peak Excursion Ratio, 802.11n HT40, 5670 MHz, R3-C

Peak Excursion Test Setup



Photograph 7. Test Setup for Peak Excursion Measurements

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(b) Undesirable Emissions

Test Requirements: **§ 15.407(b)(4), (b)(6), (b)(7), §15.205:** Emissions outside the frequency band.

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

§ 15.407(b)(6): 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 a wooden stand 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.

For frequencies from 30 MHz to 1 GHz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth. Only noise floor was measured above 18GHz.

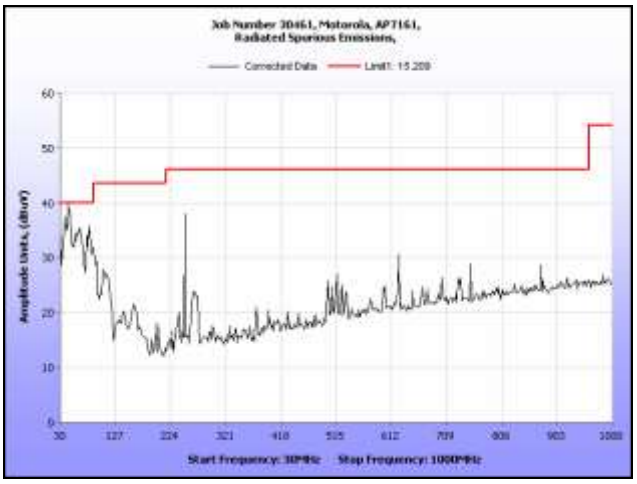
For measurements above 1 GHz, measurements were made with a Peak detector with 1 MHz resolution bandwidth. Where the spurious emissions fell into a restricted band, measurements were also made with an average detector to make sure they complied with 15.209 limits. Emissions were explored up to 40 GHz.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

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

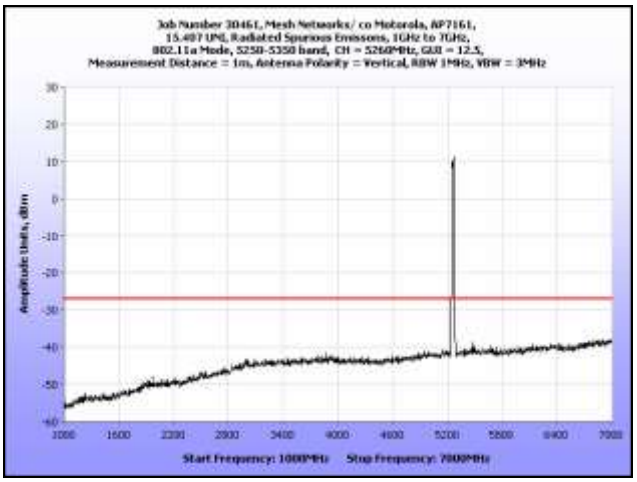
Test Engineer(s): Jeff Pratt

Test Date(s): 04/04/11

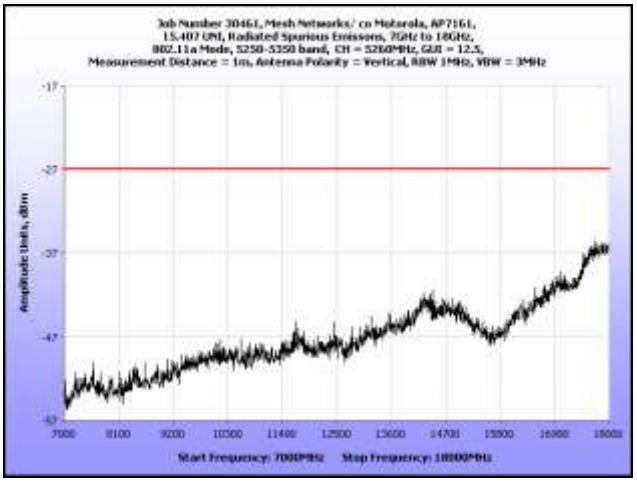
Radiated Spurious Emissions Test Results, 802.11a



Plot 169. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11a, 5260 MHz

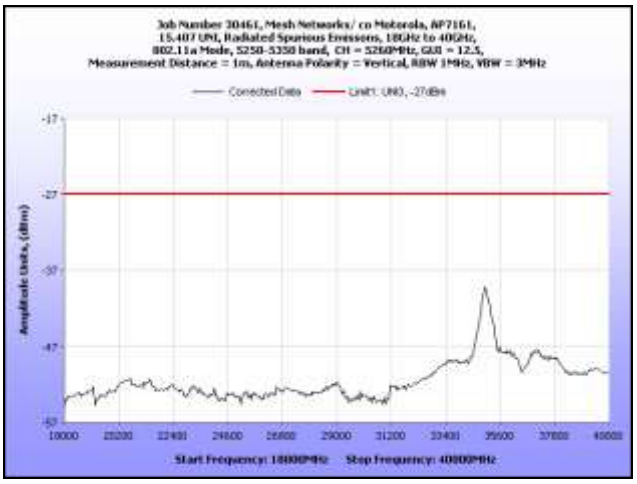


Plot 170. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11a, 5260 MHz

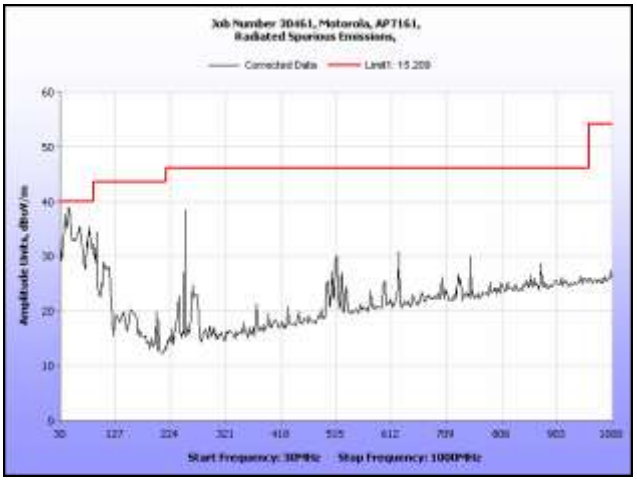


Plot 171. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11a, 5260 MHz

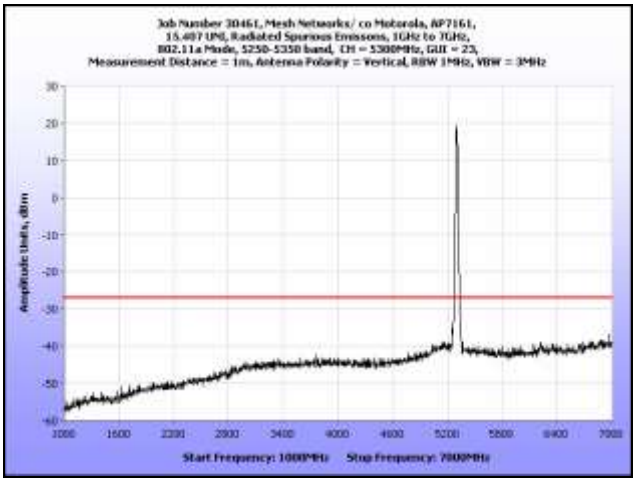
Radiated Spurious Emissions Test Results, 802.11a



Plot 172. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11a, 5260 MHz

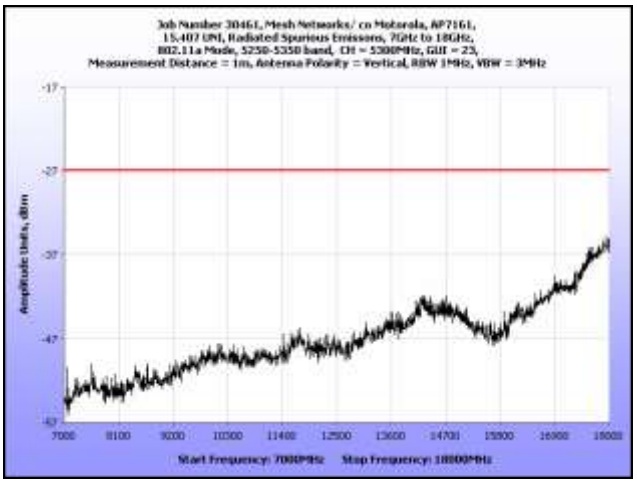


Plot 173. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11a, 5300 MHz

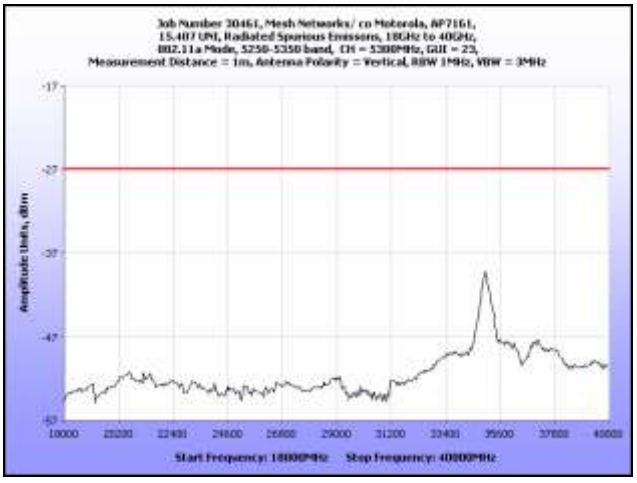


Plot 174. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11a, 5300 MHz

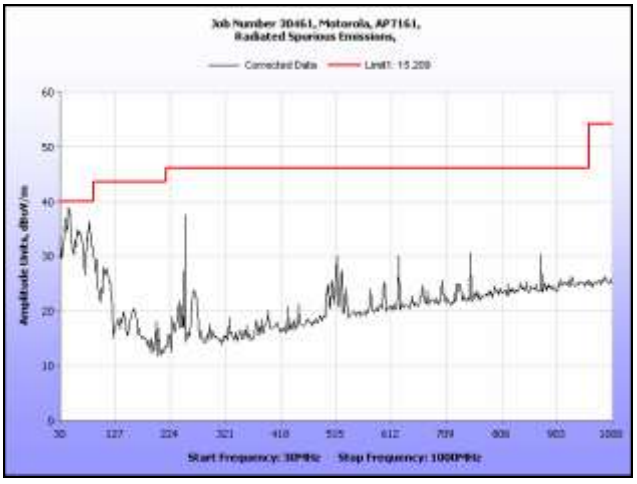
Radiated Spurious Emissions Test Results, 802.11a



Plot 175. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11a, 5300 MHz

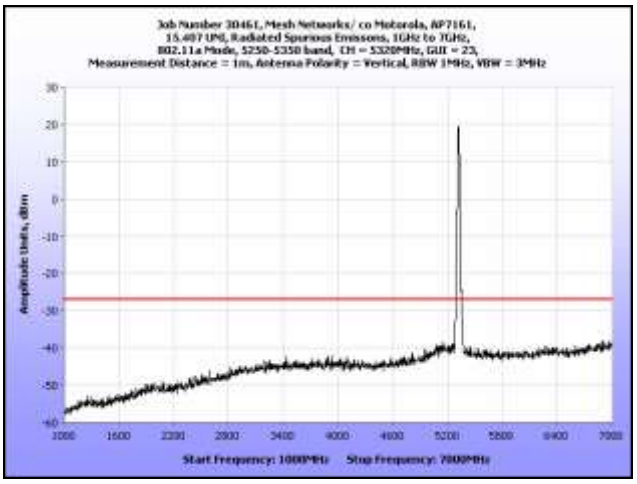


Plot 176. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11a, 5300 MHz

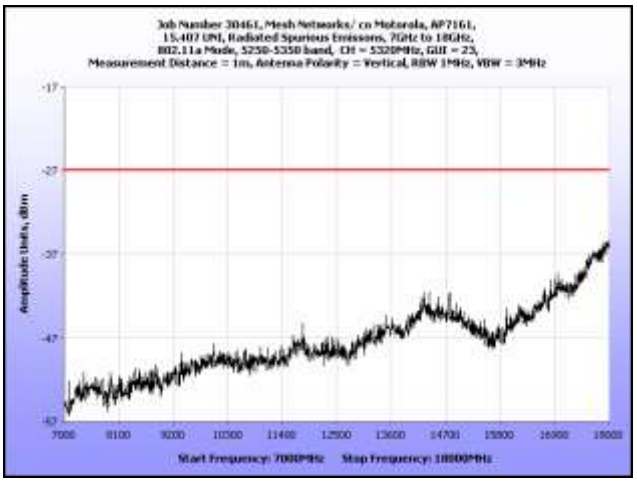


Plot 177. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11a, 5320 MHz

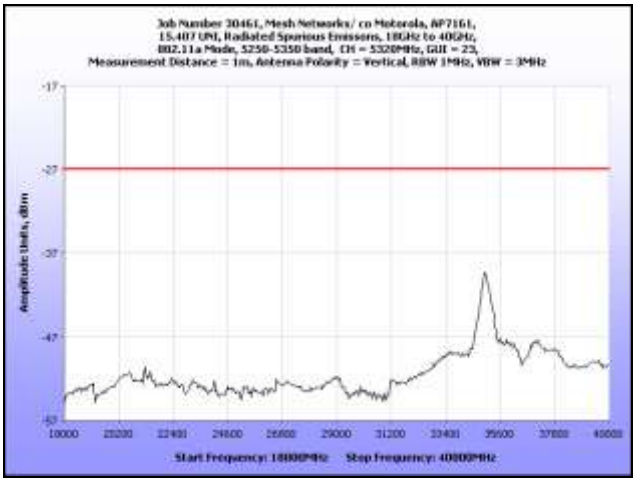
Radiated Spurious Emissions Test Results, 802.11a



Plot 178. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11a, 5320 MHz

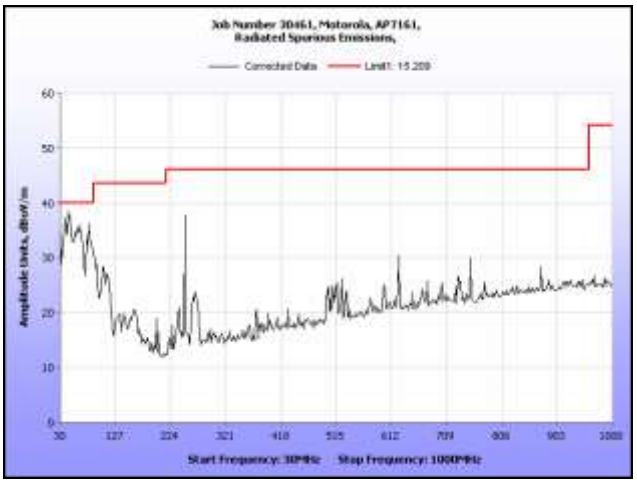


Plot 179. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11a, 5320 MHz

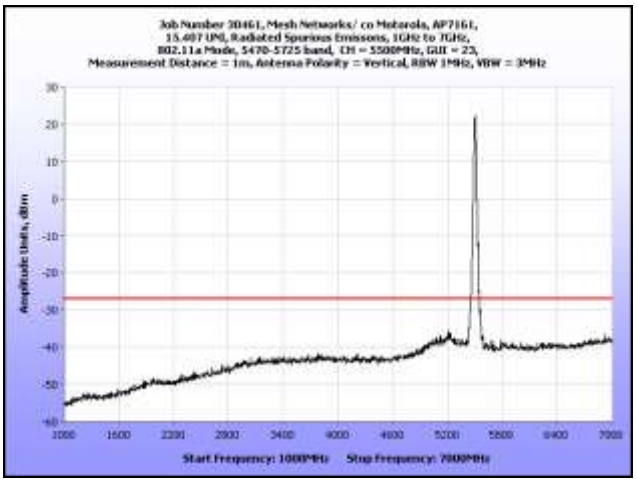


Plot 180. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11a, 5320 MHz

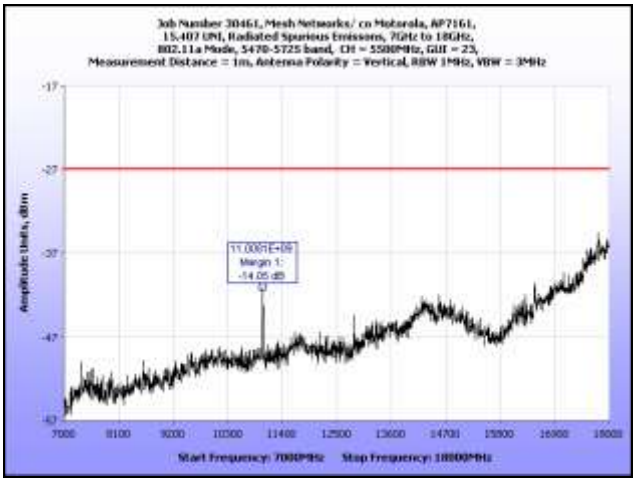
Radiated Spurious Emissions Test Results, 802.11a



Plot 181. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11a, 5500 MHz

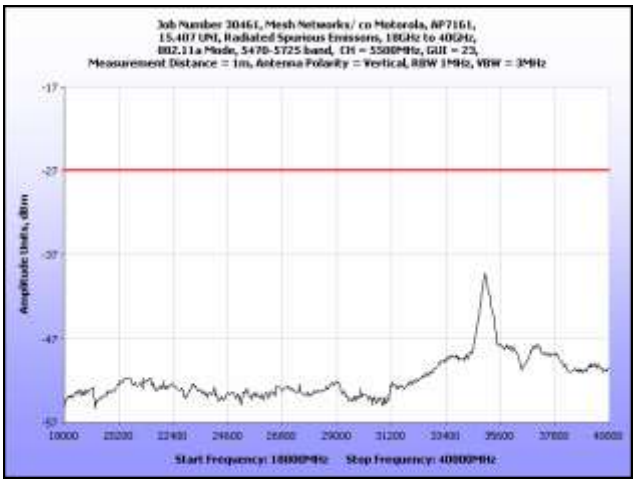


Plot 182. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11a, 5500 MHz

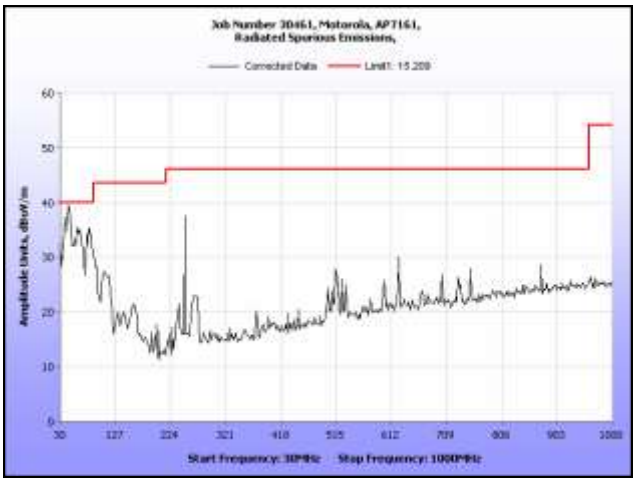


Plot 183. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11a, 5500 MHz

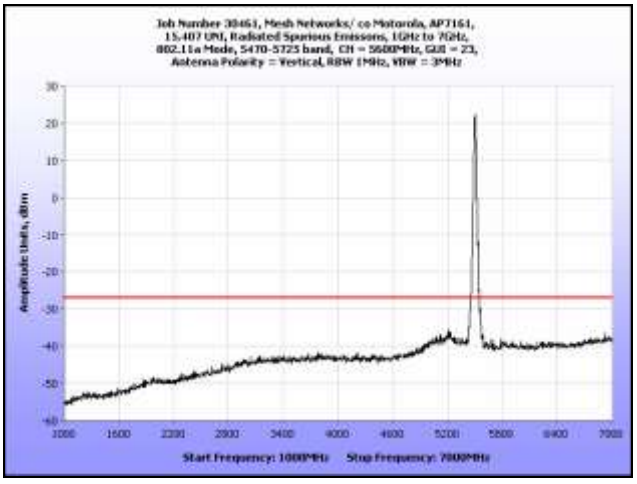
Radiated Spurious Emissions Test Results, 802.11a



Plot 184. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11a, 5500 MHz

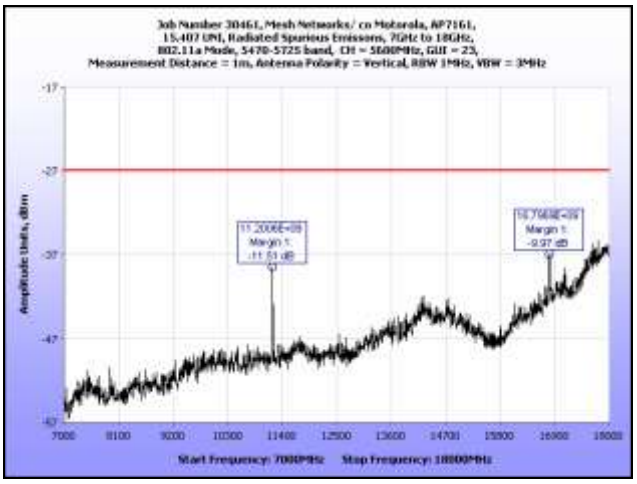


Plot 185. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11a, 5580 MHz

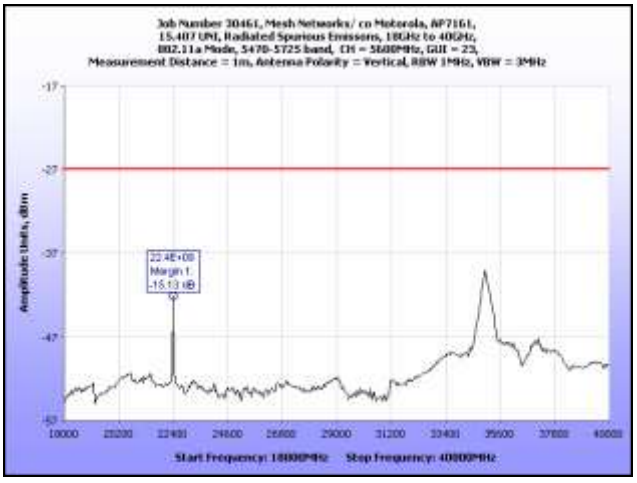


Plot 186. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11a, 5600 MHz

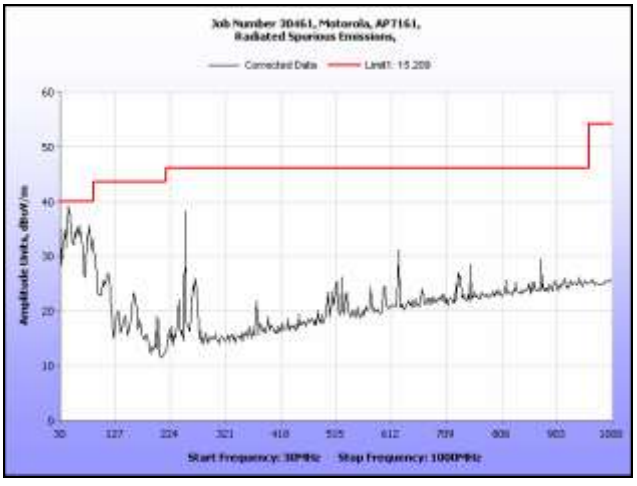
Radiated Spurious Emissions Test Results, 802.11a



Plot 187. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11a, 5600 MHz

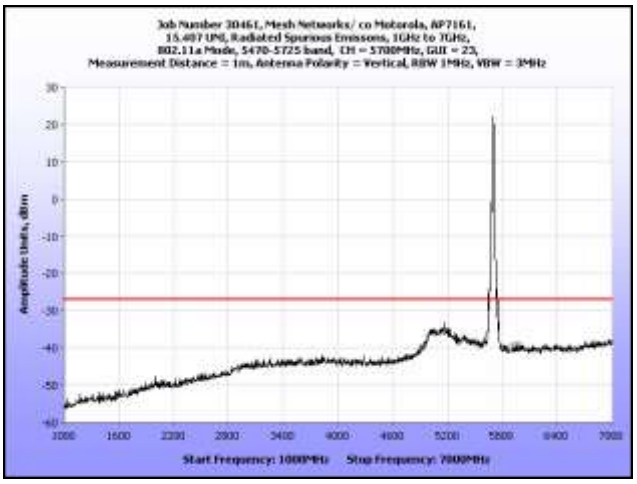


Plot 188. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11a, 5600 MHz

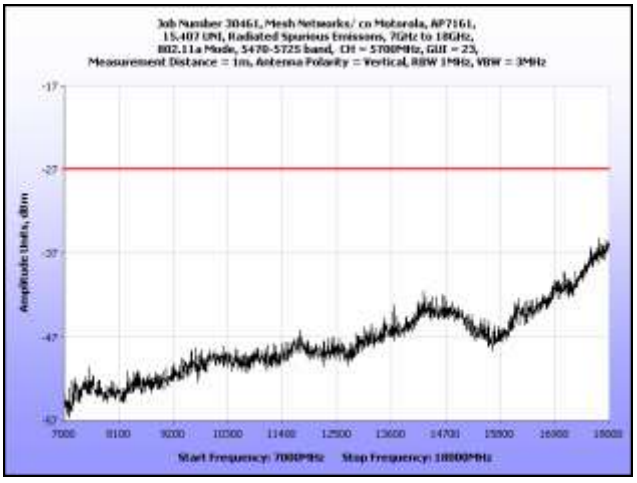


Plot 189. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11a, 5700 MHz

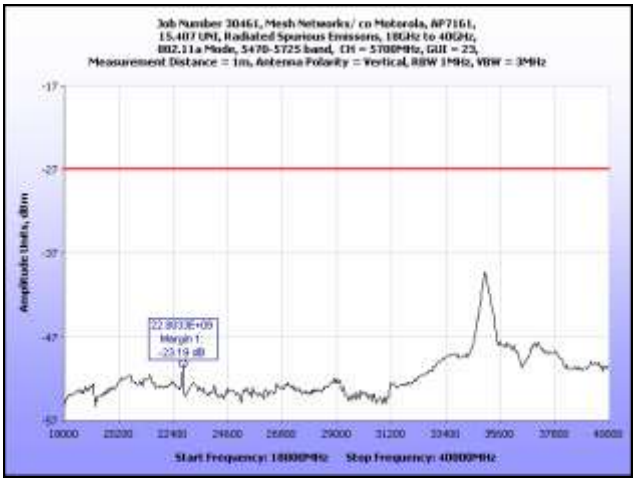
Radiated Spurious Emissions Test Results, 802.11a



Plot 190. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11a, 5700 MHz

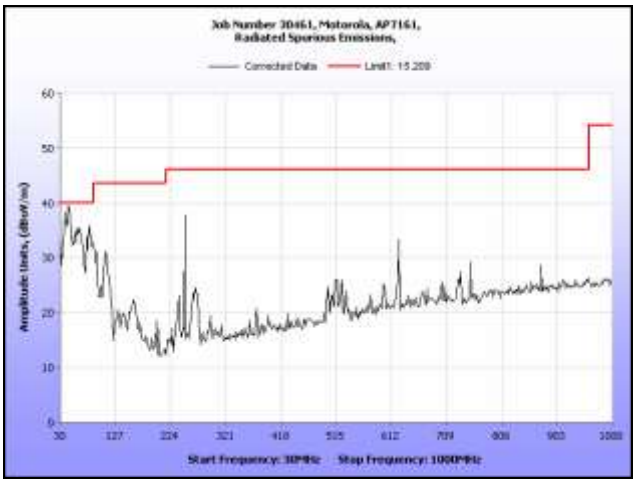


Plot 191. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11a, 5700 MHz

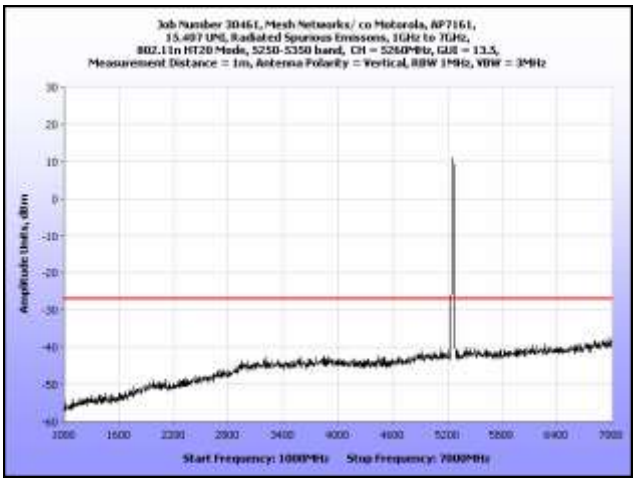


Plot 192. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11a, 5700 MHz

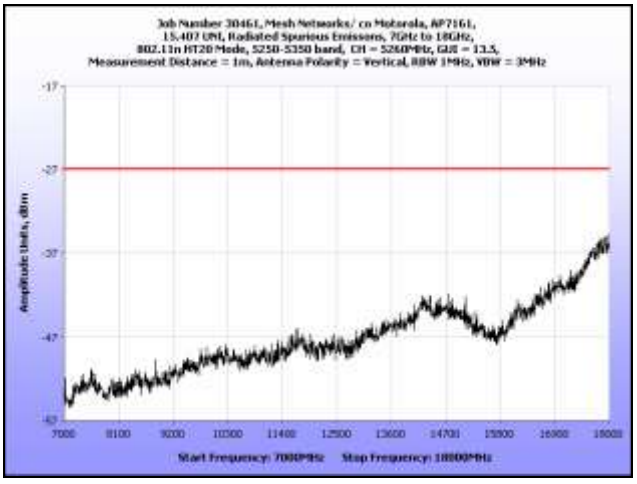
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 193. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT20, 5260 MHz

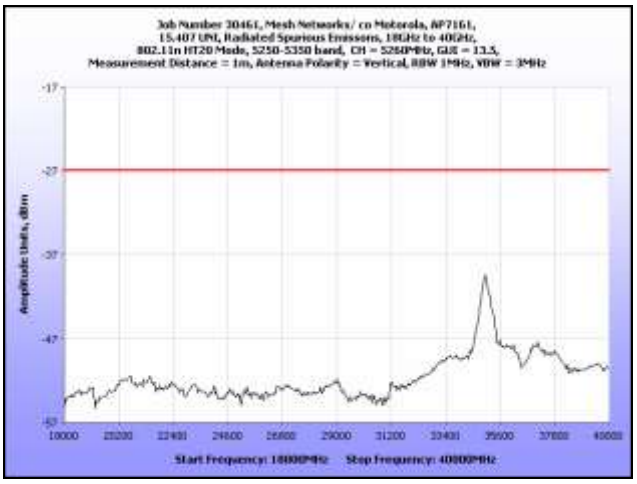


Plot 194. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT20, 5260 MHz

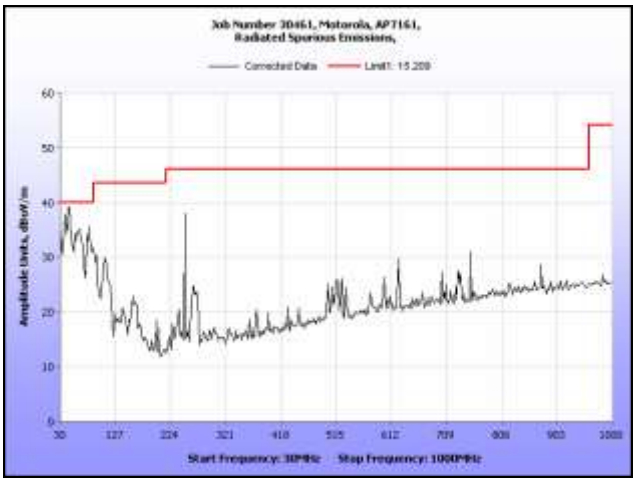


Plot 195. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT20, 5260 MHz

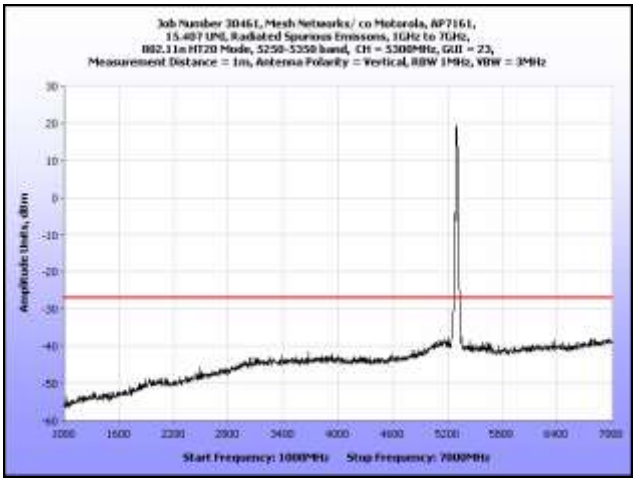
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 196. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT20, 5260 MHz

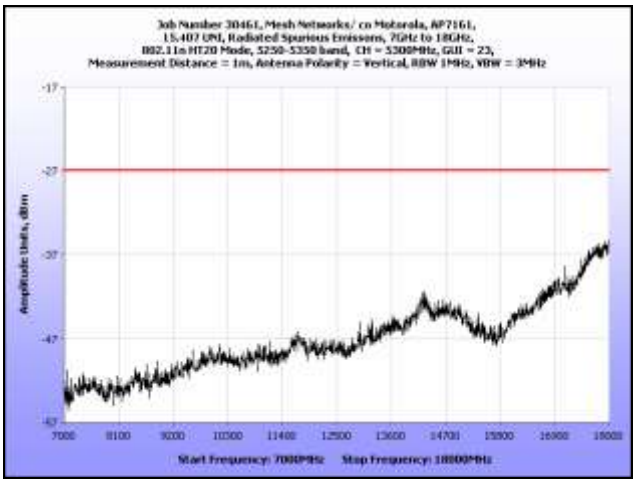


Plot 197. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT20, 5300 MHz

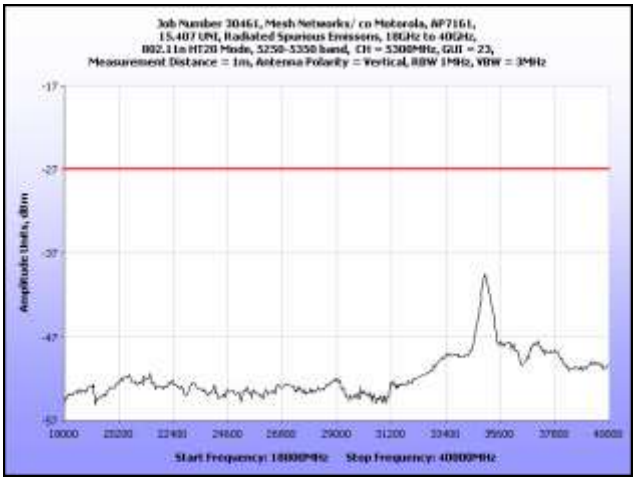


Plot 198. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT20, 5300 MHz

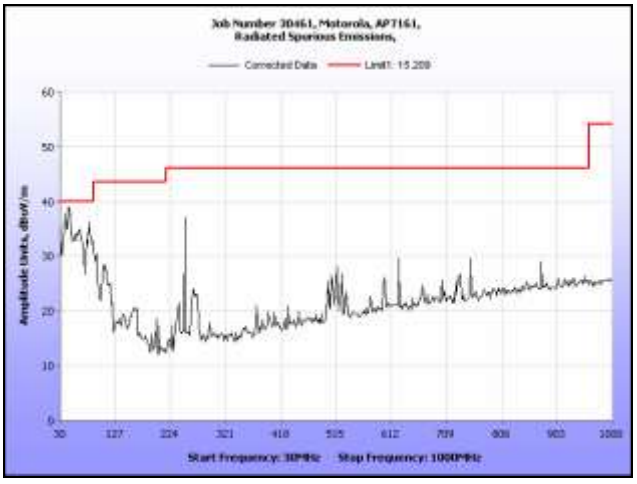
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 199. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT20, 5300 MHz

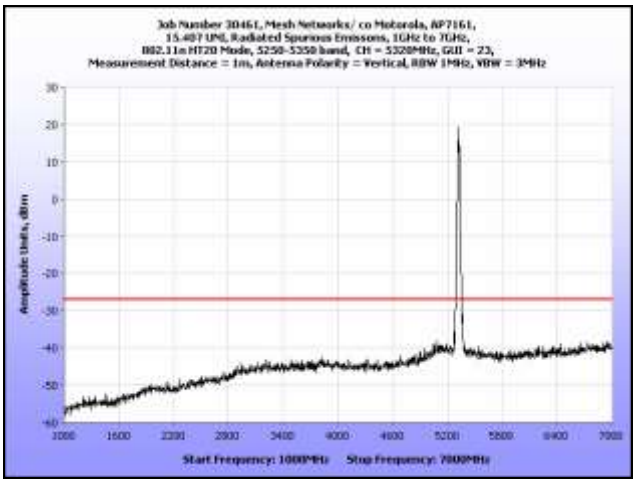


Plot 200. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT20, 5300 MHz

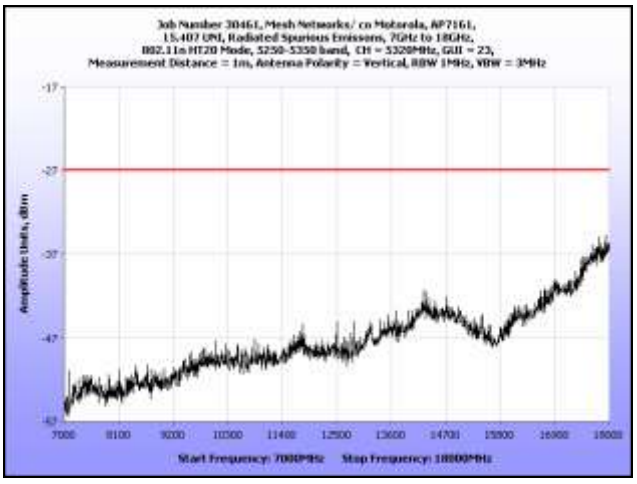


Plot 201. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT20, 5320 MHz

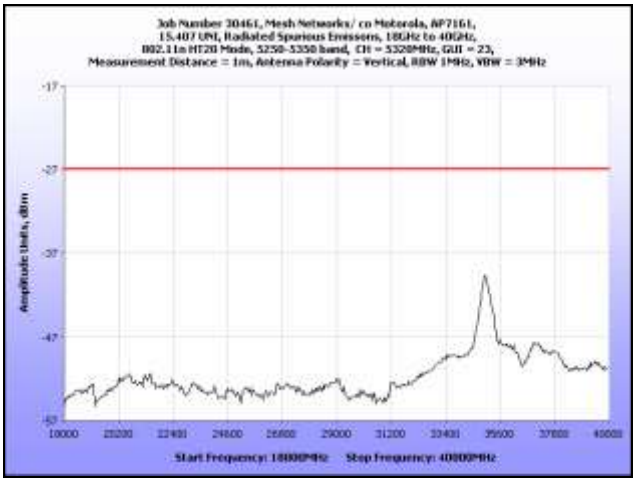
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 202. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT20, 5320 MHz

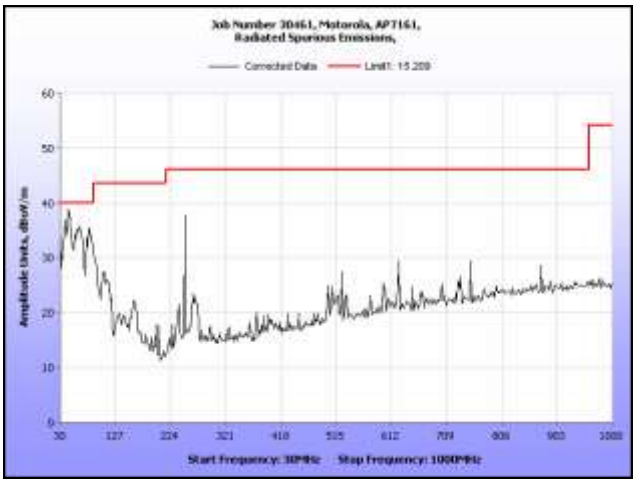


Plot 203. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT20, 5320 MHz

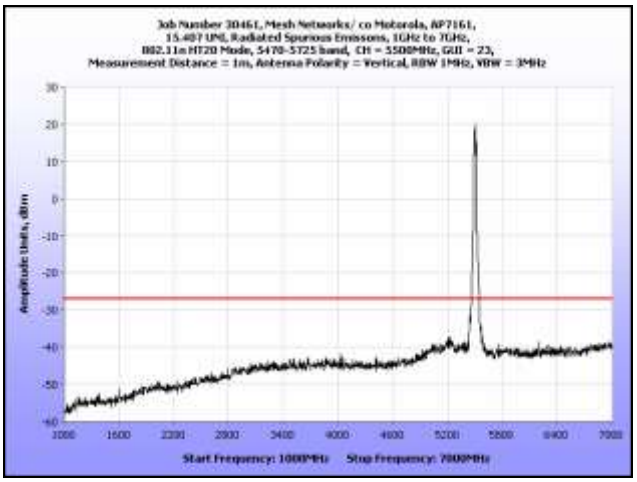


Plot 204. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT20, 5320 MHz

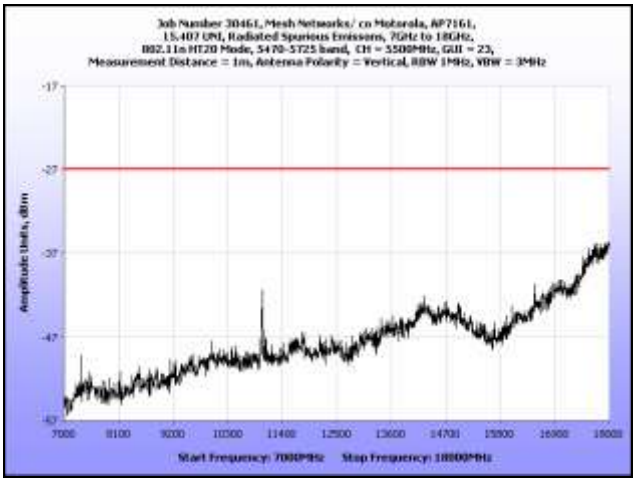
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 205. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT20, 5500 MHz

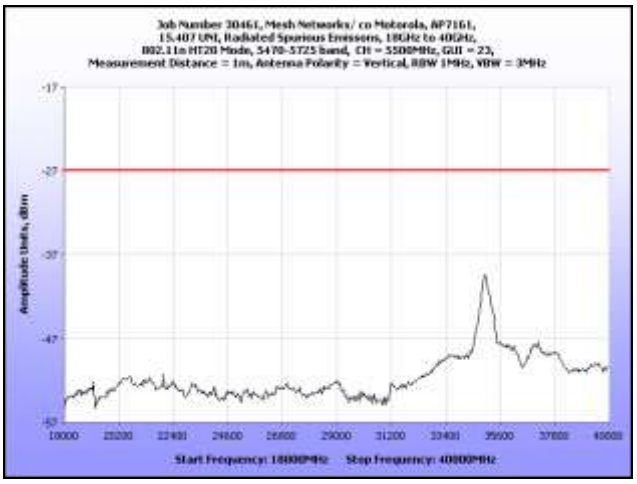


Plot 206. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT20, 5500 MHz

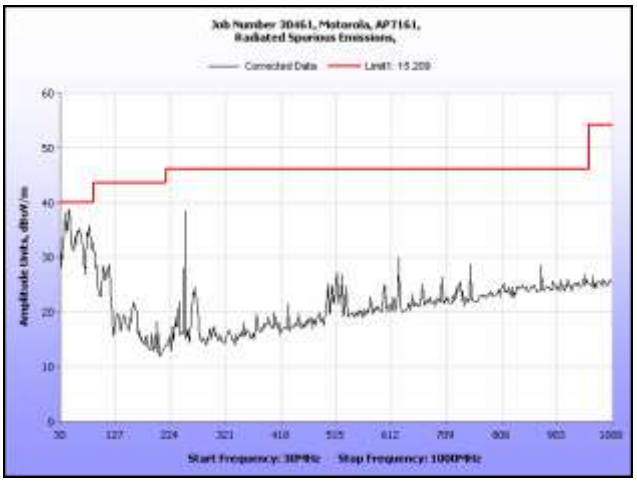


Plot 207. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT20, 5500 MHz

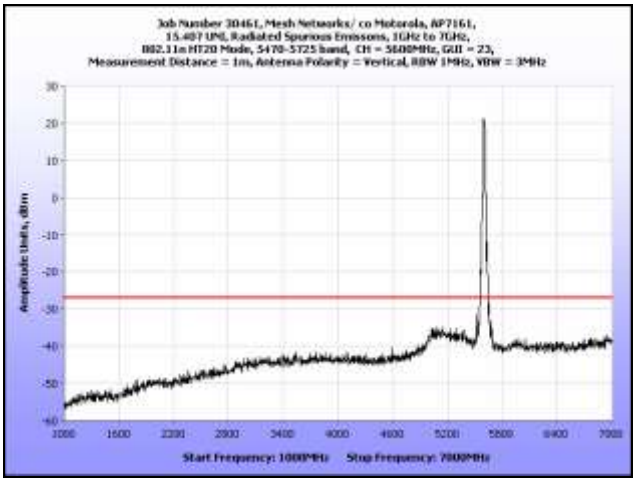
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 208. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT20, 5500 MHz

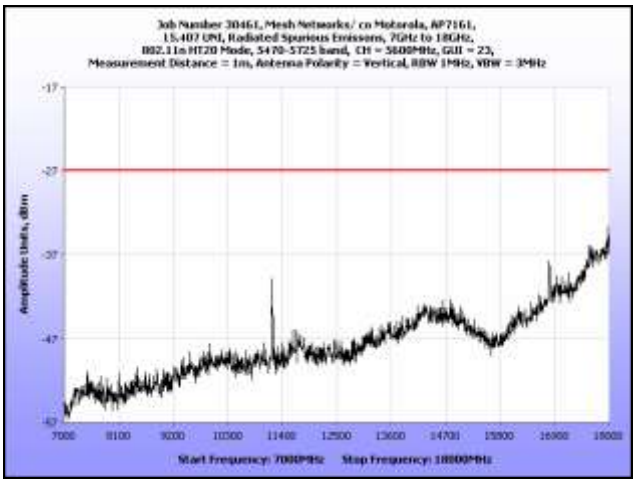


Plot 209. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT20, 5580 MHz

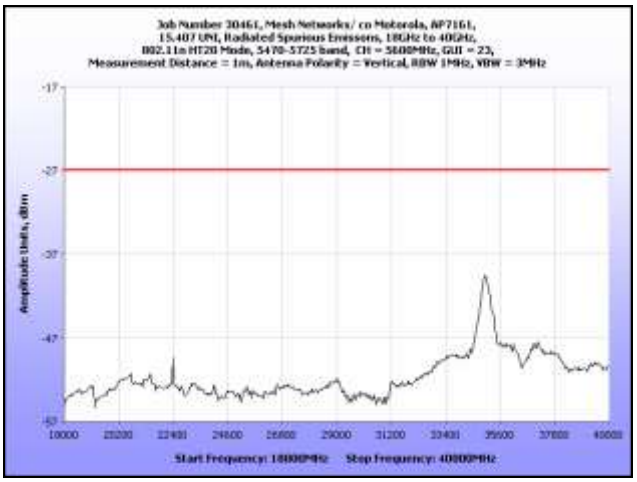


Plot 210. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT20, 5600 MHz

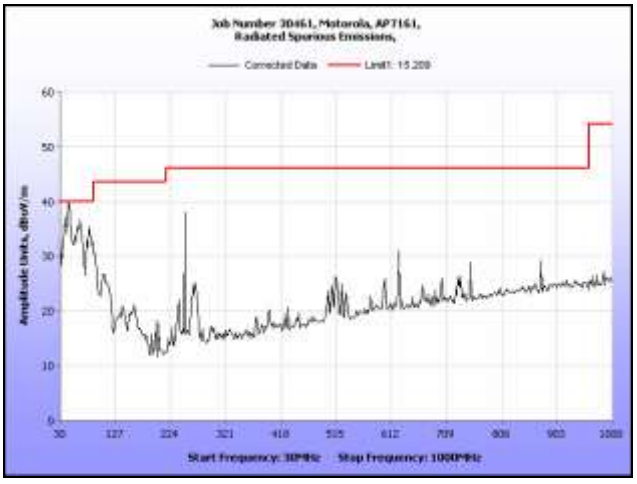
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 211. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT20, 5600 MHz

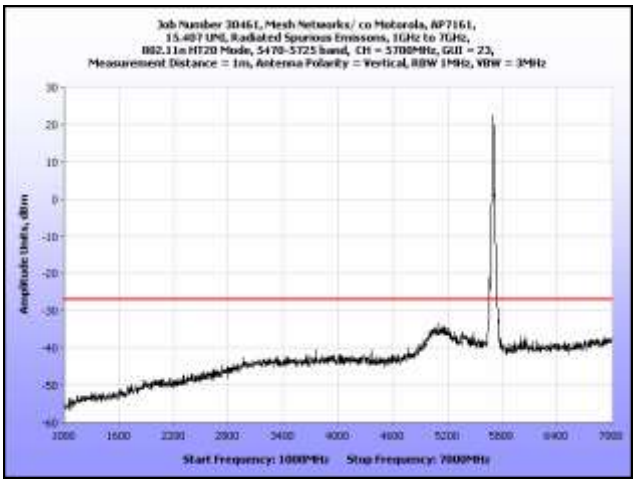


Plot 212. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT20, 5600 MHz

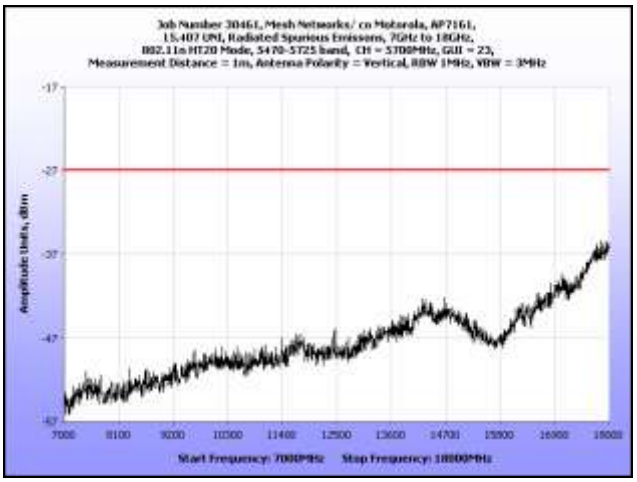


Plot 213. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT20, 5700 MHz

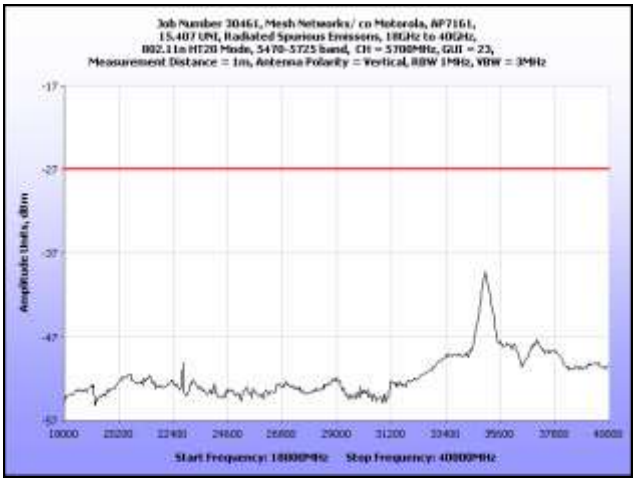
Radiated Spurious Emissions Test Results, 802.11n HT20



Plot 214. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT20, 5700 MHz

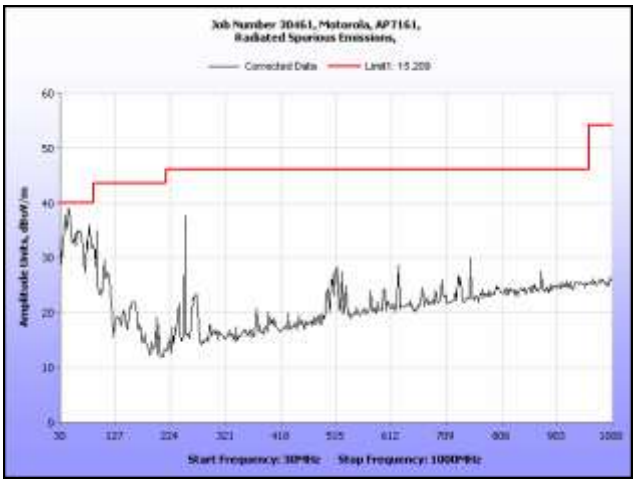


Plot 215. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT20, 5700 MHz

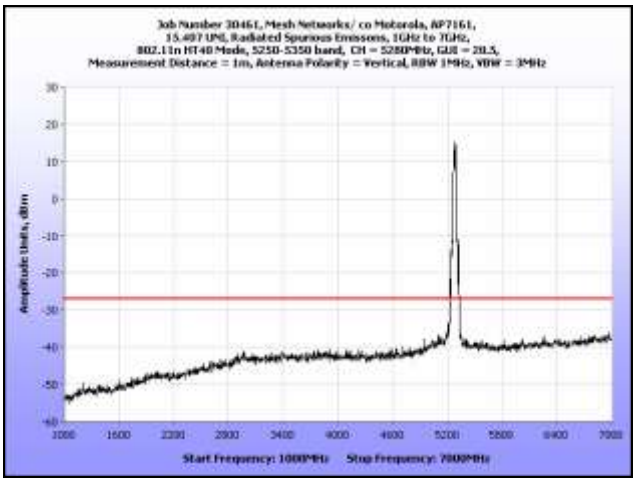


Plot 216. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT20, 5700 MHz

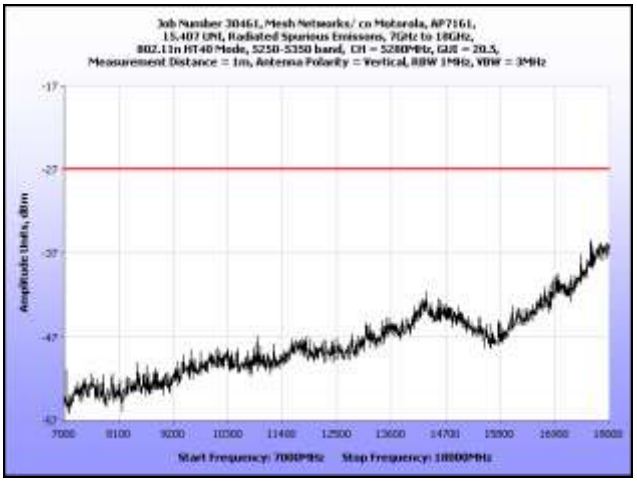
Radiated Spurious Emissions Test Results, 802.11n HT40



Plot 217. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT40, 5280 MHz

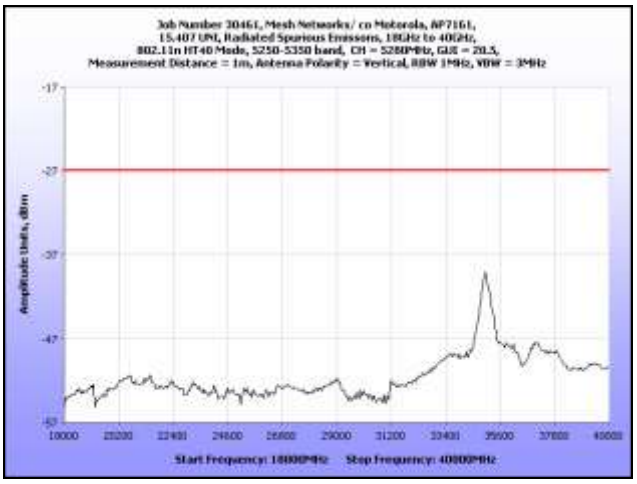


Plot 218. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT40, 5280 MHz

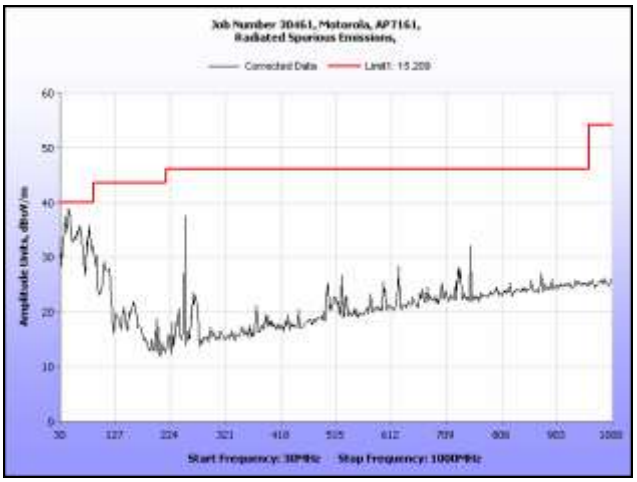


Plot 219. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT40, 5280 MHz

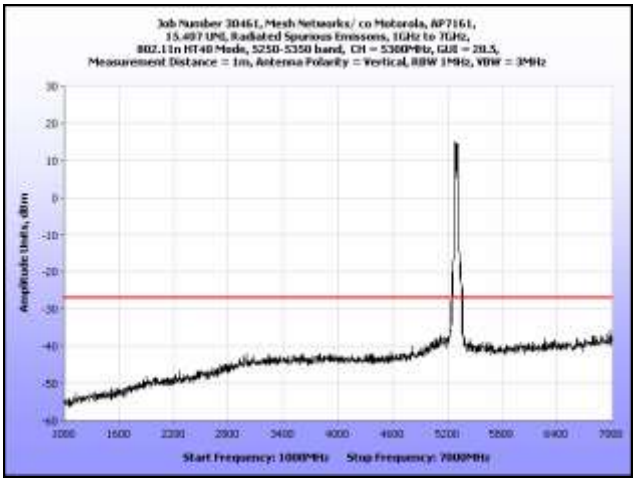
Radiated Spurious Emissions Test Results, 802.11n HT40



Plot 220. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT40, 5280 MHz

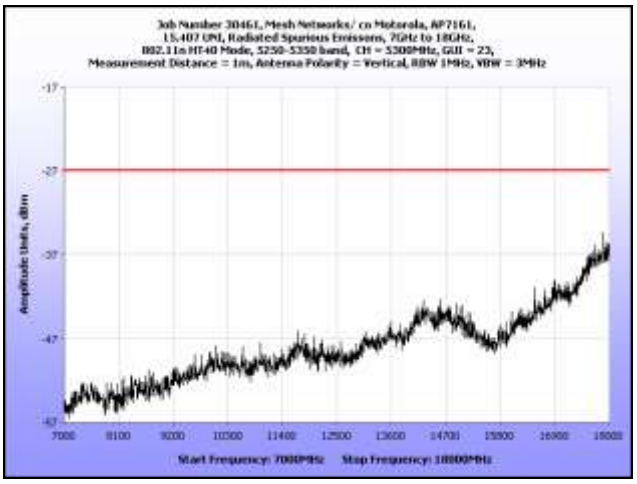


Plot 221. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT40, 5300 MHz

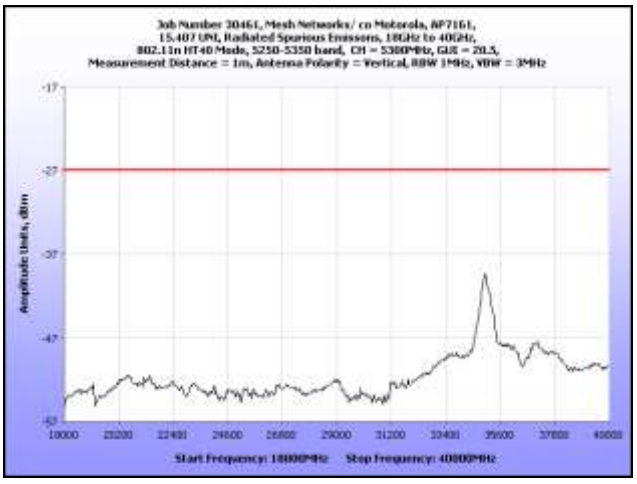


Plot 222. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT40, 5300 MHz

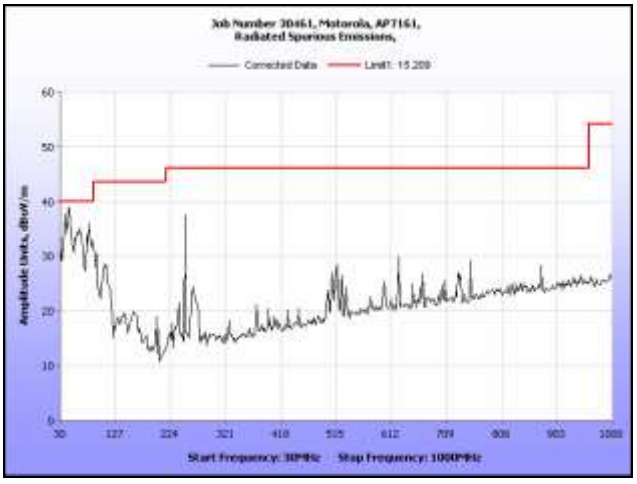
Radiated Spurious Emissions Test Results, 802.11n HT40



Plot 223. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT40, 5300 MHz

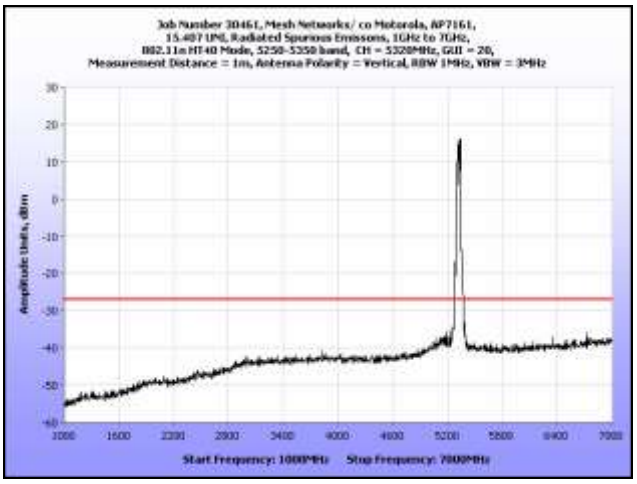


Plot 224. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT40, 5300 MHz

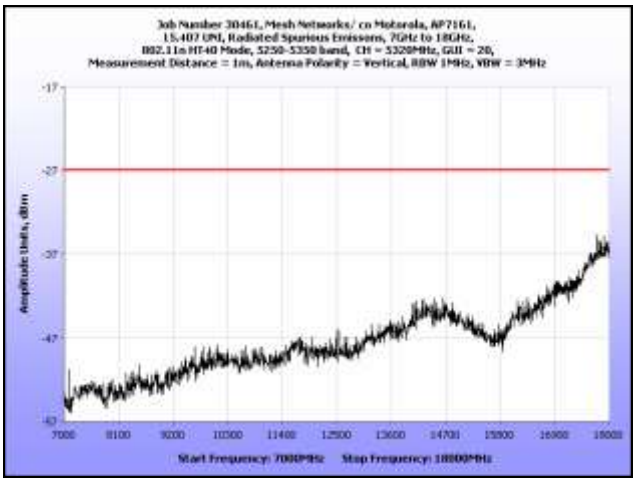


Plot 225. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT40, 5320 MHz

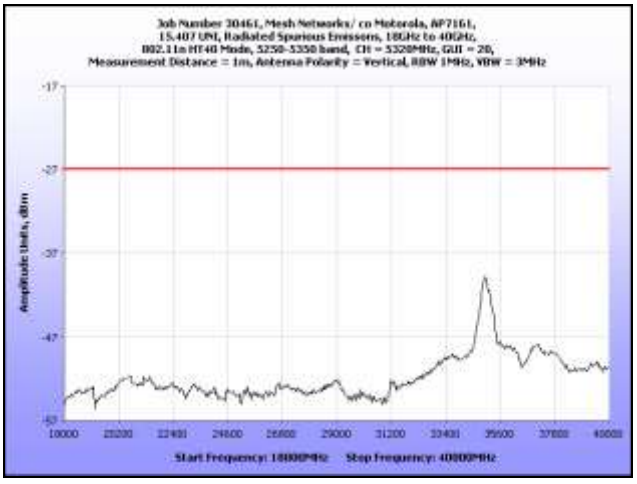
Radiated Spurious Emissions Test Results, 802.11n HT40



Plot 226. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT40, 5320 MHz

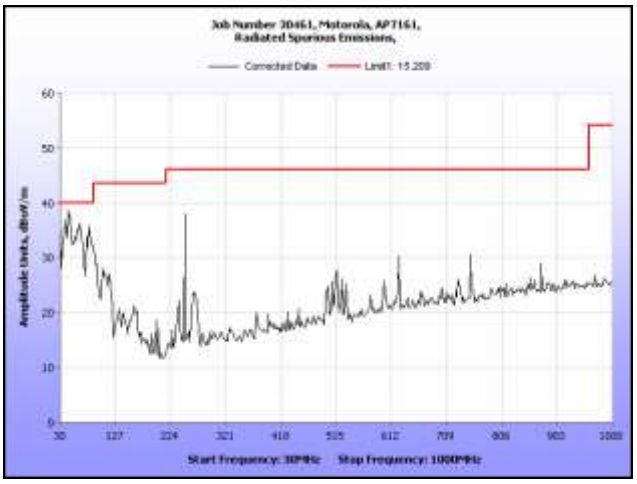


Plot 227. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT40, 5320 MHz

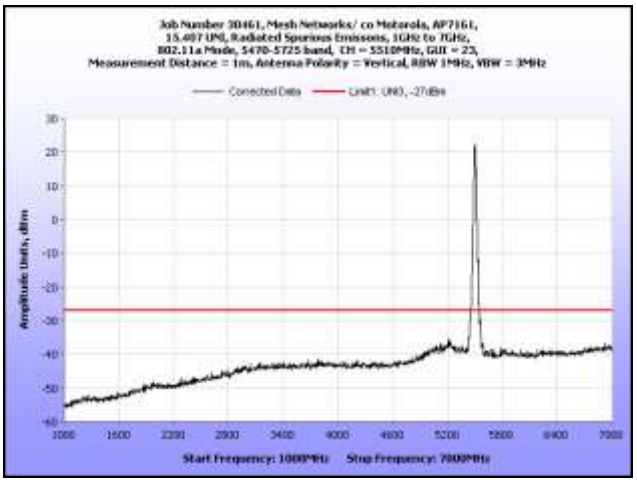


Plot 228. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT40, 5320 MHz

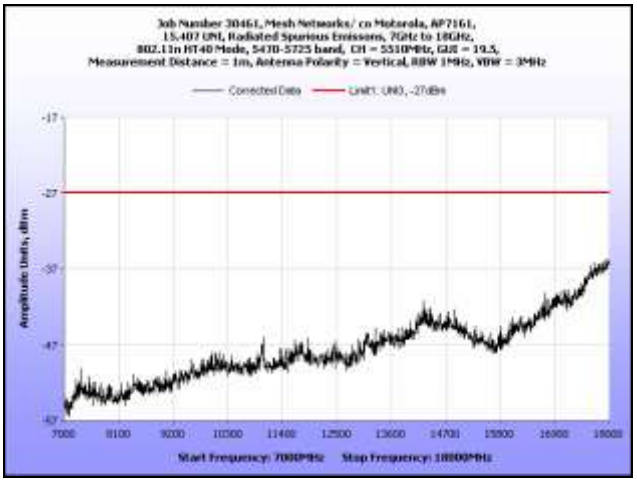
Radiated Spurious Emissions Test Results, 802.11n HT40



Plot 229. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT40, 5510 MHz

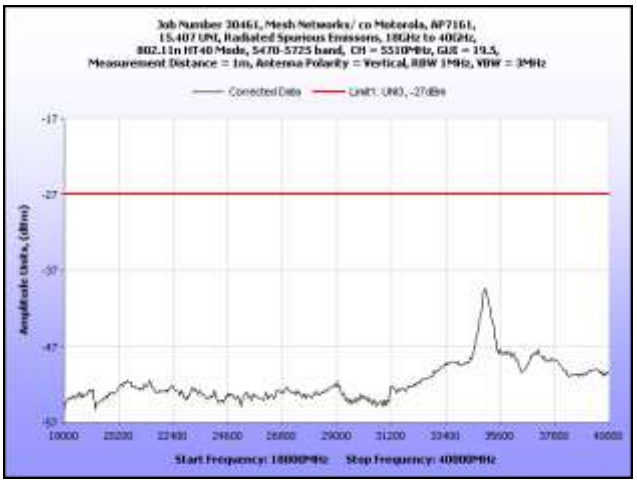


Plot 230. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT40, 5500 MHz

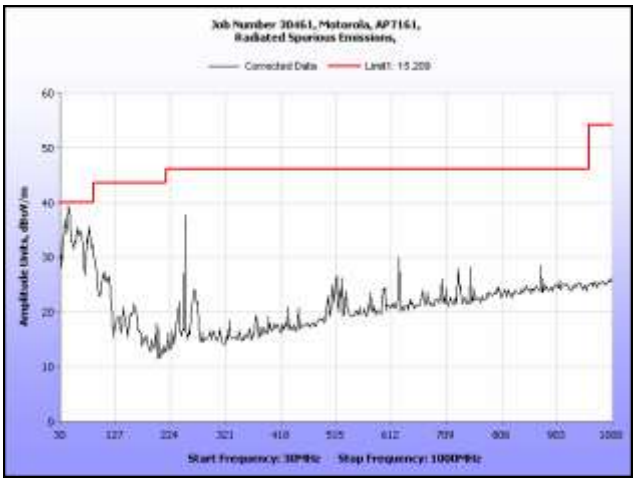


Plot 231. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT40, 5510 MHz

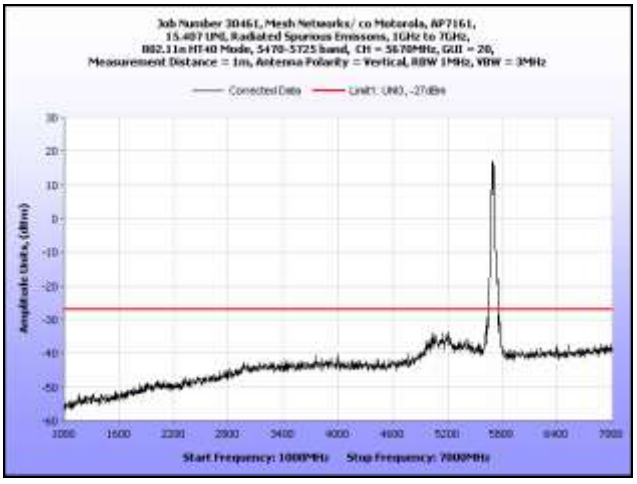
Radiated Spurious Emissions Test Results, 802.11n HT40



Plot 232. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT40, 5510 MHz

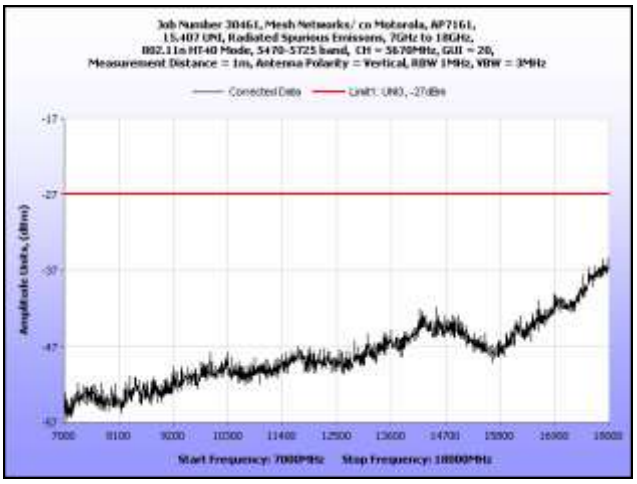


Plot 233. Radiated Spurious Emissions, 30 MHz – 1 GHz, 802.11n HT40, 5670 MHz

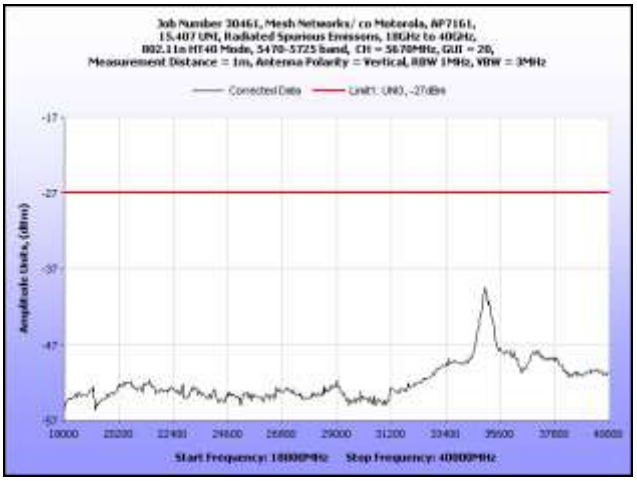


Plot 234. Radiated Spurious Emissions, 1 GHz – 7 GHz, 802.11n HT40, 5670 MHz

Radiated Spurious Emissions Test Results, 802.11n HT40

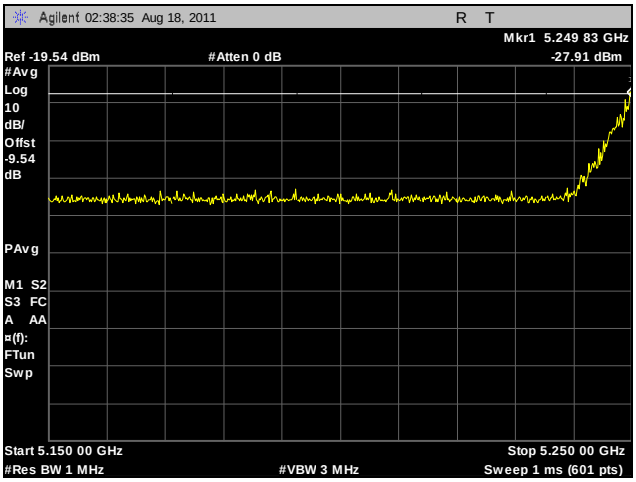


Plot 235. Radiated Spurious Emissions, 7 GHz – 18 GHz, 802.11n HT40, 5670 MHz

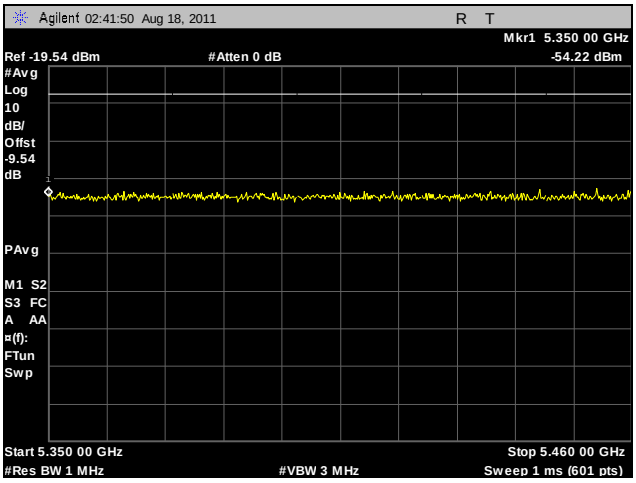


Plot 236. Radiated Spurious Emissions, 18 GHz – 40 GHz, 802.11n HT40, 5670 MHz

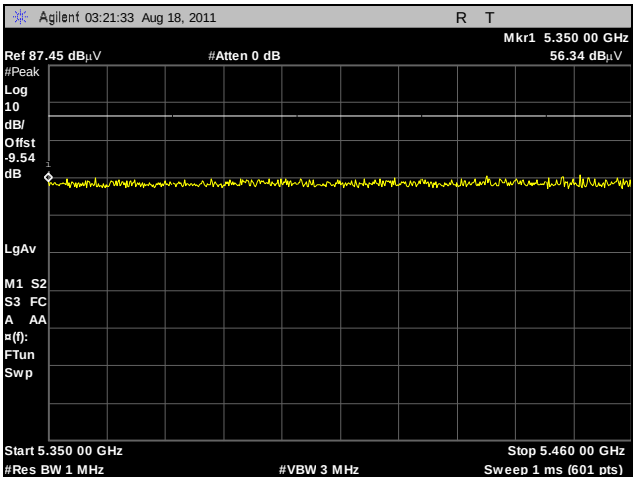
§15.407 (b)(3) Radiated Band Edge
Radiated Band Edge Test Results, 802.11a



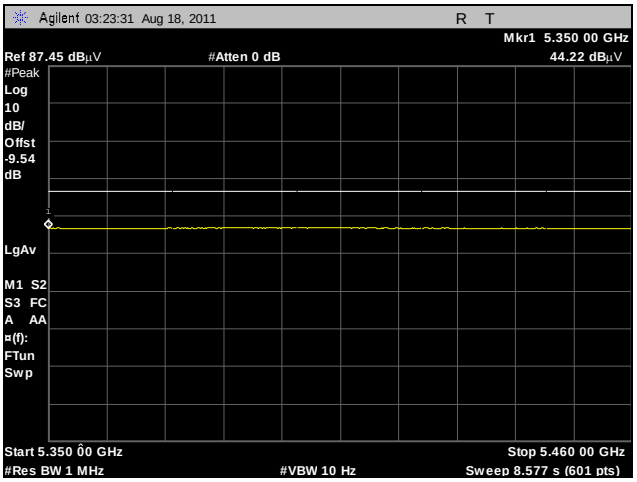
Plot 237. Radiated Band Edge, 802.11a, 5260 MHz



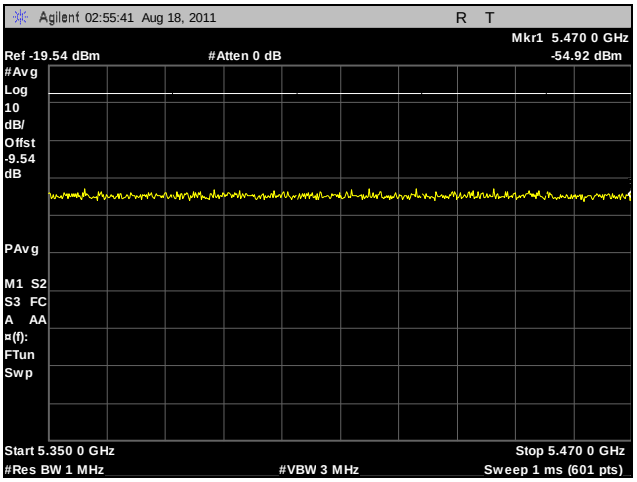
Plot 238. Radiated Band Edge, 802.11a, 5320 MHz



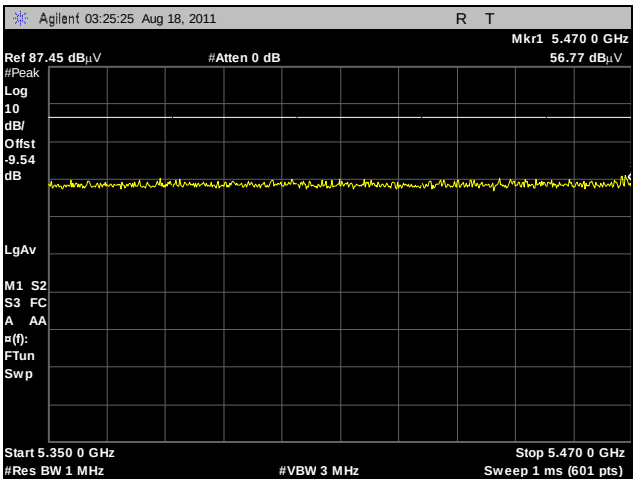
Plot 239. Radiated Restricted Band, 802.11a, 5320 MHz, Peak



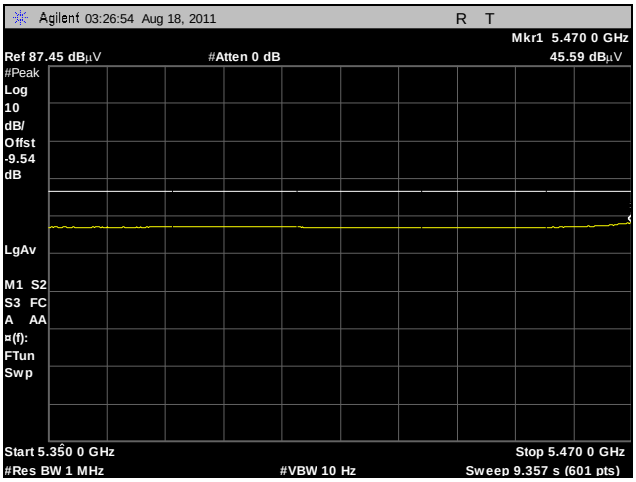
Plot 240. Radiated Restricted Band, 802.11a, 5320 MHz, Average



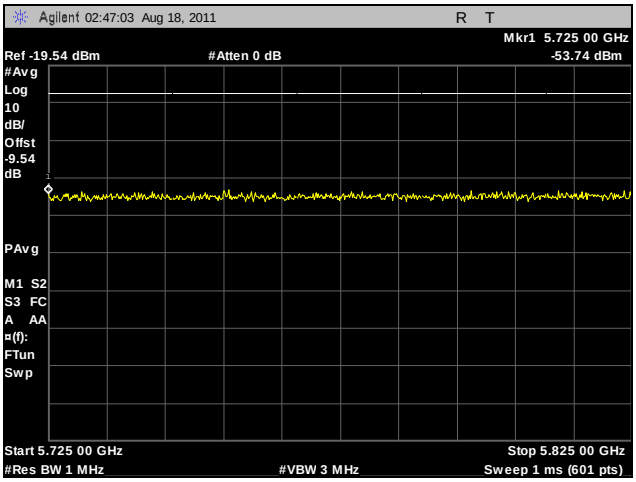
Plot 241. Radiated Band Edge, 802.11a, 5500 MHz



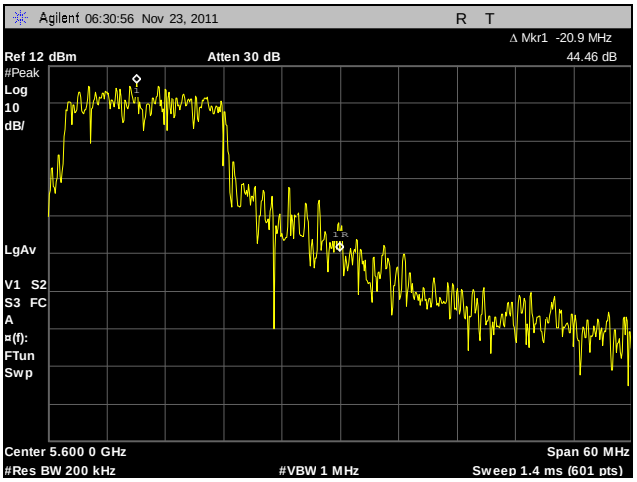
Plot 242. Radiated Restricted Band, 802.11a, 5500 MHz, Peak



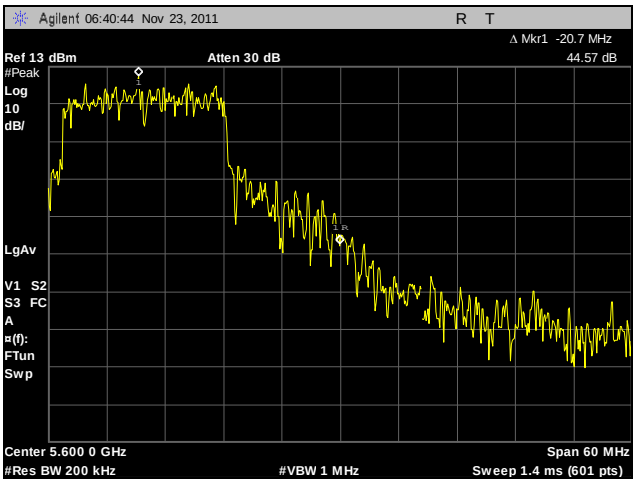
Plot 243. Radiated Restricted Band, 802.11a, 5500 MHz, Average



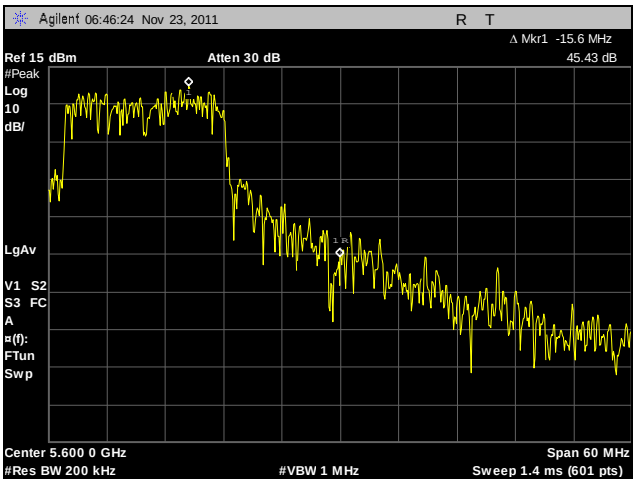
Plot 244. Radiated Band Edge, 802.11a, 5700 MHz



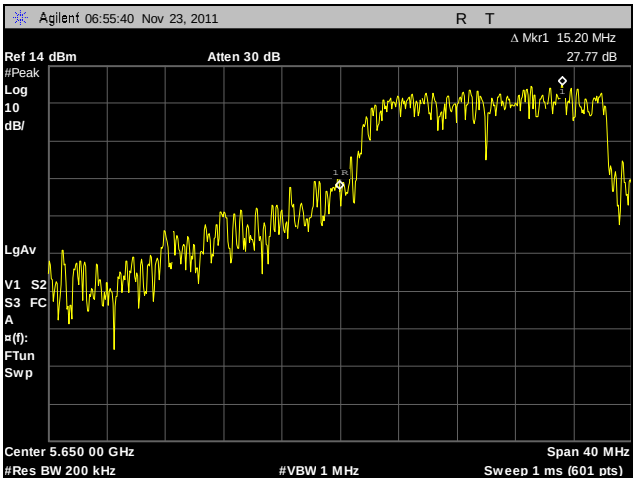
Plot 245. Radiated Band Edge, 802.11a, 5580 MHz, Port A



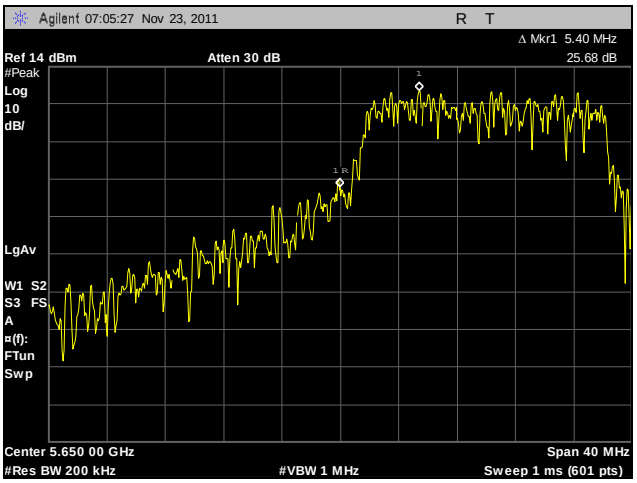
Plot 246. Radiated Band Edge, 802.11a, 5580 MHz, Port B



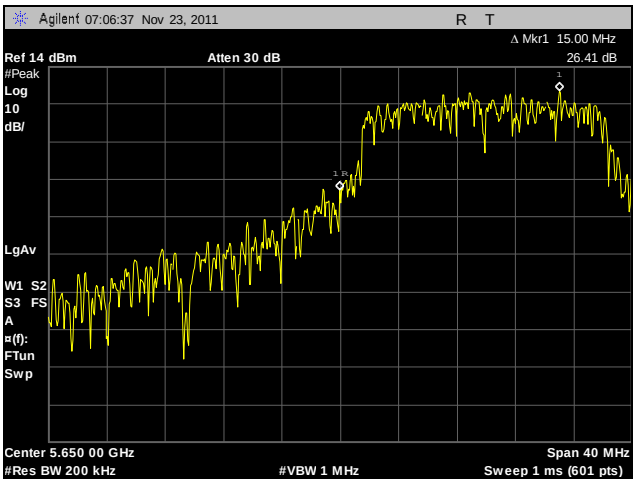
Plot 247. Radiated Band Edge, 802.11a, 5580 MHz, Port C



Plot 248. Radiated Band Edge, 802.11a, 5660 MHz, Port A

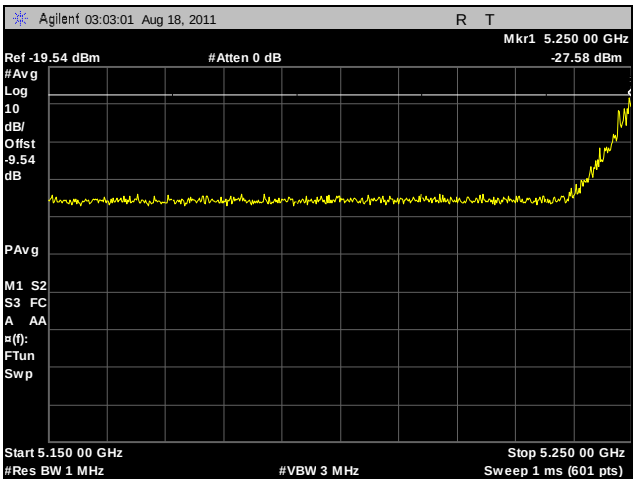


Plot 249. Radiated Band Edge, 802.11a, 5660 MHz, Port B

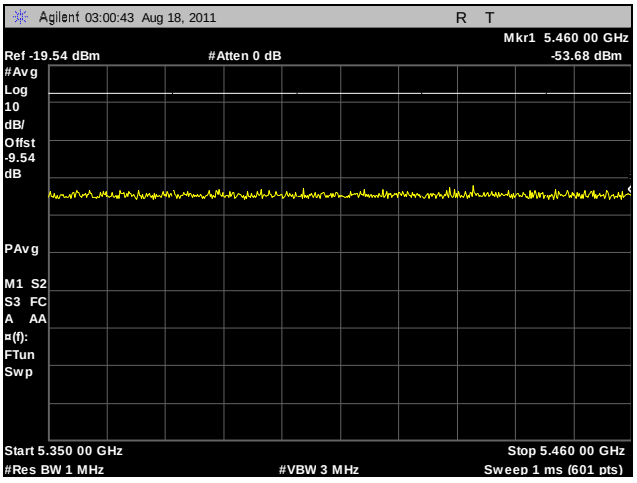


Plot 250. Radiated Band Edge, 802.11a, 5660 MHz, Port C

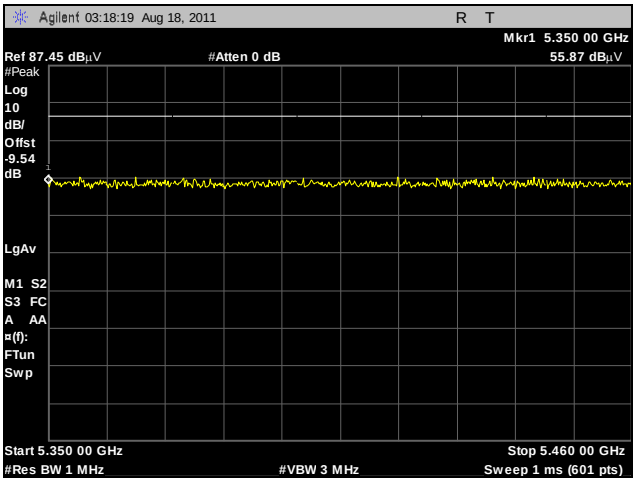
Radiated Band Edge Test Results, 802.11n HT20



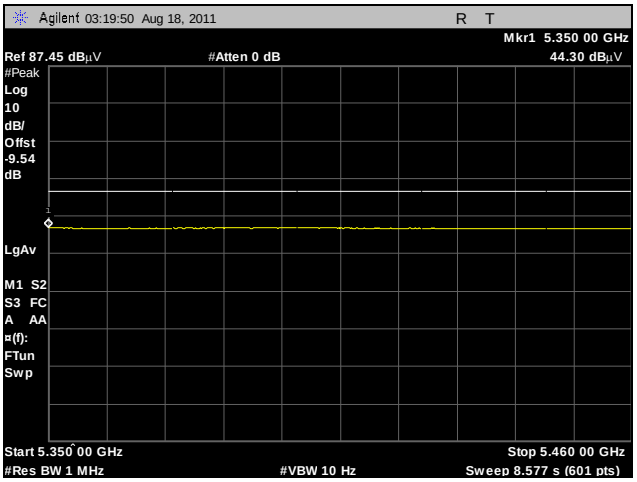
Plot 251. Radiated Band Edge, 802.11n HT20, 5260 MHz



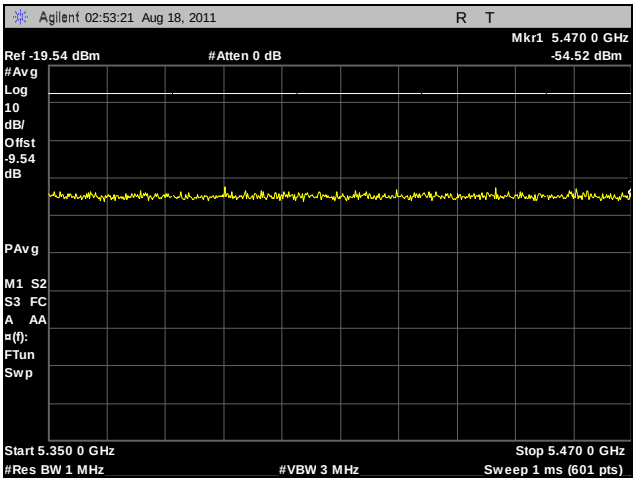
Plot 252. Radiated Band Edge, 802.11n HT20, 5320 MHz



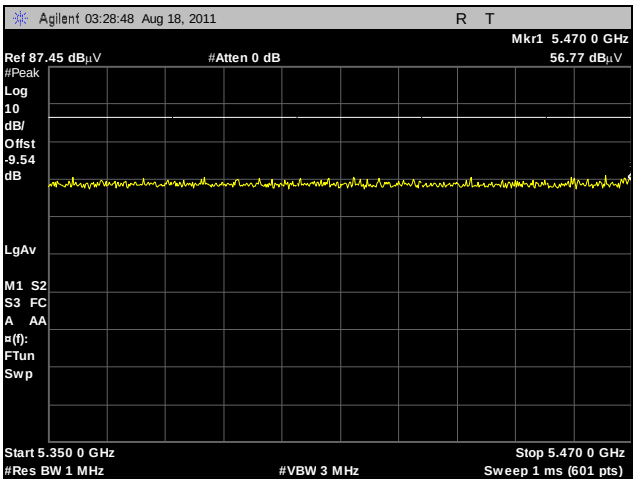
Plot 253. Radiated Restricted Band, 802.11n HT20, 5320 MHz, Peak



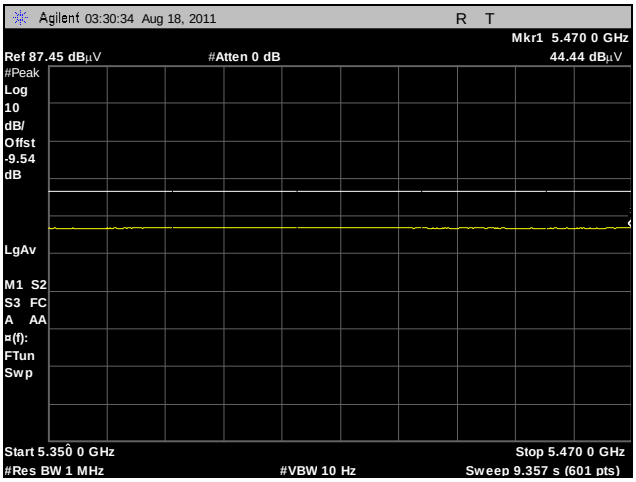
Plot 254. Radiated Restricted Band, 802.11n HT20, 5320 MHz, Average



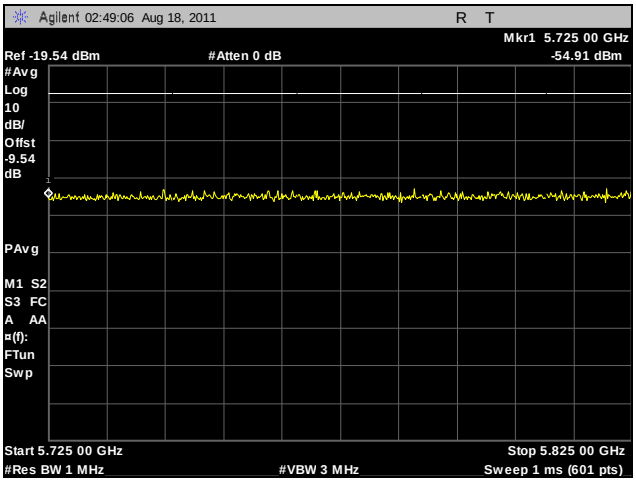
Plot 255. Radiated Band Edge, 802.11n HT20, 5500 MHz



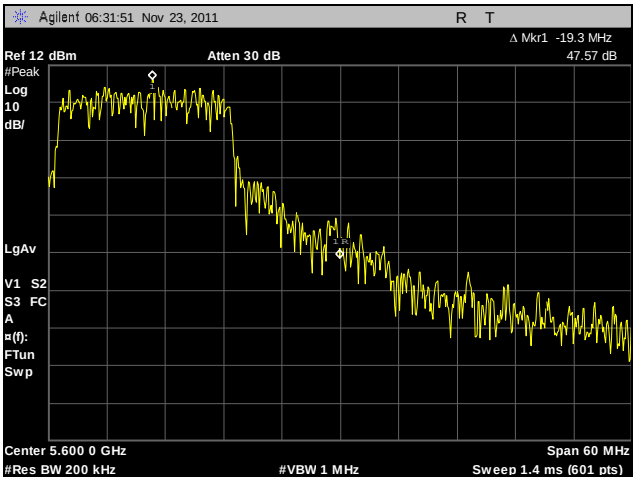
Plot 256. Radiated Restricted Band, 802.11n HT20, 5500 MHz, Peak



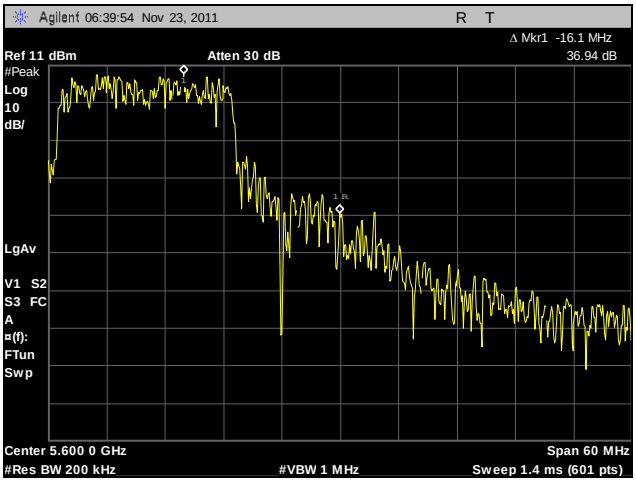
Plot 257. Radiated Restricted Band, 802.11n HT20, 5500 MHz, Average



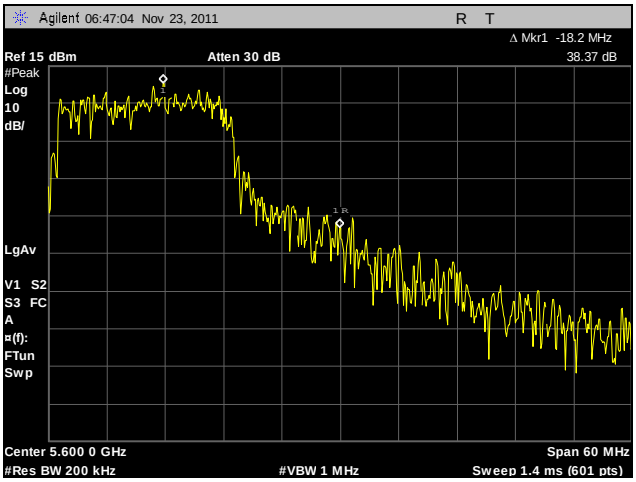
Plot 258. Radiated Band Edge, 802.11n HT20, 5700 MHz



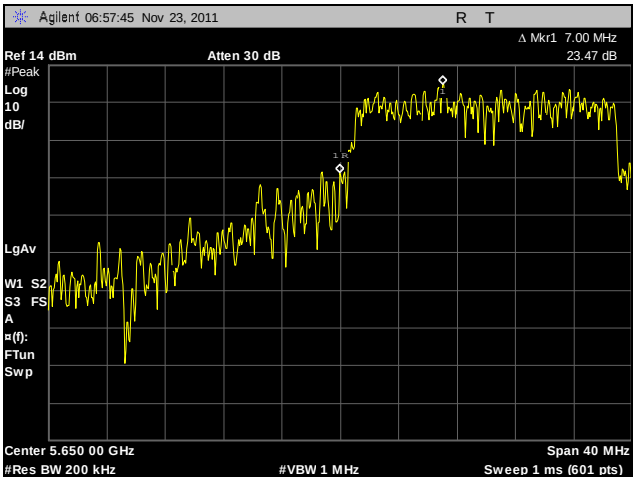
Plot 259. Radiated Band Edge, 802.11n HT20, 5580 MHz, Port A



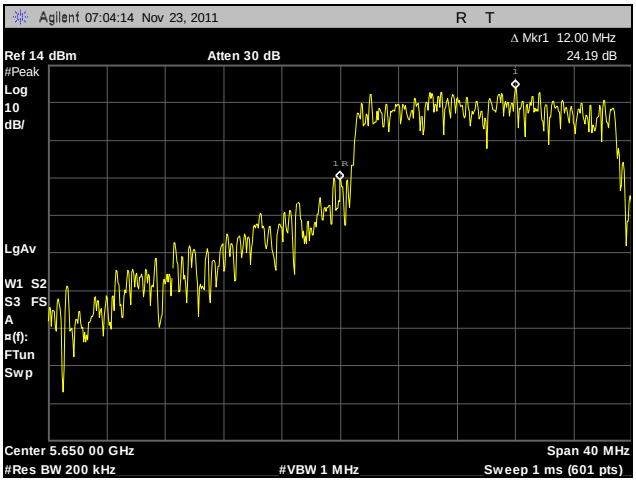
Plot 260. Radiated Band Edge, 802.11n HT20, 5580 MHz, Port B



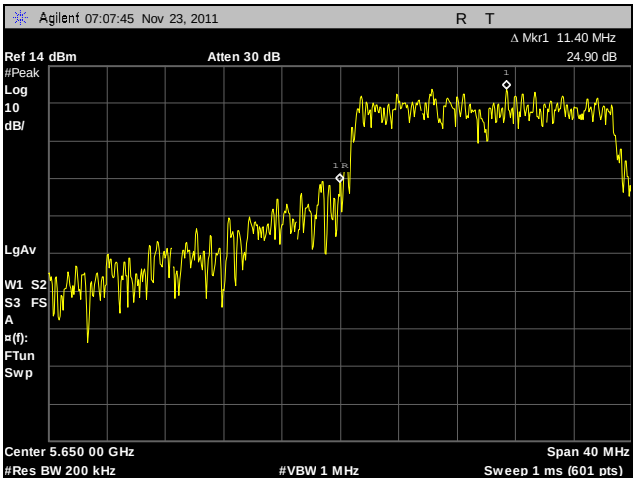
Plot 261. Radiated Band Edge, 802.11n HT20, 5580 MHz, Port C



Plot 262. Radiated Band Edge, 802.11n HT20, 5660 MHz, Port A

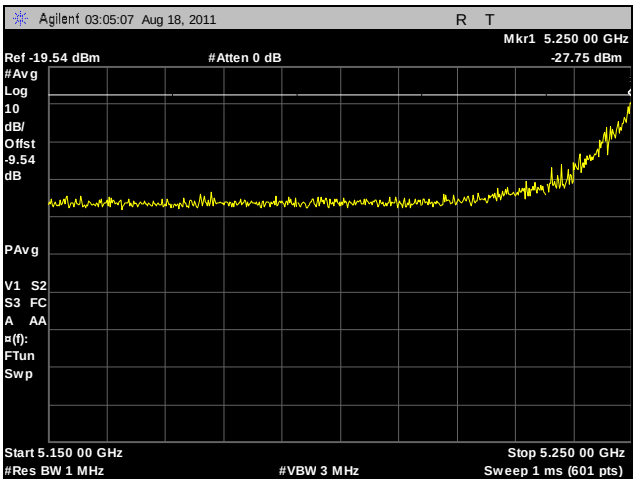


Plot 263. Radiated Band Edge, 802.11n HT20, 5660 MHz, Port B

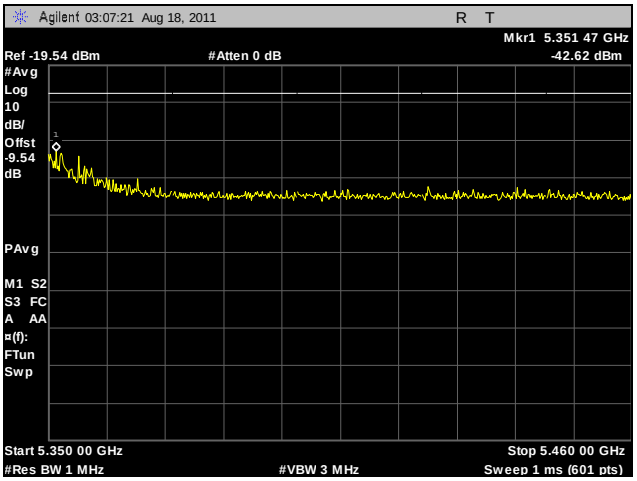


Plot 264. Radiated Band Edge, 802.11n HT20, 5660 MHz, Port C

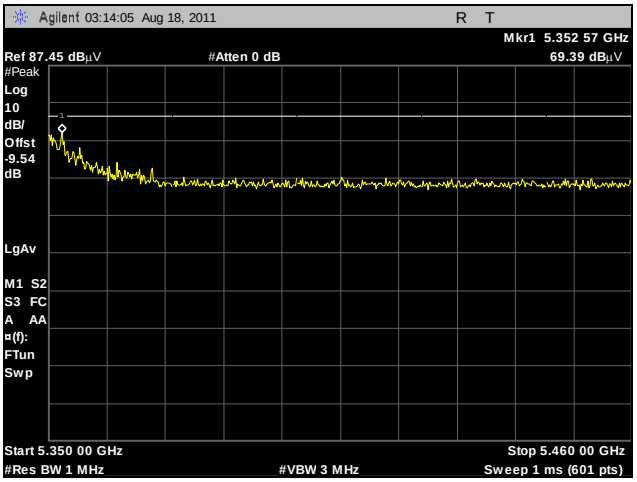
Radiated Band Edge Test Results, 802.11n HT40



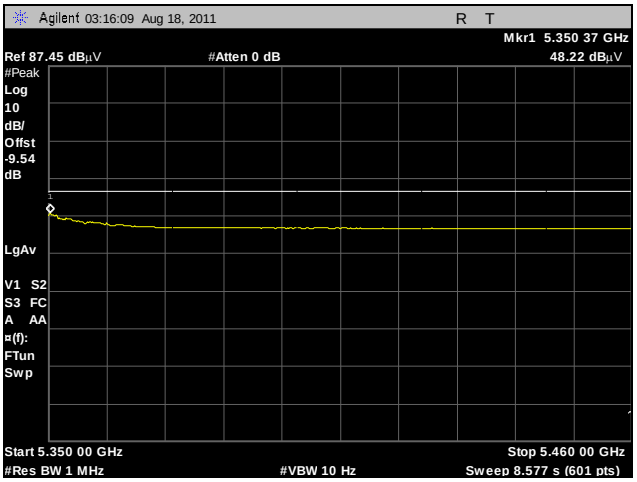
Plot 265. Radiated Band Edge, 802.11n HT40, 5270 MHz



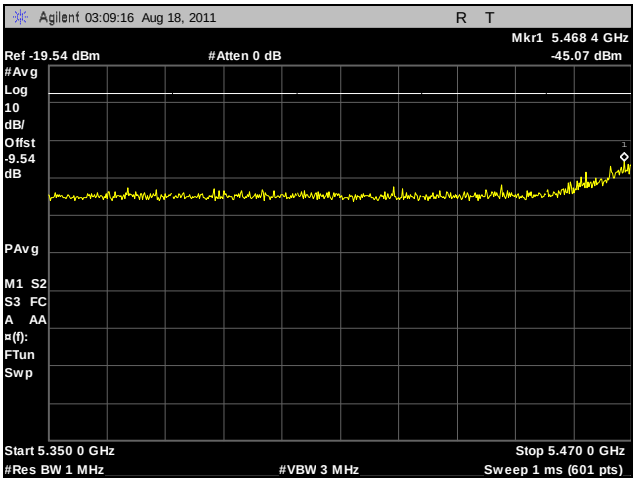
Plot 266. Radiated Band Edge, 802.11n HT40, 5320 MHz



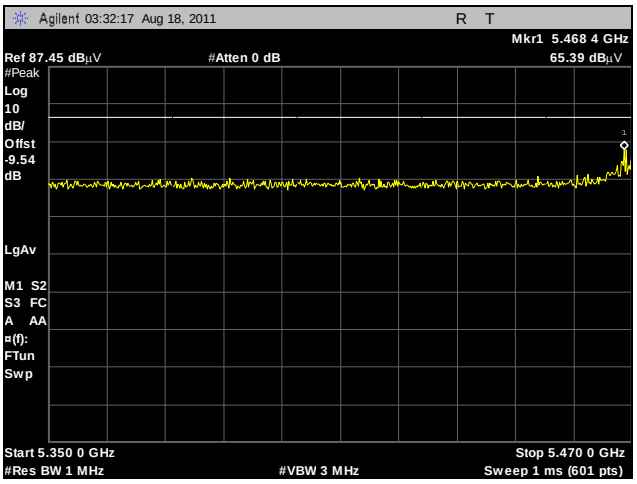
Plot 267. Radiated Restricted Band, 802.11n HT40, 5320 MHz, Peak



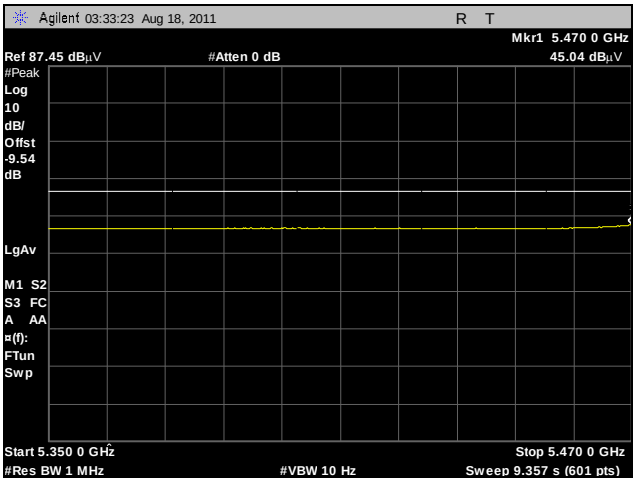
Plot 268. Radiated Restricted Band, 802.11n HT40, 5320 MHz, Average



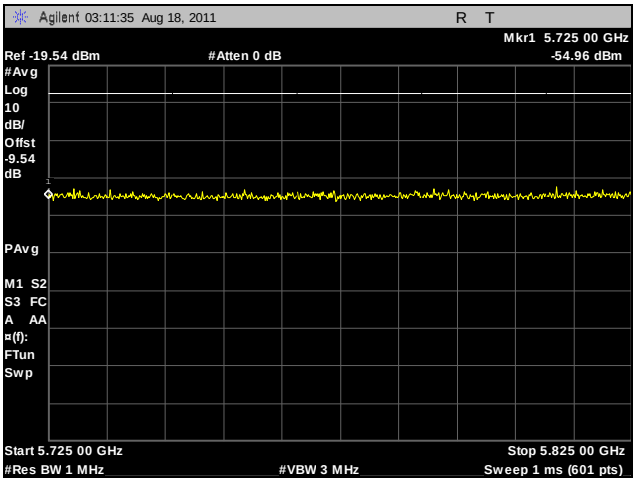
Plot 269. Radiated Band Edge, 802.11n HT40, 5510 MHz



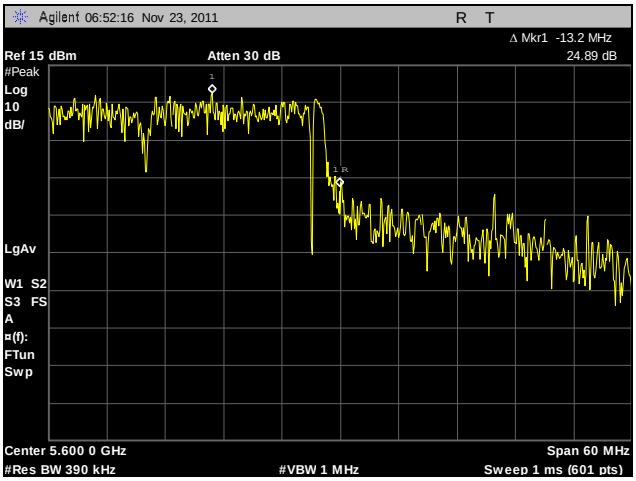
Plot 270. Radiated Restricted Band, 802.11n HT40, 5510 MHz, Peak



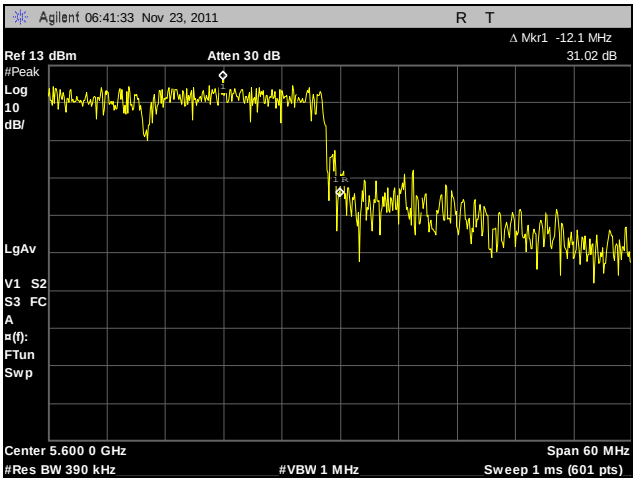
Plot 271. Radiated Restricted Band, 802.11n HT40, 5510 MHz, Average



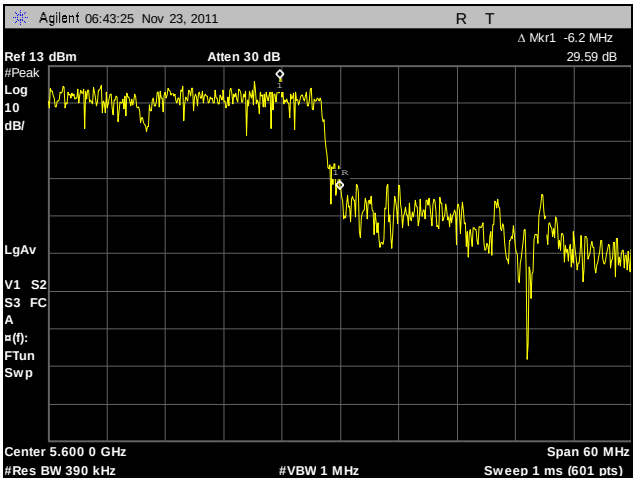
Plot 272. Radiated Band Edge, 802.11n HT40, 5670 MHz



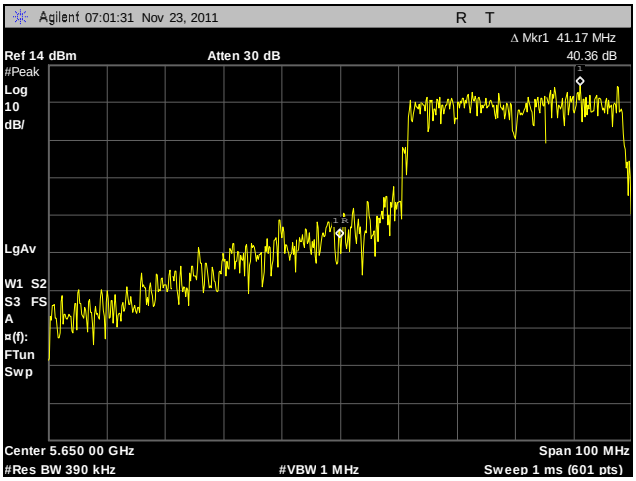
Plot 273. Radiated Band Edge, 802.11n HT40, 5580 MHz, Port A



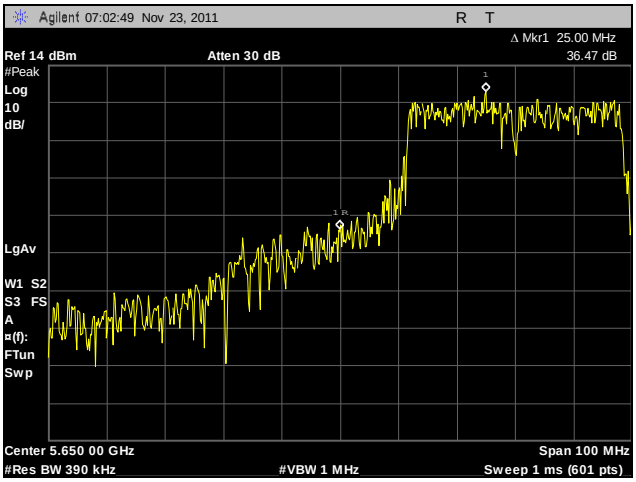
Plot 274. Radiated Band Edge, 802.11n HT40, 5580 MHz, Port B



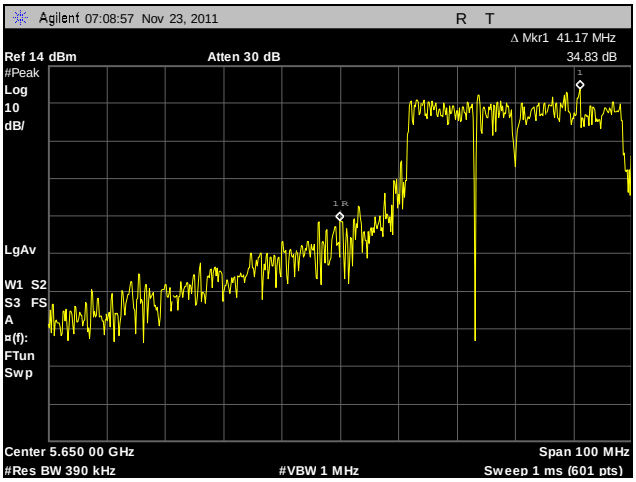
Plot 275. Radiated Band Edge, 802.11n HT40, 5580 MHz, Port C



Plot 276. Radiated Band Edge, 802.11n HT40, 5680 MHz, Port A



Plot 277. Radiated Band Edge, 802.11n HT40, 5680 MHz, Port B



Plot 278. Radiated Band Edge, 802.11n HT40, 5680 MHz, Port C

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(g) Frequency Stability

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

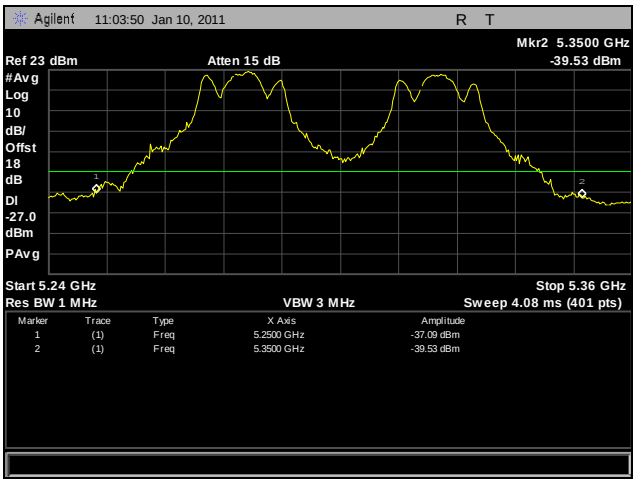
Test Procedure: The EUT was connected directly to a spectrum analyzer through a attenuator. The resolution band width of the spectrum analyzer was set to 100 KHz. A delta marker was used to verify that the carrier's peak to band edge remained at least 20dBc.

Test Results: The EUT was compliant with the requirements of **§15.407(g)**.

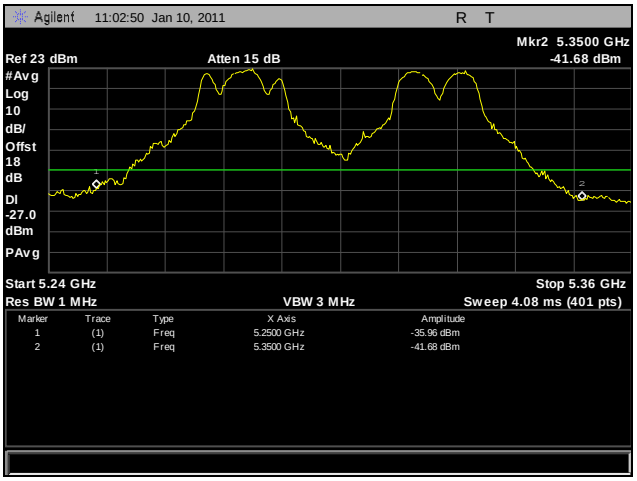
Test Engineer(s): Dan Youngcourt

Test Date(s): 01/11/11

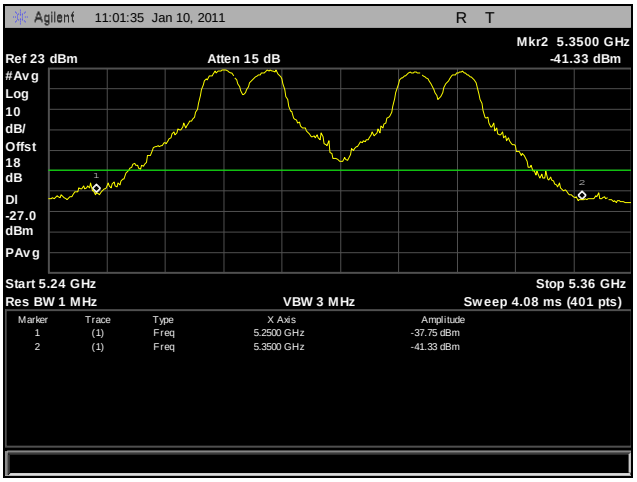
Frequency Stability Test Results



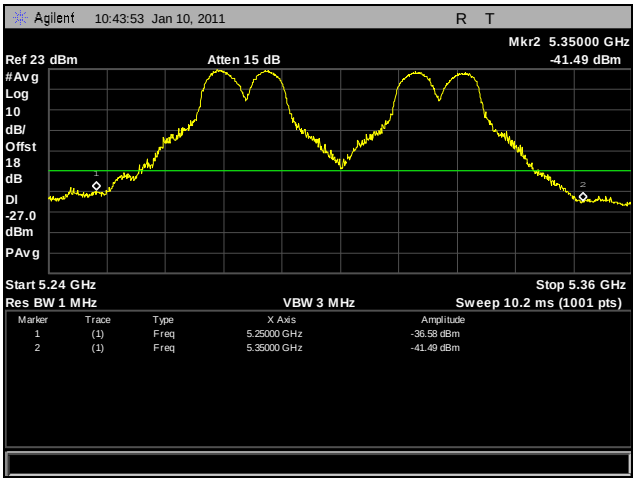
Plot 279. Frequency Stability, -40°C for 5250 MHz – 5350 MHz at 102 VAC



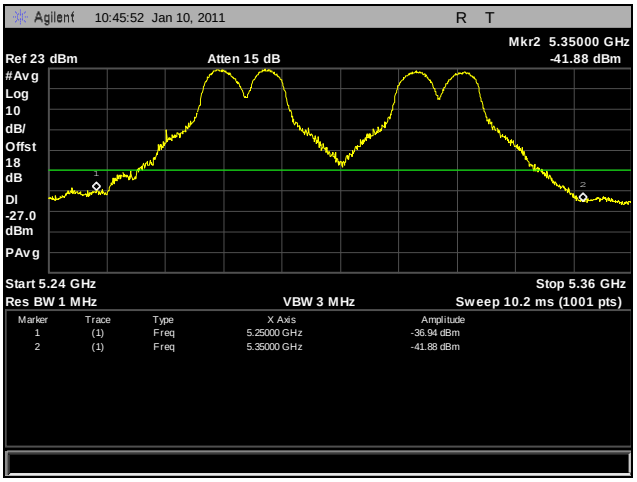
Plot 280. Frequency Stability, -40°C for 5250 MHz – 5350 MHz at 120 VAC



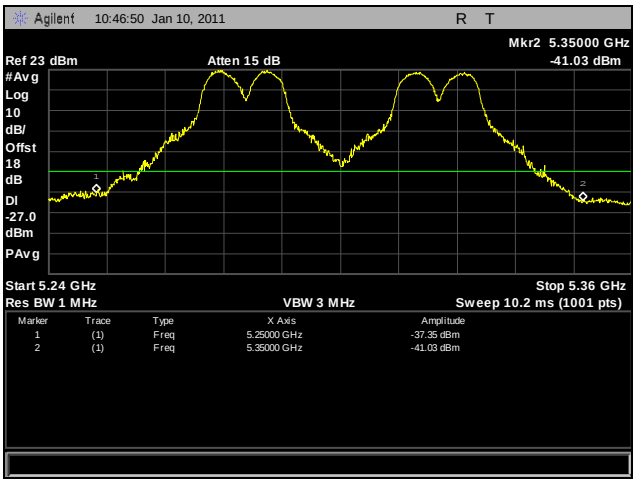
Plot 281. Frequency Stability, -40°C for 5250 MHz – 5350 MHz at 138 VAC



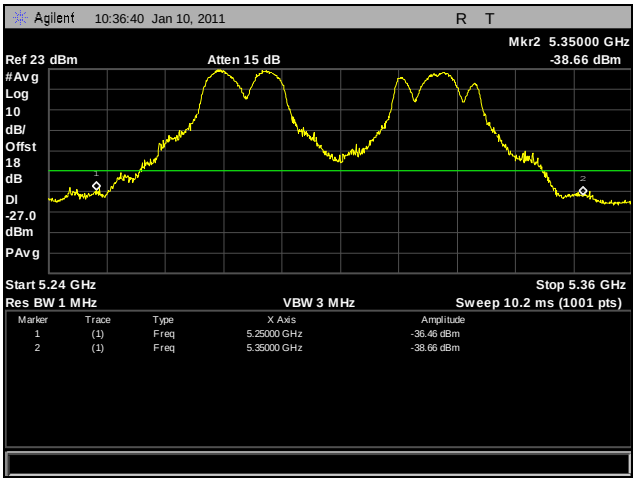
Plot 282. Frequency Stability, -30°C for 5250 MHz – 5350 MHz at 102 VAC



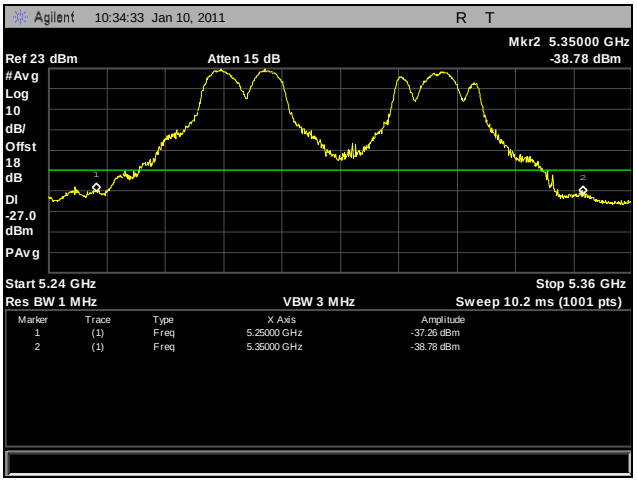
Plot 283. Frequency Stability, -30°C for 5250 MHz – 5350 MHz at 120 VAC



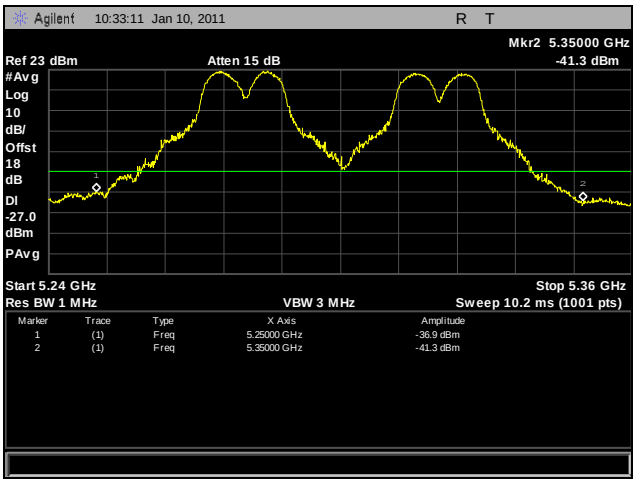
Plot 284. Frequency Stability, -30°C for 5250 MHz – 5350 MHz at 138 VAC



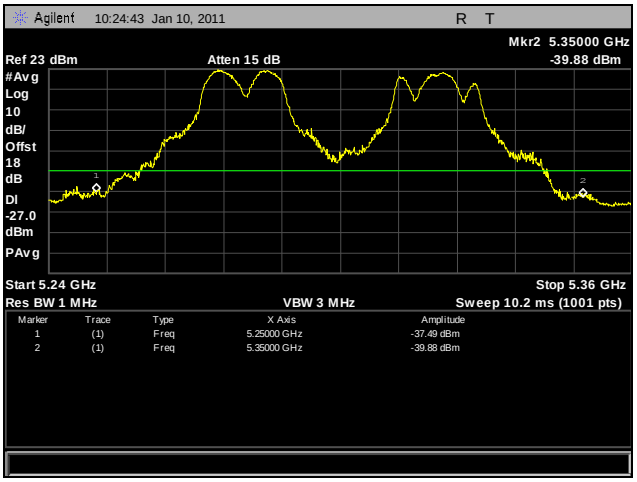
Plot 285. Frequency Stability, -20°C for 5250 MHz – 5350 MHz at 102 VAC



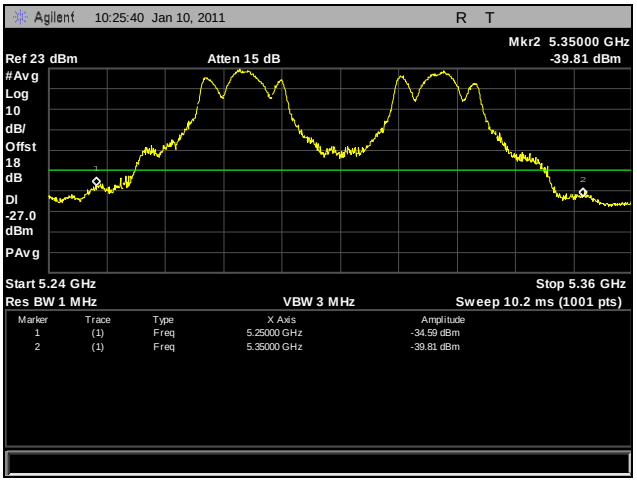
Plot 286. Frequency Stability, -20°C for 5250 MHz – 5350 MHz at 120 VAC



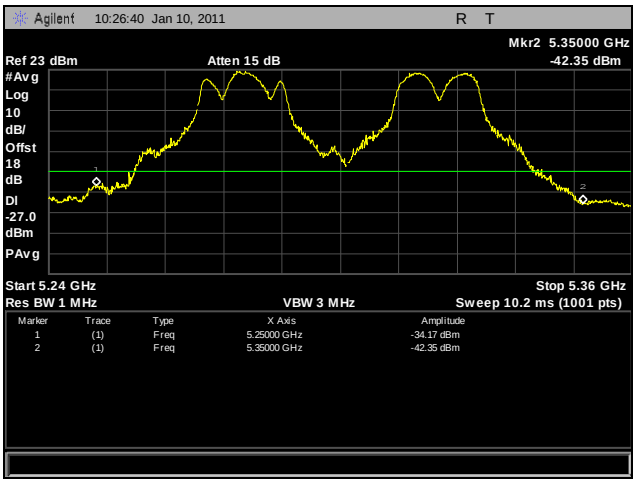
Plot 287. Frequency Stability, -20°C for 5250 MHz – 5350 MHz at 138 VAC



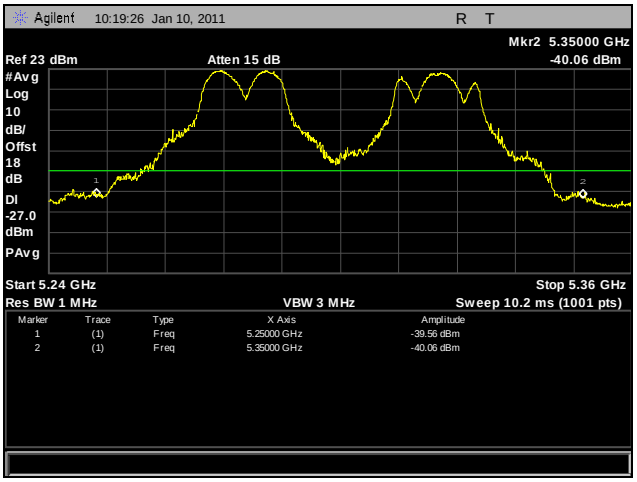
Plot 288. Frequency Stability, -10°C for 5250 MHz – 5350 MHz at 102 VAC



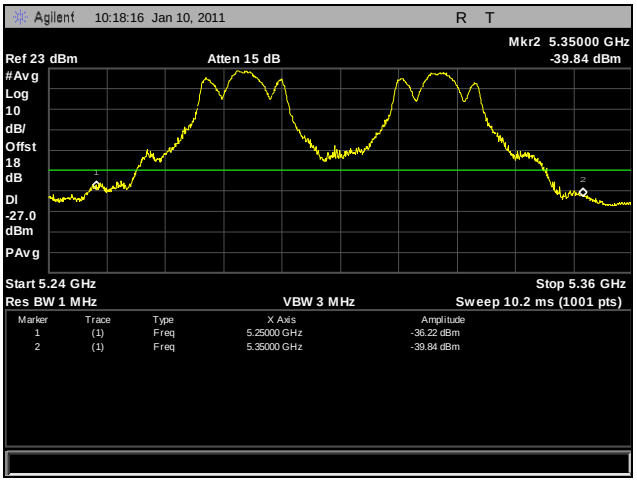
Plot 289. Frequency Stability, -10°C for 5250 MHz – 5350 MHz at 120 VAC



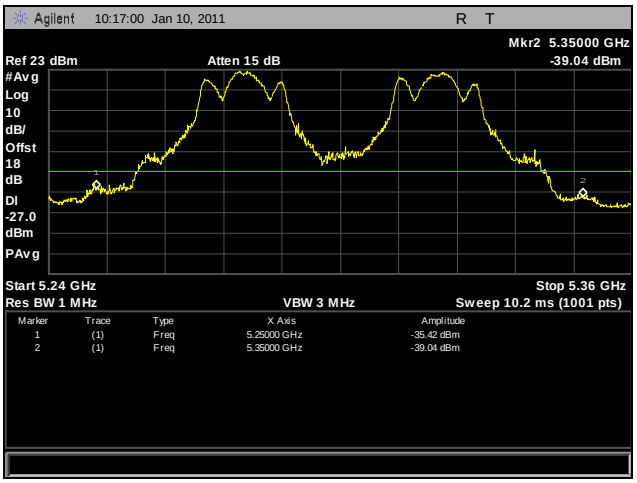
Plot 290. Frequency Stability, -10°C for 5250 MHz – 5350 MHz at 138 VAC



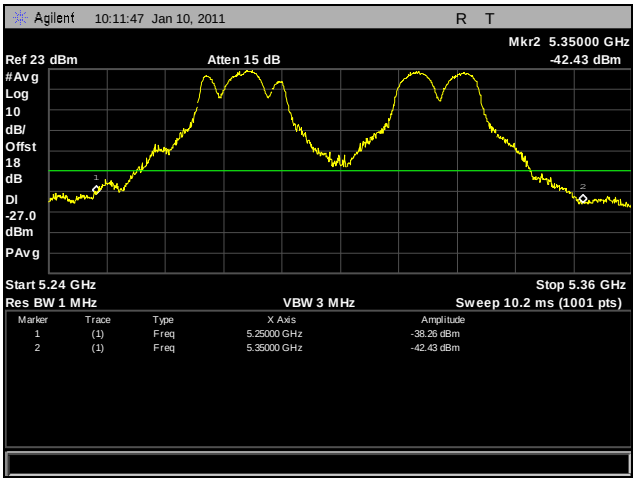
Plot 291. Frequency Stability, 0°C for 5250 MHz – 5350 MHz at 102 VAC



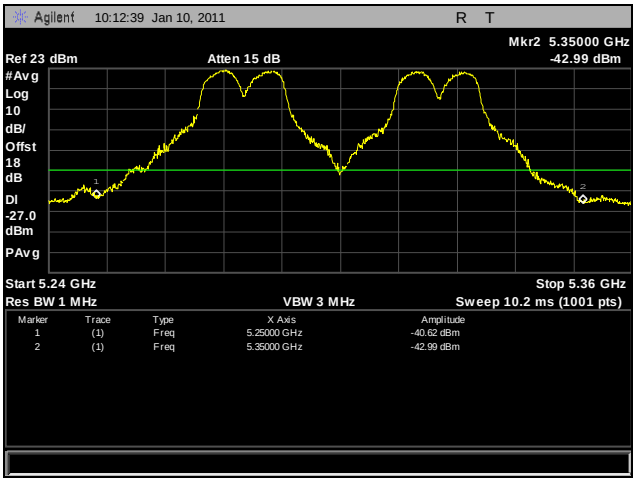
Plot 292. Frequency Stability, 0°C for 5250 MHz – 5350 MHz at 120 VAC



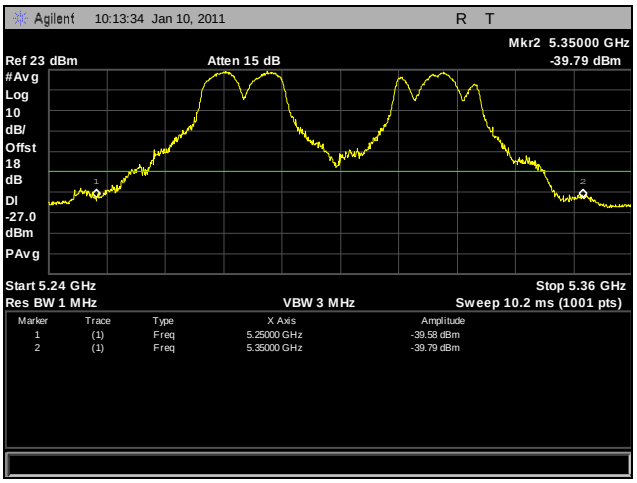
Plot 293. Frequency Stability, 0°C for 5250 MHz – 5350 MHz at 138 VAC



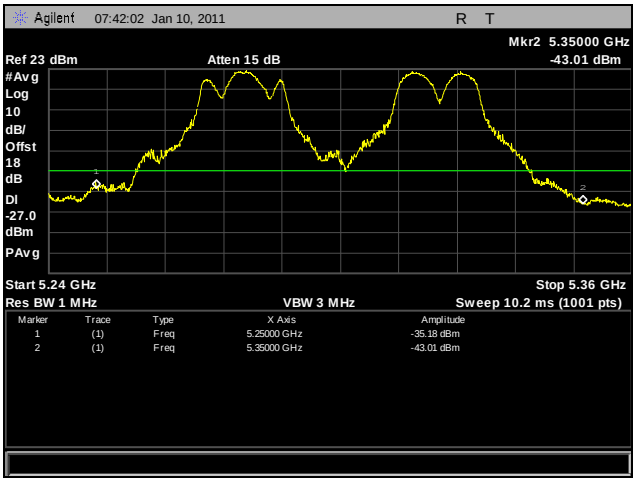
Plot 294. Frequency Stability, 10°C for 5250 MHz – 5350 MHz at 102 VAC



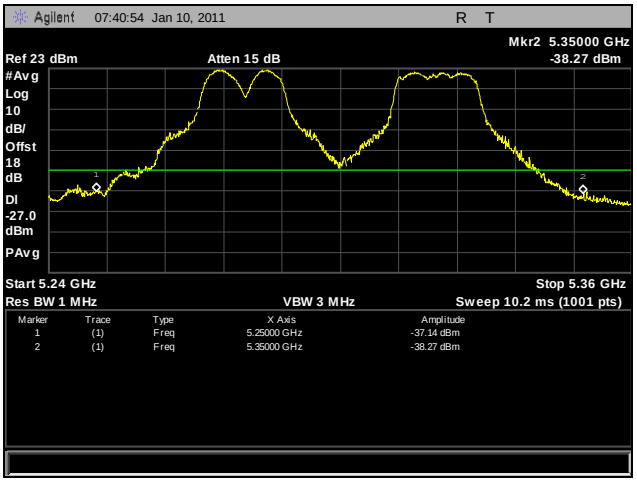
Plot 295. Frequency Stability, 10°C for 5250 MHz – 5350 MHz at 120 VAC



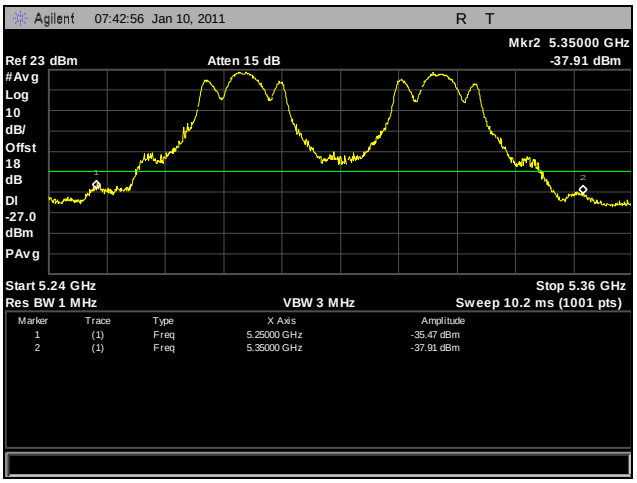
Plot 296. Frequency Stability, 10°C for 5250 MHz – 5350 MHz at 138 VAC



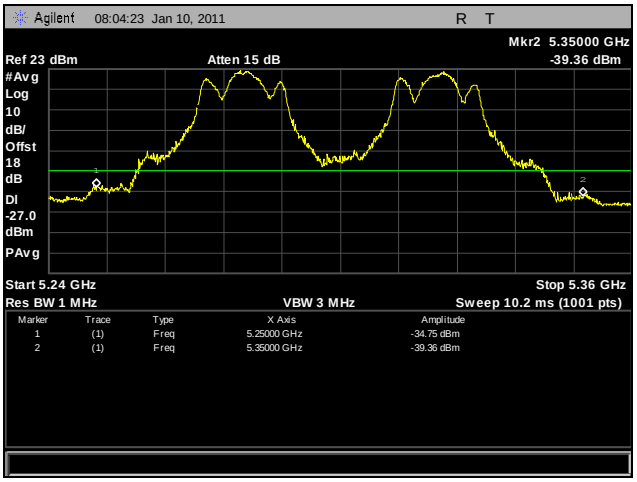
Plot 297. Frequency Stability, 20°C for 5250 MHz – 5350 MHz at 102 VAC



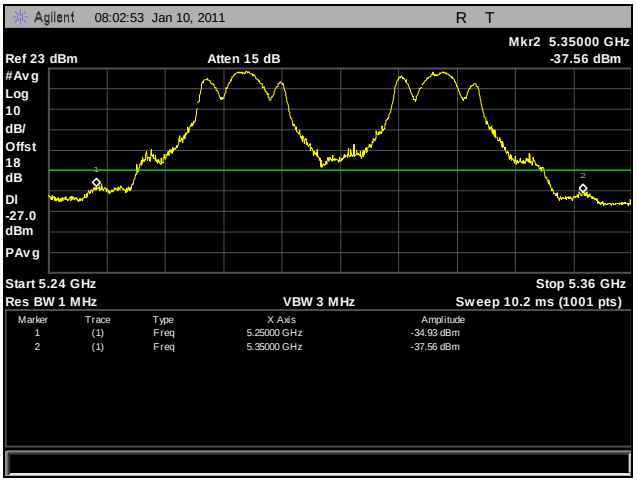
Plot 298. Frequency Stability, 20°C for 5250 MHz – 5350 MHz at 120 VAC



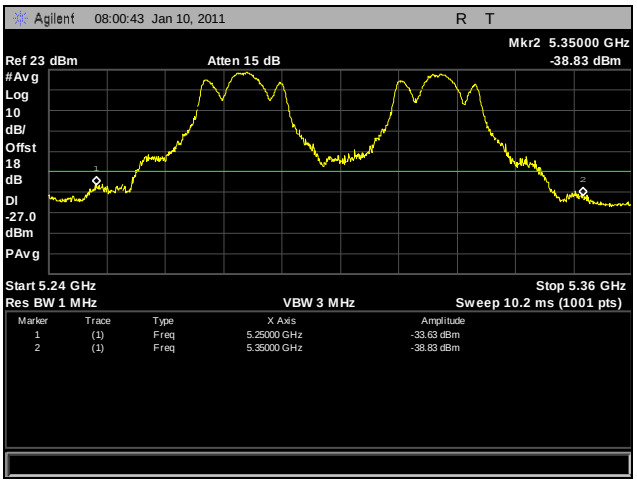
Plot 299. Frequency Stability, 20°C for 5250 MHz – 5350 MHz at 138 VAC



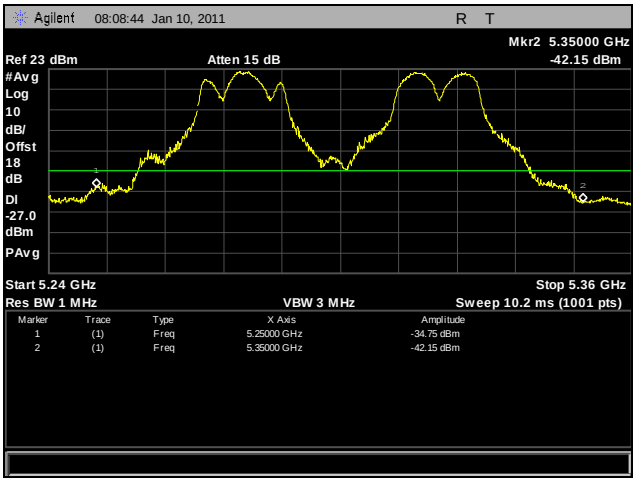
Plot 300. Frequency Stability, 30°C for 5250 MHz – 5350 MHz at 102 VAC



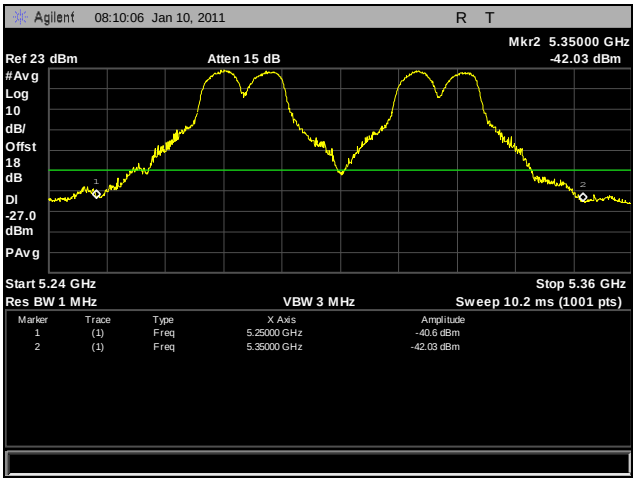
Plot 301. Frequency Stability, 30°C for 5250 MHz – 5350 MHz at 120 VAC



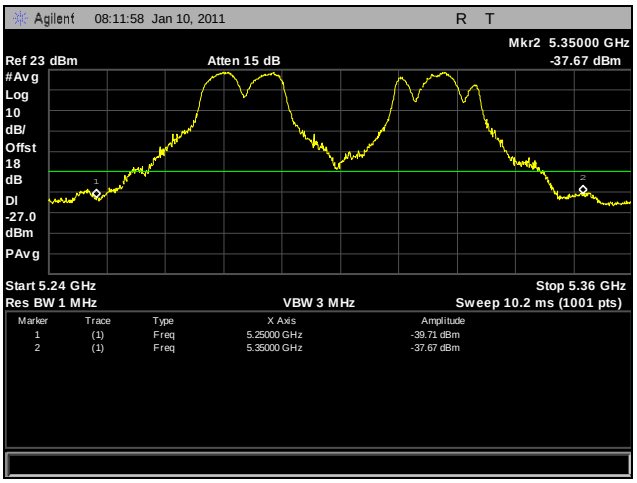
Plot 302. Frequency Stability, 30°C for 5250 MHz – 5350 MHz at 138 VAC



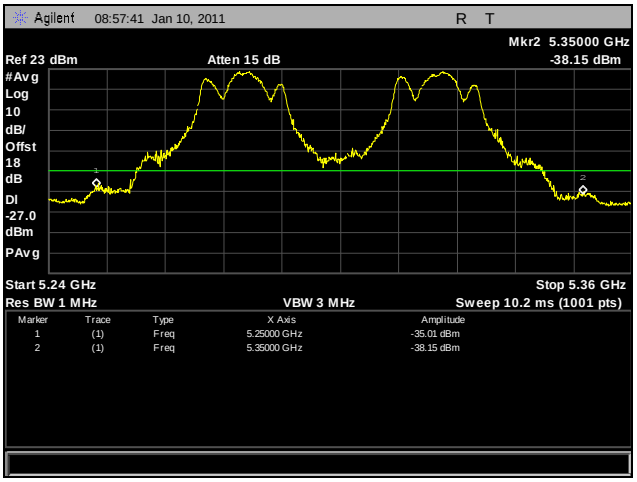
Plot 303. Frequency Stability, 40°C for 5250 MHz – 5350 MHz at 102 VAC



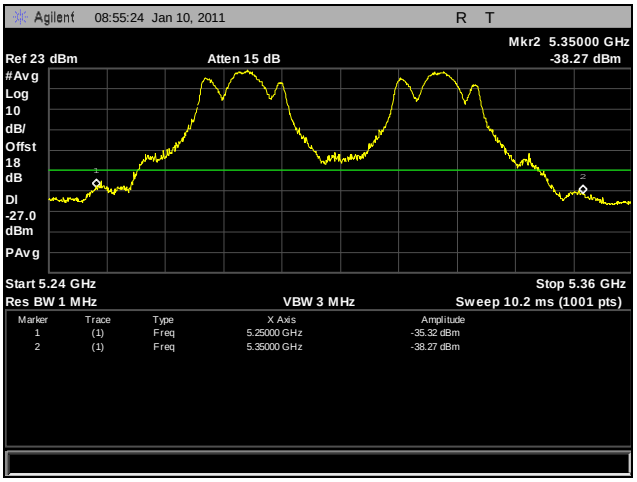
Plot 304. Frequency Stability, 40°C for 5250 MHz – 5350 MHz at 120 VAC



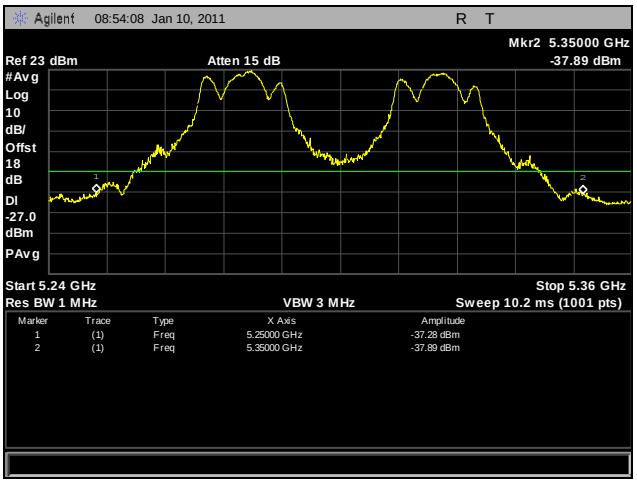
Plot 305. Frequency Stability, 40°C for 5250 MHz – 5350 MHz at 138 VAC



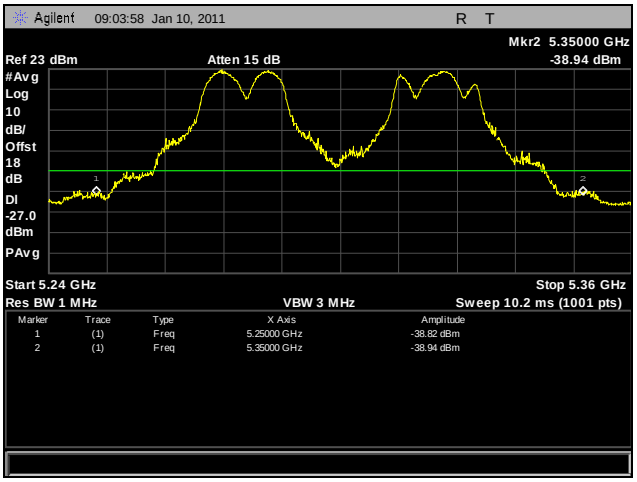
Plot 306. Frequency Stability, 50°C for 5250 MHz – 5350 MHz at 102 VAC



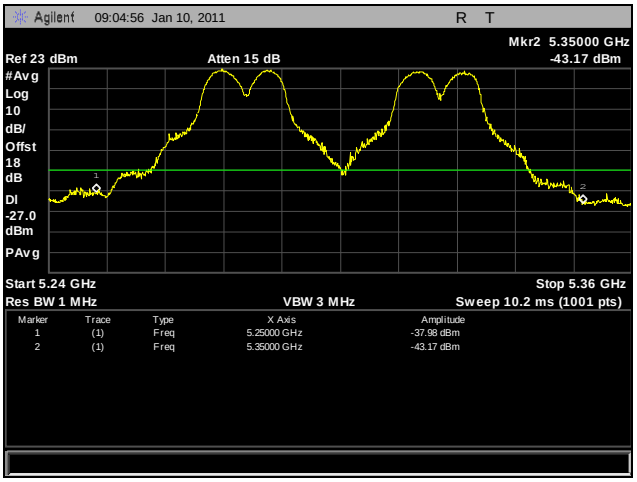
Plot 307. Frequency Stability, 50°C for 5250 MHz – 5350 MHz at 120 VAC



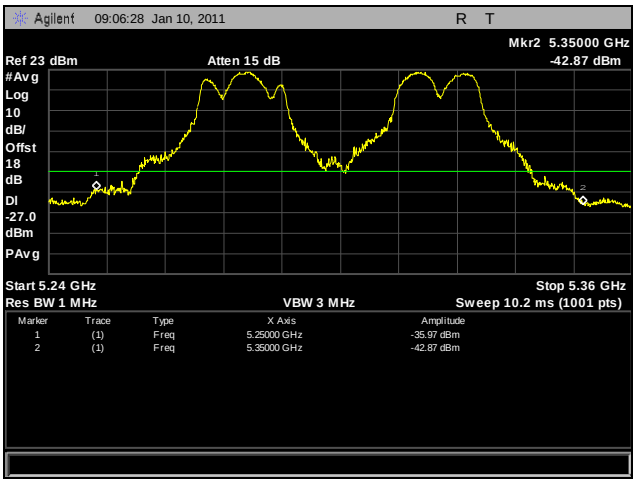
Plot 308. Frequency Stability, 50°C for 5250 MHz – 5350 MHz at 138 VAC



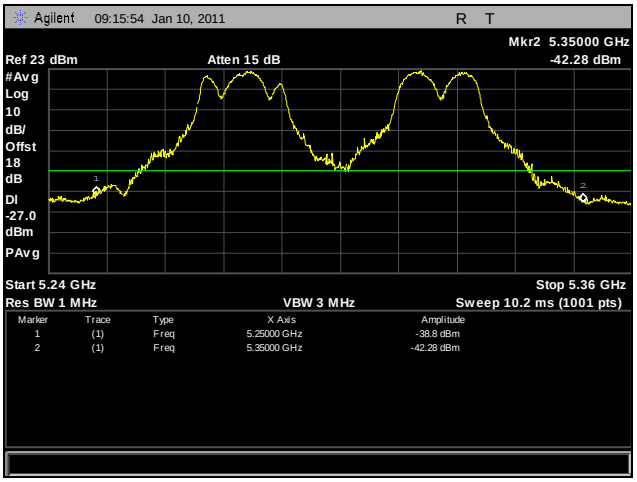
Plot 309. Frequency Stability, 60°C for 5250 MHz – 5350 MHz at 102 VAC



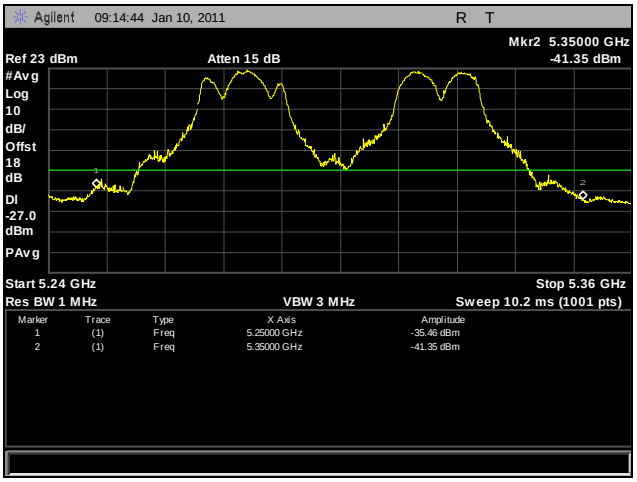
Plot 310. Frequency Stability, 60°C for 5250 MHz – 5350 MHz at 120 VAC



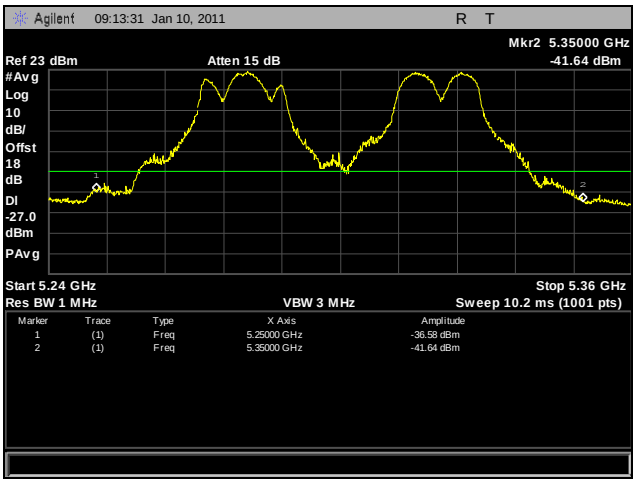
Plot 311. Frequency Stability, 60°C for 5250 MHz – 5350 MHz at 138 VAC



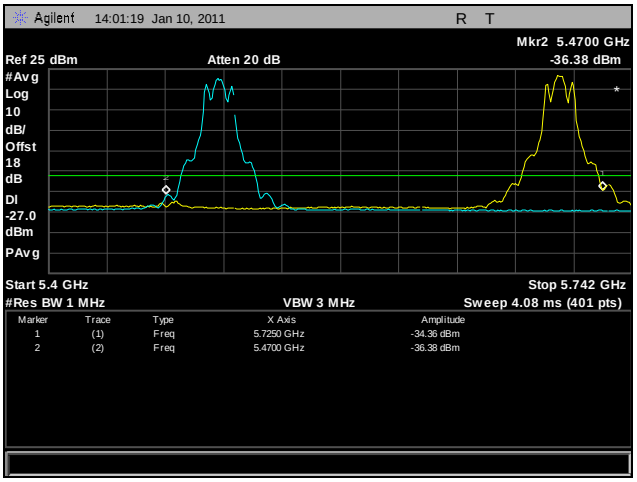
Plot 312. Frequency Stability, 70°C for 5250 MHz – 5350 MHz at 102 VAC



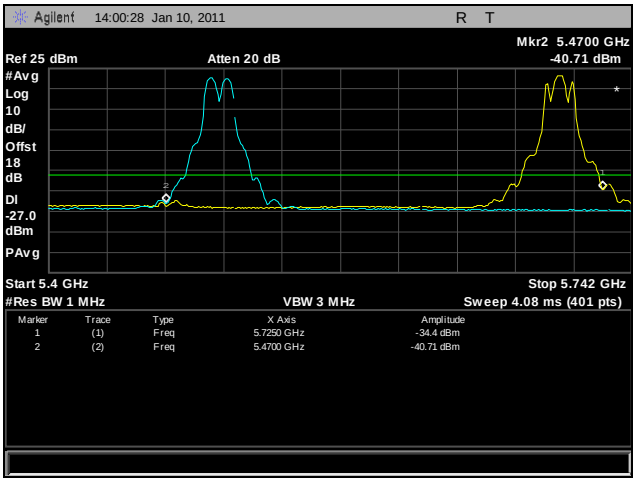
Plot 313. Frequency Stability, 70°C for 5250 MHz – 5350 MHz at 120 VAC



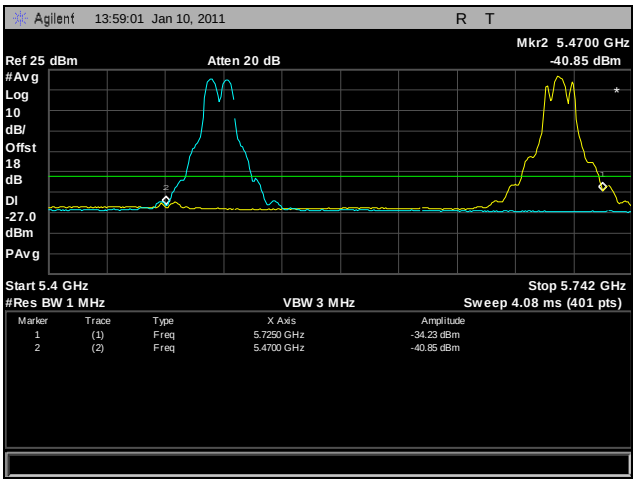
Plot 314. Frequency Stability, 70°C for 5250 MHz – 5350 MHz at 138 VAC



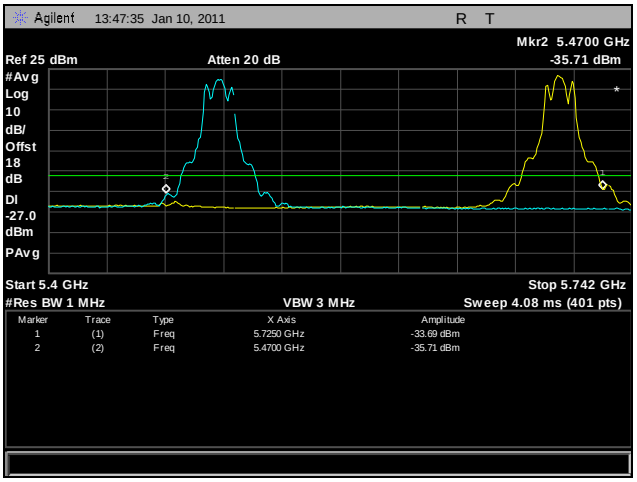
Plot 315. Frequency Stability, -40°C for 5470 MHz - 5725 MHz at 102 VAC



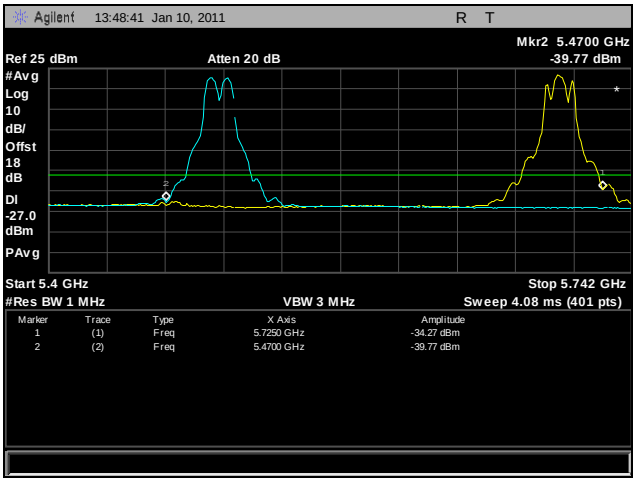
Plot 316. Frequency Stability, -40°C for 5470 MHz - 5725 MHz at 120 VAC



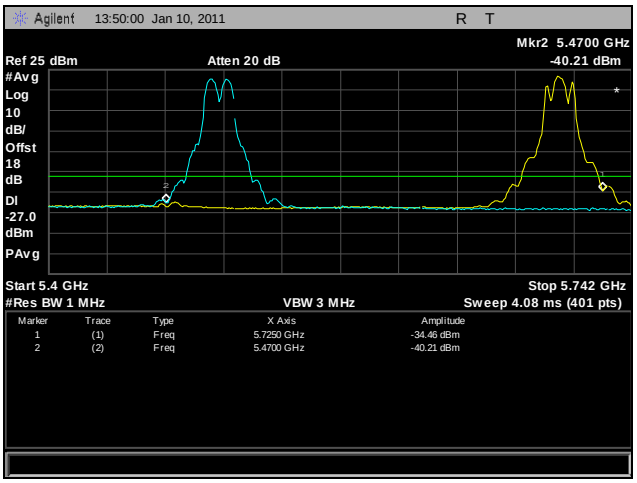
Plot 317. Frequency Stability, -40°C for 5470 MHz - 5725 MHz at 138 VAC



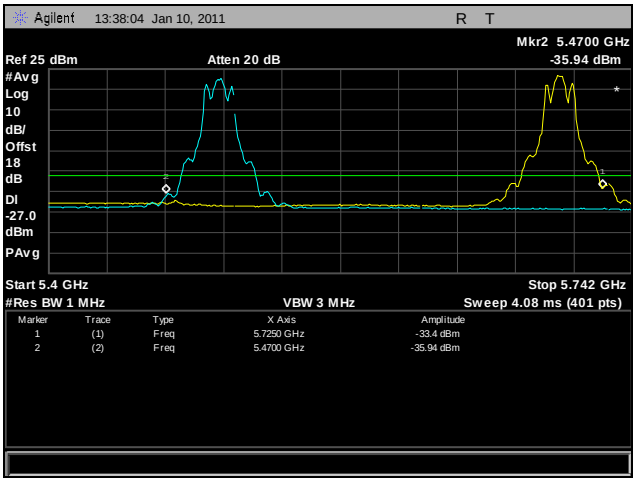
Plot 318. Frequency Stability, -30°C for 5470 MHz - 5725 MHz at 102 VAC



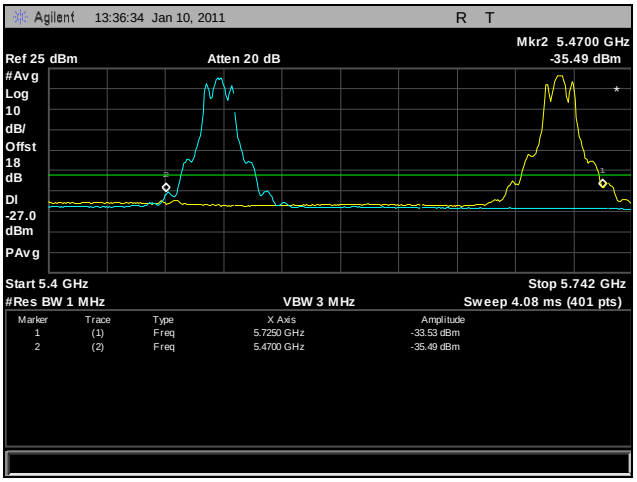
Plot 319. Frequency Stability, -30°C for 5470 MHz - 5725 MHz at 120 VAC



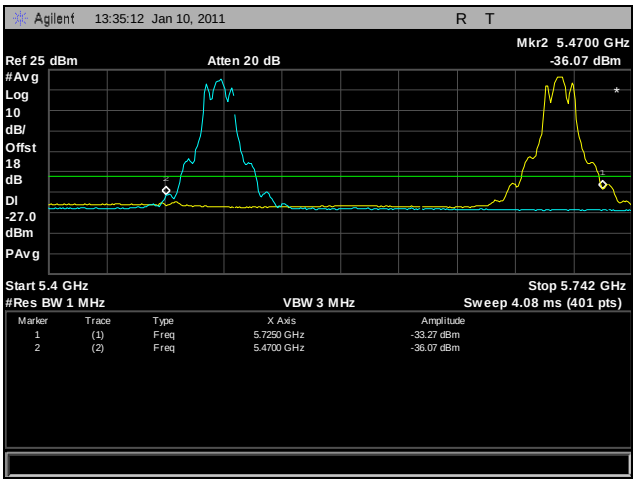
Plot 320. Frequency Stability, -30°C for 5470 MHz - 5725 MHz at 138 VAC



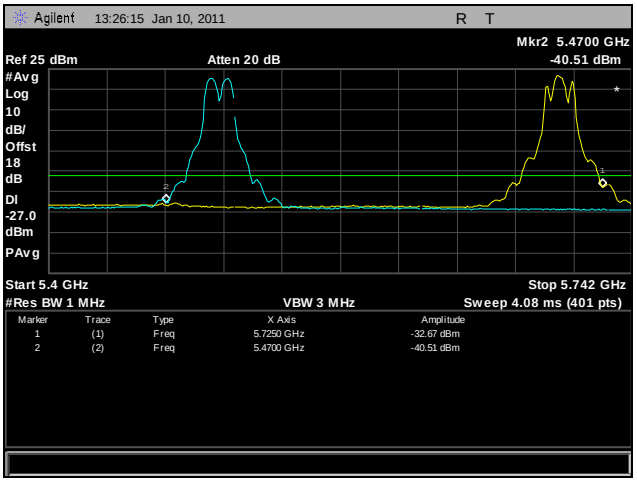
Plot 321. Frequency Stability, -20°C for 5470 MHz - 5725 MHz at 102 VAC



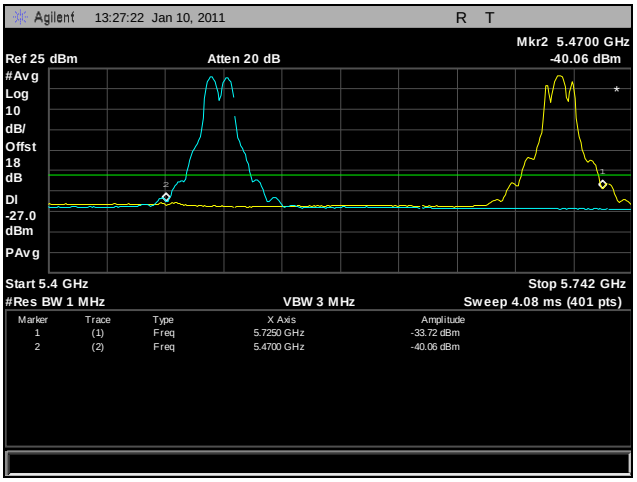
Plot 322. Frequency Stability, -20°C for 5470 MHz - 5725 MHz at 120 VAC



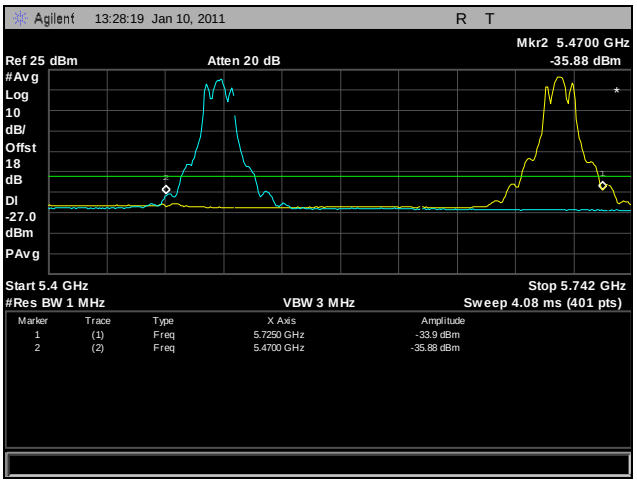
Plot 323. Frequency Stability, -20°C for 5470 MHz - 5725 MHz at 138 VAC



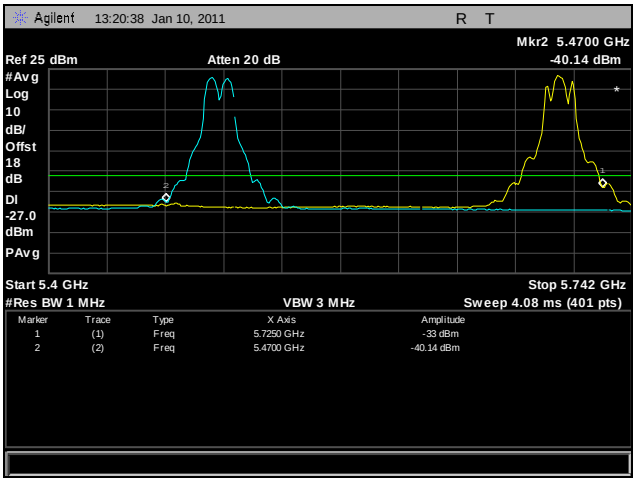
Plot 324. Frequency Stability, -10°C for 5470 MHz - 5725 MHz at 102 VAC



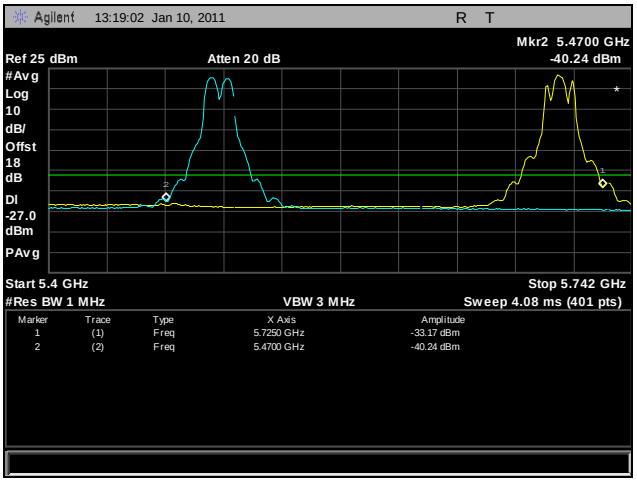
Plot 325. Frequency Stability, -10°C for 5470 MHz - 5725 MHz at 120 VAC



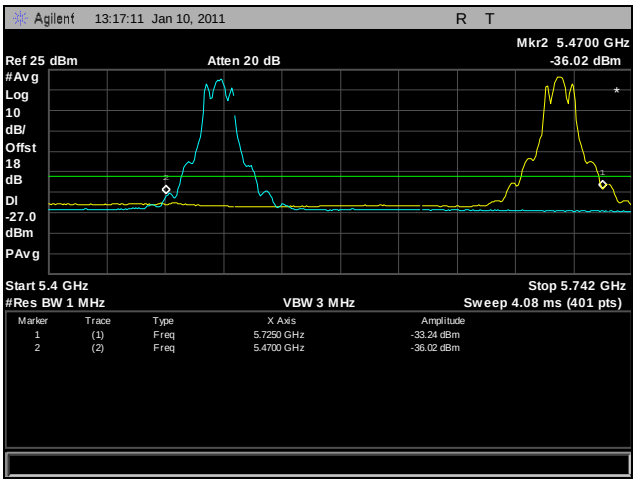
Plot 326. Frequency Stability, -10°C for 5470 MHz - 5725 MHz at 138 VAC



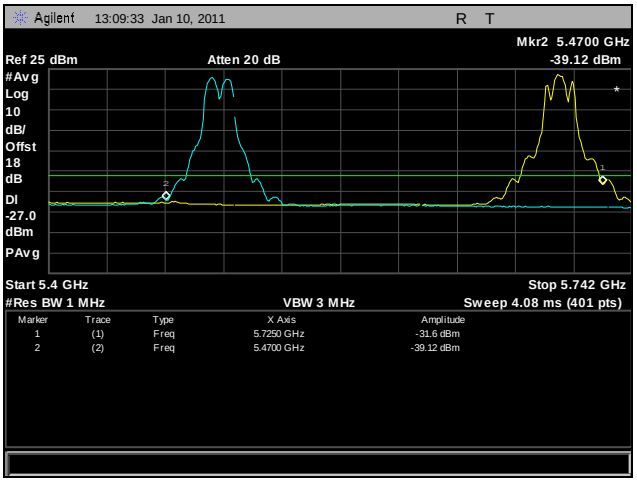
Plot 327. Frequency Stability, 0°C for 5470 MHz - 5725 MHz at 102 VAC



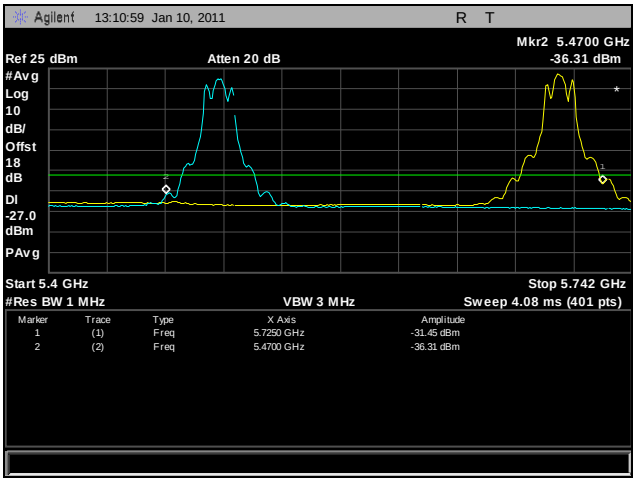
Plot 328. Frequency Stability, 0°C for 5470 MHz - 5725 MHz at 120 VAC



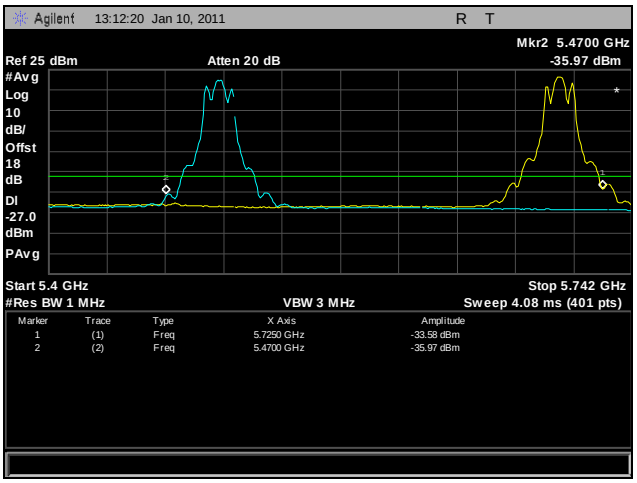
Plot 329. Frequency Stability, 0°C for 5470 MHz - 5725 MHz at 138 VAC



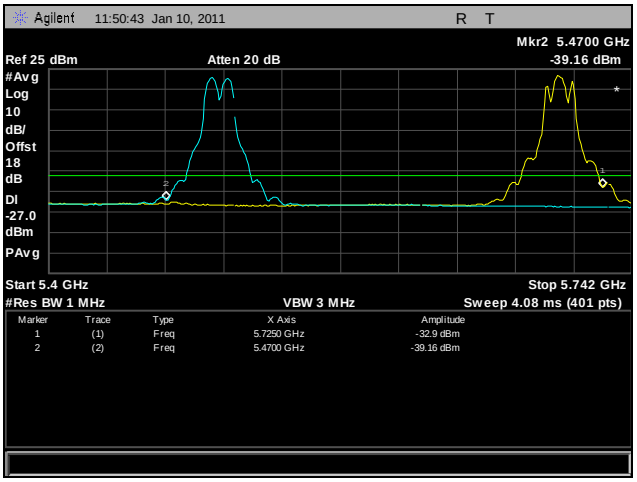
Plot 330. Frequency Stability, 10°C for 5470 MHz - 5725 MHz at 102 VAC



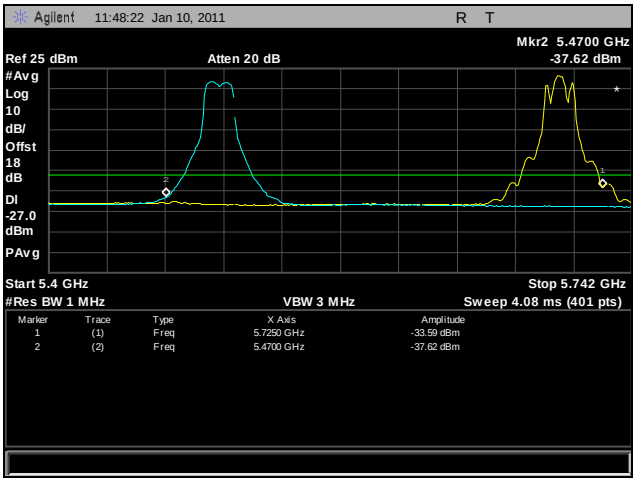
Plot 331. Frequency Stability, 10°C for 5470 MHz - 5725 MHz at 120 VAC



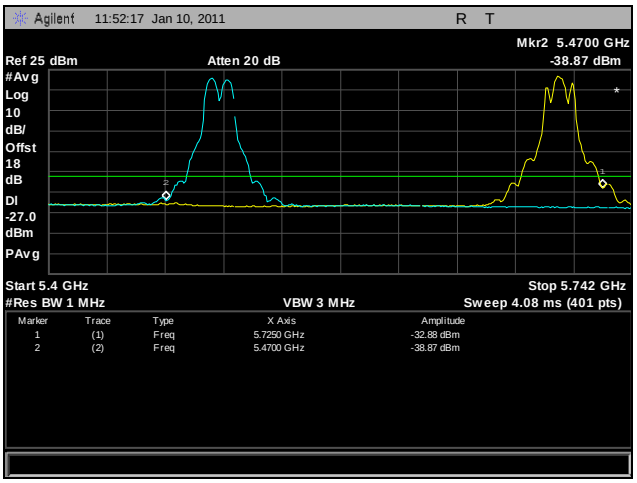
Plot 332. Frequency Stability, 10°C for 5470 MHz - 5725 MHz at 138 VAC



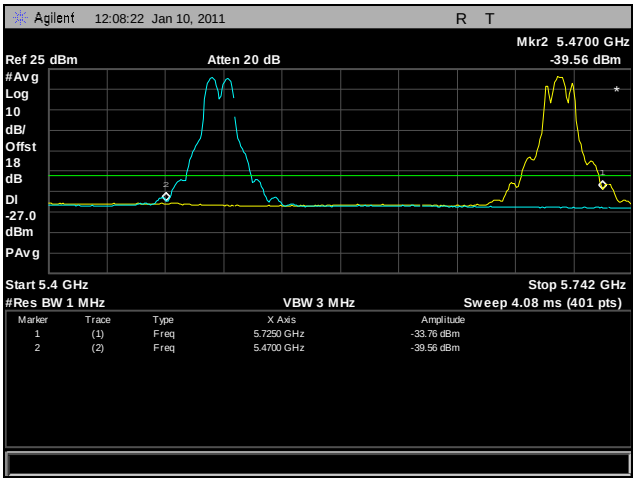
Plot 333. Frequency Stability, 20°C for 5470 MHz - 5725 MHz at 102 VAC



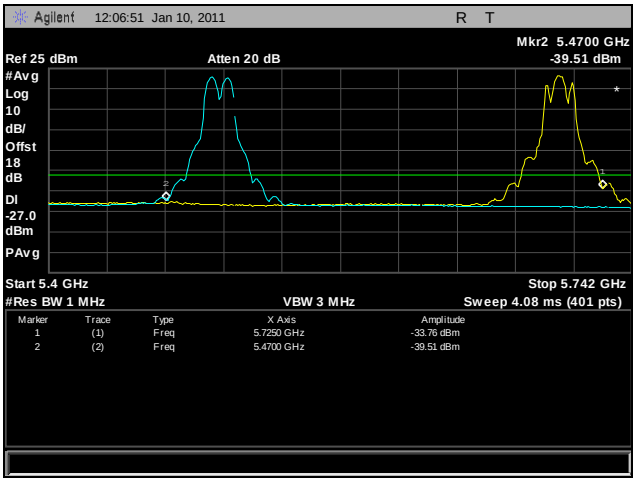
Plot 334. Frequency Stability, 20°C for 5470 MHz - 5725 MHz at 120 VAC



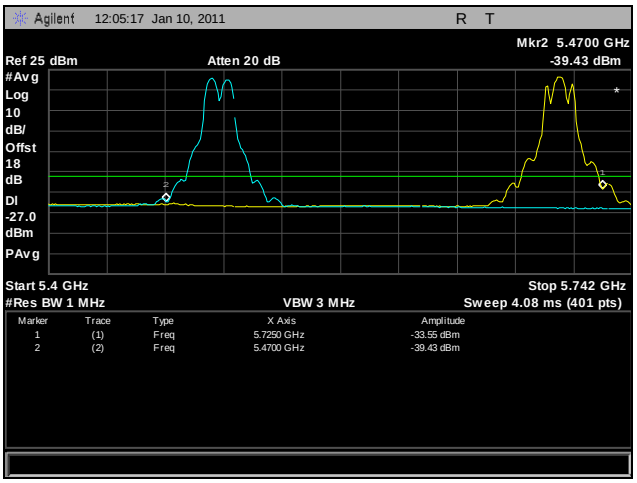
Plot 335. Frequency Stability, 20°C for 5470 MHz - 5725 MHz at 138 VAC



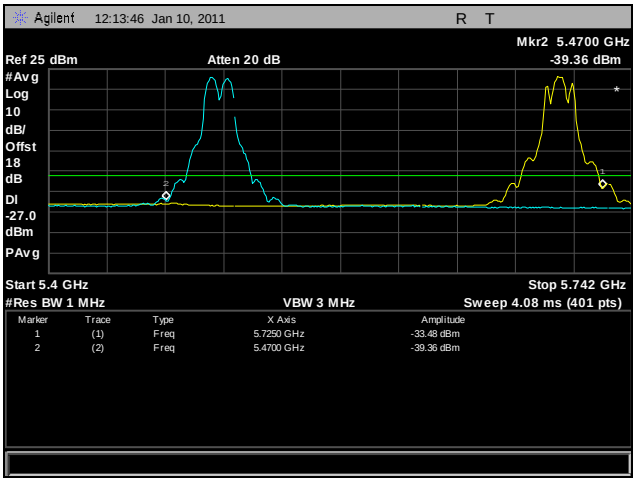
Plot 336. Frequency Stability, 30°C for 5470 MHz - 5725 MHz at 102 VAC



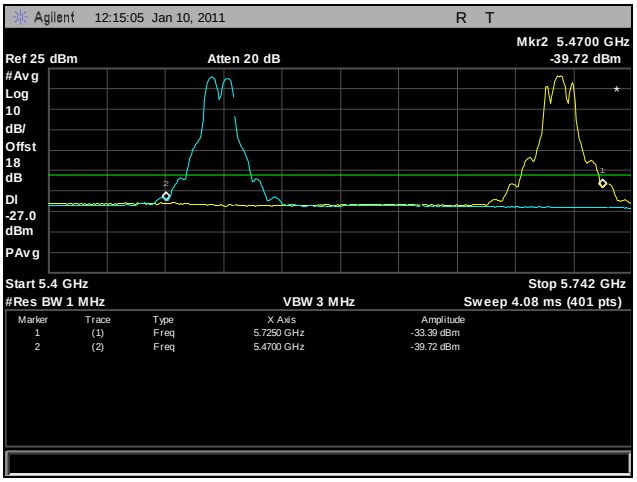
Plot 337. Frequency Stability, 30°C for 5470 MHz - 5725 MHz at 120 VAC



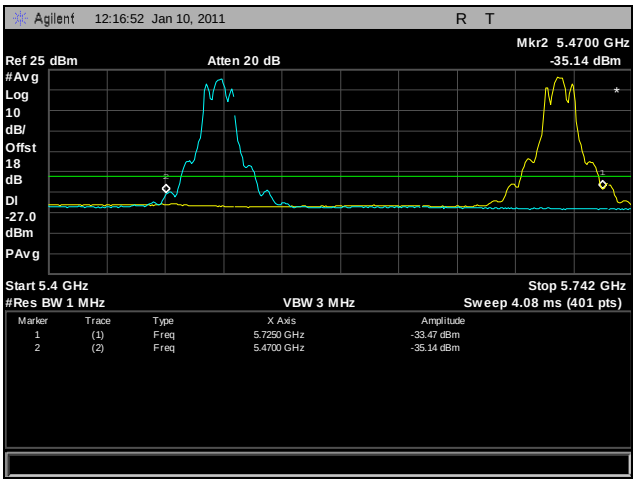
Plot 338. Frequency Stability, 30°C for 5470 MHz - 5725 MHz at 138 VAC



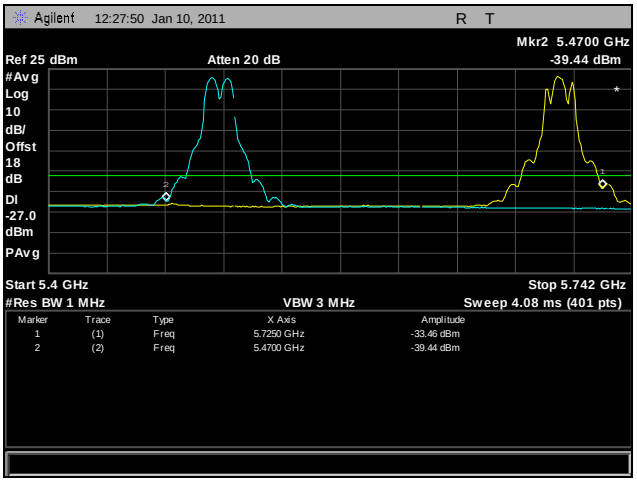
Plot 339. Frequency Stability, 40°C for 5470 MHz - 5725 MHz at 102 VAC



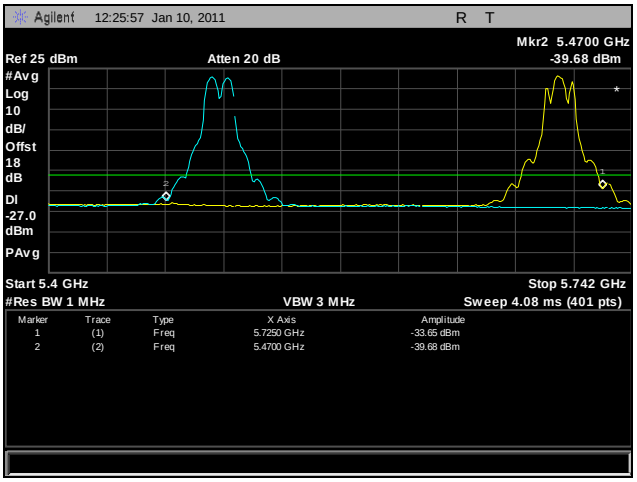
Plot 340. Frequency Stability, 40°C for 5470 MHz - 5725 MHz at 120 VAC



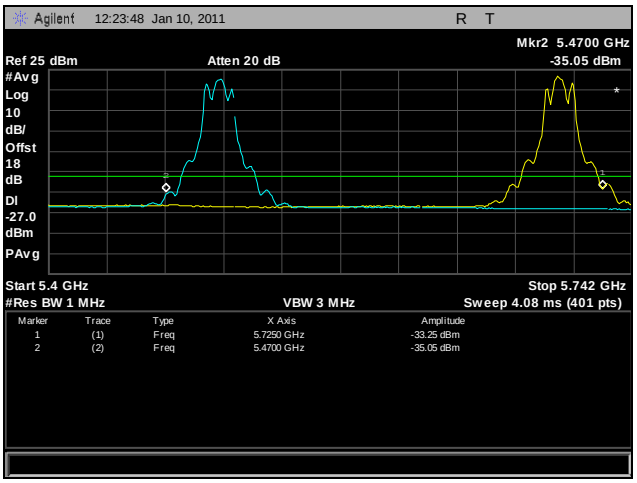
Plot 341. Frequency Stability, 40°C for 5470 MHz - 5725 MHz at 139 VAC



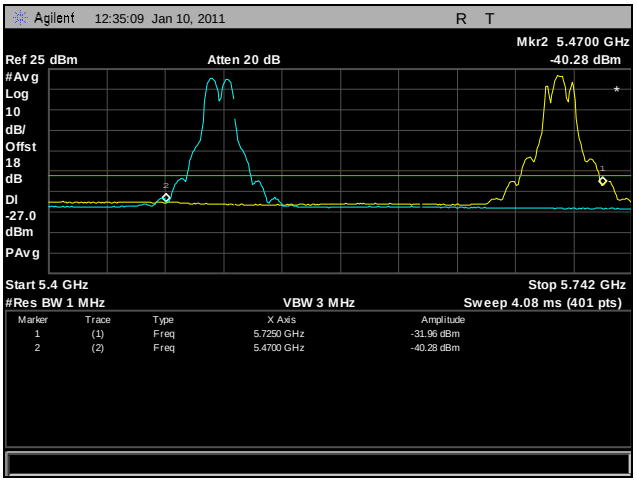
Plot 342. Frequency Stability, 50°C for 5470 MHz - 5725 MHz at 102 VAC



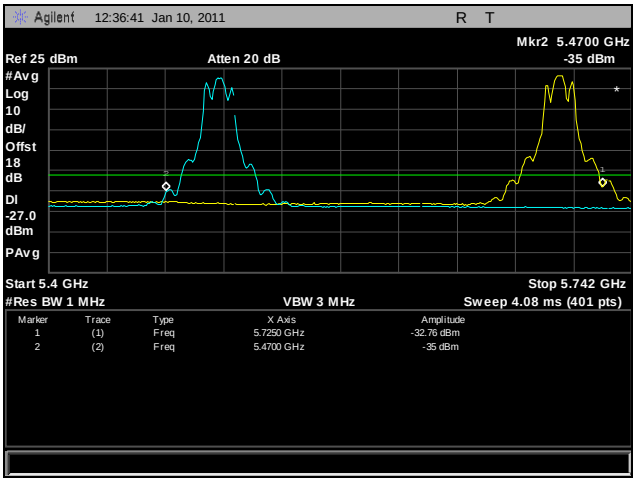
Plot 343. Frequency Stability, 50°C for 5470 MHz - 5725 MHz at 120 VAC



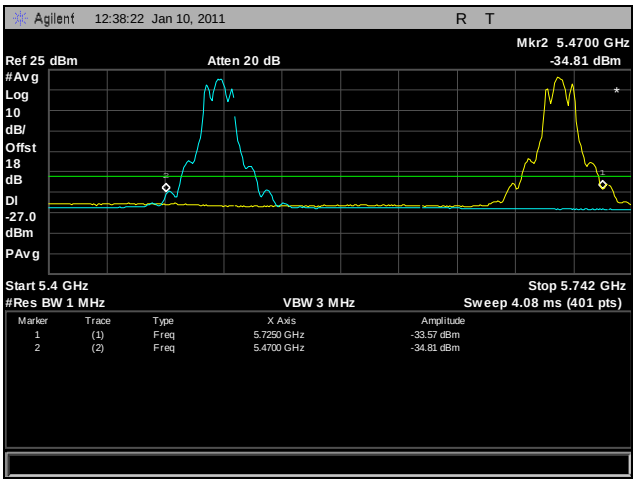
Plot 344. Frequency Stability, 50°C for 5470 MHz - 5725 MHz at 138 VAC



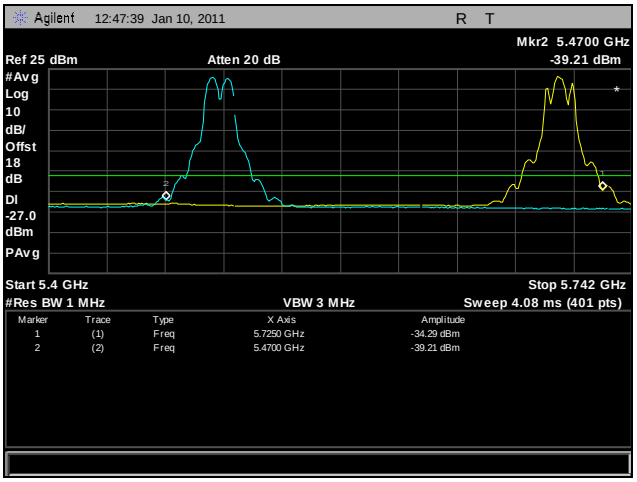
Plot 345. Frequency Stability, 60°C for 5470 MHz - 5725 MHz at 102 VAC



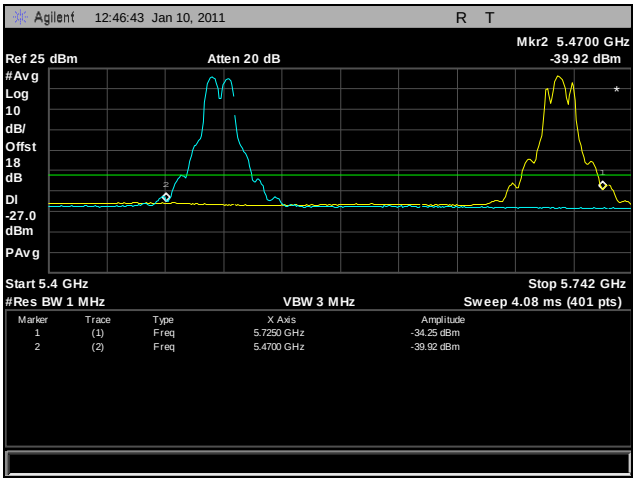
Plot 346. Frequency Stability, 60°C for 5470 MHz - 5725 MHz at 120 VAC



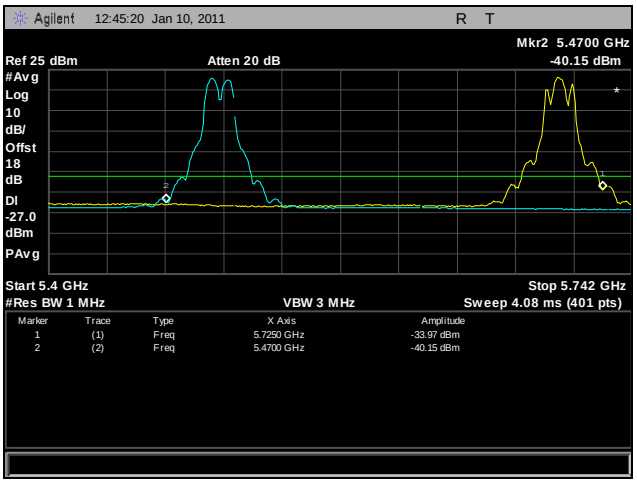
Plot 347. Frequency Stability, 60°C for 5470 MHz - 5725 MHz at 138 VAC



Plot 348. Frequency Stability, 70°C for 5470 MHz - 5725 MHz at 102 VAC



Plot 349. Frequency Stability, 70°C for 5470 MHz - 5725 MHz at 120 VAC



Plot 350. Frequency Stability, 70°C for 5470 MHz - 5725 MHz at 138 VAC

Electromagnetic Compatibility Criteria for Intentional Radiators

RSS-GEN Receiver Spurious

Test Requirements: The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 24.

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 24. Spurious Emission Limits for Receivers

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

Test Procedures: The EUT was programmed for receive mode only. Conducted measurements were taken at the antenna port of the EUT. 100 kHz resolution bandwidth was used from 30 MHz - 1 GHz and 300 kHz resolution was used for measurements done above 1 GHz. All plots are corrected for cable loss.

Test Results: Equipment is compliant with the Receiver Spurious Emissions Requirements of RSS-GEN.

Test Engineer(s): Jeff Pratt

Test Date(s): 03/07/11

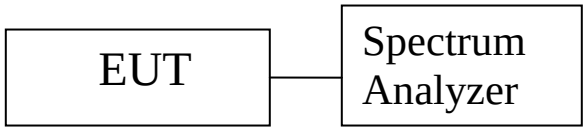
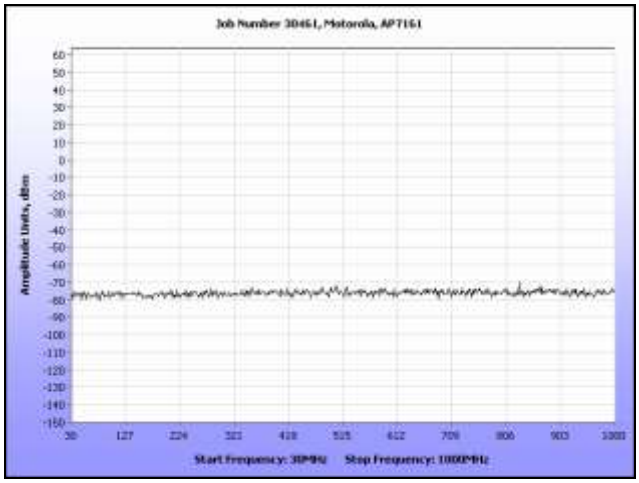
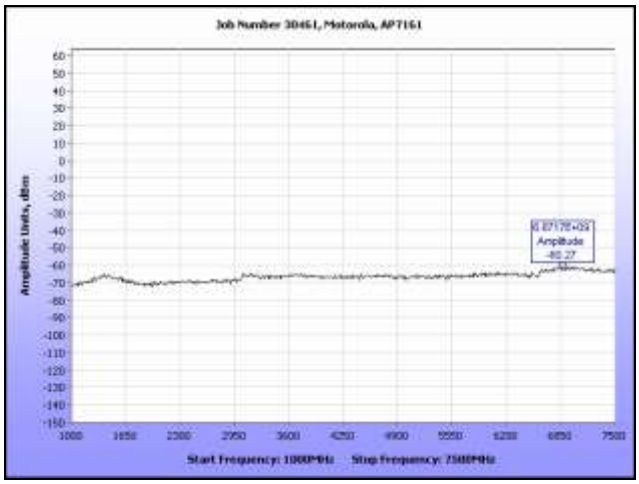


Figure 6. Block Diagram, Conducted Receiver Spurious Emissions Test Setup

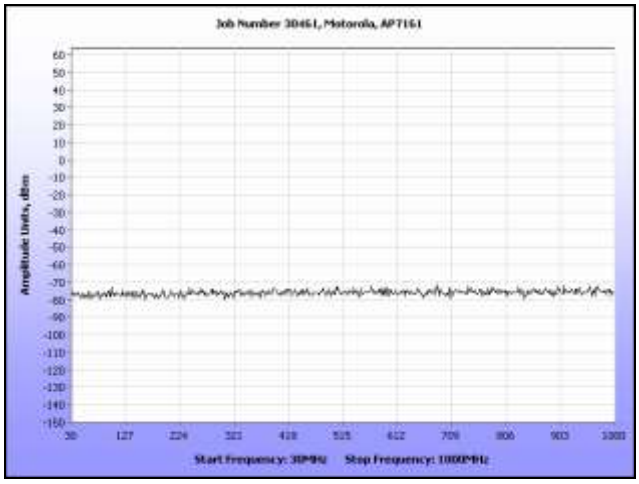
Conducted Receiver Spurious Emissions, 2.4 GHz



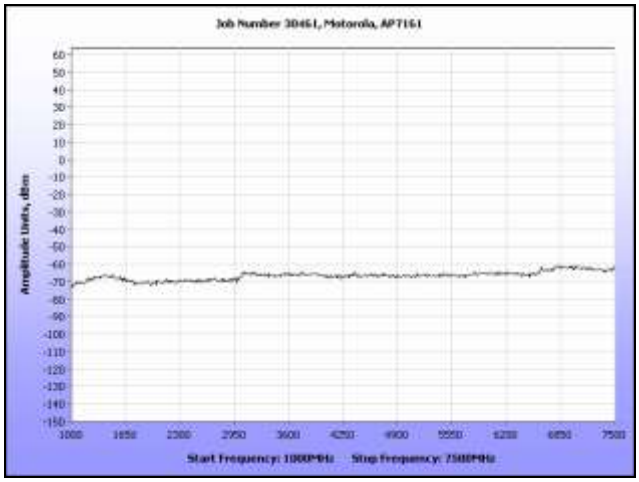
Plot 351. Receiver Spurious Emission, R3-A, 30 MHz – 1 GHz



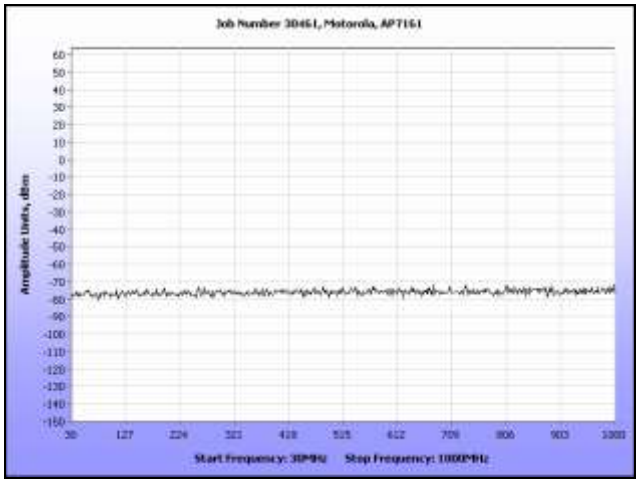
Plot 352. Receiver Spurious Emission, R3-A, 1 GHz - 7.5 GHz



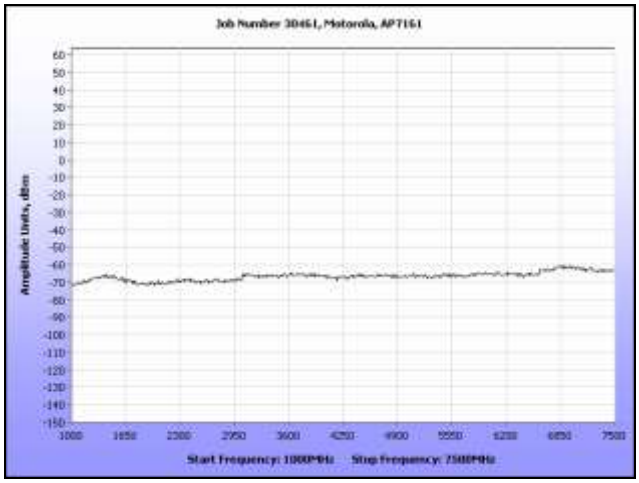
Plot 353. Receiver Spurious Emission, R3-B, 30 MHz – 1 GHz



Plot 354. Receiver Spurious Emission, R3-B, 1 GHz - 7.5 GHz

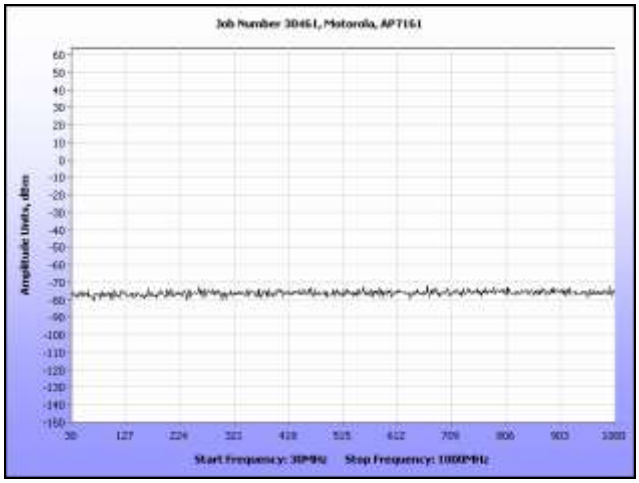


Plot 355. Receiver Spurious Emission, R3-C, 30 MHz – 1 GHz

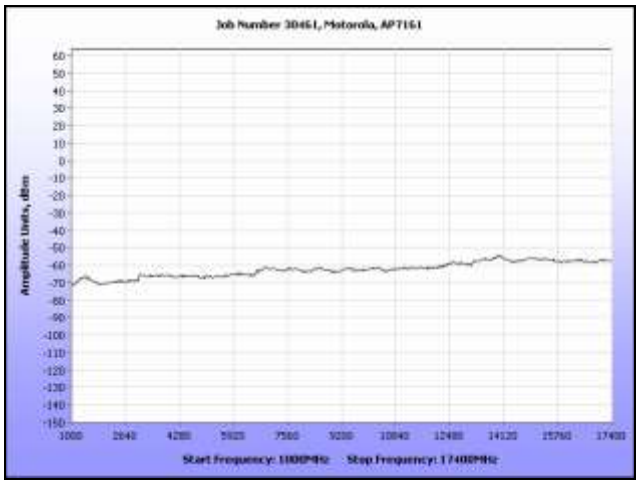


Plot 356. Receiver Spurious Emission, R3-C, 1 - 7.5 GHz

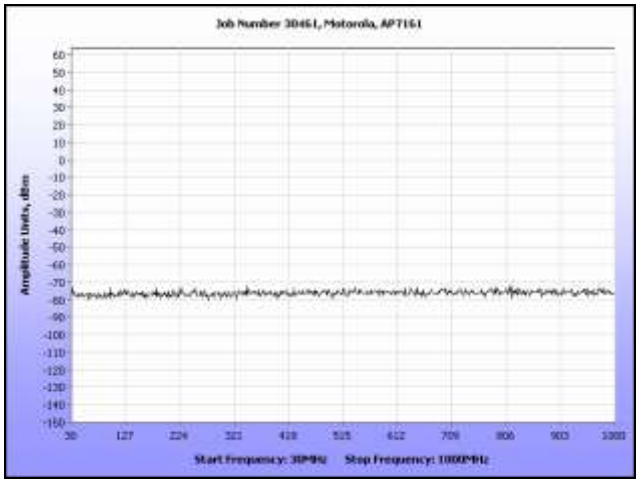
Conducted Receiver Spurious Emissions, 5.8 GHz



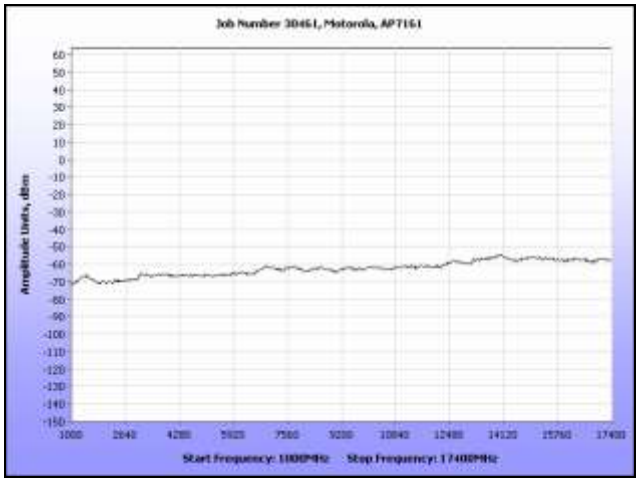
Plot 357. Receiver Spurious Emission, R3-A, 30 MHz – 1 GHz



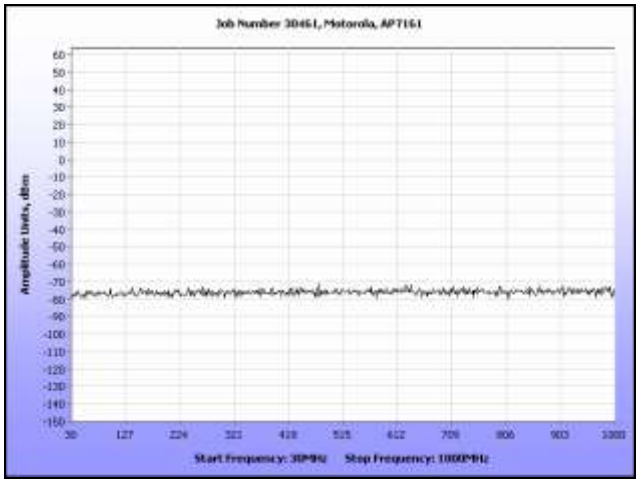
Plot 358. Receiver Spurious Emission, R3-A, 1 GHz - 17.4 GHz



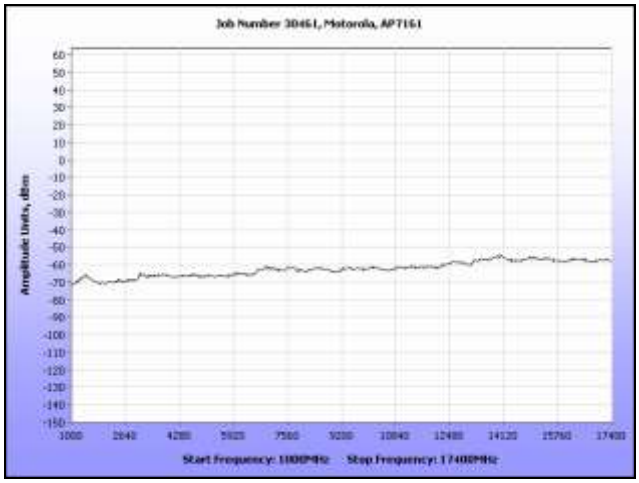
Plot 359. Receiver Spurious Emission, R3-B, 30 MHz – 1 GHz



Plot 360. Receiver Spurious Emission, R3-B, 1 GHz - 17.4 GHz



Plot 361. Receiver Spurious Emission, R3-C, 30 MHz – 1 GHz



Plot 362. Receiver Spurious Emission, R3-C, 1 GHz - 17.4 GHz

III. DFS Requirements and Radar Waveform Description & Calibration

A. DFS Requirements

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 25. Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 26. Applicability of DFS Requirements During Normal Operation

Maximum Transmit Power	Value
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

Table 27. DFS Detection Thresholds for Master or Client Devices Incorporating DFS

Parameter	Value
Non-occupancy period	*Minimum 30 minutes*
Channel Availability Check Time	*60 seconds*
Channel Move Time	*10 seconds See Note 1*
Channel Closing Transmission Time	*200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2*
U-NII Detection Bandwidth	*Minimum 80% of the 99% power bandwidth. See Note 3.*

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:
- **For the Short pulse radar Test Signals this instant is the end of the Burst.**
- **For the Frequency Hopping radar Test Signal, this instant is the end of the last radar *Burst* generated.**
- **For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.**

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating Channel changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

Table 28. DFS Response Requirement Values

B. Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per Bursts	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen independently.

A representative example of a Long Pulse radar test waveform:

1) The total test signal length is 12 seconds.
2) 8 Bursts are randomly generated for the Burst_Count.
3) Burst 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).

Graphical Representation of a Long Pulse radar Test Waveform

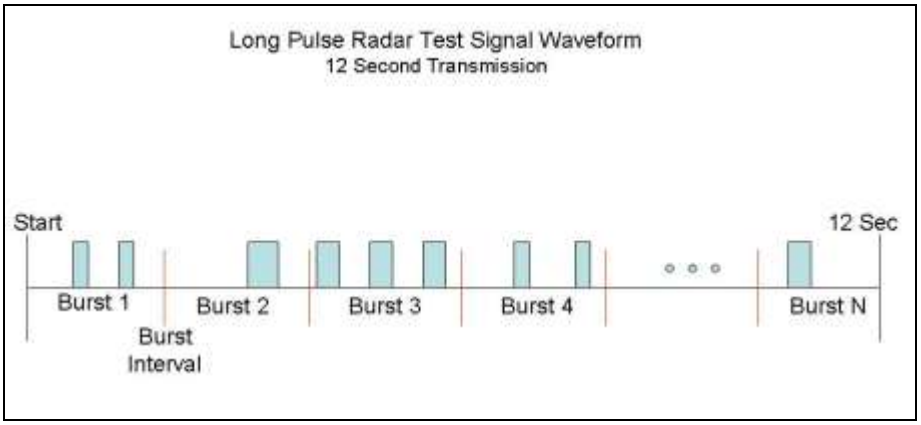


Figure 7. Long Pulse Radar Test Signal Waveform

Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	.333	300	70%	30

For the Frequency Hopping Radar Type, the same *Burst* parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected1 from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

C. Radar Waveform Calibration

The following equipment setup was used to calibrate the radiated Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer's resolution bandwidth (RBW) was set to 3 MHz and the video bandwidth (VBW) was set to 3 MHz. The calibration setup is diagrammed in Figure 8, and the radar test signal generator is shown in Photograph 8.

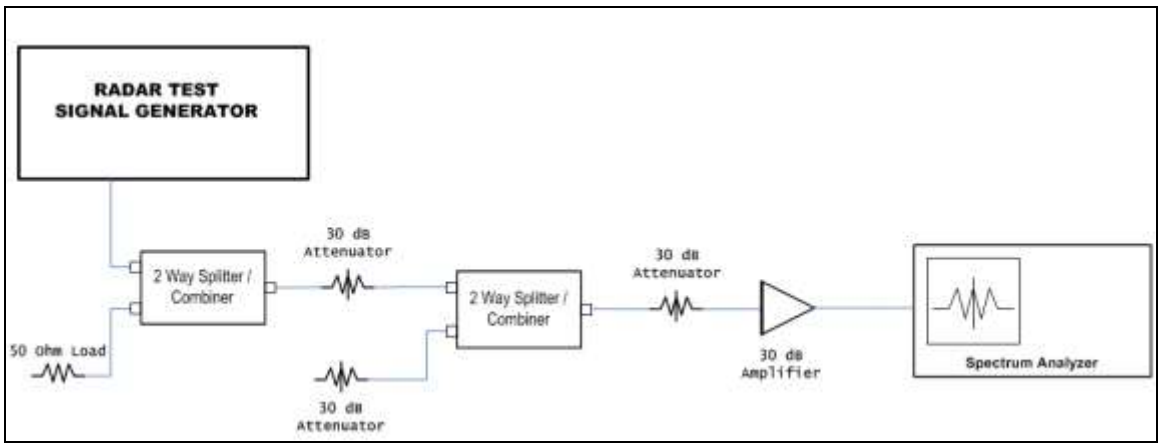
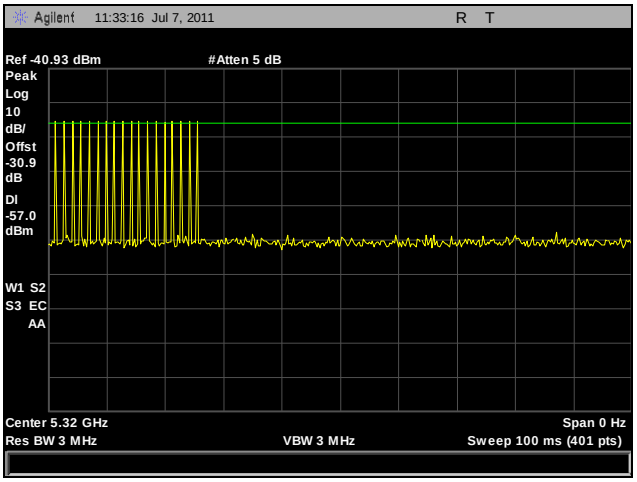


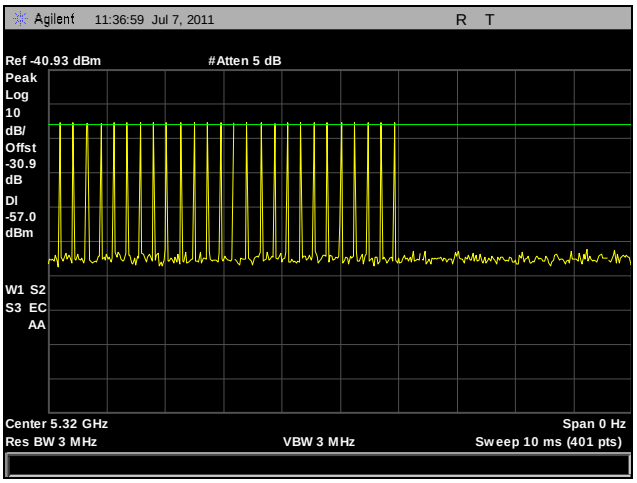
Figure 8. Calibration Test Setup

Photograph 8. DFS Radar Test Signal Generator

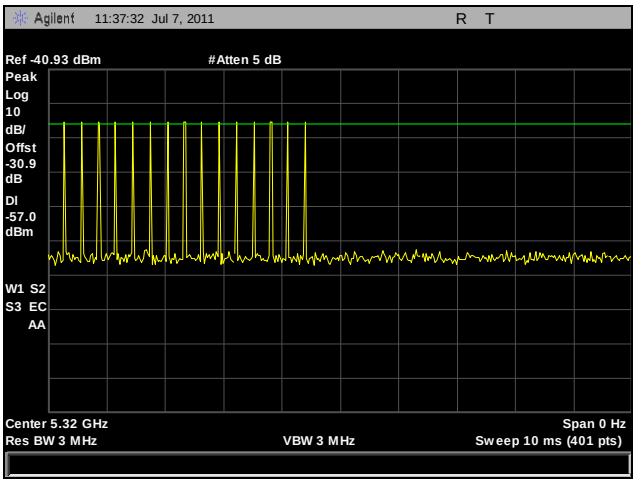
Radar Calibration



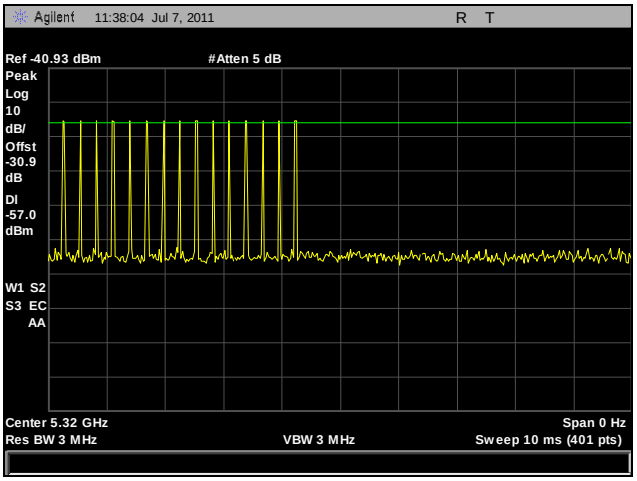
Plot 363. Bin 1 Radar Calibration for 5 dBi



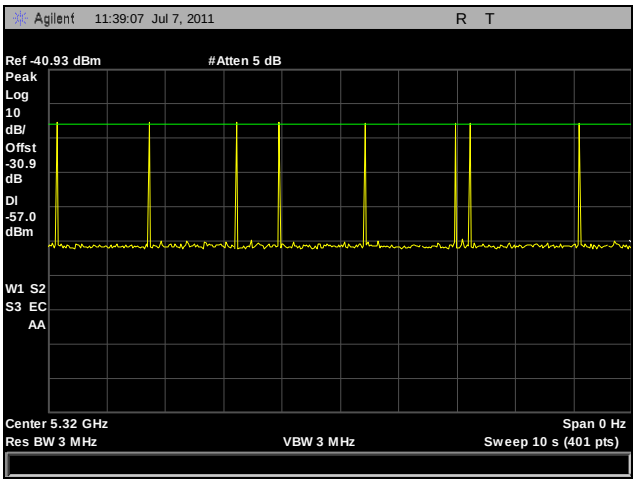
Plot 364. Bin 2 Radar Calibration for 5 dBi



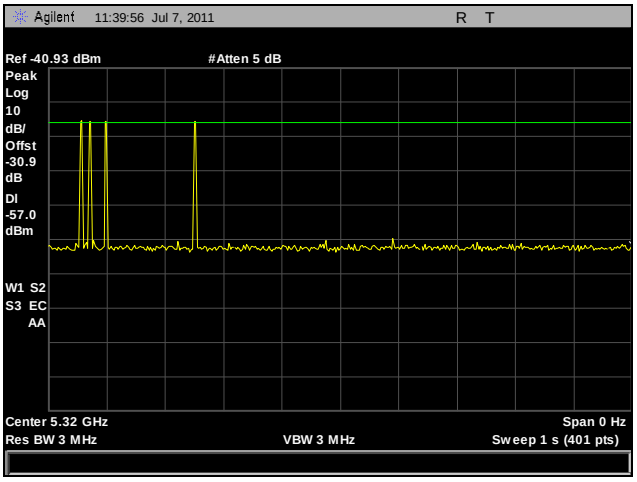
Plot 365. Bin 3 Radar Calibration for 5 dBi



Plot 366. Bin 4 Radar Calibration for 5 dBi



Plot 367. Bin 5 Radar Calibration for 5 dBi



Plot 368. Bin 6 Radar Calibration for 5 dBi

V. DFS Test Procedure and Test Results

DFS Test Setup

A. DFS Test Setup

The 5600 – 5650 MHz bands were disabled.

1. A spectrum analyzer is used as a monitor to verify that the Unit Under Test (UUT) has vacated the Channel within the Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the detection and subsequent Channel move. It is also used to monitor UUT transmissions during the Channel Availability Check Time.
2. The test setup, which consists of test equipment and equipment under test (EUT), is and pictured in Figure 9. Test Setup Diagram.

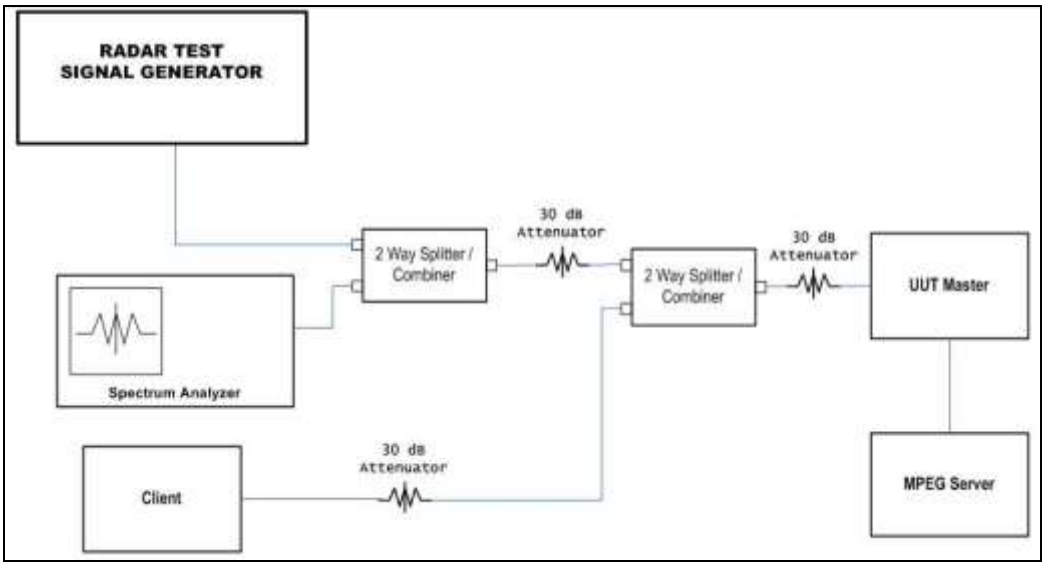


Figure 9. Test Setup Diagram

B. Description of Master Device

1. Operating Frequency Range – 5250-5350MHz; 5470-5725 MHz
2. Modes of Operation – 802.11a/802.11n
3. Highest and Lowest EIRP – Highest: 29.9dBm; Lowest:27.77 dBm
4. List all antennas and associated gains –

Gain/Type	Model	Manufacturer
10 dBi/Omni	S4908WBF	Laird

5. List output power ranges – 12.50dBm – 15.13 dBm
6. List antenna impedance – 50 ohms
7. Antenna gain verification - Use antenna data sheet
8. State test file that is transmitted – 6 and ½ Magic Hours
9. Time for master to complete its power-on-cycle – 29.4 seconds

UNII Detection Bandwidth

Test Requirement(s): **§ 15.407** A minimum 80% of the UNII 99% transmission power bandwidth is required.

Test Procedure: All UNII channels for this device have identical channel bandwidths.

A single burst of the short pulse radar type 1 is produced at 5320 and 5310 MHz, at the -59dBm test level. The UUT is set up as a standalone device (no associated client, and no data traffic).

A single radar burst is generated for a minimum of 10 trials, and the response of the UUT is recorded. The UUT must detect the radar waveform 90% or more of the time.

The radar frequency is increased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The highest frequency at which detection is greater than or equal to 90% is denoted F_H.

The radar frequency is decreased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The lowest frequency at which detection is greater than or equal to 90% is denoted F_L.

The U-NII Detection Bandwidth is calculated as follows:

$$\text{U-NII Detection Bandwidth} = F_H - F_L$$

Test Engineer: Jeff Pratt

Test Date: 06/06/11

EUT Frequency- 5320MHz											
	DFS Detection Trials (1=Detection, 0= No Detection)										
Radar Frequency (MHz)	1	2	3	4	5	6	7	8	9	10	Detection Rate (%)
5310	1	1	1	1	1	1	1	1	1	1	100
5311	1	1	1	1	1	1	1	1	1	1	100
5312	1	1	1	1	1	1	1	1	1	1	100
5313	1	1	1	1	1	1	1	1	1	1	100
5314	1	1	1	1	1	1	1	1	1	1	100
5315	1	1	1	1	1	1	1	1	1	1	100
5316	1	1	1	1	1	1	1	1	1	1	100
5317	1	1	1	1	1	1	1	1	1	1	100
5318	1	1	1	1	1	1	1	1	1	1	100
5319	1	1	1	1	1	1	1	1	1	1	100
5320	1	1	1	1	1	1	1	1	1	1	100
5321	1	1	1	1	1	1	1	1	1	1	100
5322	1	1	1	1	1	1	1	1	1	1	100
5323	1	1	1	1	1	1	1	1	1	1	100
5324	1	1	1	1	1	1	1	1	1	1	100
5325	1	1	1	1	1	1	1	1	1	1	100
5326	1	1	1	1	1	1	1	1	1	1	100
5327	1	1	1	1	1	1	1	1	1	1	100
5328	1	1	1	1	1	1	1	1	1	1	100
5329	1	1	1	1	1	1	1	1	1	1	100
5330	1	1	1	1	1	1	1	1	1	1	100
Overall Detection Percentage											100%
Detection Bandwidth = f_h - f_l = 5330MHz-5310MHz = 20MHz											
EUT 99% Bandwidth = 16.49MHz											
OBW* 80% = 13.192MHz											

Table 29. UNII Detection Bandwidth, Test Results, 5320 MHz, 802.11n HT20

EUT Frequency- 5320MHz											
	DFS Detection Trials (1=Detection, 0= No Detection)										
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5294	1	1	1	1	1	1	1	1	1	1	100
5295	1	1	1	1	1	1	1	1	1	1	100
5296	1	1	1	1	1	1	1	1	1	1	100
5297	1	1	1	1	1	1	1	1	1	1	100
5298	1	1	1	1	1	1	1	1	1	1	100
5299	1	1	1	1	1	1	1	1	1	1	100
5300	1	1	1	1	1	1	1	1	1	1	100
5301	1	1	1	1	1	1	1	1	1	1	100
5302	1	1	1	1	1	1	1	1	1	1	100
5303	1	1	1	1	1	1	1	1	1	1	100
5304	1	1	1	1	1	1	1	1	1	1	100
5305	1	1	1	1	1	1	1	1	1	1	100
5306	1	1	1	1	1	1	1	1	1	1	100
5307	1	1	1	1	1	1	1	1	1	1	100
5308	1	1	1	1	1	1	1	1	1	1	100
5309	1	1	1	1	1	1	1	1	1	1	100
5310	1	1	1	1	1	1	1	1	1	1	100
5311	1	1	1	1	1	1	1	1	1	1	100
5312	1	1	1	1	1	1	1	1	1	1	100
5313	1	1	1	1	1	1	1	1	1	1	100
5314	1	1	1	1	1	1	1	1	1	1	100
5315	1	1	1	1	1	1	1	1	1	1	100
5316	1	1	1	1	1	1	1	1	1	1	100
5317	1	1	1	1	1	1	1	1	1	1	100
5318	1	1	1	1	1	1	1	1	1	1	100
5319	1	1	1	1	1	1	1	1	1	1	100
5320	1	1	1	1	1	1	1	1	1	1	100
5321	1	1	1	1	1	1	1	1	1	1	100
5322	1	1	1	1	1	1	1	1	1	1	100
5323	1	1	1	1	1	1	1	1	1	1	100
5324	1	1	1	1	1	1	1	1	1	1	100
5325	1	1	1	1	1	1	1	1	1	1	100
5326	1	1	1	1	1	1	1	1	1	1	100
5327	1	1	1	1	1	1	1	1	1	1	100
5328	1	1	1	1	1	1	1	1	1	1	100
5329	1	1	1	1	1	1	1	1	1	1	100
5330	1	1	1	1	1	1	1	1	1	1	100
5331	1	0	1	1	1	1	1	1	1	1	90
5332	0	1	0	1	0	1	0	1	0	1	50
Overall Detection Percentage											98.4%
Detection Bandwidth = f_h - f_l = 5331MHz-5294MHz = 37MHz											
EUT 99% Bandwidth = 36.33MHz											
OBW* 80% = 29.064MHz											

Table 30. UNII Detection Bandwidth, Test Results, 5320 MHz, 802.11n HT40

Initial Channel Availability Check Time

Test Requirements: **§ 15.407** The Initial Channel Availability Check Time tests that the UUT does not emit beacon, control, or data signals on the test channel until the power-up sequence has been completed and the U-NII device has checked for radar waveforms, for one minute, on the test channel. This test does not use any of the radar waveforms and only needs to be performed once.

The UUT should not make any transmissions over the test channel, for at least 1 minute after completion of its power-on cycle.

Test Procedure: The U-NII device is powered on and instructed to operate at 5500 MHz. At the same time the UUT is powered on, the spectrum analyzer is set to 5500MHz with a zero span and a 2.5 minute sweep time. The analyzer is triggered at the same time power is applied to the U-NII device.

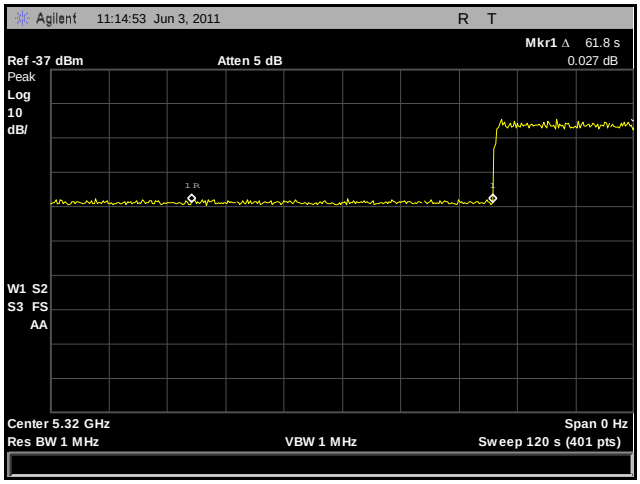
Test Results: Marker 1R on plot 101 indicates the start of the channel availability check time. Initial beacon/data transmission is indicated by marker 1.

The Equipment was compliant with § 15.407 Initial Channel Availability Check Time.

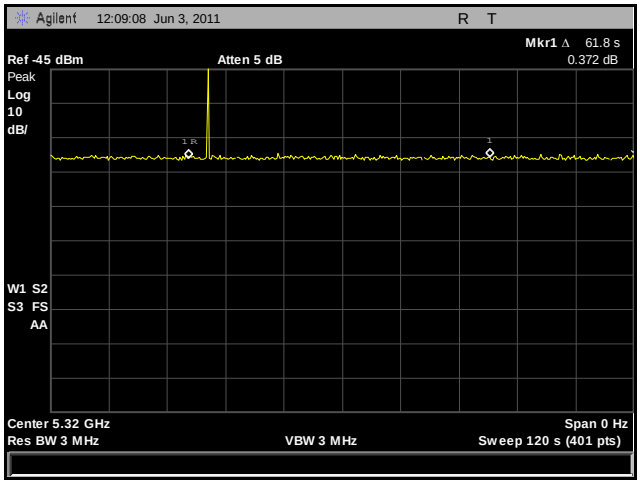
Test Results: The EUT is compliant with this requirement.

Test Engineer: Jeff Pratt

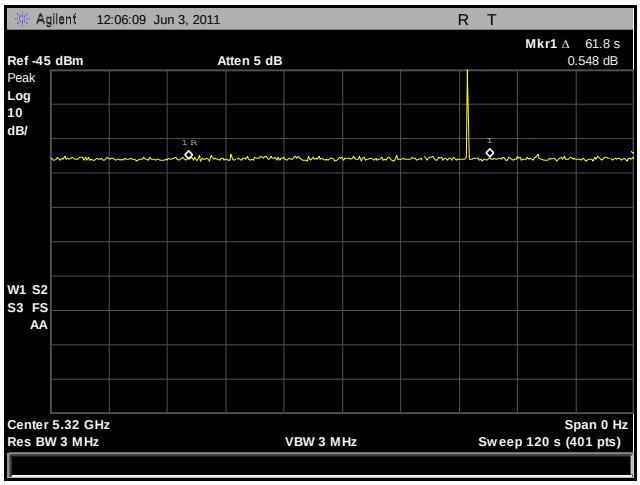
Test Date: 06/06/11



Plot 369. Channel Availability Check (CAC), 5320 MHz



Plot 370. Channel Availability Check (CAC), Start Burst, 5320 MHz



Plot 371. Channel Availability Check (CAC), End Burst, 5320 MHz

In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time, and Non-Occupancy Period

Test Requirements: **§ 15.407** (Refer to DFS Response Requirement Values table in section III-A of this report.) The UUT shall continuously monitor for radar transmissions in the operating test channel. When a radar burst occurs in the test channel, it has 10 seconds to move to another channel. This 10 second window is termed Channel Move Time (CMT).

When a radar burst occurs, the UUT has 200 milliseconds, plus an aggregate of 60 milliseconds, to cease transmission in the operating test channel. This 200 ms + 60 ms requirement is termed Channel Closing Transmission Time (CCT).

After radar burst and subsequent move to another channel, the UUT shall not resume transmission, on the channel it moved from, for a period of 30 minutes. This requirement is termed Non-Occupancy Period (NOP).

Test Procedure: These tests define how the following DFS parameters are verified during In-Service Monitoring: Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB (-59dBm) is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client Device will associate with the UUT (Master) at 5320 & 5310 MHz. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test.

At time T0 the Radar Waveform generator sends a Burst of pulses for each of the radar types at -59dBm.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the *DFS Response Requirement Values table*.

Test Results: The EUT is compliant with this requirement.

Test Engineer: Jeff Pratt

Test Date: 06/06/11

Radar Type	Trial #	Pulses per Burst	Pulse Width (µsec)	PRI (µsec)	Detection
					1 = Yes, 0 = No
1	1	18	1	1428	1
	2	18	1	1428	1
	3	18	1	1428	1
	4	18	1	1428	1
	5	18	1	1428	1
	6	18	1	1428	1
	7	18	1	1428	1
	8	18	1	1428	1
	9	18	1	1428	1
	10	18	1	1428	1
	11	18	1	1428	1
	12	18	1	1428	1
	13	18	1	1428	1
	14	18	1	1428	1
	15	18	1	1428	1
	16	18	1	1428	1
	17	18	1	1428	1
	18	18	1	1428	1
	19	18	1	1428	1
	20	18	1	1428	1
	21	18	1	1428	1
	22	18	1	1428	1
	23	18	1	1428	1
	24	18	1	1428	1
	25	18	1	1428	1
	26	18	1	1428	1
	27	18	1	1428	1
	28	18	1	1428	1
	29	18	1	1428	1
	30	18	1	1428	1
	Detection Percentage				100% (> 60%)

Table 31. In-Service Monitoring, Bin 1 for 5 dBi Antenna

Radar Type	Trial #	Pulse Width 1 to 5 µsec	PRI 150 to 230 µsec	Pulses per Burst 23 to 29	Detection 1 = Yes, 0 = No
2	1	1.3	227	25	1
	2	2.2	210	28	1
	3	5	200	23	1
	4	3.3	210	25	1
	5	1.6	213	29	1
	6	4	213	26	1
	7	3.3	229	25	1
	8	2.7	218	27	0
	9	2	178	27	0
	10	3.5	192	27	0
	11	2.7	188	26	0
	12	4.1	193	29	1
	13	3.6	203	24	1
	14	2.5	157	26	1
	15	3.1	184	25	1
	16	4.7	212	24	0
	17	2.8	226	29	0
	18	5	222	28	1
	19	1.7	182	25	0
	20	1.8	191	26	1
	21	4.9	153	26	0
	22	1.4	170	28	0
	23	3.3	179	29	0
	24	2.3	160	26	1
	25	1.5	167	26	1
	26	4.6	180	28	0
	27	1	227	24	1
	28	1.9	205	27	1
	29	4.3	222	23	0
	30	3.2	173	23	1
	Detection Percentage				60% (60%)

Table 32. In-Service Monitoring, Bin 2 for 5 dBi Antenna

Radar Type	Trial #	Pulse Width 6 to 10 µsec	PRI 200 to 500 µsec 1 = Yes, 0 = No
3	1	6.6	251
	2	6.2	493
	3	6.7	274
	4	6.2	417
	5	6.1	317
	6	9.8	371
	7	7	327
	8	6.8	229
	9	7.5	438
	10	7.1	293
	11	6.2	425
	12	6.2	372
	13	7.5	385
	14	7.7	219
	15	7.4	469
	16	8.8	343
	17	6.3	485
	18	6	267
	19	6.4	344
	20	9.1	438
	21	6.1	471
	22	9.1	317
	23	8.8	291
	24	7.9	208
	25	6.8	332
	26	9.8	347
	27	9.4	210
	28	7.2	357
	29	8	403
	30	9.7	350
	Detection Percentage		

Table 33. In-Service Monitoring, Bin 3 for 5 dBi Antenna

Radar Type	Trial #	Pulse Width 11 to 20 µsec	PRI 200 to 500 µsec 1 = Yes, 0 = No
4	1	11.2	383
	2	18.1	313
	3	19.8	423
	4	15.3	203
	5	14.8	343
	6	18.5	256
	7	19.6	460
	8	12.4	332
	9	15.6	378
	10	16.2	308
	11	12.5	389
	12	12.7	387
	13	13.8	486
	14	13.9	255
	15	14	325
	16	19.5	437
	17	11.8	293
	18	16.6	324
	19	18.2	207
	20	13.3	274
	21	20	493
	22	13.3	342
	23	13	444
	24	17.6	449
	25	15.1	379
	26	12.4	222
	27	17	474
	28	14	447
	29	11.1	492
	30	15.5	370
	Detection Percentage		**63% (> 60%)**

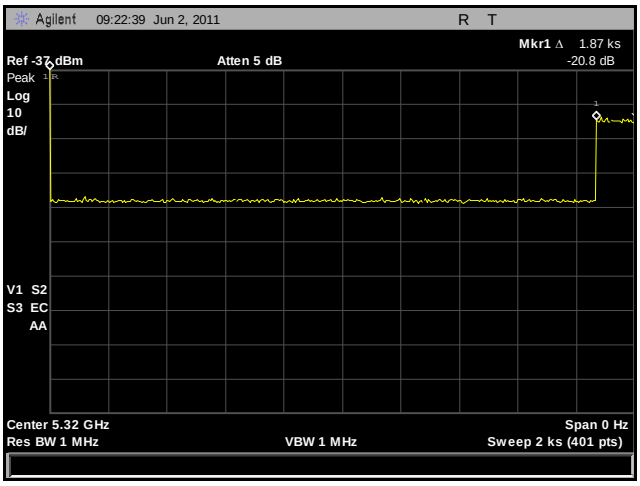
Table 34. In-Service Monitoring, Bin 4 for 5 dBi Antenna

Radar Type	Trial #	Filename*	Detection
			1 = Yes, 0 = No
5	1	bin5set518wav1	1
	2	bin5set518wav2	1
	3	bin5set518wav3	0
	4	bin5set518wav4	1
	5	bin5set518wav5	1
	6	bin5set518wav6	1
	7	bin5set518wav7	1
	8	bin5set518wav8	1
	9	bin5set518wav9	1
	10	bin5set518wav10	1
	11	bin5set518wav11	1
	12	bin5set518wav12	1
	13	bin5set518wav13	0
	14	bin5set518wav14	1
	15	bin5set518wav15	1
	16	bin5set518wav16	1
	17	bin5set518wav17	1
	18	bin5set518wav18	0
	19	bin5set518wav19	1
	20	bin5set518wav20	1
	21	bin5set518wav21	1
	22	bin5set518wav22	1
	23	bin5set518wav23	1
	24	bin5set518wav24	1
	25	bin5set518wav25	1
	26	bin5set518wav26	1
	27	bin5set518wav27	1
	28	bin5set518wav28	1
	29	bin5set518wav29	1
	30	bin5set518wav30	1
	Detection Percentage		**90% (> 80%)**

Table 35. In-Service Monitoring, Bin 5 for 5 dBi Antenna0

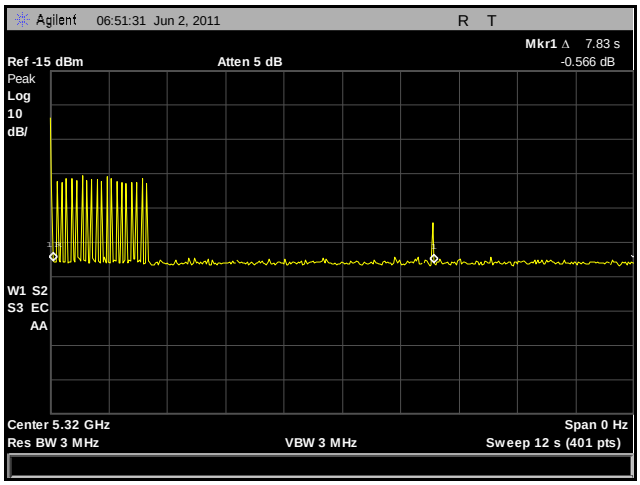
Radar Type	Trial #	Frequency (MHz)	Pulses/Hop	Pulse Width (µsec)	PRI (µsec)	Detection
						1 = Yes, 0 = No
6	1	5320	9	1	333	1
	2	5320	9	1	333	1
	3	5320	9	1	333	1
	4	5320	9	1	333	1
	5	5320	9	1	333	1
	6	5320	9	1	333	1
	7	5320	9	1	333	1
	8	5320	9	1	333	1
	9	5320	9	1	333	0
	10	5320	9	1	333	1
	11	5320	9	1	333	1
	12	5320	9	1	333	1
	13	5320	9	1	333	1
	14	5320	9	1	333	1
	15	5320	9	1	333	1
	16	5320	9	1	333	0
	17	5320	9	1	333	1
	18	5320	9	1	333	0
	19	5320	9	1	333	1
	20	5320	9	1	333	1
	21	5320	9	1	333	1
	22	5320	9	1	333	1
	23	5320	9	1	333	1
	24	5320	9	1	333	1
	25	5320	9	1	333	1
	26	5320	9	1	333	1
	27	5320	9	1	333	1
	28	5320	9	1	333	1
	29	5320	9	1	333	1
	30	5320	9	1	333	1
	Detection Percentage					90% (> 70%)

Table 36. In-Service Monitoring, Bin 6 for 5 dBi Antenna



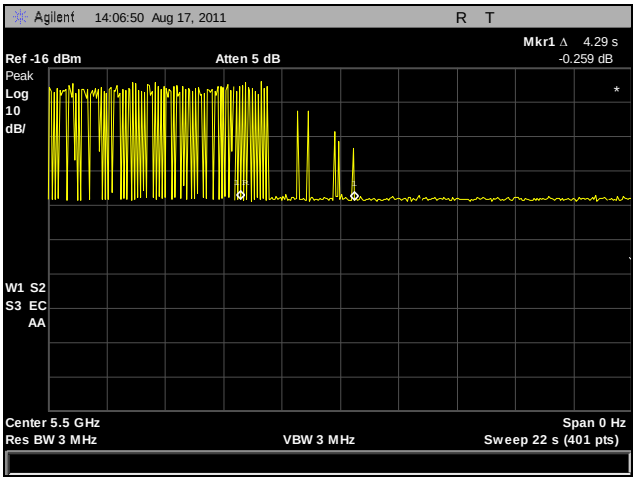
Plot 372. Non-Occupancy Period

Non-Occupancy Period is 31.17 minutes, which is compliant.



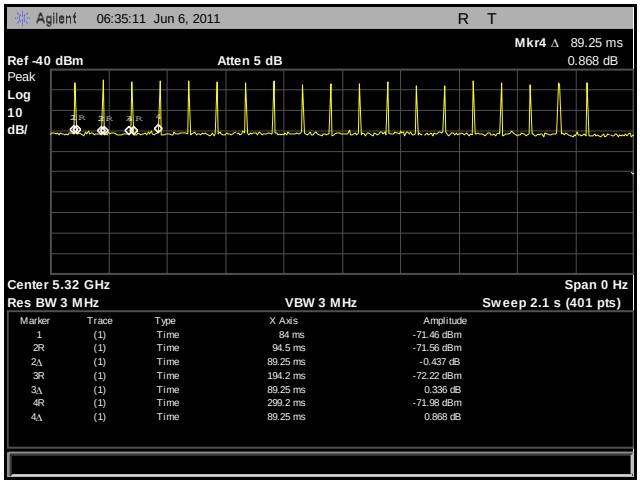
Plot 373. Channel Move Time, 5320 MHz

Channel Move Time is 7.83 sec, which is compliant.



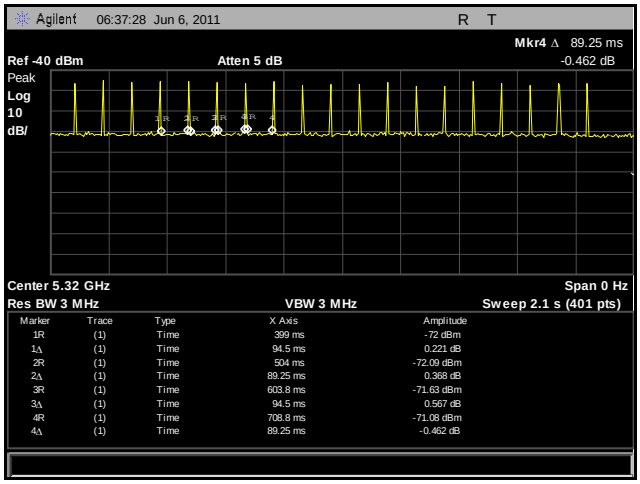
Plot 374. Bin 5, Channel Move Time, 5510 MHz

The Channel Move time was 4.29sec, which is compliant.

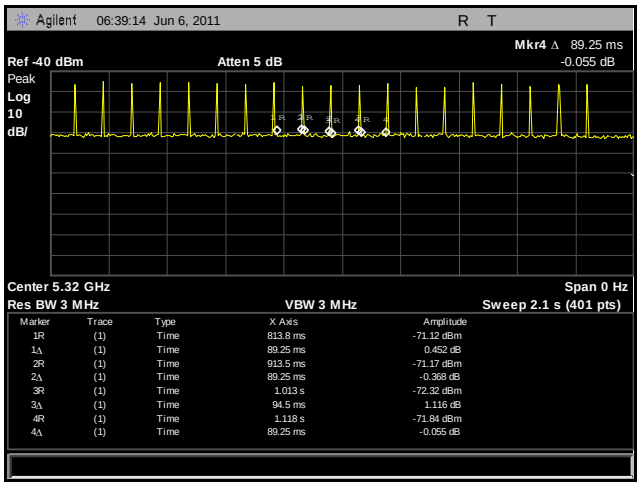


Plot 375. Channel Closing Transmission Time 1

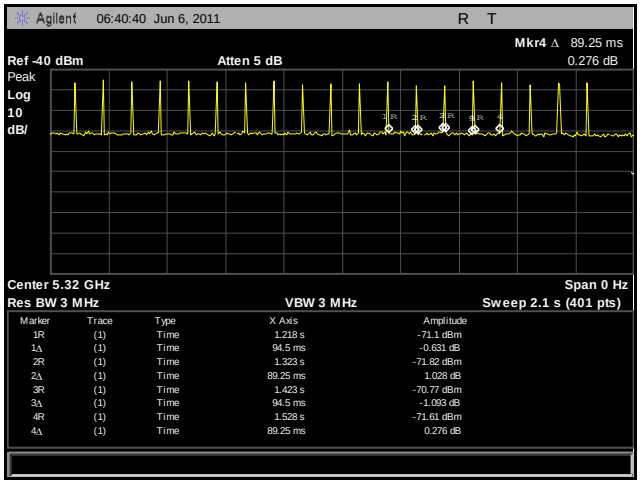
Channel Closing Transmission Time is 252.7ms, which is compliant.



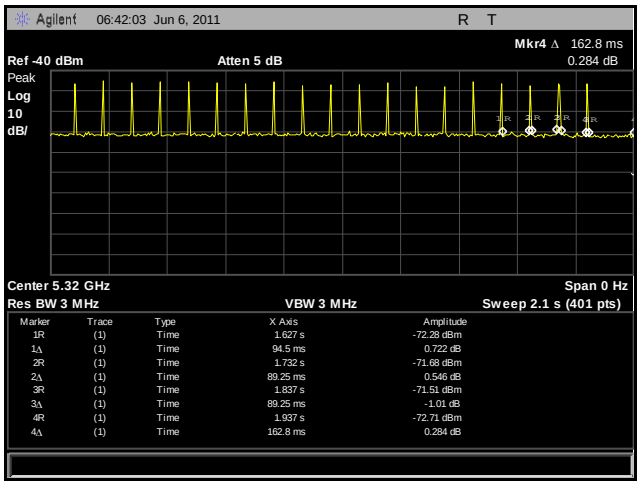
Plot 376. Channel Closing Transmission Time 2



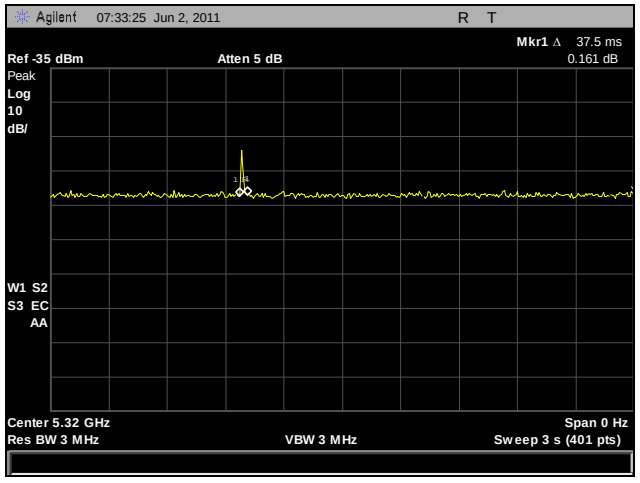
Plot 377. Channel Closing Transmission Time 3



Plot 378. Channel Closing Transmission Time 4



Plot 379. Channel Closing Transmission Time 5



Plot 380. Channel Closing Transmission Time 6

IV. Test Equipment

Test Equipment

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

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	6/14/2011	6/14/2012
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4402B	5/31/2011	5/31/2012
1S2602	DFS SIGNAL GENERATOR	NATIONAL INSTRUMENTS	NIPXI-1042	SEE NOTE	
1T4612	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	9/27/2010	9/27/2011
1T4751	ANTENNA – BILOG	SUNOL SCIENCES	JB6	11/3/2010	11/3/2011
1T4681	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4448A	1/27/2011	1/27/2012
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4752	PRE-AMPLIFIER	MITEQ	JS44-18004000-35-8P	SEE NOTE	
1T4564	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	10/6/2010	10/6/2011
1T4505	TEMPERATURE CHAMBER	TEST EQUITY	115	11/29/2010	11/29/2011
1T4596	AC POWER SOURCE	CALIFORNIA INSTRUMENTS	2001RP	CAL NOT REQUIRED	
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	6/8/2010	6/8/2011
1T4744	ANTENNA, HORN	ETS-LINDGREN	3116	5/27/2010	5/27/2011

Table 37. Test Equipment List

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

V. Certification & User's Manual Information

Certification & User's Manual Information

A. Certification Information

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

§ 2.801 Radio-frequency device defined.

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

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

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

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

Certification & User's Manual Information

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

§ 2.901 Basis and Purpose

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

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

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

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

Certification & User's Manual Information

Label and User's Manual Information

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

§ 15.19 Labeling requirements.

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

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

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

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

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

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

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

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

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

§ 15.21 Information to user.

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

Verification & User's Manual Information

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

§ 15.105 Information to the user.

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

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

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

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

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

