



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

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May 31, 2011

Firetide, Inc.  
16795 Lark Ave. Suite 200  
Los Gatos, CA 95032

Dear Steve Gu,

Enclosed is the EMC Wireless test report for compliance testing of the Firetide, Inc., 7100 Indoor Unit as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Title 47 of the CFR, Part 15, Subpart B, Industry Canada ICES-003 Issue 4 February 2004 for Unintentional Radiators and Part 15.407, Industry Canada RSS-210, 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: (\Firetide, Inc.\EMCS81748A-FCC407 Rev. 2)

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**Electromagnetic Compatibility Criteria  
Test Report**

for the

**Firetide, Inc.  
Model 7100 Indoor Unit**

**Tested under**  
the Certification Rules  
contained in  
Title 47 of the CFR, Part 15, Subpart B and  
ICES-003 Issue 4 February 2004  
for Unintentional Radiators  
and  
Title 47 of the CFR, Part 15.407 and  
Industry Canada RSS-210, Issue 7, June 2007  
for Intentional Radiators

May 31, 2011

**Prepared For:**

**Firetide, Inc.  
16795 Lark Ave. Suite 200  
Los Gatos, CA 95032**

**Prepared By:**  
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## Electromagnetic Compatibility Criteria Test Report

for the

**Firetide, Inc.**  
**Model 7100 Indoor Unit**

the Certification Rules  
contained in  
Title 47 of the CFR, Part 15, Subpart B and  
ICES-003 Issue 4 February 2004  
for Unintentional Radiators  
and  
Title 47 of the CFR, Part 15.407 and  
Industry Canada RSS-210, Issue 7, June 2007  
for Intentional Radiators



Minh Ly, Project Engineer  
Electromagnetic Compatibility Lab



Jennifer Warnell  
Documentation Department

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Parts 15B, 15.407, of the FCC Rules and ICES-003 and RSS-210 of the Industry Canada rules under normal use and maintenance.



Shawn McMillen, Wireless Manager  
Electromagnetic Compatibility Lab

## Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	October 28, 2009	Initial Issue.
1	January 13, 2010	Revised to incorporate various engineer corrections.
2	May 31, 2011	Revised to reflect engineer corrections.

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## List of Terms and Abbreviations

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

# I. Executive Summary

## A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Firetide, Inc. 7100 Indoor Unit, with the requirements of Part 15, §15.407. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the 7100 Indoor Unit. Firetide, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the 7100 Indoor Unit, has been **permanently** discontinued.

## B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.407, in accordance with Firetide, Inc., purchase order number 2475. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference	Industry Canada Reference	Description	Results
15.107	ICES-003 Issue 4 February 2004	Conducted Emissions	Compliant
15.109		Radiated Emissions	Compliant
15.203	RSS-GEN 7.1.4	Antenna Requirements	Compliant
15.205/15.209	2.2	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Compliant
15.207	RSS-GEN 7.2.2; RSS-210 2.2	AC Conducted Emissions 150KHz – 30MHz	Compliant
15.403 (c)	A8.2	26dB Occupied Bandwidth	Compliant
15.407 (a)(1), (2), (3)	A9.2(3)	Conducted Transmitter Output Power	Compliant
15.407 (a)(1), (2), (3), (5)	A9.2(3)	Power Spectral Density	Compliant
15.407 (a)(6)	A8.2	Peak Excursion	Compliant
15.407 (b)(1), (2), (5), (6)	A9.3(4)	Undesirable Emissions	Compliant
15.407(f)	RSS-GEN	RF Exposure	Compliant
15.407(g)	2.1	Frequency Stability	Compliant
15.407 (h)(1)	A9.4	Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS)	Compliant
15.407 (h)(2)	A9.4	Channel Availability Check Time	Compliant
15.407 (h)(2)(ii)	A9.4	Channel Move Time and Channel Closing Time	Compliant
15.407 (h)(2)(iii)	A9.4	Non-Occupancy Period	Compliant
15.407 (h)(2)(iv)	A9.4	Radar Detection Function of Dynamic Frequency Selection (DFS)	Compliant

**Table 1. Executive Summary of EMC Part 15.407 Compliance Testing**



## II. Equipment Configuration

## A. Overview

MET Laboratories, Inc. was contracted by Firetide, Inc. to perform testing on the 7100 Indoor Unit, under Firetide, Inc.'s purchase order number 2475.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Firetide, Inc. 7100 Indoor Unit.

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

<b>Model(s) Tested:</b>	7100 Indoor Unit			
<b>Model(s) Covered:</b>	7100 Indoor Unit			
<b>EUT Specifications:</b>	Primary Power: 12 VDC			
	FCC ID: REP-7100-1			
	Type of Modulations:	OFDM		
	Emission Designators:	802.11a:	16M9D7D	
		802.11n 20MHz:	17M9D7D	
		802.11n 40MHz:	37M2D7D	
	Equipment Code:	NII		
	Peak RF Output Power:	802.11a:	20.21dBm (0.105W)	
		802.11n 20MHz:	20.21dBm (0.105W)	
		802.11n 40MHz:	20.14dBm (0.103W)	
EUT Frequency Ranges:	<u>802.11a and 802.11n 20MHz BW</u> 5180 MHz – 5240 MHz 5260 MHz – 5320 MHz 5500 MHz – 5580 MHz 5660 MHz – 5700 MHz  <u>40MHz BW</u> 5190 MHz – 5230 MHz 5270 MHz – 5310 MHz 5510 MHz – 5550 MHz 5670MHz			
<b>Analysis:</b>	The results obtained relate only to the item(s) tested.			
<b>Environmental Test Conditions:</b>	Temperature: 15-35° C			
	Relative Humidity: 30-60%			
	Barometric Pressure: 860-1060 mbar			
<b>Evaluated by:</b>	Minh Ly			
<b>Report Date(s):</b>	May 31, 2011			

**Table 2. EUT Summary**

## B. References

<b>CFR 47, Part 15, Subpart B</b>	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
<b>CFR 47, Part 15, Subpart E</b>	Unlicensed National Information Infrastructure Devices (UNII)
<b>RSS-210, Issue 7, June 2007</b>	Low-power License-exempt Radiocommunications Devices (All Frequency Bands): Category I Equipment
<b>ICES-003, Issue 4 February 2004</b>	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
<b>ANSI C63.4:2003</b>	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
<b>ANSI/NCSL Z540-1-1994</b>	Calibration Laboratories and Measuring and Test Equipment - General Requirements
<b>ANSI/ISO/IEC 17025:2000</b>	General Requirements for the Competence of Testing and Calibration Laboratories

**Table 3. References**

## C. Test Site

All 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.

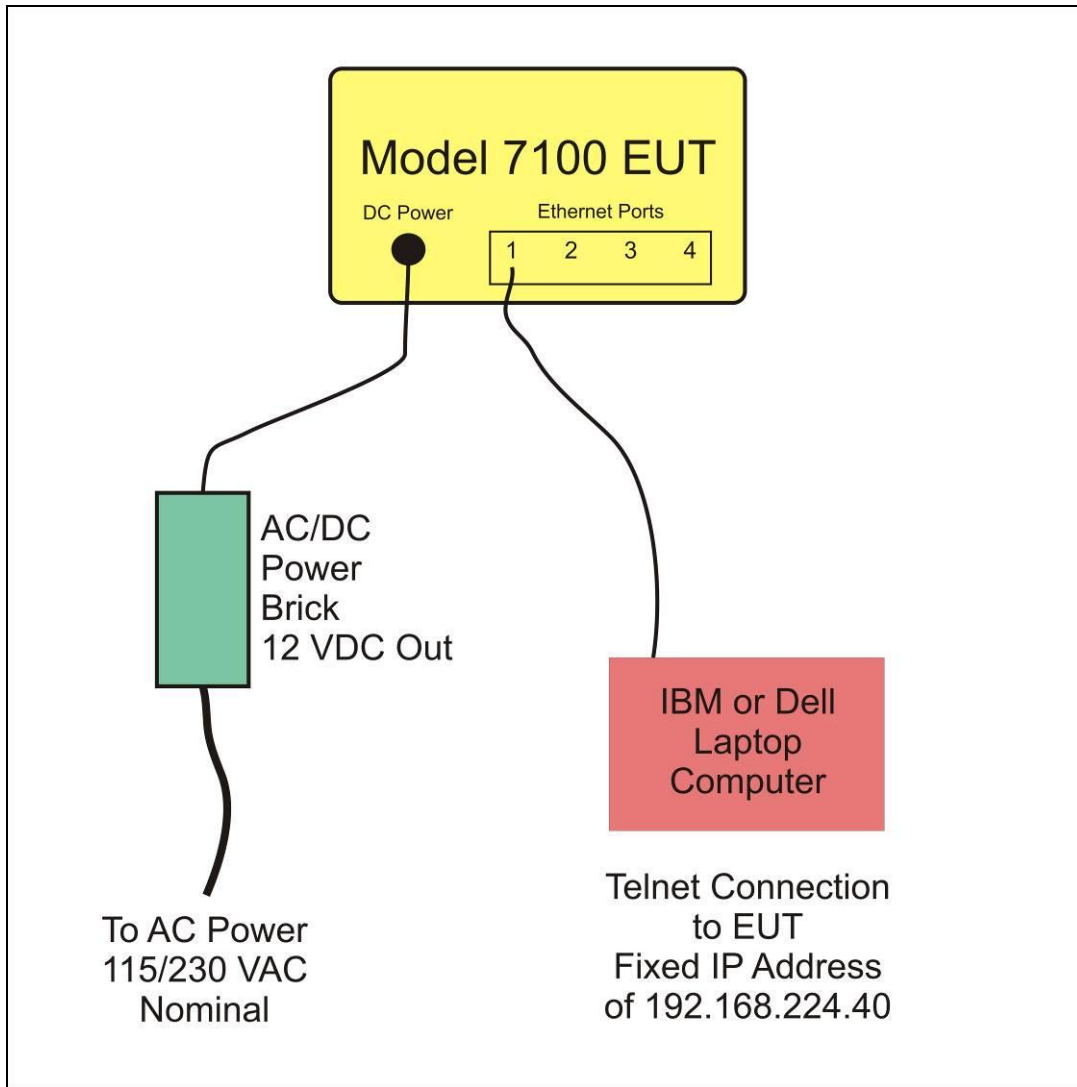
Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

## D. Description of Test Sample

The Firetide, Inc. 7100 Indoor Unit, is a Dual Radio Wireless Mesh Node.



Photograph 1. Firetide, Inc. 7100 Indoor Unit



**Figure 1. Block Diagram of Test Configuration**

## E. Equipment Configuration

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

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
N/A	N/A	HOTPORT INDOOR MESH NODE	7100	7100	N/A	1

**Table 4. Equipment Configuration**

## F. Support Equipment

Firetide, Inc. supplied support equipment necessary for the operation and testing of the 7100 Indoor Unit. All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
N/A	LAPTOP COMPUTER	IBM	T42	N/A
N/A	LAPTOP COMPUTER	DELL	N/A	N/A
N/A	AC/DC POWER BRICK	FSP GROUPINC.	FSP040-1ADF03A	N/A

**Table 5. Support Equipment**

\* The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.

## G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded (Y/N)	Termination Box ID & Port Name
N/A	PORT 1	ETHERNET	1	1.5	N	LAPTOP
N/A	PORT 2 – 4	NOT CONNECTED; ONLY 1 ETHERNET CONNECTION IS NECESSARY TO COMMUNICATE WITH EUT	N/A	N/A	N/A	N/A
N/A	POWER	DC POWER IN FROM POWER BRICK; 2.1 MM PLUG	1	1	N	N/A
N/A	USB	NOT USED; DISABLED	N/A	N/A	N/A	N/A

**Table 6. Ports and Cabling Information**

## **H. Mode of Operation**

The UUT has the Atheros Radio Test (ART) software loaded. The UUT can be put into continuous TX or RX using ART. The Mesh Node has a default IP address of 192.168.224.150. An external computer can ping this address to verify the Ethernet PHY and processor are running.

## **I. Method of Monitoring EUT Operation**

An external computer can ping this address to verify the Ethernet PHY and processor are running.

## **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 Firetide, Inc. upon completion of testing.

### **III. Electromagnetic Compatibility Criteria for Unintentional Radiators**



## Electromagnetic Compatibility Criteria

### § 15.107 Conducted Emissions Limits

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

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

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

**Table 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 found compliant with the Class B requirement(s) of this section. Measured emissions were below applicable limits.

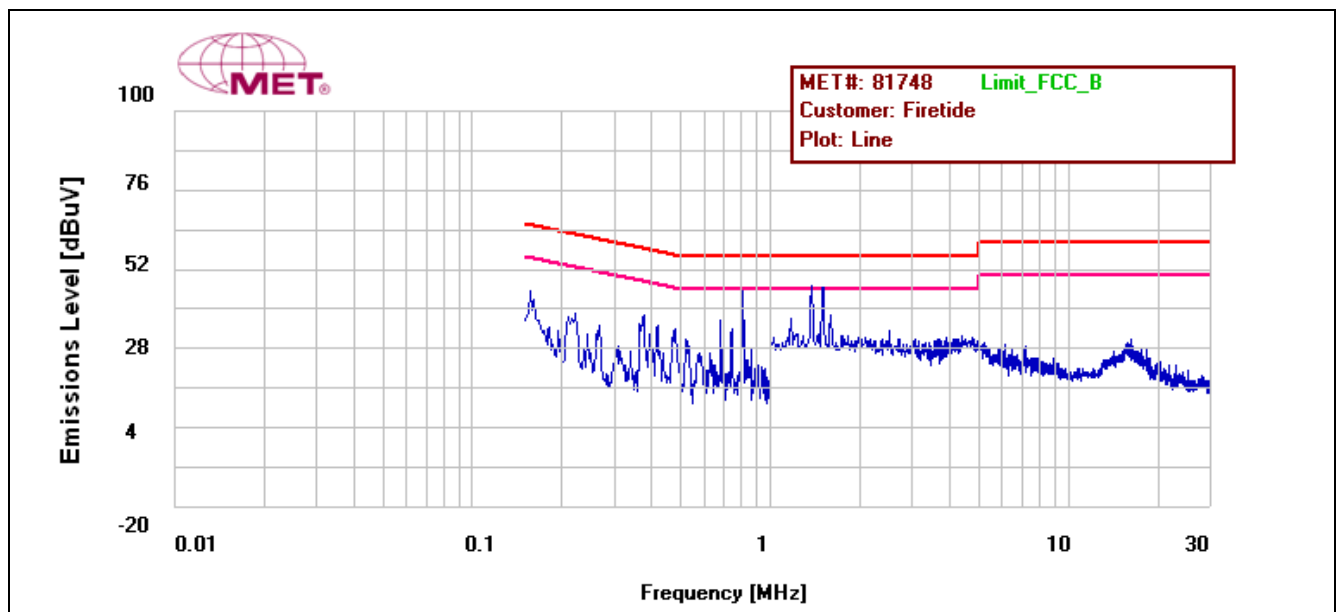
**Test Engineer(s):** Minh Ly

**Test Date(s):** 08/06/09

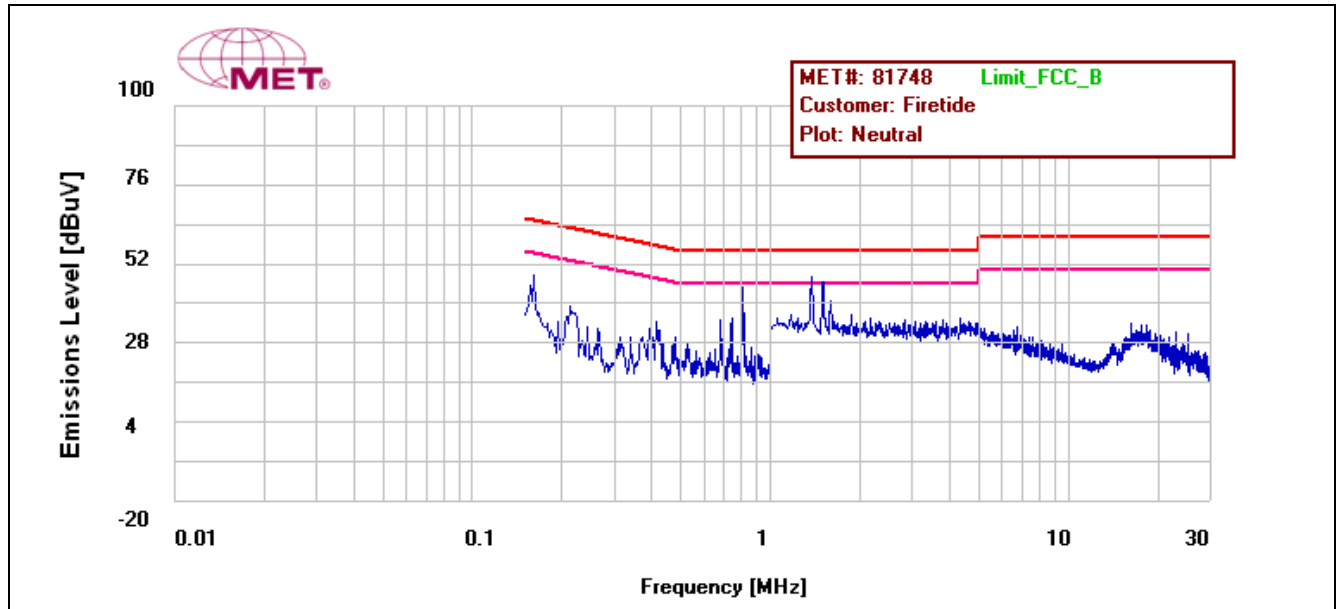
### Conducted Emissions - Voltage, AC Power

Line	Freq (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
Line	0.809	48.48	56	-7.52	Pass	44.48	46	-1.52	Pass
Line	1.37	45.08	56	-10.92	Pass	41.72	46	-4.28	Pass
Line	1.5	42.8	56	-13.2	Pass	40.39	46	-5.61	Pass
Neutral	0.810	47.88	56	-8.12	Pass	44.88	46	-1.12	Pass
Neutral	1.371	45.01	56	-10.99	Pass	42.16	46	-3.84	Pass
Neutral	1.5	40.76	56	-15.24	Pass	39.93	46	-6.07	Pass

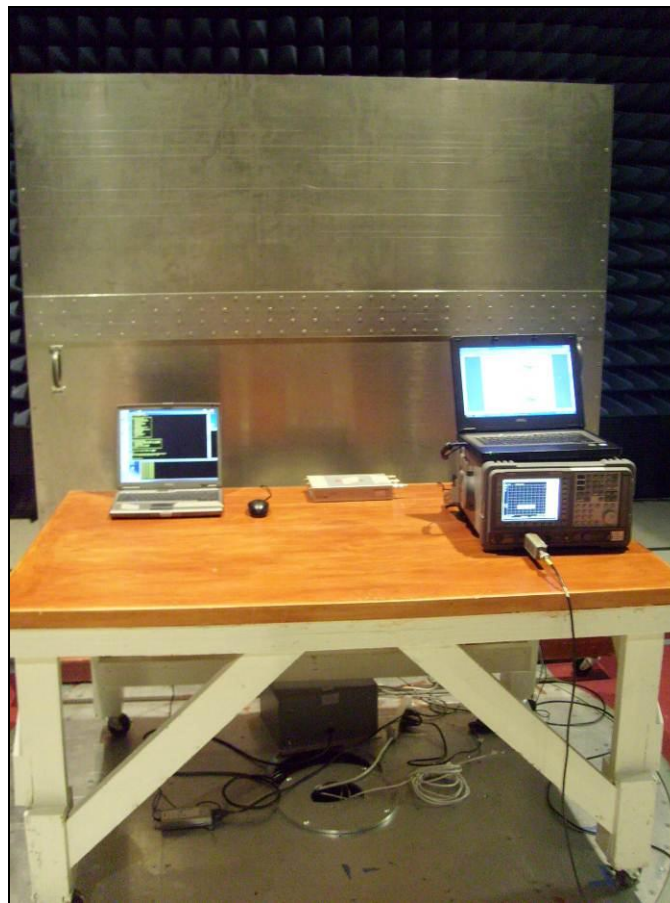
Table 8. Conducted Emissions - Voltage, AC Power, Test Results



Plot 1. Conducted Emission, Phase Line Plot



Plot 2. Conducted Emission, Neutral Line Plot



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 9.

**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 9.

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

**Table 9. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)**

**Test Procedures:** The EUT was placed on a 0.8m-high wooden table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

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

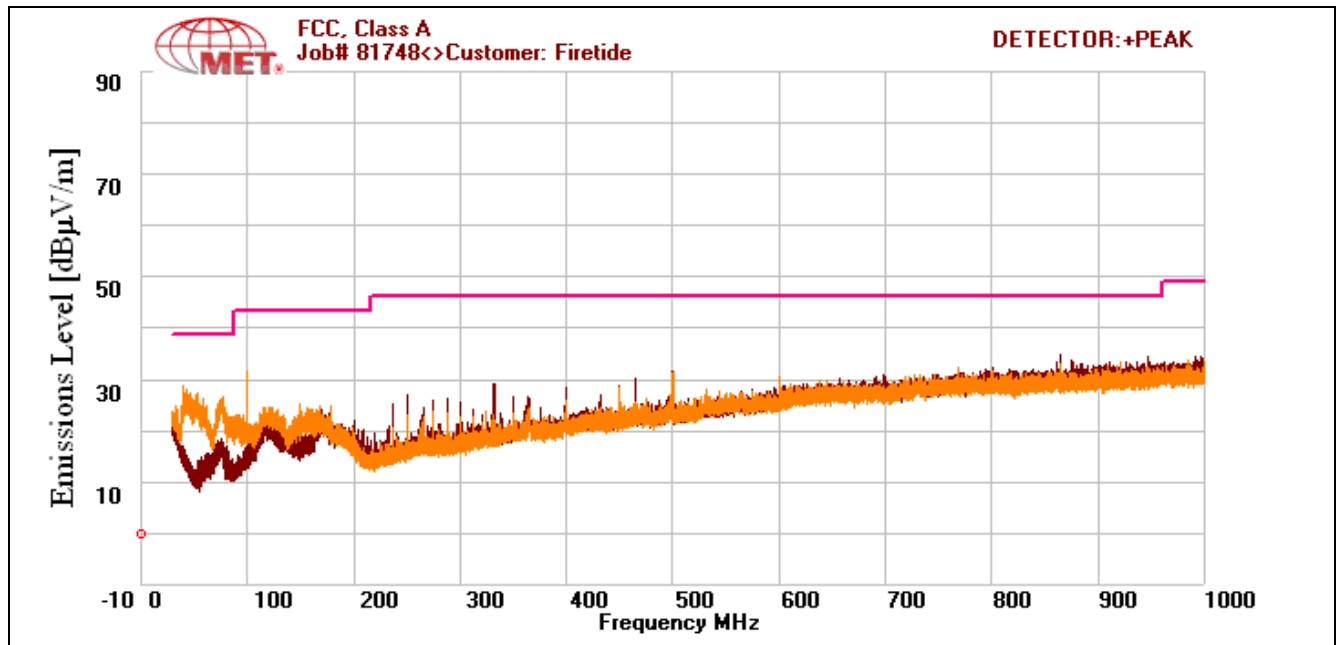
**Test Engineer(s):** Minh Ly

**Test Date(s):** 08/10/09

### Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
100	V	134	100	27.52	12.7	0	2.47	-10.46	32.23	43.5	-11.27
500	V	193	100	19.49	17.6	0	5.74	-10.46	32.37	46.4	-14.03
42.4	V	139	100	25.2	10.7	0	1.565	-10.46	27.005	39	-11.995
100	H	81	253	23.3	11.1	0	2.47	-10.46	26.41	43.5	-17.09
332	H	0	100	18.48	14.74	0	4.636	-10.46	27.396	46.4	-19.004
500	H	197	205	17.8	18	0	5.74	-10.46	31.08	46.4	-15.32

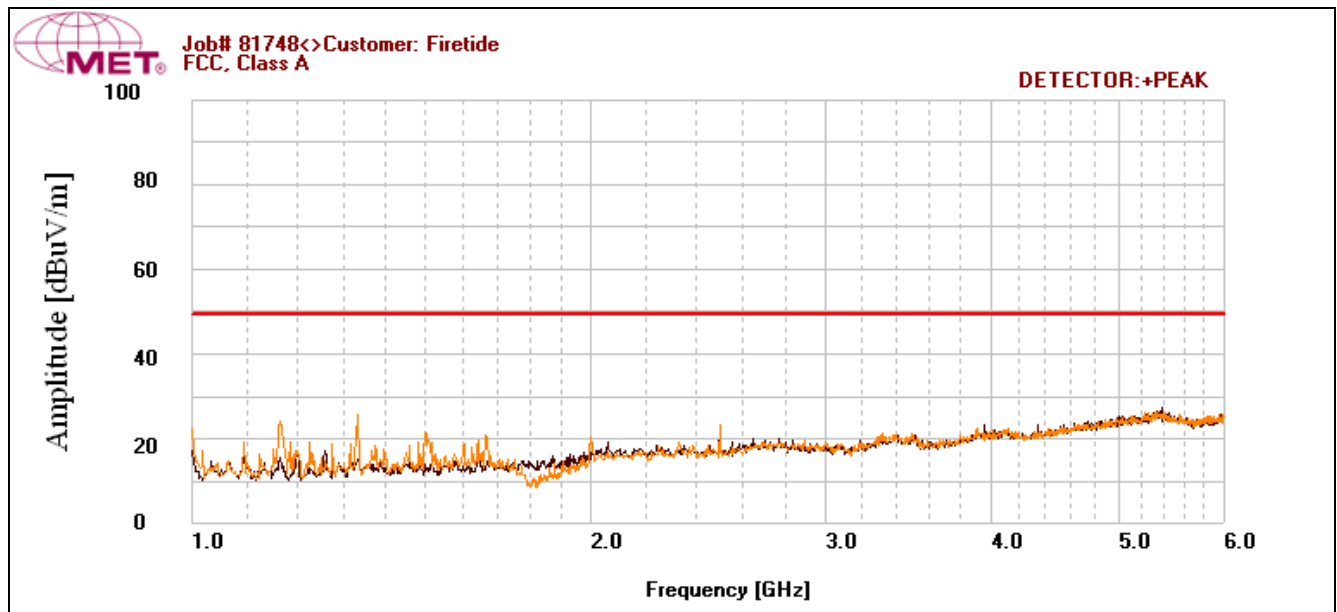
Table 10. Radiated Emissions, Test Results, FCC Limits, 30 MHz – 1 GHz



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

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2250	H	91	100	49.24	1.485	34.555	2.187	-10.46	7.897	49.5	-41.603
5000	H	0	100	44.36	8.299	34.415	4.13	-10.46	11.914	49.5	-37.586
1260	V	29	100	51.53	-1.552	35.258	1.686	-10.46	5.946	49.5	-43.554
1328	V	193	100	59.13	-1.636	35.155	1.724	-10.46	13.603	49.5	-35.897
5000	V	0	100	45.28	8.299	34.415	4.13	-10.46	12.834	49.5	-36.666

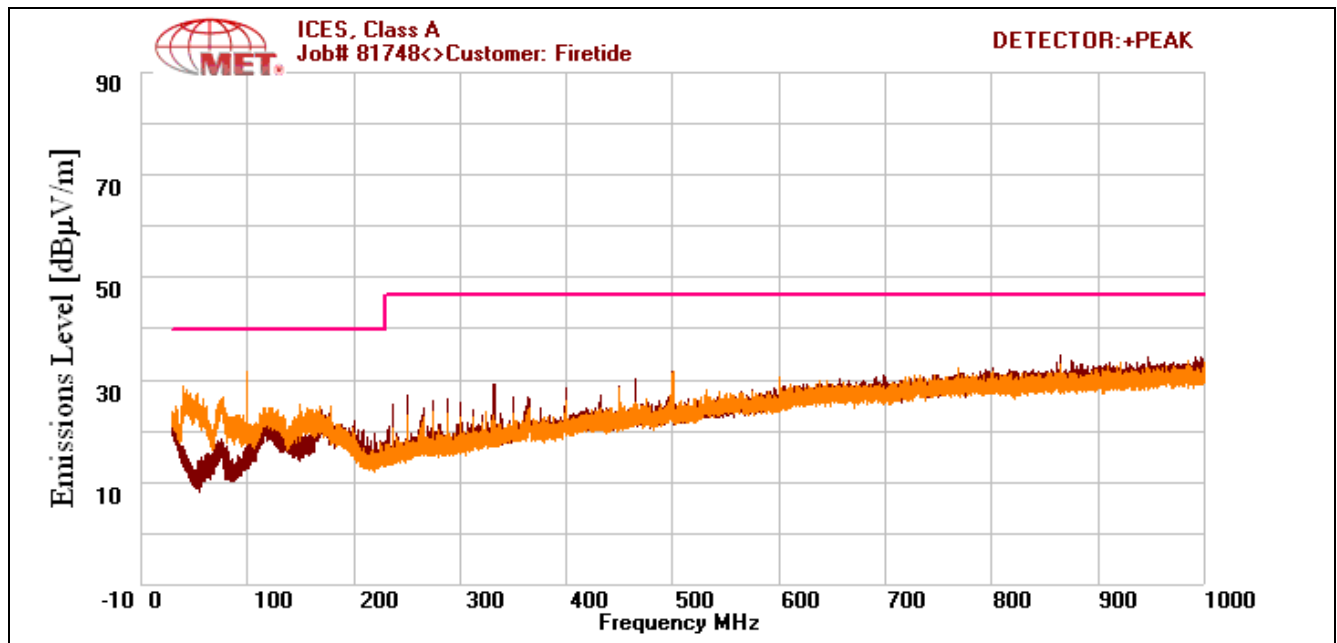
Table 11. Radiated Emissions, Test Results, FCC Limits, 1GHz – 6GHz



Plot 4. Radiated Emissions, Pre-Scan, FCC Limits, 1 GHz – 6 GHz

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
100	V	134	100	27.52	12.7	0	2.47	-10.46	32.23	40	-7.77
500	V	193	100	19.49	17.6	0	5.74	-10.46	32.37	47	-14.63
42.4	V	139	100	25.2	10.7	0	1.565	-10.46	27.005	40	-12.995
100	H	81	253	23.3	11.1	0	2.47	-10.46	26.41	40	-13.59
332	H	0	100	18.48	14.74	0	4.636	-10.46	27.396	47	-19.604

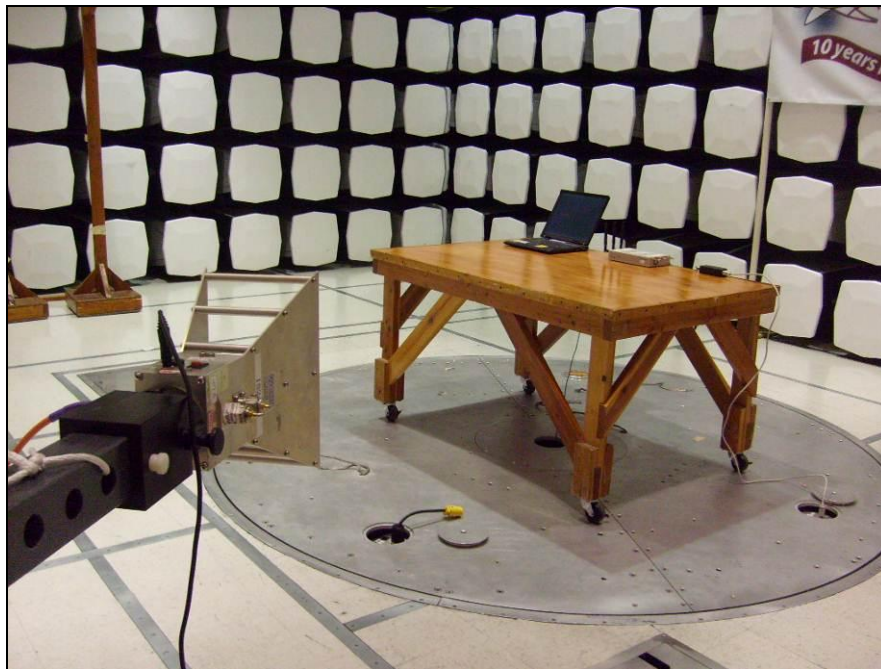
Table 12. Radiated Emissions, Test Results, ICES-003 Limits, 30 MHz – 1 GHz



Plot 5. Radiated Emissions, Pre-Scan, ICES-003 Limits, 30 MHz – 1 GHz



**Photograph 3 Radiated Emission Test Setup 30 MHz – 1 GHz**



**Photograph 4. Radiated Emission Test Setup 1 GHz – 6 GHz**



## **IV. Electromagnetic Compatibility Criteria for Intentional Radiators**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.203 Antenna Requirement

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

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

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

**Results:** The EUT as tested is compliant the criteria of §15.203. The unit will be professionally installed.

Gain/Type	Model	Manufacturer
5dBi Omni (5GHz)	C812-510012-A	Wha Yu

**Table 13. Antenna Information**

**Test Engineer(s):** Minh Ly

**Test Date(s):** 09/02/09

## 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  $\mu$ H/50  $\Omega$  line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dB $\mu$ V)	
	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 0.8 m-high wooden table 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  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-1992 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50  $\Omega$ /50  $\mu$ H LISN as the input transducer to an EMC/field intensity meter.

**Test Results:** The EUT was found to comply with the requirement(s) of this section. Measured emissions were below applicable limits.

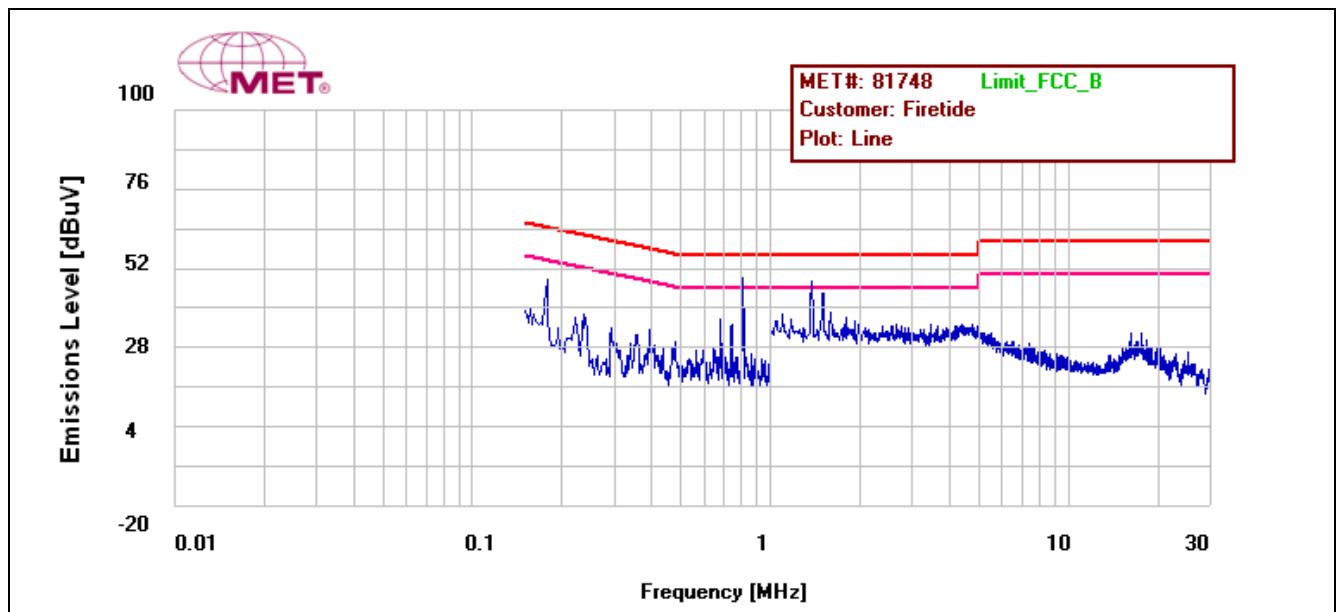
**Test Engineer(s):** Minh Ly

**Test Date(s):** 08/06/09

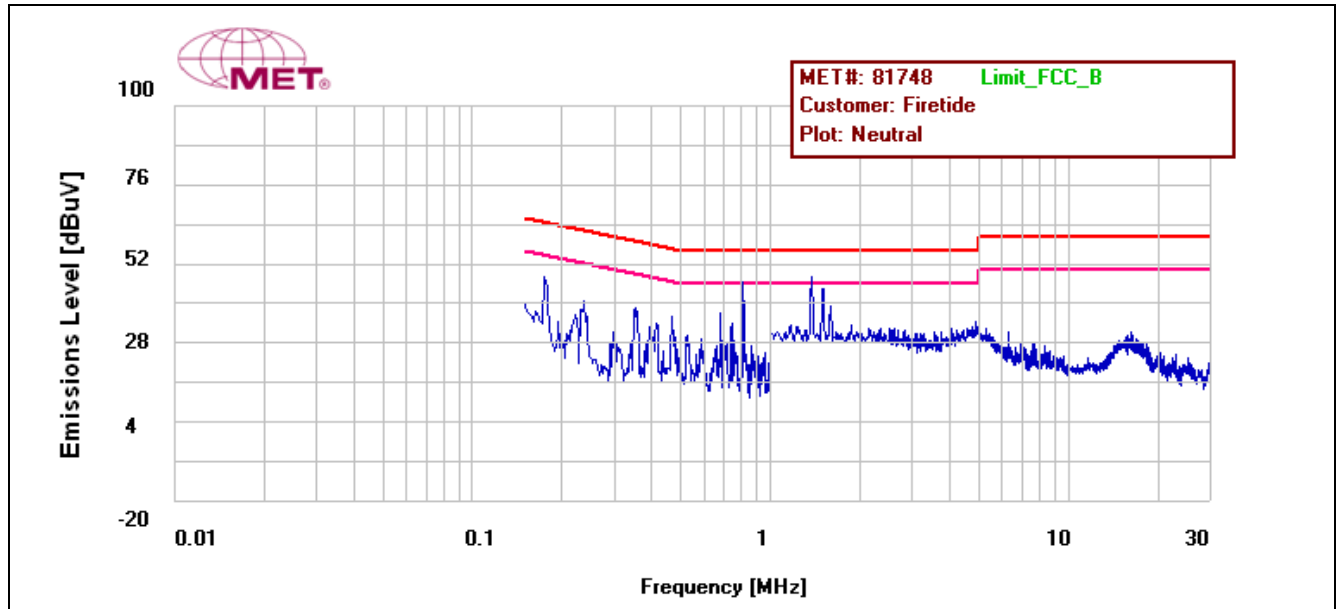
### Conducted Emissions - Voltage, AC Power

Line	Freq (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
Line	0.81	48.12	56	-7.88	Pass	44.49	46	-1.51	Pass
Line	1.37	45.92	56	-10.08	Pass	41.87	46	-4.13	Pass
Line	1.5	40.81	56	-15.19	Pass	40.63	46	-5.37	Pass
Neutral	0.809	45.55	56	-10.45	Pass	43.78	46	-2.22	Pass
Neutral	1.37	46.16	56	-9.84	Pass	41.91	46	-4.09	Pass
Neutral	1.5	43.79	56	-12.21	Pass	40.02	46	-5.98	Pass

Table 15. Conducted Emissions - Voltage, AC Power, Test Results



Plot 6. §15.207 Conducted Emissions, Phase Line Plot, 7100 Indoor Unit



Plot 7. §15.207 Conducted Emissions, Neutral Line Plot, 7100 Indoor Unit

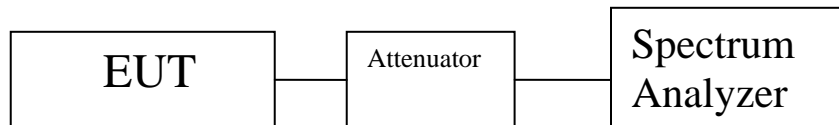


Photograph 5. Conducted Emissions, Test Setup

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.403(c) 26dB Bandwidth

- Test Requirements:** § 15.403 (c): Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
- Test Procedure:** The transmitter was set to the mid channel 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. The measurements were repeated at the low and high channels.
- Test Results** Equipment complies with § 15.407 (c). The 26 dB Bandwidth was determined from the plots on the following pages.
- Test Engineer(s):** Minh Ly
- Test Date(s):** 07/28/09 – 08/11/09



**Figure 2. Occupied Bandwidth Test Setup**

<b>Occupied Bandwidth, Port 1</b>			
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>Measured 26 dB Bandwidth (MHz)</b>	<b>99 % Bandwidth (MHz)</b>
<b>802.11a</b>	5180	16.4999	16.4057
	5240	16.6734	16.4064
	5260	16.6051	16.2574
	5320	16.5974	16.4561
	5500	16.8858	16.2905
	5580	16.5369	16.4007
	5700	16.5889	16.3513
<b>802.11n 20MHz</b>	5180	17.6727	17.6892
	5240	17.7090	17.6419
	5260	17.8775	17.6328
	5320	17.7002	17.5481
	5500	17.7966	17.6993
	5580	17.6172	17.4919
	5700	17.7173	17.3338
<b>802.11n 40MHz</b>	5190	36.9103	36.9786
	5230	36.6544	36.5282
	5270	36.9057	36.7638
	5310	36.9001	36.6566
	5510	36.6398	36.4100
	5550	36.5579	36.5839
	5670	36.6412	36.6333

**Table 16. Occupied Bandwidth, Port 1, Test Results**

<b>Occupied Bandwidth, Port 2</b>			
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>Measured 26 dB Bandwidth (MHz)</b>	<b>99 % Bandwidth (MHz)</b>
<b>802.11n 20MHz</b>	5180	17.7645	17.7283
	5240	17.7915	17.7916
	5260	17.7306	17.5789
	5320	17.7836	17.6254
	5500	17.8179	17.5414
	5580	17.5533	17.6765
	5700	17.6525	17.5882
<b>802.11n 40MHz</b>	5190	36.6272	36.5092
	5230	36.7027	36.8081
	5270	36.8372	36.6803
	5310	36.7184	36.2819
	5510	36.8367	36.5567
	5550	36.7273	36.4103
	5670	36.7982	36.7017

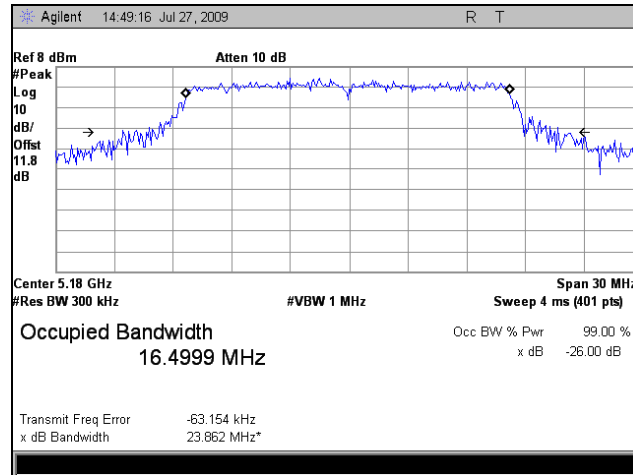
**Table 17. Occupied Bandwidth, Port 2, Test Results**

<b>Occupied Bandwidth, Port 3</b>			
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>Measured 26 dB Bandwidth (MHz)</b>	<b>99 % Bandwidth (MHz)</b>
<b>802.11n 20MHz</b>	5180	17.7794	17.6803
	5240	17.7421	17.5279
	5260	17.8378	17.6291
	5320	17.7333	17.5672
	5500	17.7594	17.5506
	5580	17.6137	17.5337
	5700	17.8288	17.5724
<b>802.11n 40MHz</b>	5190	36.7797	36.4884
	5230	36.8511	36.4926
	5270	36.8721	36.2576
	5310	36.8101	36.8722
	5510	37.0056	36.8653
	5550	36.5107	36.6691
	5670	36.9159	36.4767

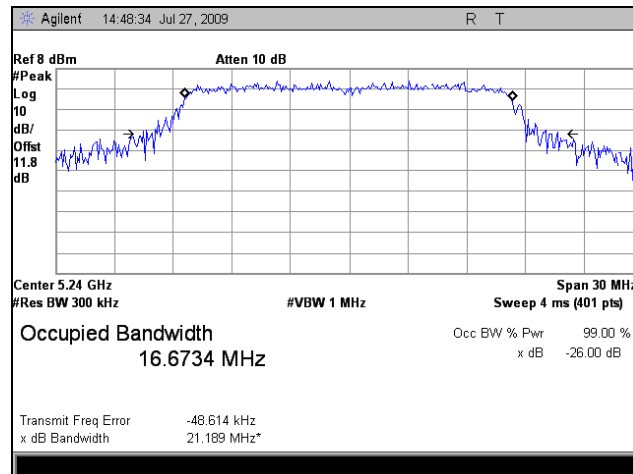
**Table 18. Occupied Bandwidth, Port 3, Test Results**



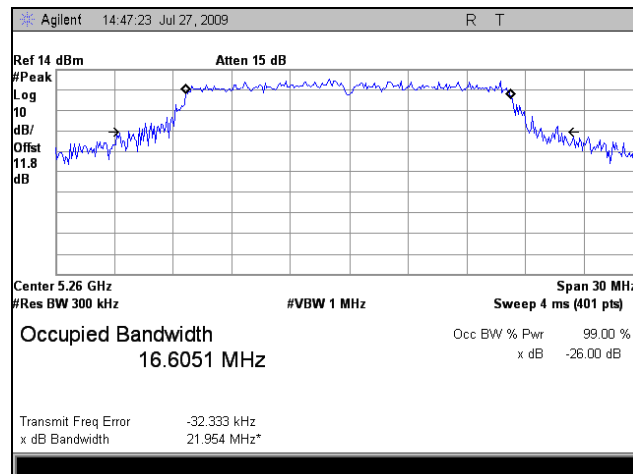
## Occupied Bandwidth, Port 1



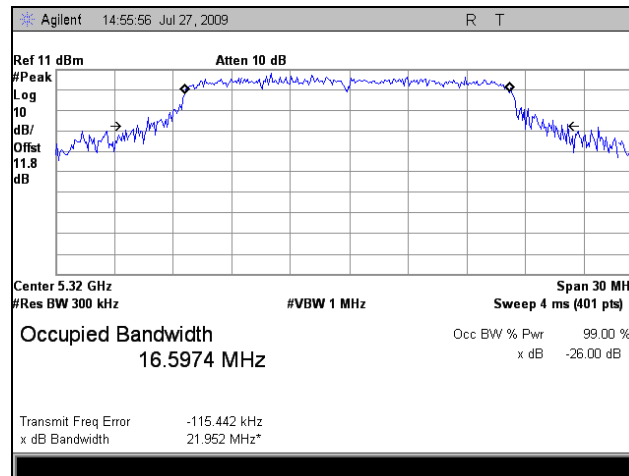
Plot 8. Occupied Bandwidth, Port 1, 802.11a, 5180 MHz



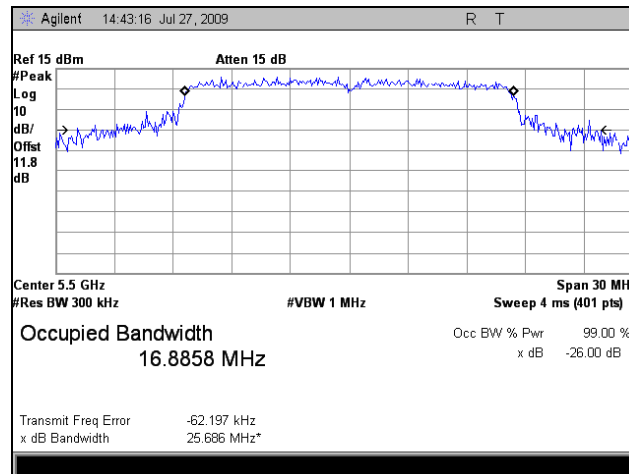
Plot 9. Occupied Bandwidth, Port 1, 802.11a, 5240 MHz



Plot 10. Occupied Bandwidth, Port 1, 802.11a, 5260 MHz

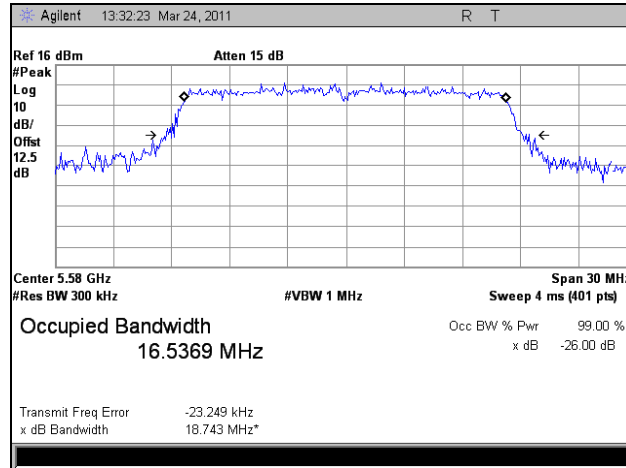


**Plot 11. Occupied Bandwidth, Port 1, 802.11a, 5320 MHz**

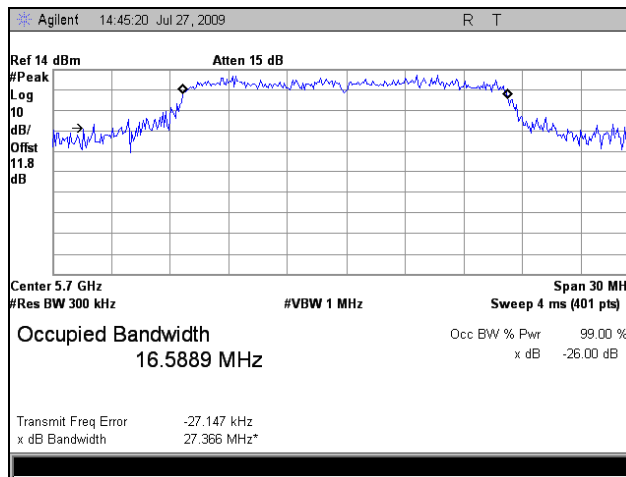


**Plot 12. Occupied Bandwidth, Port 1, 802.11a, 5500 MHz**

## Occupied Bandwidth, Port 1

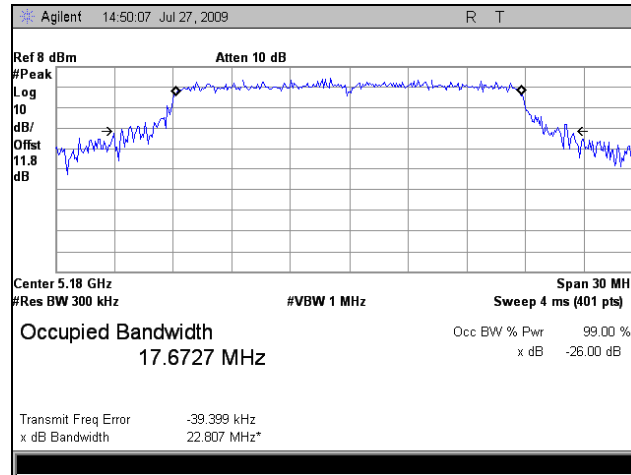


**Plot 13. Occupied Bandwidth, Port 1, 802.11a, 5580 MHz**

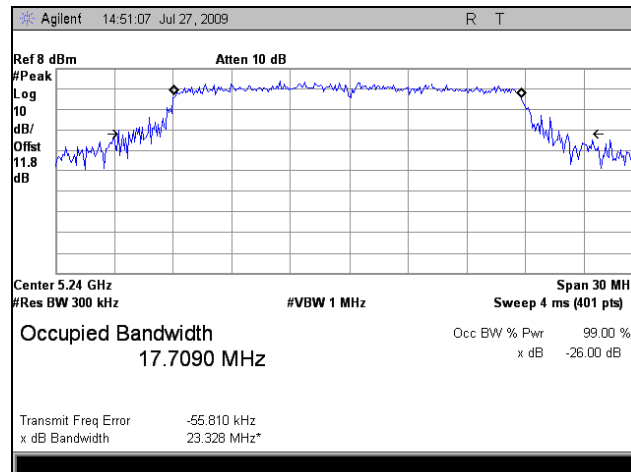


**Plot 14. Occupied Bandwidth, Port 1, 802.11a, 5700 MHz**

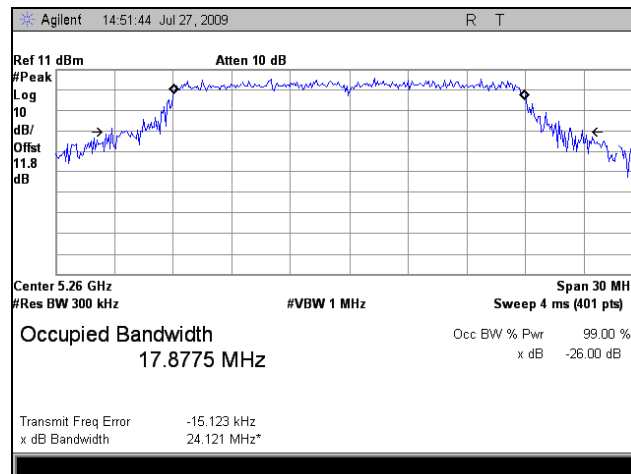
## Occupied Bandwidth, Port 1, 802.11n 20MHz



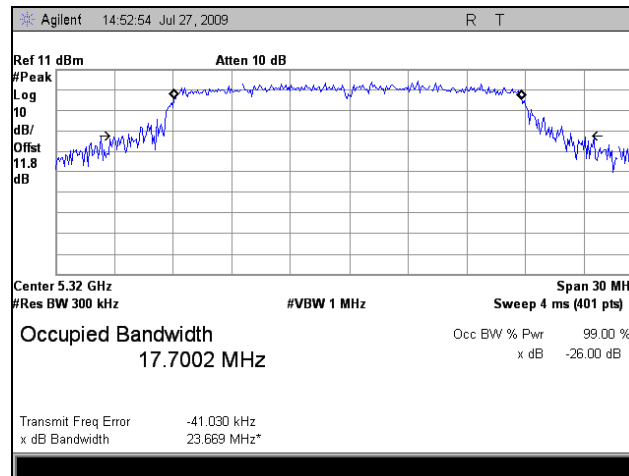
Plot 15. Occupied Bandwidth, Port 1, 802.11n 20MHz, 5180 MHz



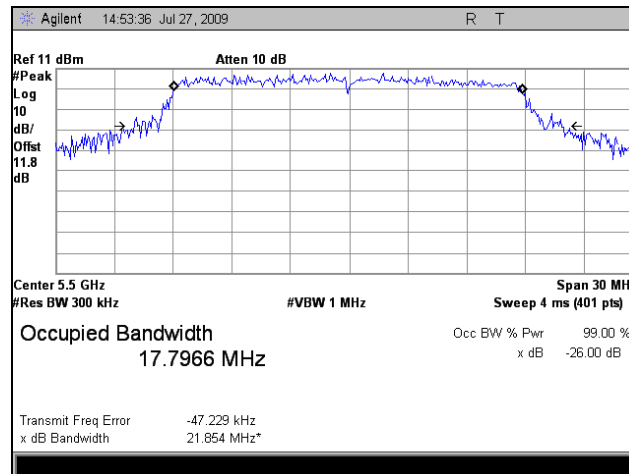
Plot 16. Occupied Bandwidth, Port 1, 802.11n 20MHz, 5240 MHz



Plot 17. Occupied Bandwidth, Port 1, 802.11n 20MHz, 5260 MHz

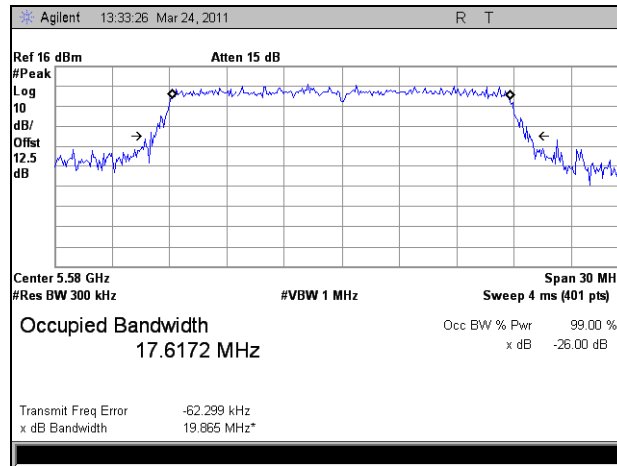


Plot 18. Occupied Bandwidth, Port 1, 802.11n 20MHz, 5320 MHz

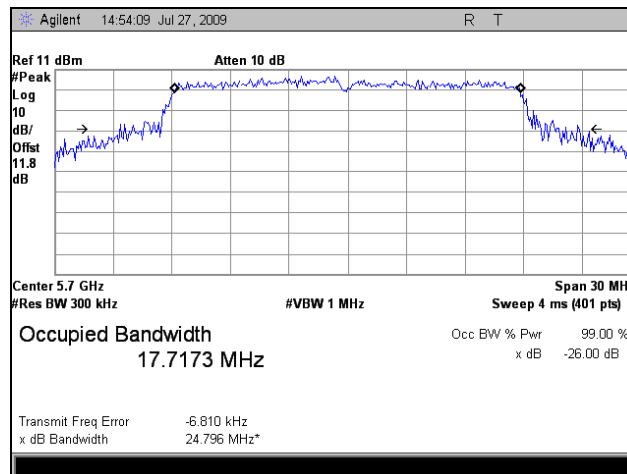


Plot 19. Occupied Bandwidth, Port 1, 802.11n 20MHz, 5500 MHz

## Occupied Bandwidth, Port 1, 802.11n 20MHz

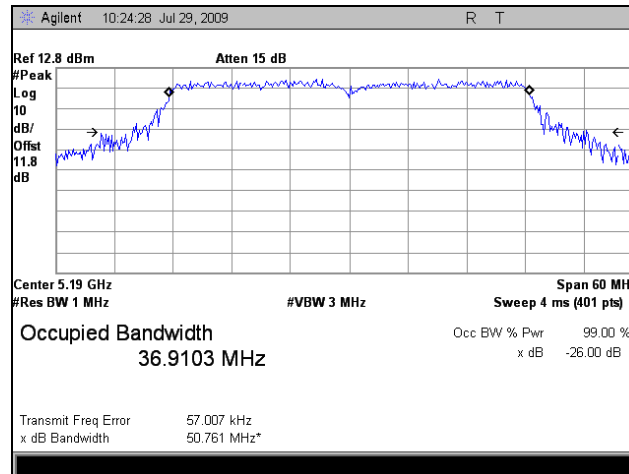


Plot 20. Occupied Bandwidth, Port 1, 802.11n 20MHz, 5580 MHz

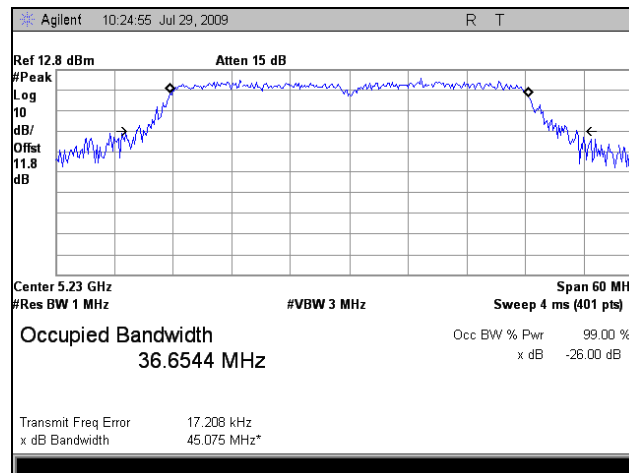


Plot 21. Occupied Bandwidth, Port 1, 802.11n 20MHz, 5700 MHz

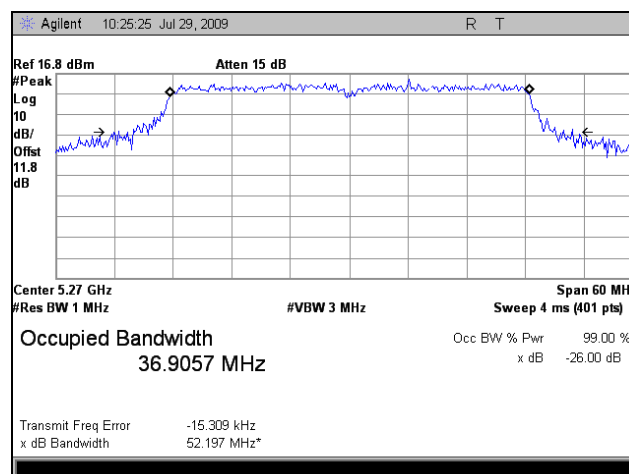
## Occupied Bandwidth, Port 1, 802.11n 40MHz



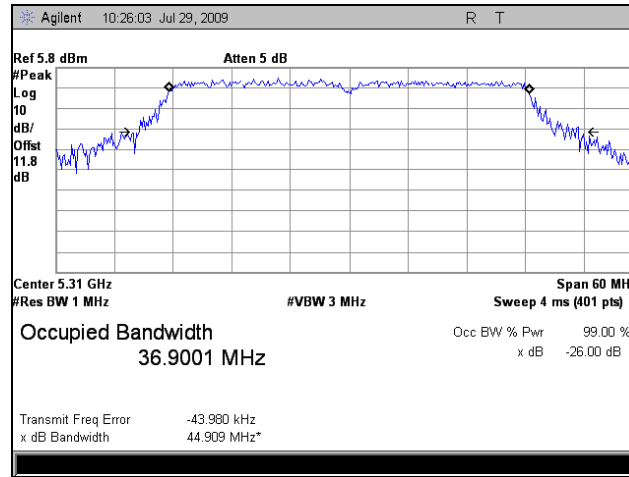
Plot 22. Occupied Bandwidth, Port 1, 802.11n 40MHz, 5190 MHz



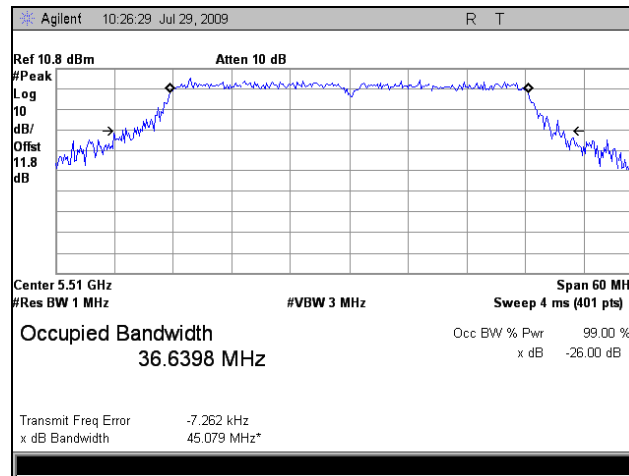
Plot 23. Occupied Bandwidth, Port 1, 802.11n 40MHz, 5230 MHz



Plot 24. Occupied Bandwidth, Port 1, 802.11n 40MHz, 5270 MHz



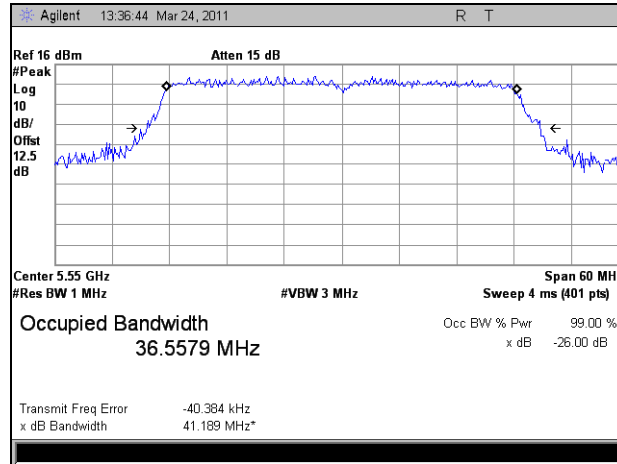
Plot 25. Occupied Bandwidth, Port 1, 802.11n 40MHz, 5310 MHz



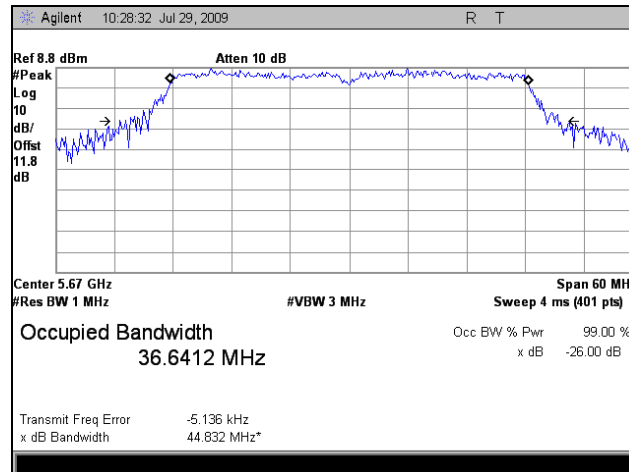
Plot 26. Occupied Bandwidth, Port 1, 802.11n 40MHz, 5510 MHz



**Occupied Bandwidth, Port 1, 802.11n 40MHz**

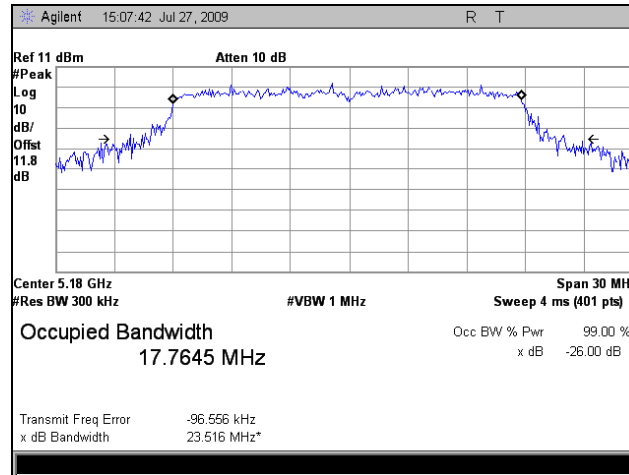


**Plot 27. Occupied Bandwidth, Port 1, 802.11n 40MHz, 5550 MHz**

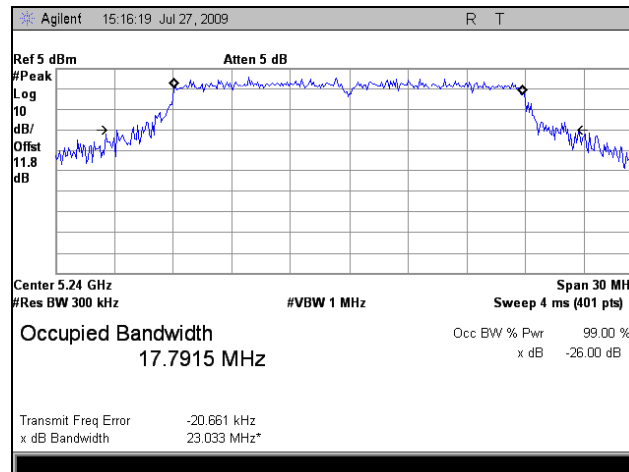


**Plot 28. Occupied Bandwidth, Port 1, 802.11n 40MHz, 5670 MHz**

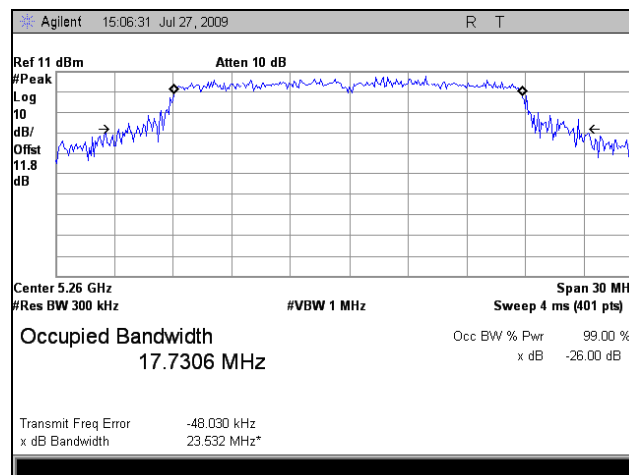
## Occupied Bandwidth, Port 2, 802.11n 20MHz



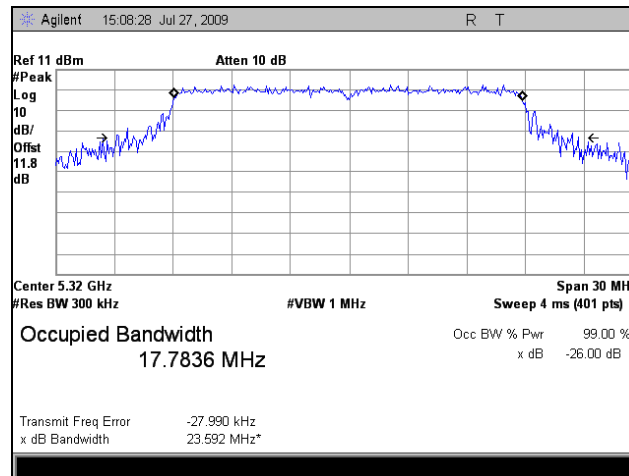
Plot 29. Occupied Bandwidth, Port 2, 802.11n 20MHz, 5180 MHz



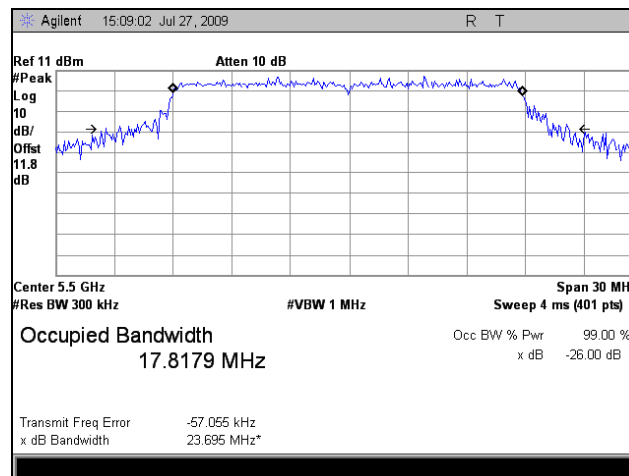
Plot 30. Occupied Bandwidth, Port 2, 802.11n 20MHz, 5240 MHz



Plot 31. Occupied Bandwidth, Port 2, 802.11n 20MHz, 5260 MHz

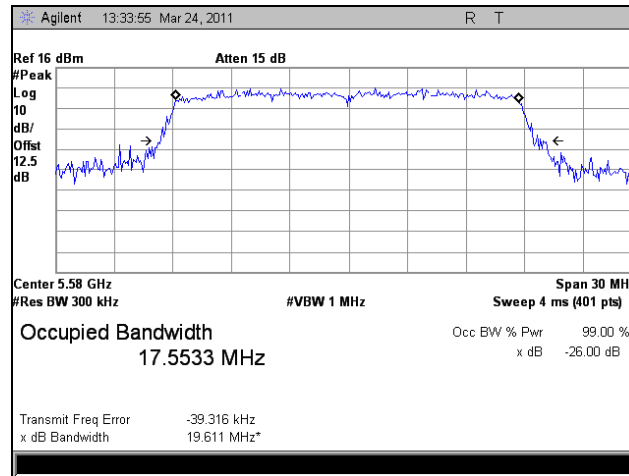


Plot 32. Occupied Bandwidth, Port 2, 802.11n 20MHz, 5320 MHz

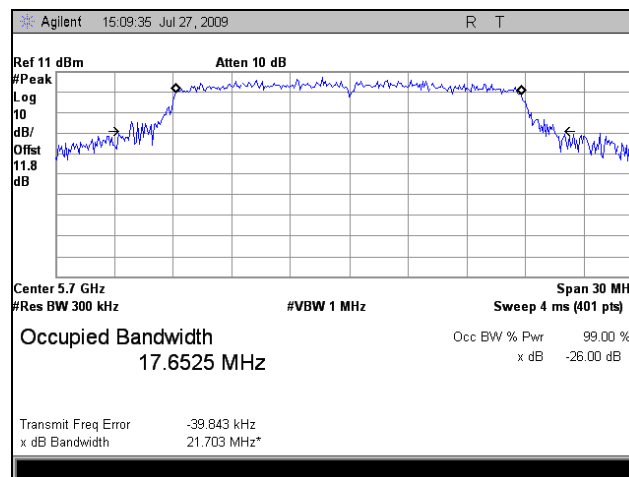


Plot 33. Occupied Bandwidth, Port 2, 802.11n 20MHz, 5500 MHz

## Occupied Bandwidth, Port 2, 802.11n 20MHz

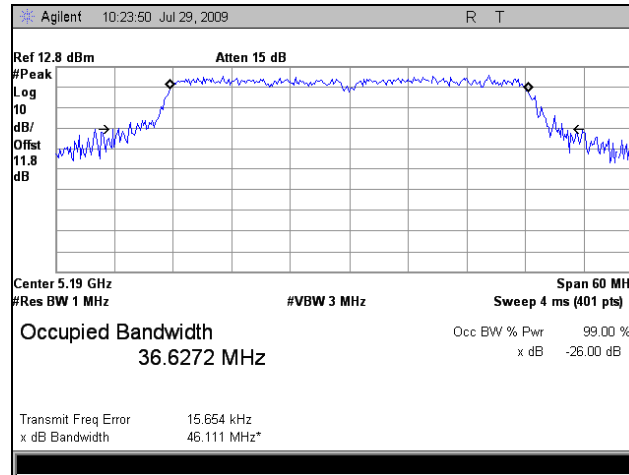


Plot 34. Occupied Bandwidth, Port 2, 802.11n 20MHz, 5580 MHz

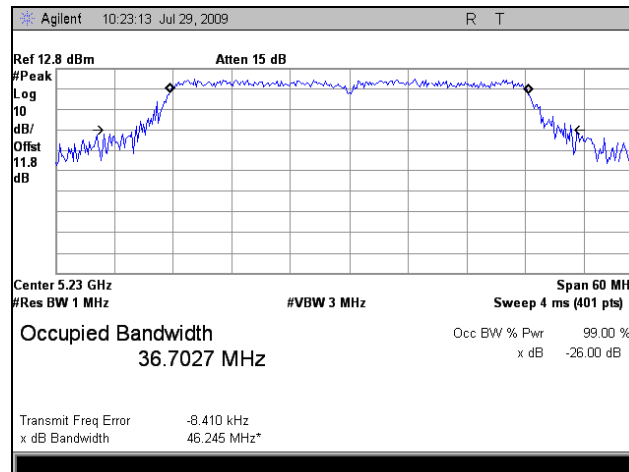


Plot 35. Occupied Bandwidth, Port 2, 802.11n 20MHz, 5700 MHz

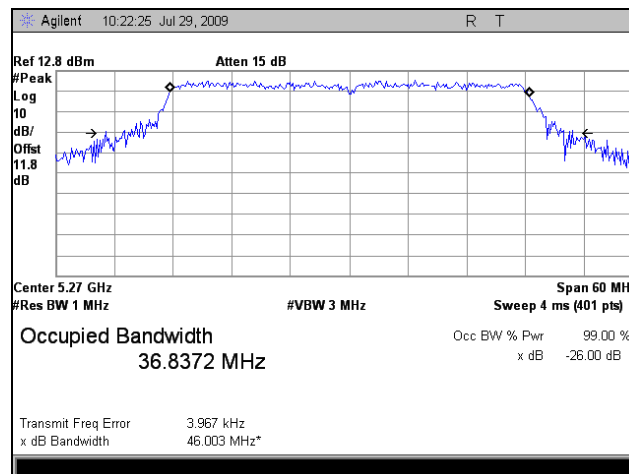
## Occupied Bandwidth, Port 2, 802.11n 40MHz



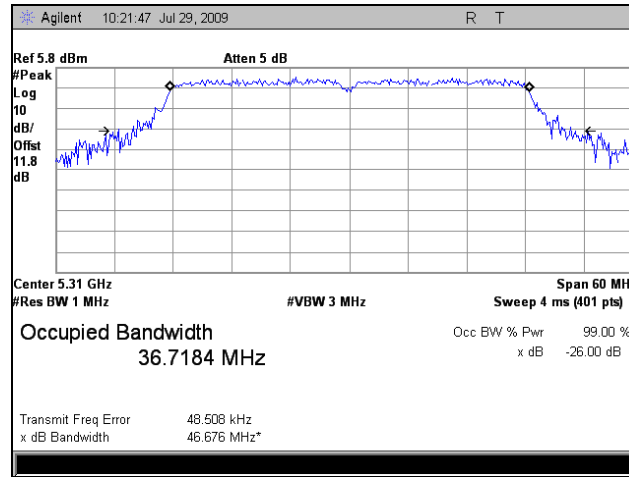
Plot 36. Occupied Bandwidth, Port 2, 802.11n 40MHz, 5190 MHz



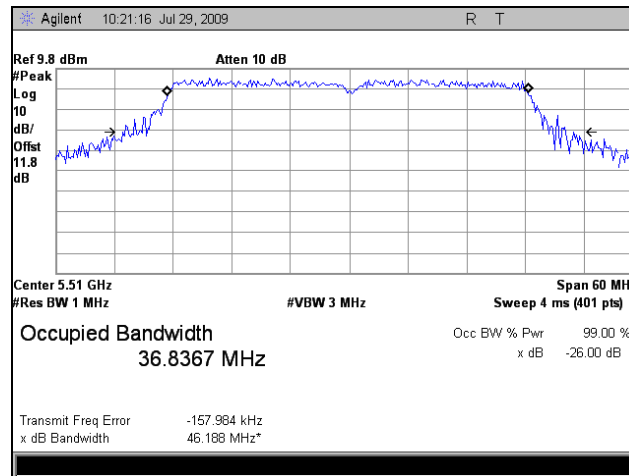
Plot 37. Occupied Bandwidth, Port 2, 802.11n 40MHz, 5230 MHz



Plot 38. Occupied Bandwidth, Port 2, 802.11n 40MHz, 5270 MHz

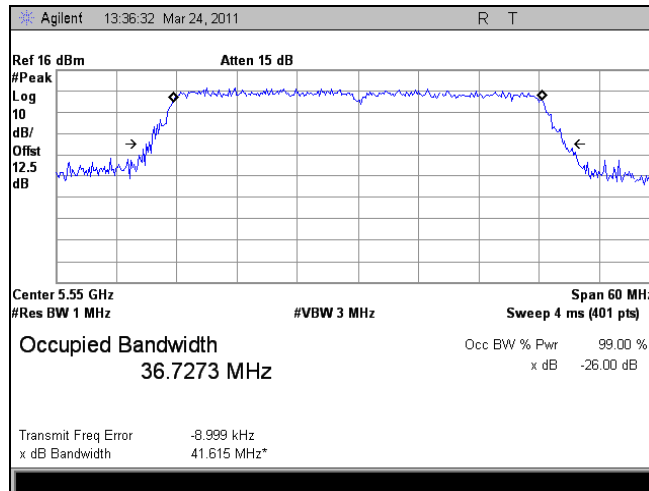


Plot 39. Occupied Bandwidth, Port 2, 802.11n 40MHz, 5310 MHz

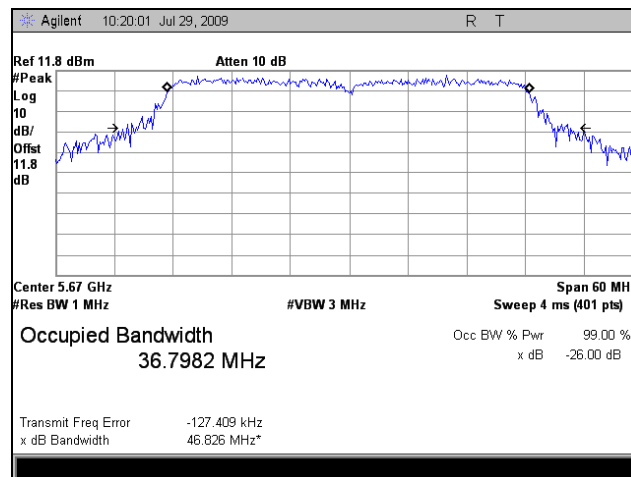


Plot 40. Occupied Bandwidth, Port 2, 802.11n 40MHz, 5510 MHz

### Occupied Bandwidth, Port 2, 802.11n 40MHz

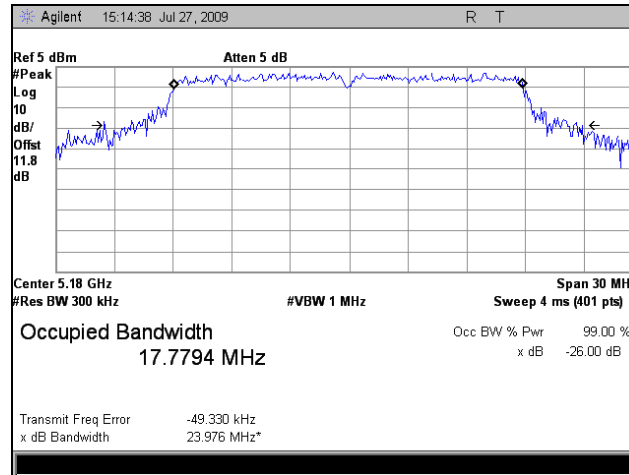


Plot 41. Occupied Bandwidth, Port 2, 802.11n 40MHz, 5550 MHz

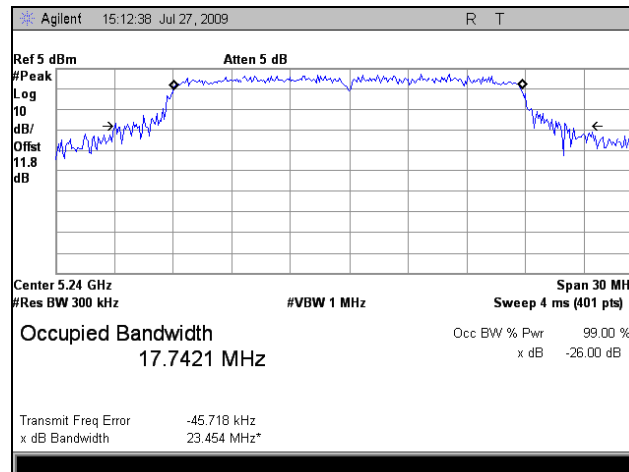


Plot 42. Occupied Bandwidth, Port 2, 802.11n 40MHz, 5670 MHz

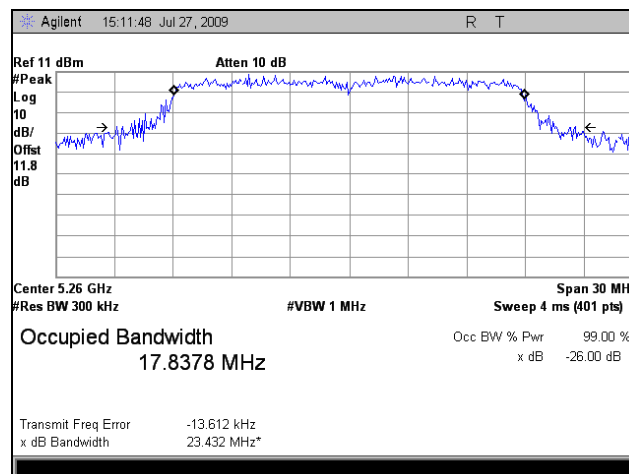
## Occupied Bandwidth, Port 3, 802.11n 20MHz



Plot 43. Occupied Bandwidth, Port 3, 802.11n 20MHz, 5180 MHz

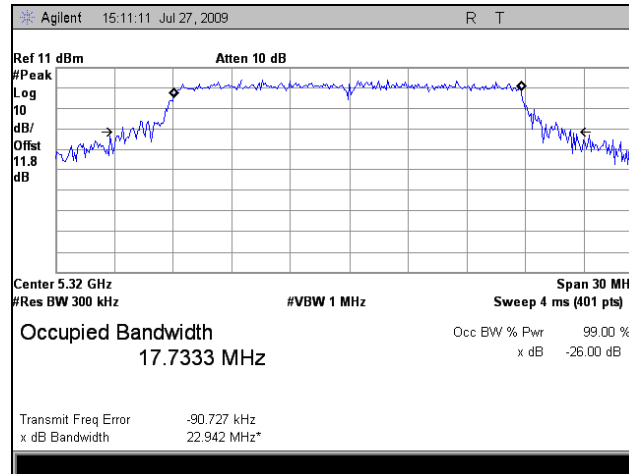


Plot 44. Occupied Bandwidth, Port 3, 802.11n 20MHz, 5240 MHz

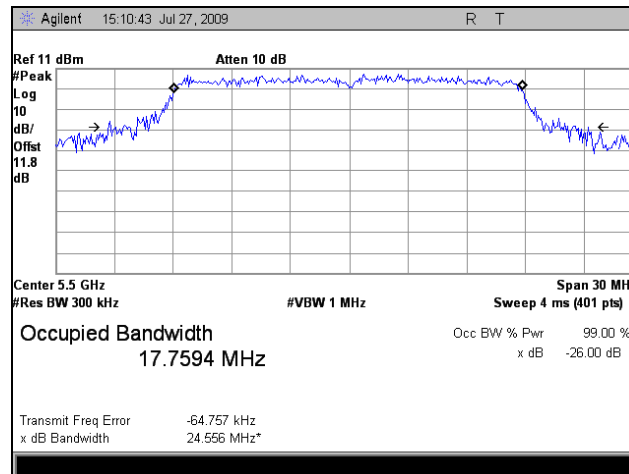


Plot 45. Occupied Bandwidth, Port 3, 802.11n 20MHz, 5260 MHz



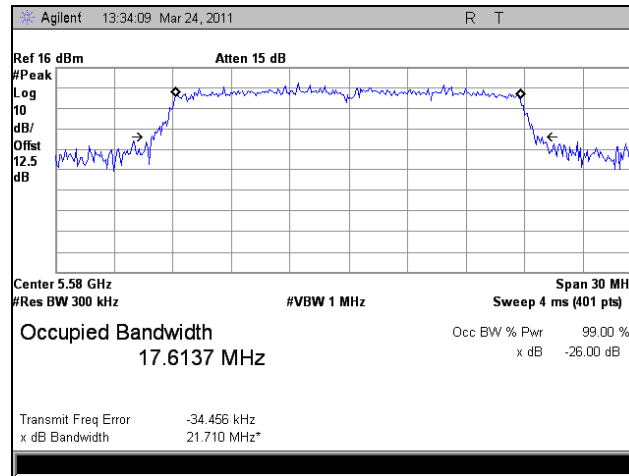


Plot 46. Occupied Bandwidth, Port 3, 802.11n 20MHz, 5320 MHz

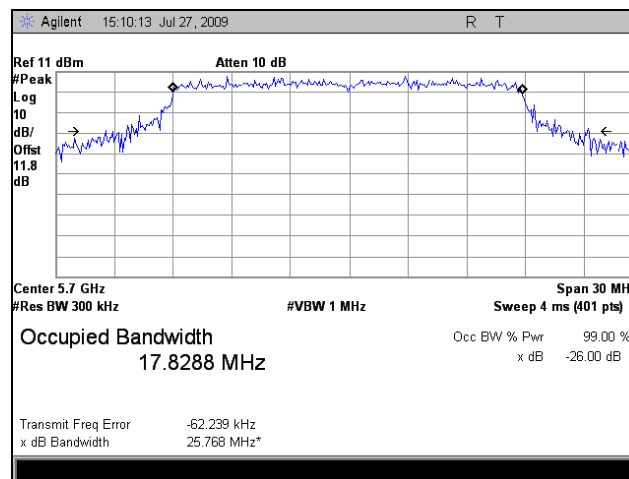


Plot 47. Occupied Bandwidth, Port 3, 802.11n 20MHz, 5500 MHz

## Occupied Bandwidth, Port 3, 802.11n 20MHz

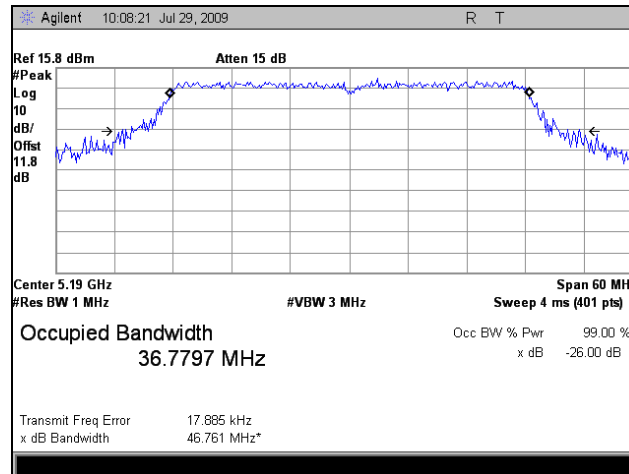


Plot 48. Occupied Bandwidth, Port 3, 802.11n 20MHz, 5580 MHz

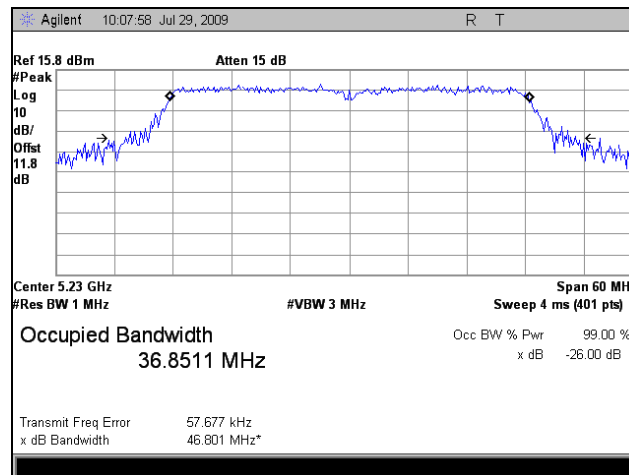


Plot 49. Occupied Bandwidth, Port 3, 802.11n 20MHz, 5700 MHz

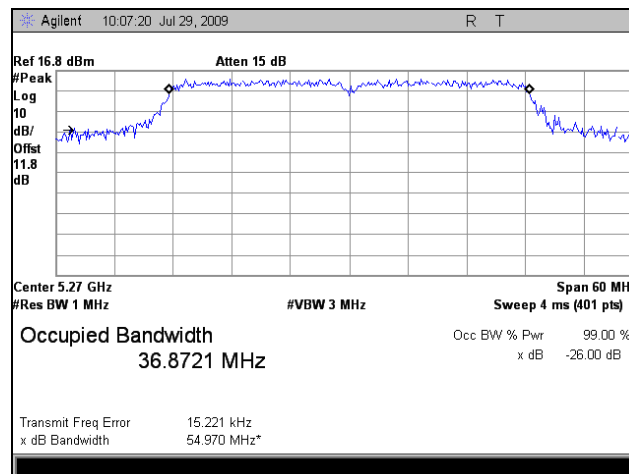
## Occupied Bandwidth, Port 3, 802.11n 40MHz



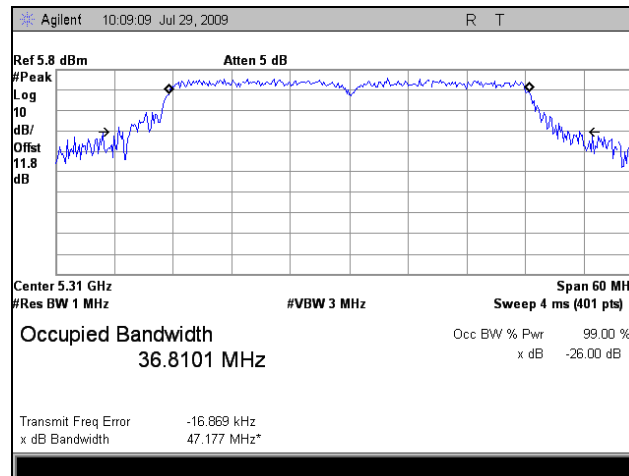
Plot 50. Occupied Bandwidth, Port 3, 802.11n 40MHz, 5190 MHz



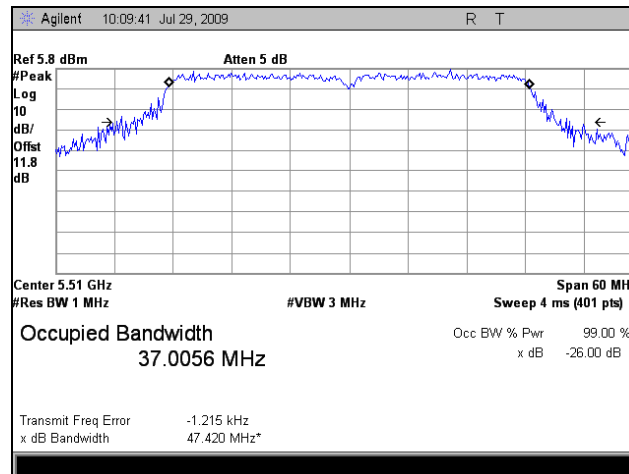
Plot 51. Occupied Bandwidth, Port 3, 802.11n 40MHz, 5230 MHz



Plot 52. Occupied Bandwidth, Port 3, 802.11n 40MHz, 5270 MHz

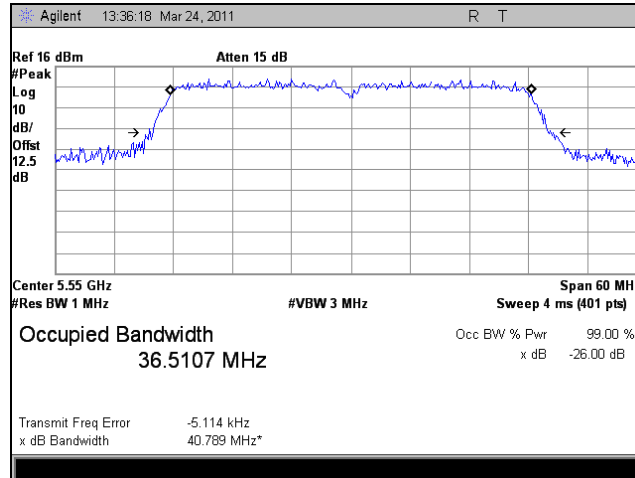


Plot 53. Occupied Bandwidth, Port 3, 802.11n 40MHz, 5310 MHz

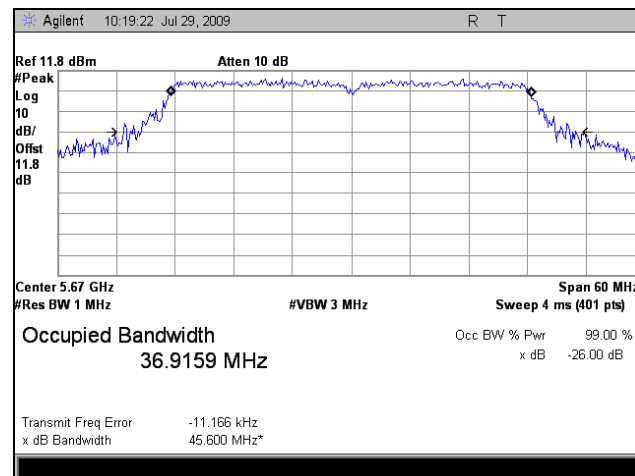


Plot 54. Occupied Bandwidth, Port 3, 802.11n 40MHz, 5510 MHz

### Occupied Bandwidth, Port 3, 802.11n 40MHz

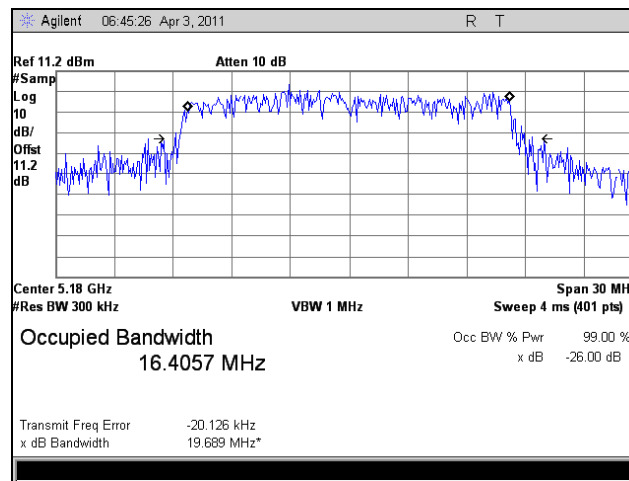


Plot 55. Occupied Bandwidth, Port 3, 802.11n 40MHz, 5550 MHz

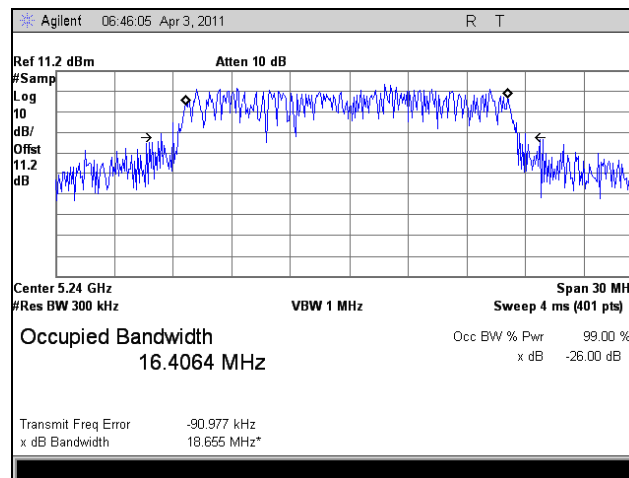


Plot 56. Occupied Bandwidth, Port 3, 802.11n 40MHz, 5670 MHz

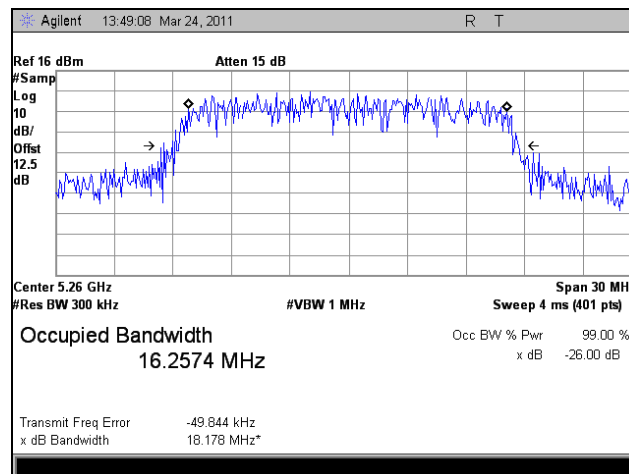
## 99% Occupied Bandwidth, Port 1



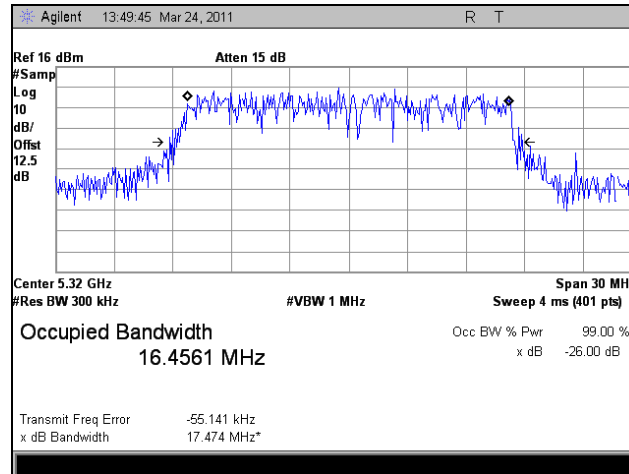
Plot 57. 99% Occupied Bandwidth, Port 1, 802.11a, 5180 MHz



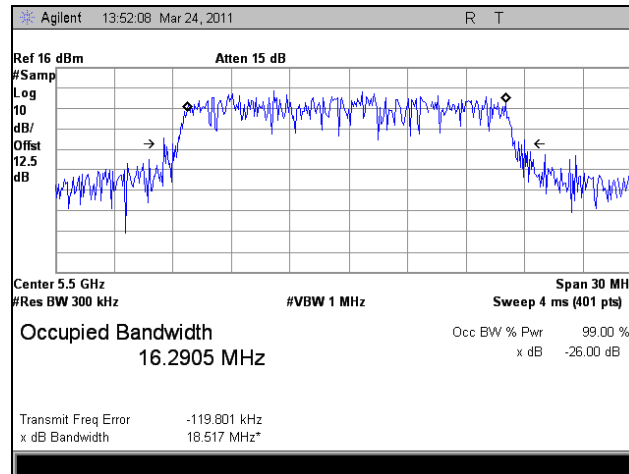
Plot 58. 99% Occupied Bandwidth, Port 1, 802.11a, 5240 MHz



Plot 59. 99% Occupied Bandwidth, Port 1, 802.11a, 5260 MHz

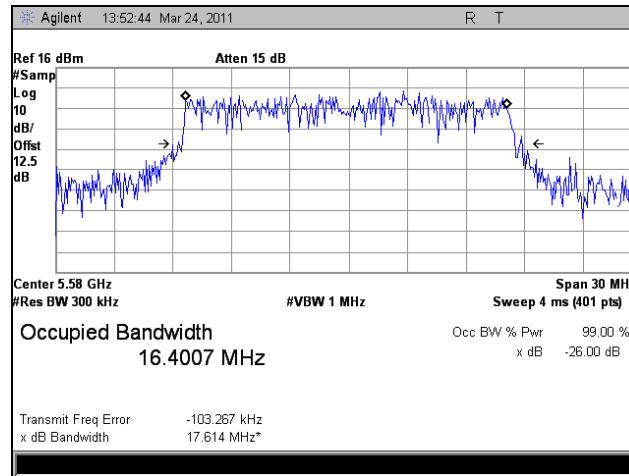


**Plot 60. 99% Occupied Bandwidth, Port 1, 802.11a, 5320 MHz**

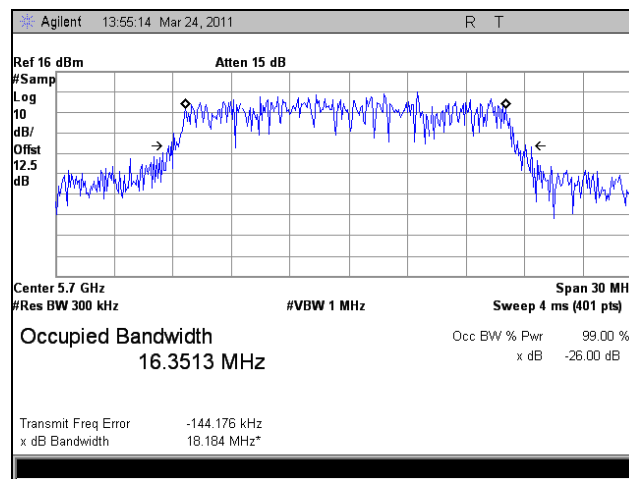


**Plot 61. 99% Occupied Bandwidth, Port 1, 802.11a, 5500 MHz**

## 99% Occupied Bandwidth, Port 1



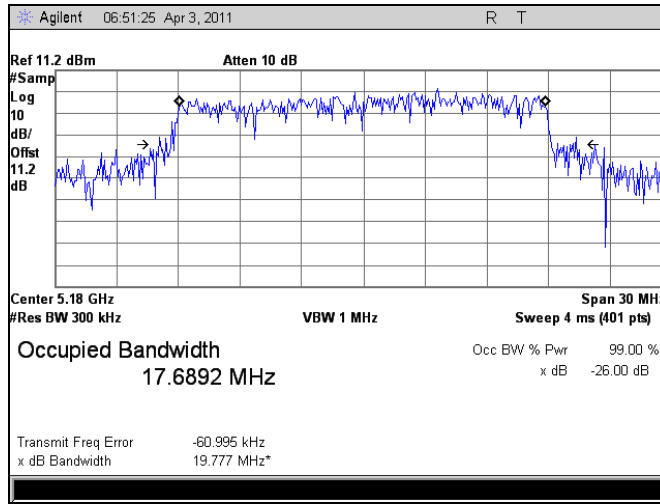
Plot 62. 99% Occupied Bandwidth, Port 1, 802.11a, 5580 MHz



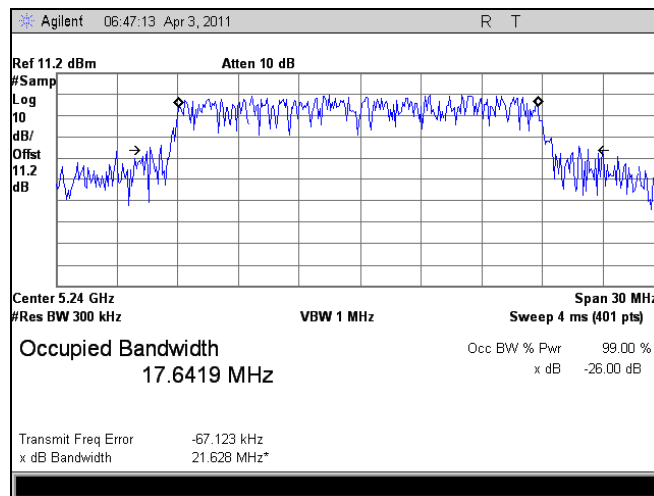
Plot 63. 99% Occupied Bandwidth, Port 1, 802.11a, 5700 MHz



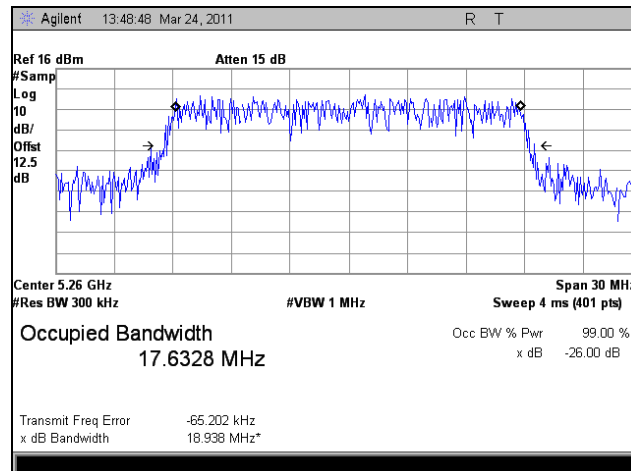
### 99% Occupied Bandwidth, Port 1, 802.11n 20MHz



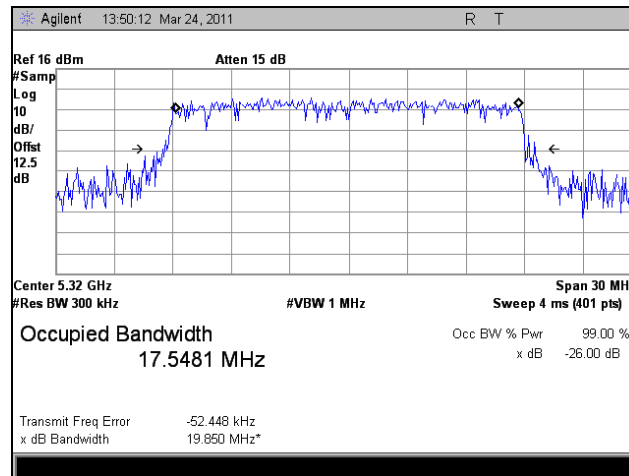
Plot 64. 99% Occupied Bandwidth, Port 1, 802.11n 20MHz, 5180 MHz



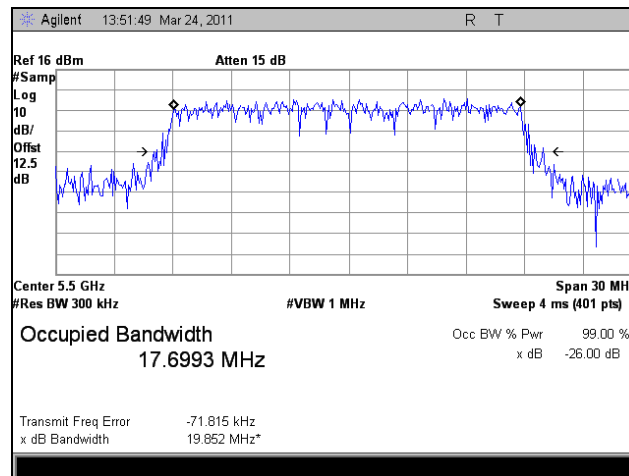
Plot 65. 99% Occupied Bandwidth, Port 1, 802.11n 20MHz, 5240 MHz



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

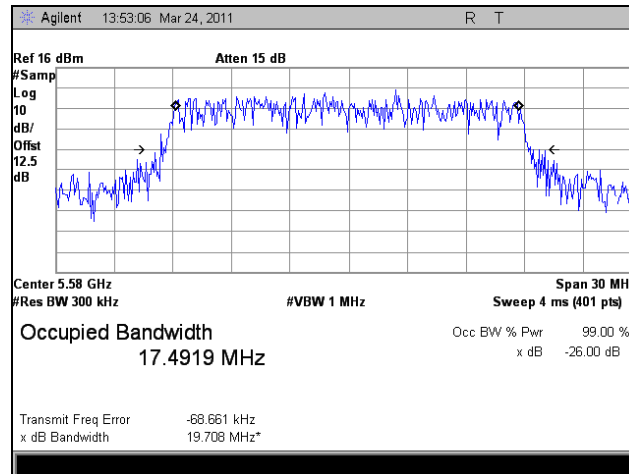


**Plot 67. 99% Occupied Bandwidth, Port 1, 802.11n 20MHz, 5320 MHz**

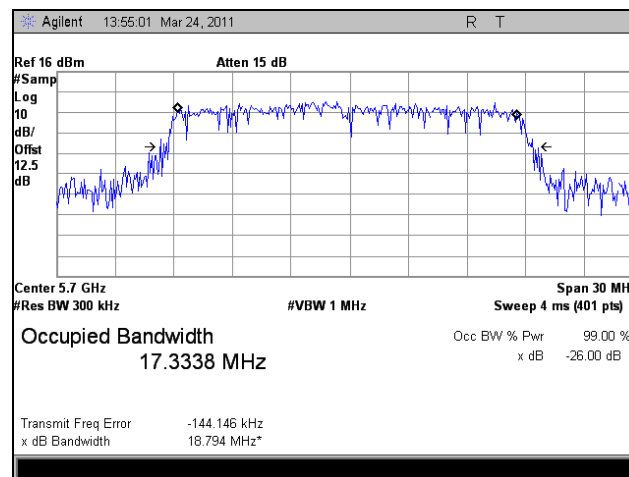


**Plot 68. 99% Occupied Bandwidth, Port 1, 802.11n 20MHz, 5500 MHz**

**99% Occupied Bandwidth, Port 1, 802.11n 20MHz**

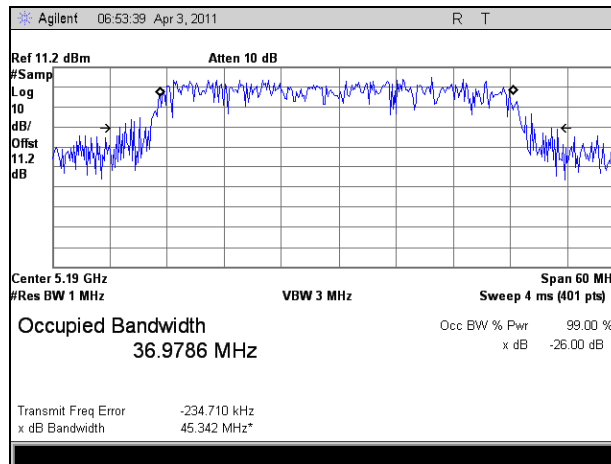


**Plot 69. 99% Occupied Bandwidth, Port 1, 802.11n 20MHz, 5580 MHz**

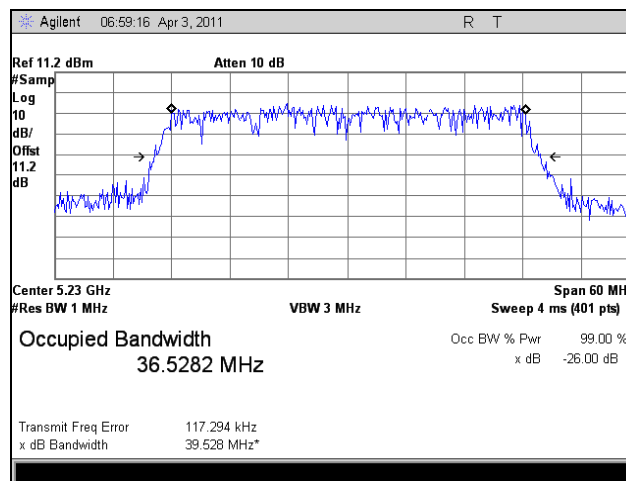


**Plot 70. 99% Occupied Bandwidth, Port 1, 802.11n 20MHz, 5700 MHz**

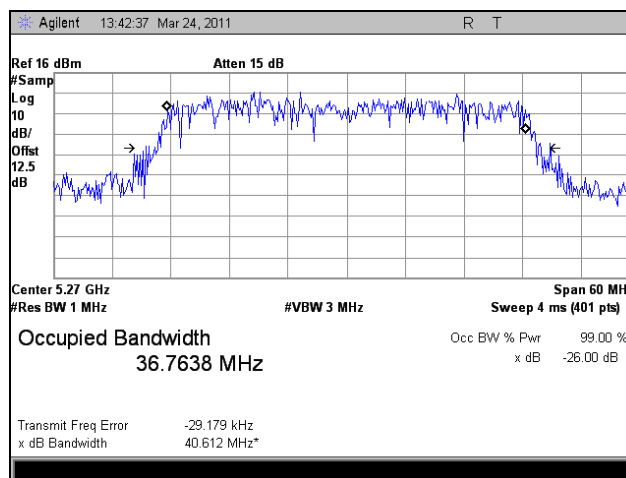
## 99% Occupied Bandwidth, Port 1, 802.11n 40MHz



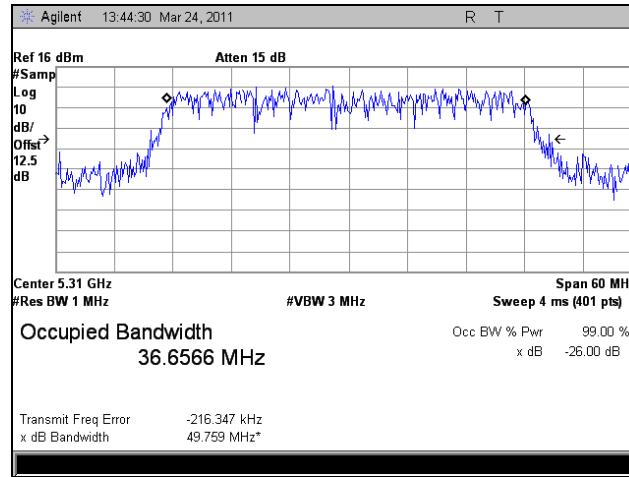
Plot 71. 99% Occupied Bandwidth, Port 1, 802.11n 40MHz, 5190 MHz



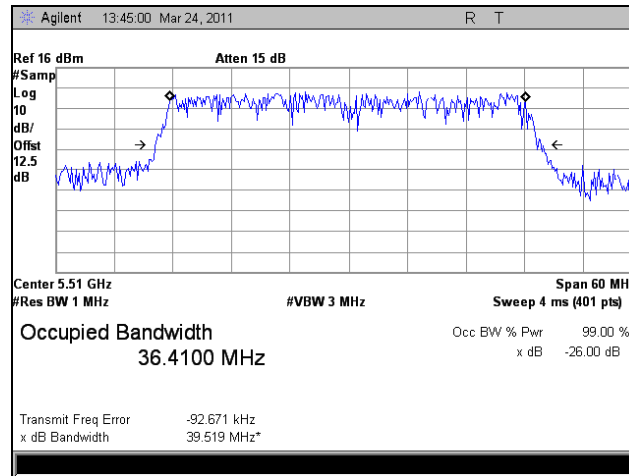
Plot 72. 99% Occupied Bandwidth, Port 1, 802.11n 40MHz, 5230 MHz



Plot 73. 99% Occupied Bandwidth, Port 1, 802.11n 40MHz, 5270 MHz

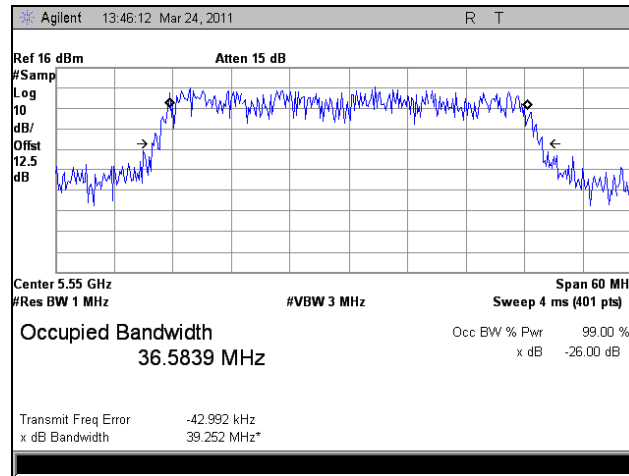


**Plot 74. 99% Occupied Bandwidth, Port 1, 802.11n 40MHz, 5310 MHz**

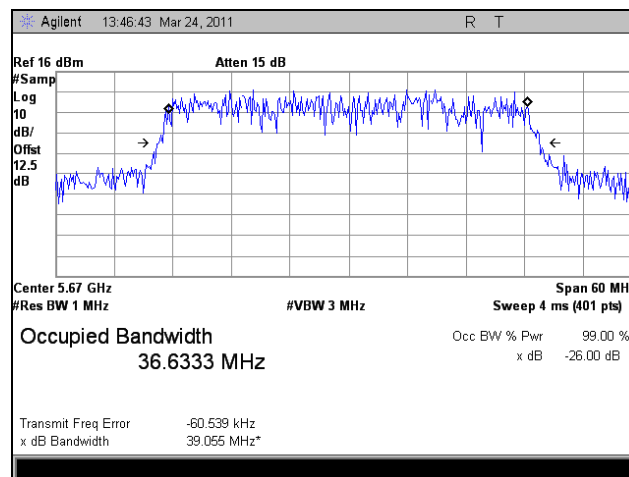


**Plot 75. 99% Occupied Bandwidth, Port 1, 802.11n 40MHz, 5510 MHz**

**99% Occupied Bandwidth, Port 1, 802.11n 40MHz**

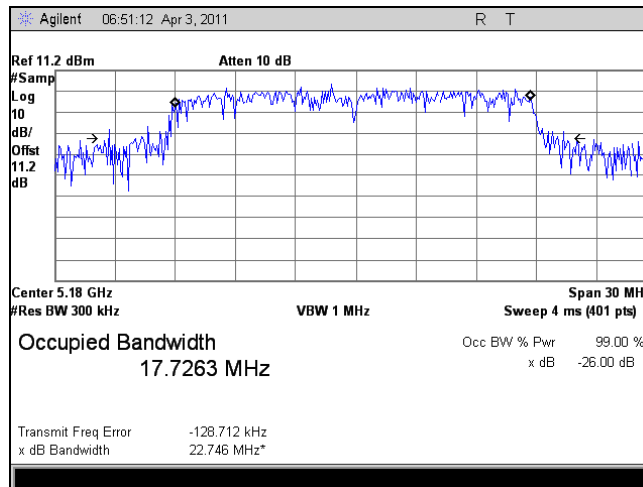


**Plot 76. 99% Occupied Bandwidth, Port 1, 802.11n 40MHz, 5550 MHz**

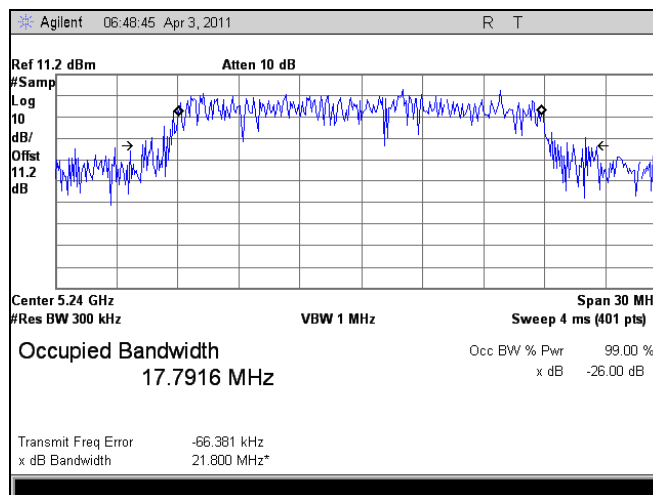


**Plot 77. 99% Occupied Bandwidth, Port 1, 802.11n 40MHz, 5670 MHz**

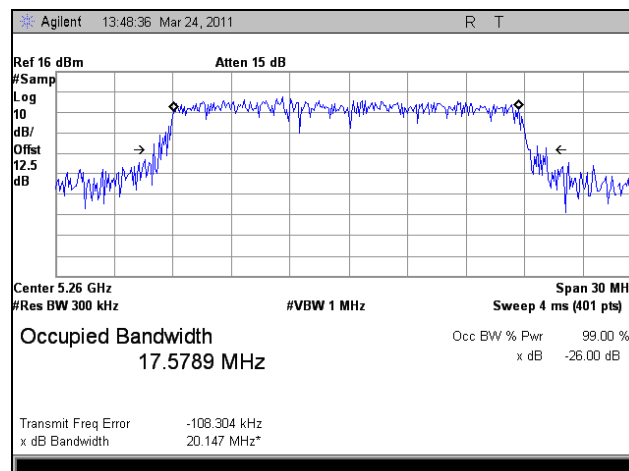
### 99% Occupied Bandwidth, Port 2, 802.11n 20MHz



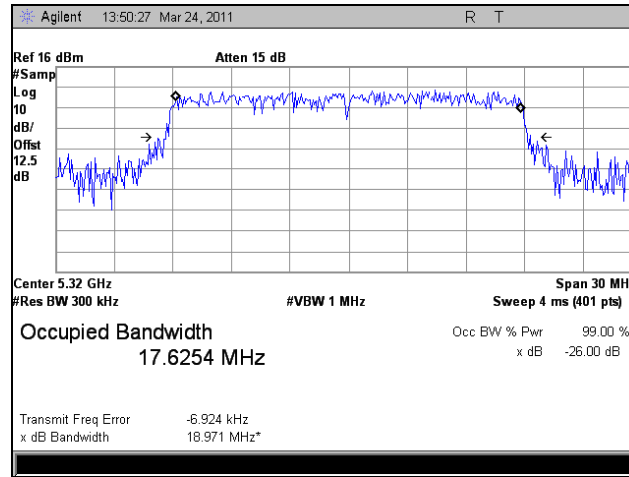
Plot 78. 99% Occupied Bandwidth, Port 2, 802.11n 20MHz, 5180 MHz



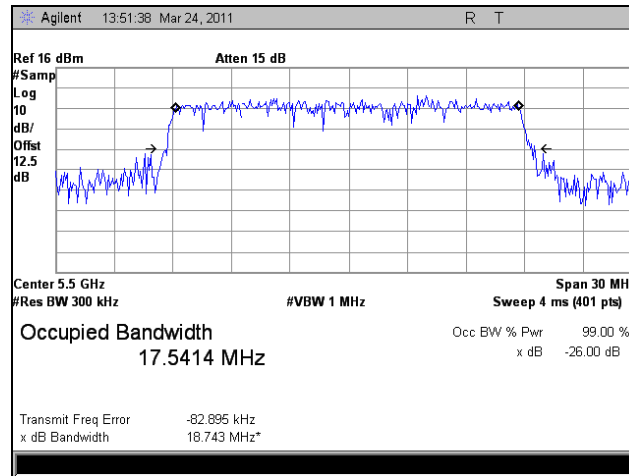
Plot 79. 99% Occupied Bandwidth, Port 2, 802.11n 20MHz, 5240 MHz



Plot 80. 99% Occupied Bandwidth, Port 2, 802.11n 20MHz, 5260 MHz



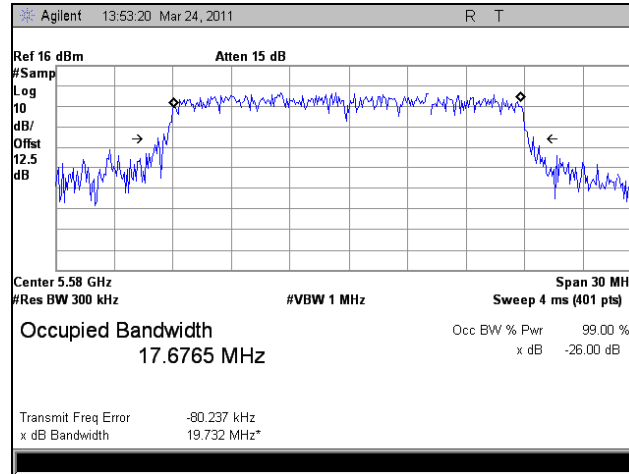
**Plot 81. 99% Occupied Bandwidth, Port 2, 802.11n 20MHz, 5320 MHz**



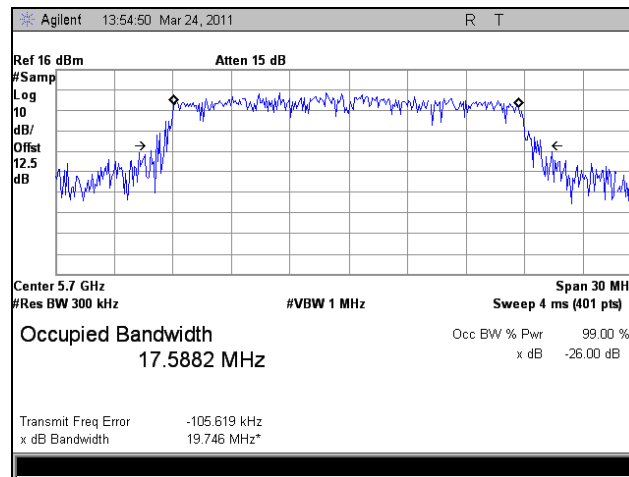
**Plot 82. 99% Occupied Bandwidth, Port 2, 802.11n 20MHz, 5500 MHz**



**99% Occupied Bandwidth, Port 2, 802.11n 20MHz**

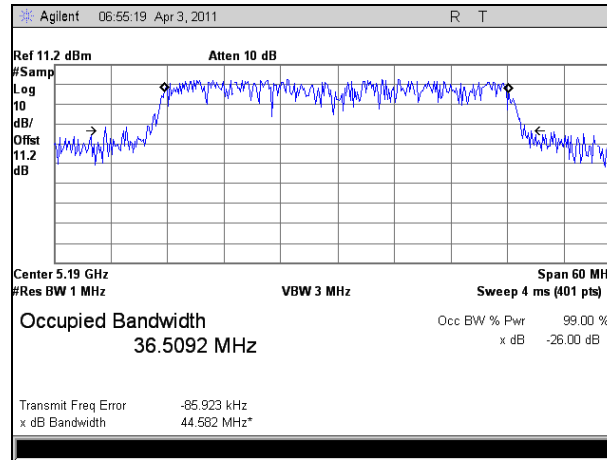


**Plot 83. 99% Occupied Bandwidth, Port 2, 802.11n 20MHz, 5580 MHz**

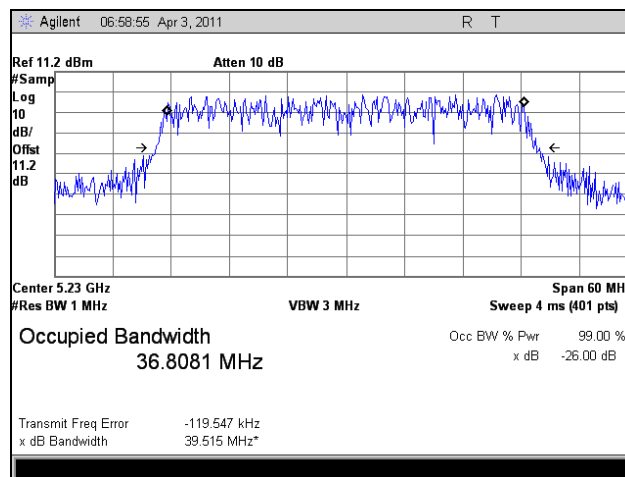


**Plot 84. 99% Occupied Bandwidth, Port 2, 802.11n 20MHz, 5700 MHz**

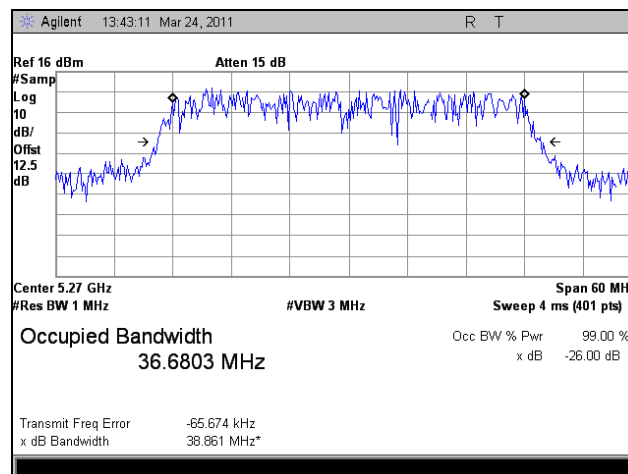
### 99% Occupied Bandwidth, Port 2, 802.11n 40MHz



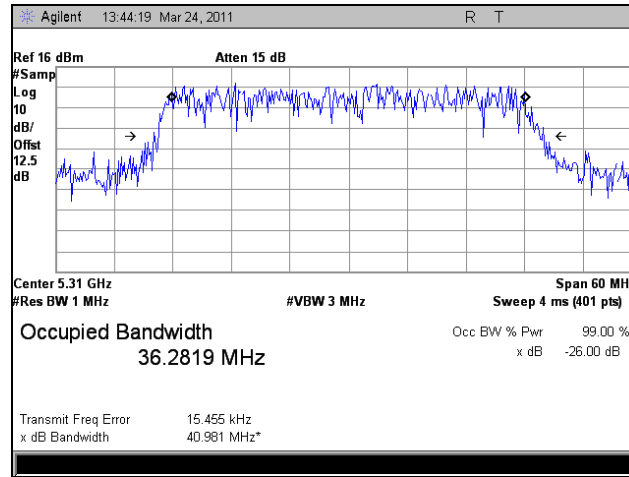
Plot 85. 99% Occupied Bandwidth, Port 2, 802.11n 40MHz, 5190 MHz



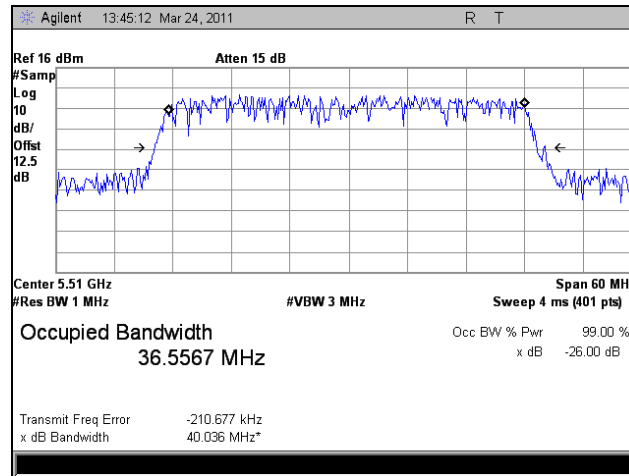
Plot 86. 99% Occupied Bandwidth, Port 2, 802.11n 40MHz, 5230 MHz



Plot 87. 99% Occupied Bandwidth, Port 2, 802.11n 40MHz, 5270 MHz

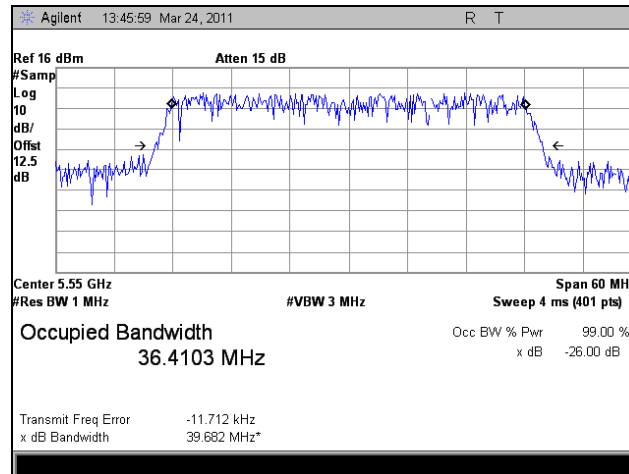


**Plot 88. 99% Occupied Bandwidth, Port 2, 802.11n 40MHz, 5310 MHz**

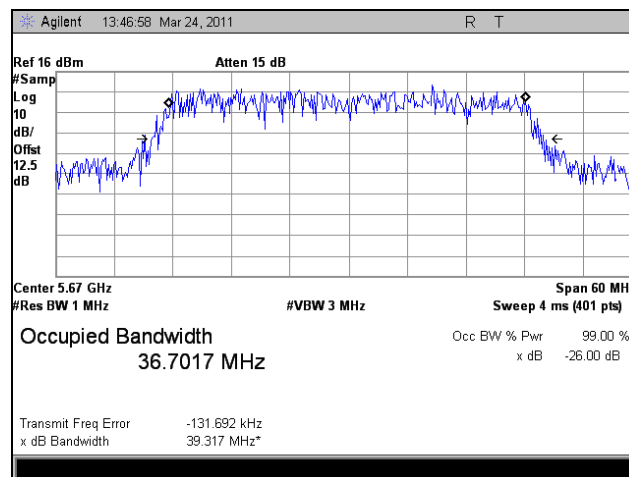


**Plot 89. 99% Occupied Bandwidth, Port 2, 802.11n 40MHz, 5510 MHz**

### 99% Occupied Bandwidth, Port 2, 802.11n 40MHz

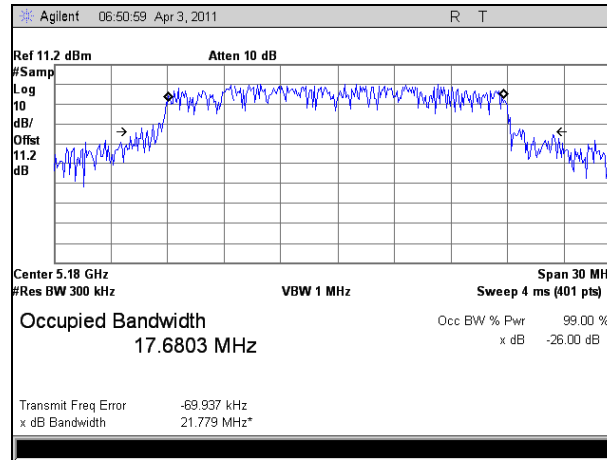


Plot 90. 99% Occupied Bandwidth, Port 2, 802.11n 40MHz, 5550 MHz

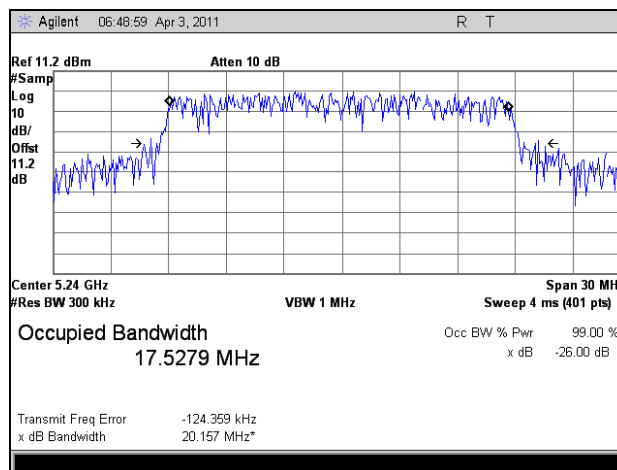


Plot 91. 99% Occupied Bandwidth, Port 2, 802.11n 40MHz, 5670 MHz

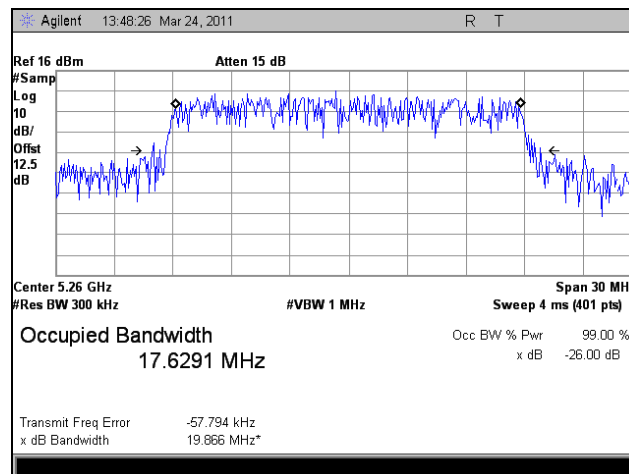
### 99% Occupied Bandwidth, Port 3, 802.11n 20MHz



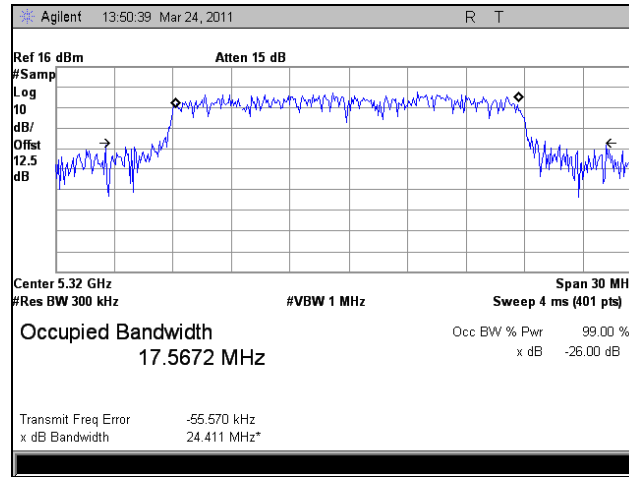
Plot 92. 99% Occupied Bandwidth, Port 3, 802.11n 20MHz, 5180 MHz



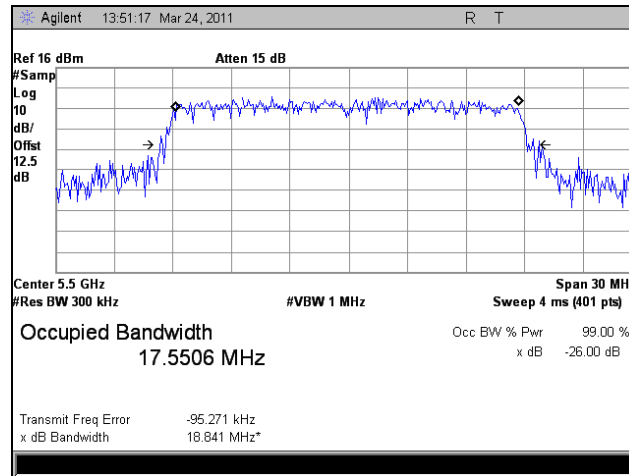
Plot 93. 99% Occupied Bandwidth, Port 3, 802.11n 20MHz, 5240 MHz



Plot 94. 99% Occupied Bandwidth, Port 3, 802.11n 20MHz, 5260 MHz

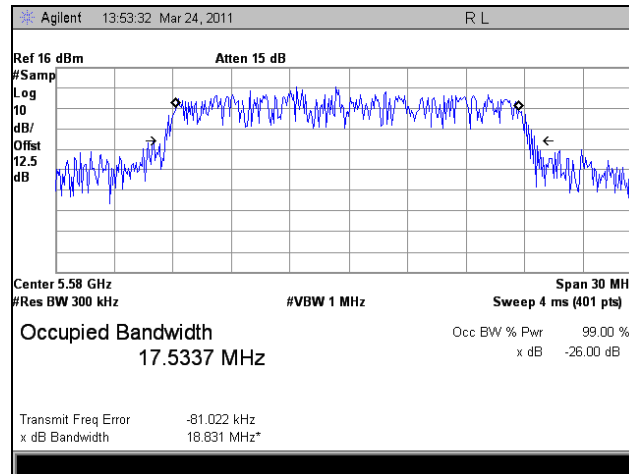


**Plot 95. 99% Occupied Bandwidth, Port 3, 802.11n 20MHz, 5320 MHz**

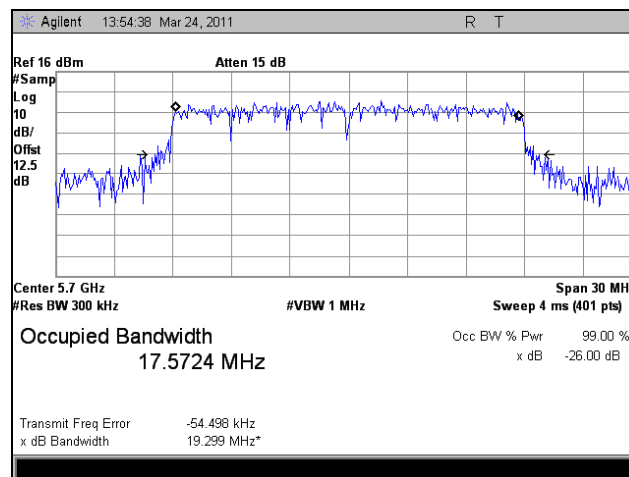


**Plot 96. 99% Occupied Bandwidth, Port 3, 802.11n 20MHz, 5500 MHz**

**99% Occupied Bandwidth, Port 3, 802.11n 20MHz**

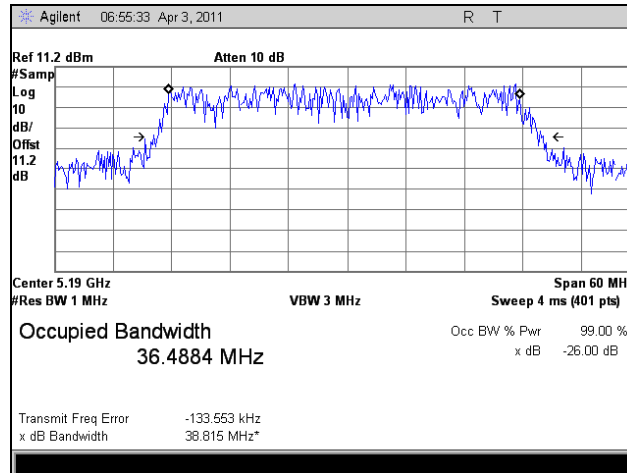


**Plot 97. 99% Occupied Bandwidth, Port 3, 802.11n 20MHz, 5580 MHz**

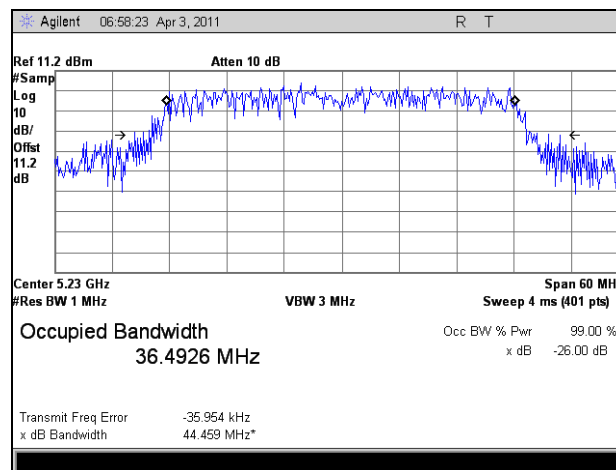


**Plot 98. 99% Occupied Bandwidth, Port 3, 802.11n 20MHz, 5700 MHz**

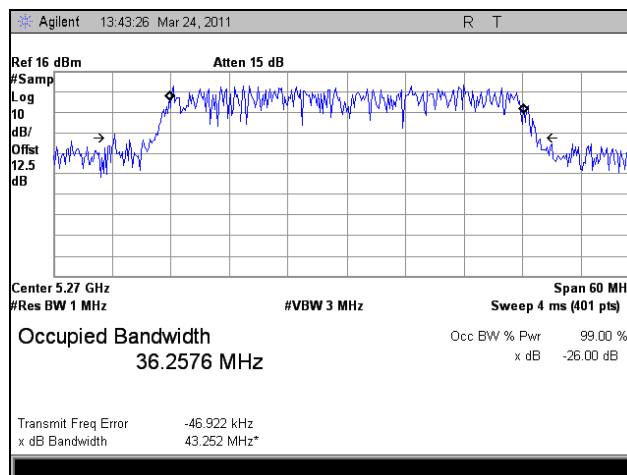
### 99% Occupied Bandwidth, Port 3, 802.11n 40MHz



Plot 99. 99% Occupied Bandwidth, Port 3, 802.11n 40MHz, 5190 MHz

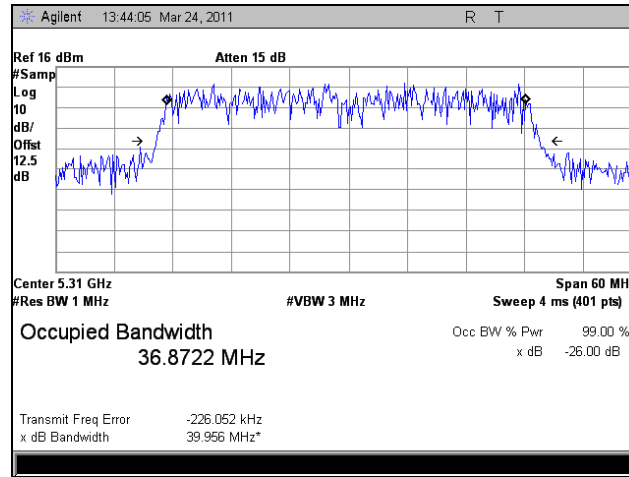


Plot 100. 99% Occupied Bandwidth, Port 3, 802.11n 40MHz, 5230 MHz

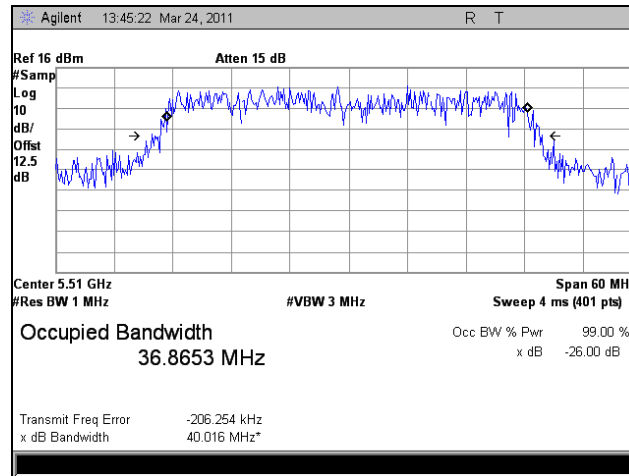


Plot 101. 99% Occupied Bandwidth, Port 3, 802.11n 40MHz, 5270 MHz



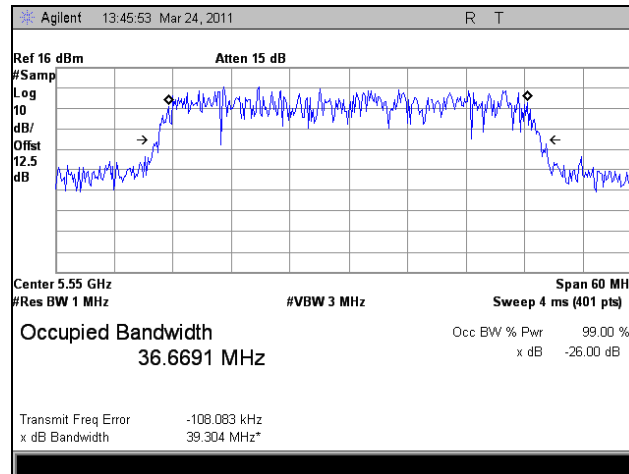


Plot 102. 99% Occupied Bandwidth, Port 3, 802.11n 40MHz, 5310 MHz

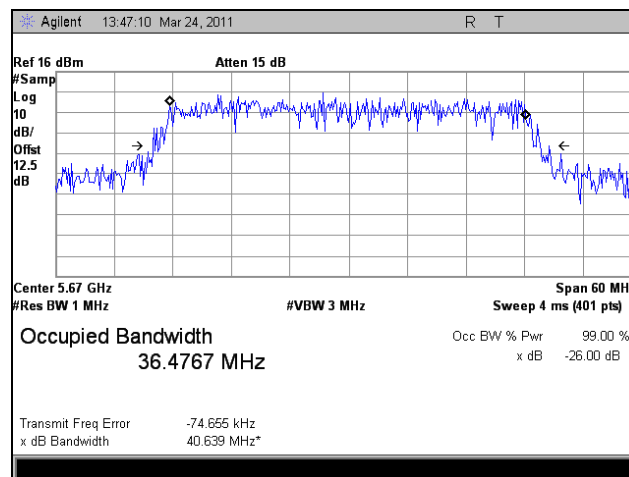


Plot 103. 99% Occupied Bandwidth, Port 3, 802.11n 40MHz, 5510 MHz

**99% Occupied Bandwidth, Port 3, 802.11n 40MHz**



**Plot 104. 99% Occupied Bandwidth, Port 3, 802.11n 40MHz, 5550 MHz**



**Plot 105. 99% Occupied Bandwidth, Port 3, 802.11n 40MHz, 5670 MHz**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.407(a) (1), (2) RF Power Output

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

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

**Table 19. Output Power Requirements from §15.407**

§15.407(a) (1): For the band 5.15-5.25 GHz the peak transmit power over the frequency band of operation shall not exceed the lesser 50mW or  $4\text{dBm} + 10\log B$ , where B is the 26-dB emission bandwidth in MHz.

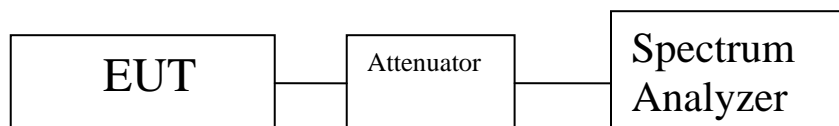
§15.407(a) (2): For the band 5.25-5.35GHz & 5.470-5.72GHz the peak transmit power over the frequency band of operation shall not exceed the lesser of 250mW or  $11\text{dBm} + 10\log B$ , where B is the 26-dB emission bandwidth in MHz.

**Test Procedure:** The transmitter was connected to a calibrated Spectrum analyzer. The EUT was measured at the low, mid and high channels of each band with the data rate that produced the highest output power.

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

**Test Engineer(s):** Minh Ly

**Test Date(s):** 07/28/09 - 08/11/09



**Figure 3. Peak Power Output Test Setup**

7100 Indoor 802.11a			
Mode	Frequency (MHz)	Measured Output Power (dBm)	
802.11a	UNII-1	5180	15.55
		5240	14.63
	UNII-2 Lower Band	5260	15.59
		5320	16.85
	UNII-2 Upper Band	5500	19.55
		5580	20.21
	5700	19.35	

Table 20. RF Power Output, Test Results, a Mode

7100 Indoor, Summed Power (n mode)						
Mode	Frequency (MHz)	Port 1	Port 2	Port 3	Summed Power (dBm)	
802.11n 20MHz	UNII-1	5180	8.12	8.45	8.34	13.08
		5240	8.08	8.32	8.23	12.98
	UNII-2 Lower Band	5260	15.91	15.06	15.31	20.21
		5320	14.74	13.11	14.65	19.00
	UNII-2 Upper Band	5500	15.57	15.14	15.02	20.02
		5580	15.34	15.22	15.65	20.18
	5700	15.20	15.07	15.49	20.03	
802.11n 40MHz	UNII-1	5190	11.37	11.73	11.06	16.17
		5230	11.68	11.97	11.16	16.39
	UNII-2 Lower Band	5270	15.11	15.12	15.83	20.14
		5310	6.43	7.07	7.61	11.83
	UNII-2 Upper Band	5510	11.02	10.18	10.80	15.45
		5550	15.21	15.41	15.05	20.00
		5670	11.39	14.42	13.82	18.17

Table 21. RF Power Output, Test Results, Summed Power

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.407(a)(1), (a)(2) 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 CA 02-2138 was used.

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

**Test Engineer(s):** Minh Ly

**Test Date(s):** 07/28/09 – 08/11/09

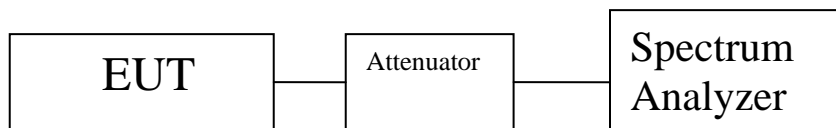


Figure 4. Peak Power Spectral Density Test Setup

7100 Indoor Unit a Mode				
Mode	Frequency	Measured PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
802.11a	5180	3.713	4	-0.287
	5240	3.614	4	-0.386
	5260	4.342	11	-6.658
	5320	4.682	11	-6.318
	5500	8.358	11	-2.642
	5580	8.253	11	-2.747
	5700	8.450	11	-2.550

Table 22. Power Spectral Density, 802.11a, Test Results

7100 Indoor Unit n Mode							
Mode	Frequency	Port 1	Port 2	Port 3	Summed	Limit*	Margin
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
802.11n 20MHz	5180	-4.955	-4.913	-4.145	0.116	0.22	-0.104
	5240	-5.047	-4.100	-5.71	-0.130	0.22	-0.350
	5260	1.569	1.873	1.970	6.579	7.22	-0.641
	5320	1.874	2.003	2.033	6.742	7.22	-0.478
	5500	1.828	1.631	1.418	6.400	7.22	-0.820
	5580	1.943	1.930	1.540	6.580	7.22	-0.640
	5700	1.975	1.603	1.925	6.609	7.22	-0.611
802.11n 40MHz	5190	-4.033	-5.095	-5.750	-0.130	0.22	-0.350
	5230	-4.996	-4.834	-5.909	-0.450	0.22	-0.670
	5270	1.224	1.988	1.440	6.334	7.22	-0.886
	5310	-7.480	-7.634	-6.795	-2.516	7.22	-9.736
	5510	-4.089	-4.152	-4.110	0.654	7.22	-6.566
	5550	1.785	0.189	1.845	6.109	7.22	-1.111
	5670	-2.097	-0.142	1.043	4.558	7.22	-2.662

Table 23. Power Spectral Density, 802.11n, Test Results, Port 1-3 & Summed

\*Note Limit was corrected for the use of three 5dBi Antennas. Sum of three 5dBi Antennas is equal to 9.77dBi Gain.

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.407(a)(6) Peak Excursion Ratio

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

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

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

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

**Test Engineer(s):** Minh Ly

**Test Date(s):** 07/28/09 - 08/11/09

7100 Indoor Unit, Port 1				
Mode	Frequency (MHz)	Excursion Ratio (dBm)	Limit (dBm)	Margin (dB)
802.11a	5180	9.667	13	3.333
	5240	9.006	13	3.994
	5260	9.087	13	3.913
	5320	9.009	13	3.991
	5500	9.613	13	3.387
	5580	11.37	13	1.63
	5700	9.827	13	3.173
802.11n 20MHz	5180	11.09	13	1.91
	5240	9.562	13	3.438
	5260	10.32	13	2.68
	5320	11.53	13	1.47
	5500	10.65	13	2.35
	5580	10.26	13	2.74
	5700	10.79	13	2.21
802.11n 40MHz	5190	12.72	13	0.28
	5230	11.58	13	1.42
	5270	12.71	13	0.29
	5310	12.65	13	0.35
	5510	12.59	13	0.41
	5550	10.68	13	2.32
	5670	11.73	13	1.27

Table 24. Peak Excursion Ratio, Test Results, Port 1

7100 Indoor Unit, Port 2				
Mode	Frequency (MHz)	Excursion Ratio (dBm)	Limit (dBm)	Margin (dB)
802.11n 20MHz	5180	10.02	13	2.98
	5240	10.32	13	2.68
	5260	10.33	13	2.67
	5320	9.634	13	3.366
	5500	11.02	13	1.98
	5580	11.27	13	1.73
	5700	10.63	13	2.37
802.11n 40MHz	5190	11.83	13	1.17
	5230	12.17	13	0.83
	5270	12.95	13	0.05
	5310	11.98	13	1.02
	5510	11.73	13	1.27
	5550	10.52	13	2.48
	5670	9.8	13	3.2

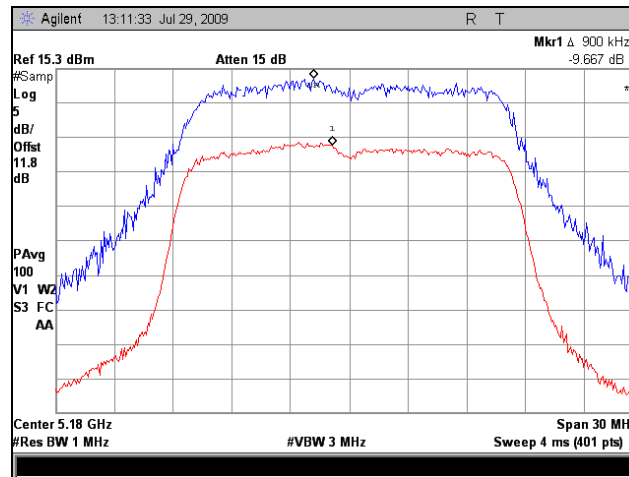
Table 25. Peak Excursion Ratio, Test Results, Port 2

7100 Indoor Unit, Port 3				
Mode	Frequency (MHz)	Excursion Ratio (dBm)	Limit (dBm)	Margin (dB)
802.11n 20MHz	5180	9.873	13	3.127
	5240	11.08	13	1.92
	5260	11.96	13	1.04
	5320	9.529	13	3.471
	5500	10.11	13	2.89
	5580	10.24	13	2.76
	5700	8.677	13	4.323
802.11n 40MHz	5190	12.22	13	0.78
	5230	12.41	13	0.59
	5270	12.86	13	0.14
	5310	12.17	13	0.83
	5510	12.6	13	0.4
	5550	11.2	13	1.8
	5670	12	13	1

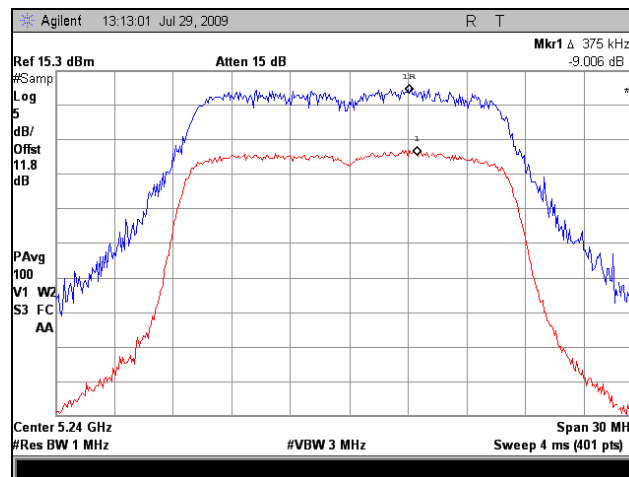
Table 26. Peak Excursion Ratio, Test Results, Port 3



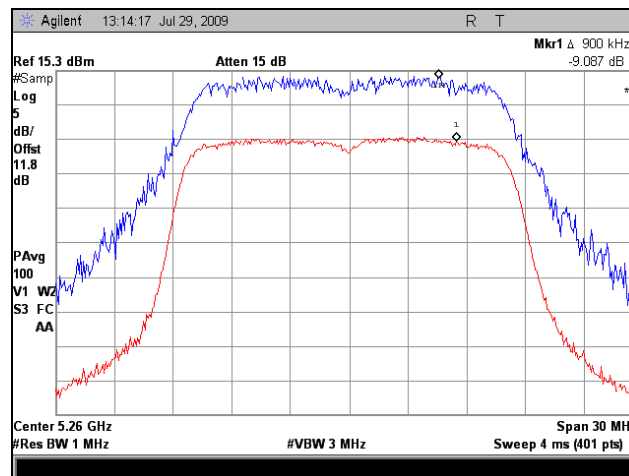
**Peak Excursion Ratio, Port 1, 802.11a**



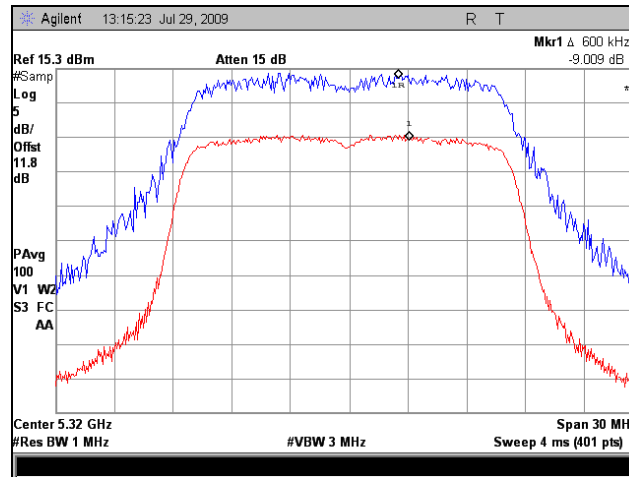
**Plot 106. Peak Excursion, Port 1, 802.11a, 5180 MHz**



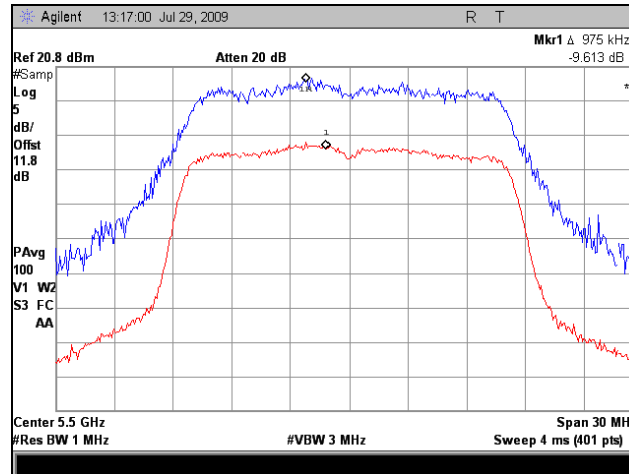
**Plot 107. Peak Excursion, Port 1, 802.11a, 5240 MHz**



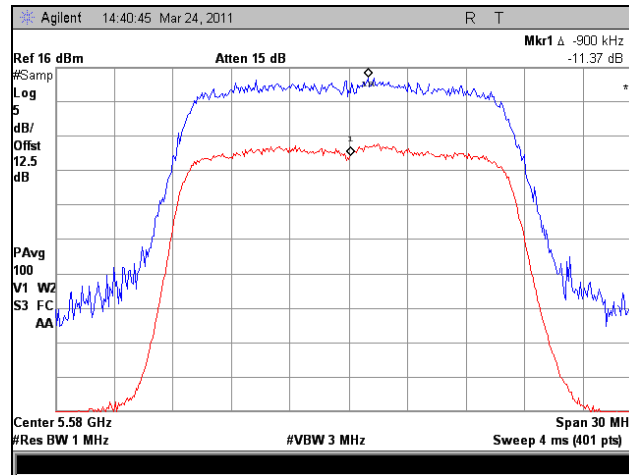
**Plot 108. Peak Excursion, Port 1, 802.11a, 5260 MHz**



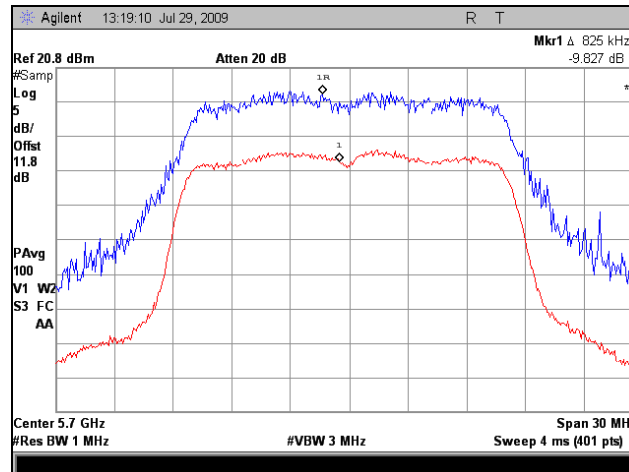
Plot 109. Peak Excursion, Port 1, 802.11a, 5320 MHz



Plot 110. Peak Excursion, Port 1, 802.11a, 5500 MHz

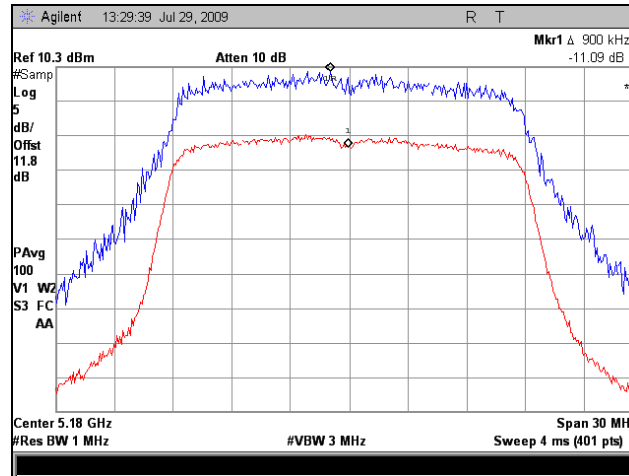


Plot 111. Peak Excursion, Port 1, 802.11a, 5580 MHz

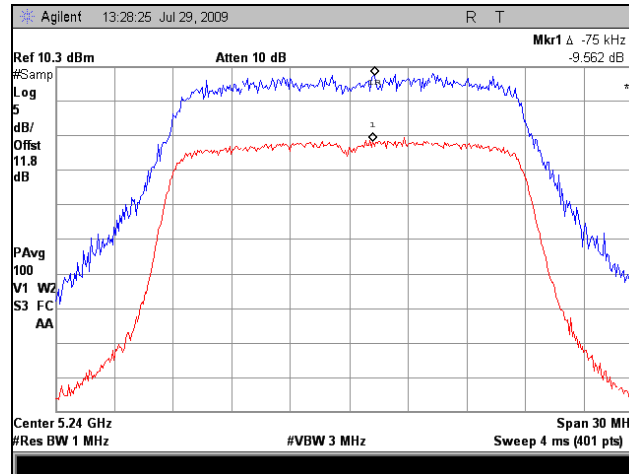


Plot 112. Peak Excursion, Port 1, 802.11a, 5700 MHz

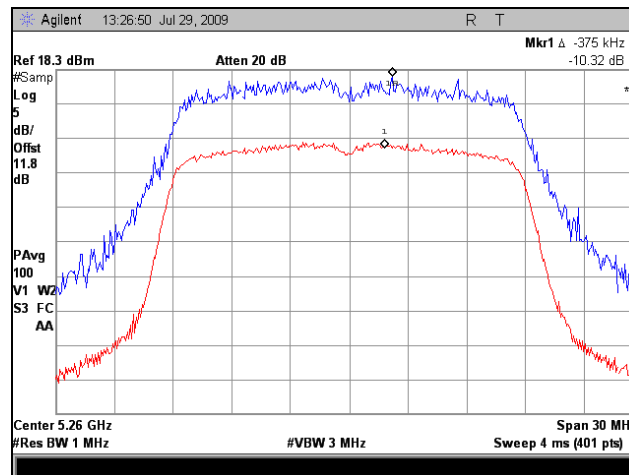
### Peak Excursion Ratio, 7100 Indoor, Port 1, 802.11n 20MHz



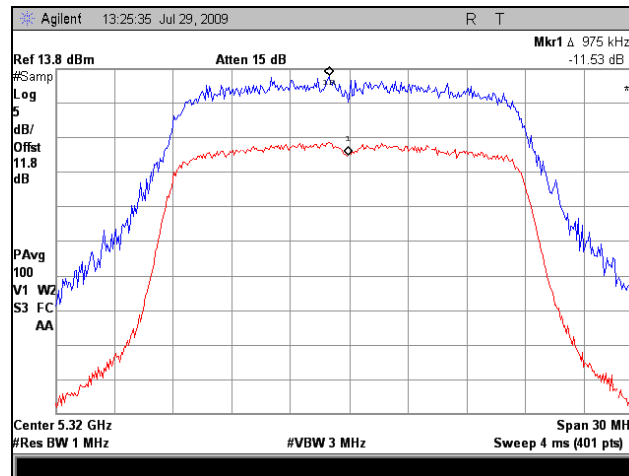
Plot 113. Peak Excursion, Port 1, 802.11n 20MHz, 5180 MHz



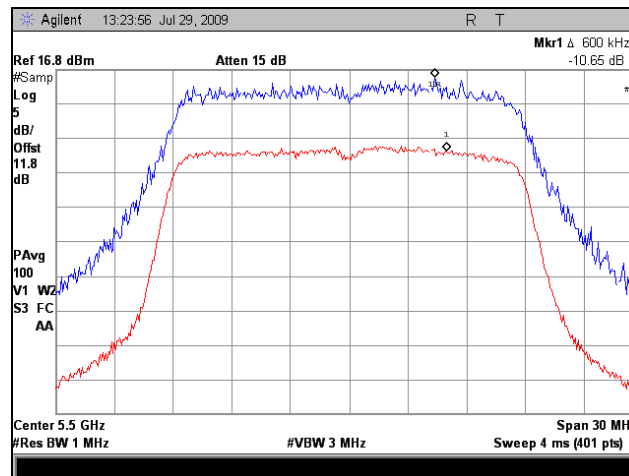
Plot 114. Peak Excursion, Port 1, 802.11n 20MHz, 5240 MHz



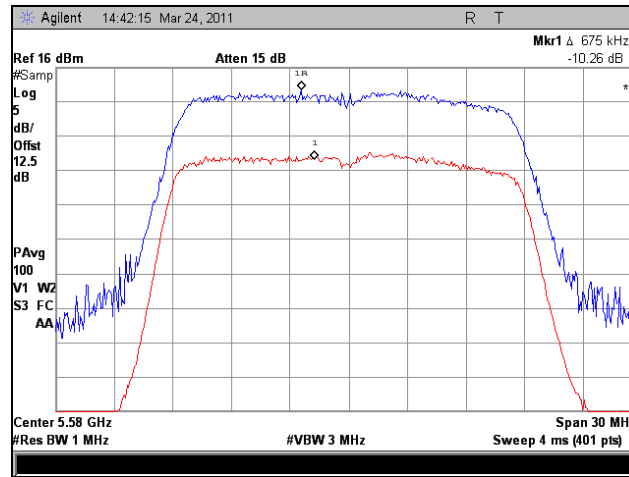
Plot 115. Peak Excursion, Port 1, 802.11n 20MHz, 5260 MHz



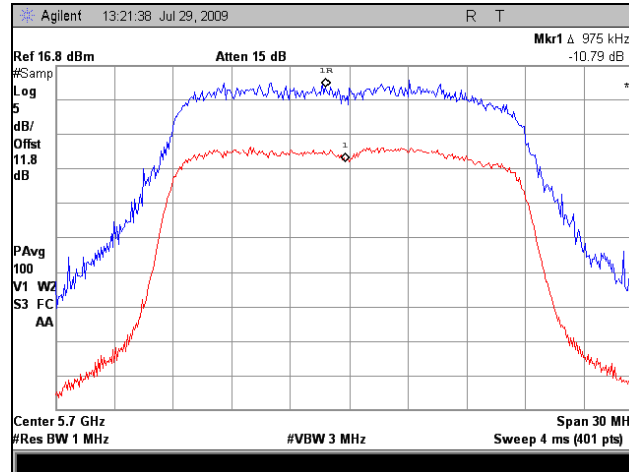
Plot 116. Peak Excursion, Port 1, 802.11n 20MHz, 5320 MHz



Plot 117. Peak Excursion, Port 1, 802.11n 20MHz, 5500 MHz

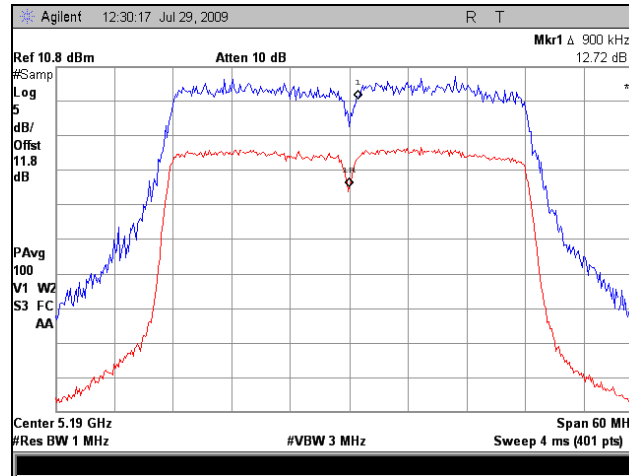


Plot 118. Peak Excursion, Port 1, 802.11n 20MHz, 5580 MHz

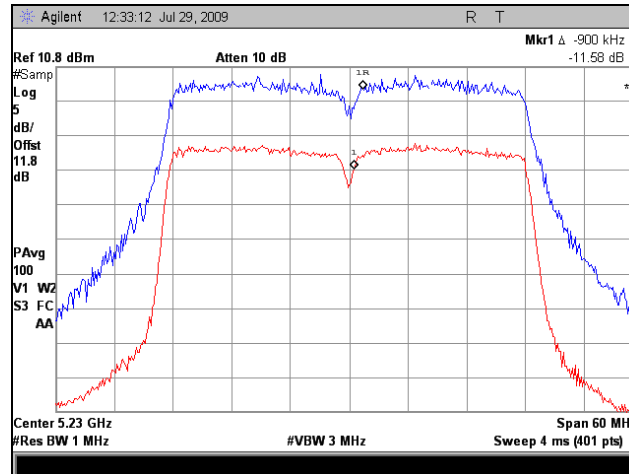


Plot 119. Peak Excursion, Port 1, 802.11n 20MHz, 5700 MHz

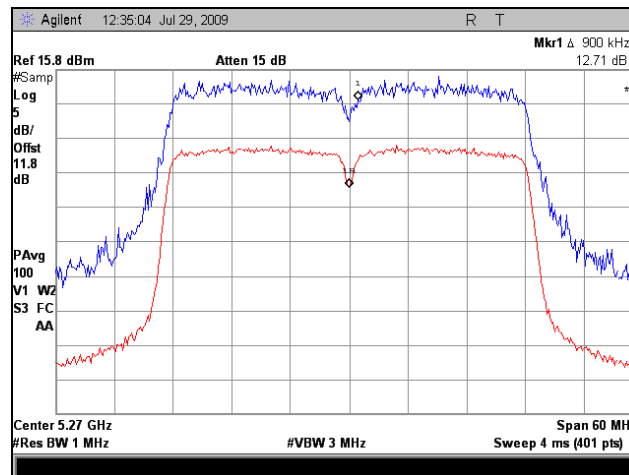
## Peak Excursion Ratio, Port 1, 802.11n 40MHz



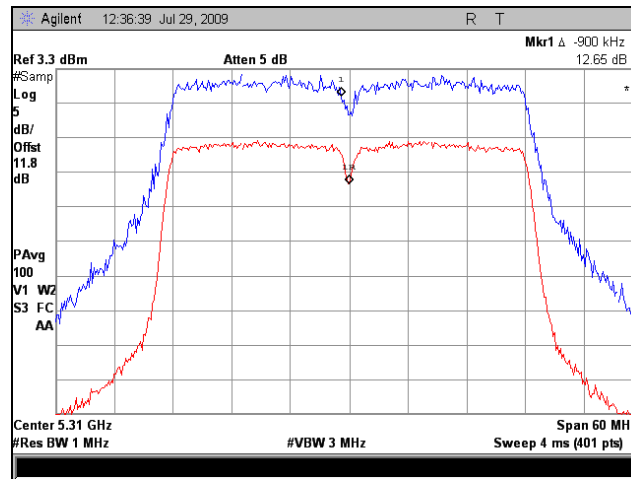
Plot 120. Peak Excursion, Port 1, 802.11n 40MHz, 5190 MHz



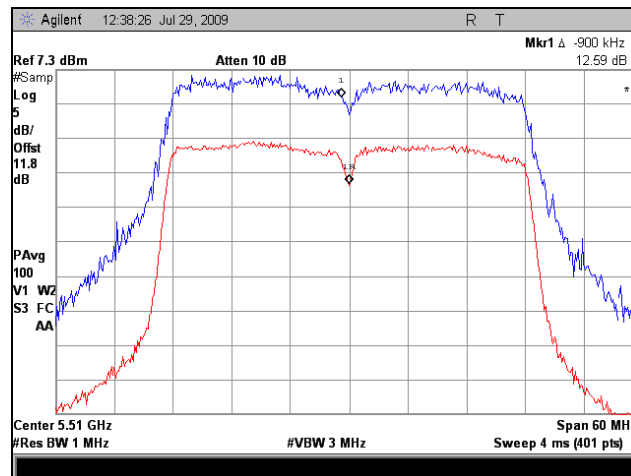
Plot 121. Peak Excursion, Port 1, 802.11n 40MHz, 5230 MHz



Plot 122. Peak Excursion, Port 1, 802.11n 40MHz, 5270 MHz

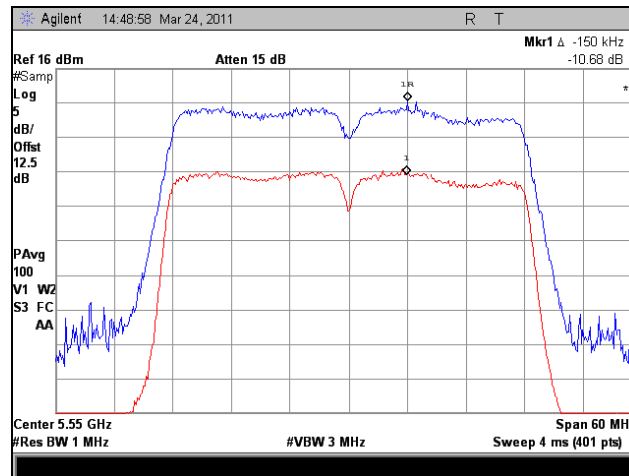


Plot 123. Peak Excursion, Port 1, 802.11n 40MHz, 5310 MHz

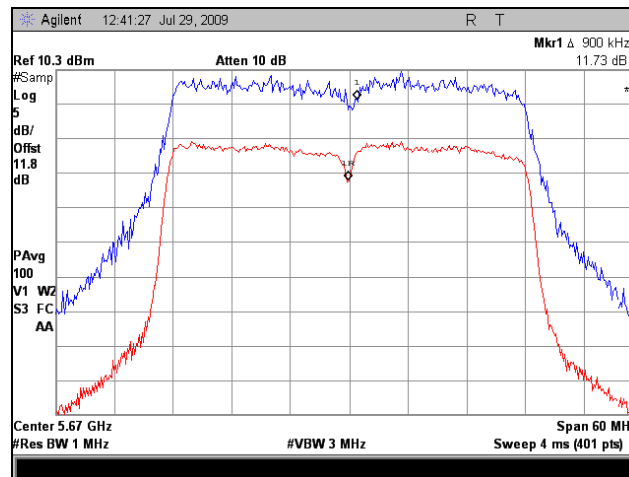


Plot 124. Peak Excursion, Port 1, 802.11n 40MHz, 5510 MHz



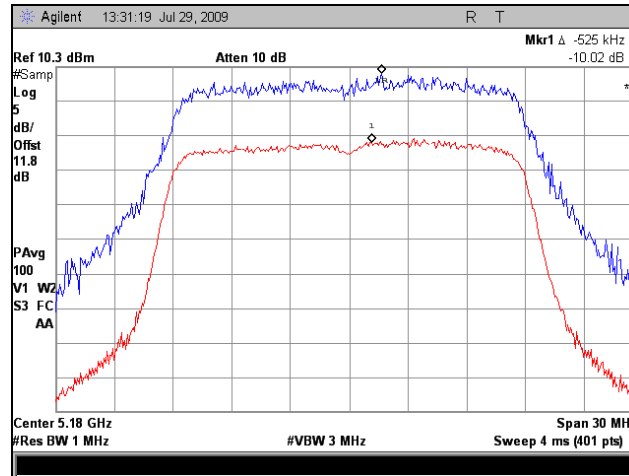


Plot 125. Peak Excursion, Port 1, 802.11n 40MHz, 5550 MHz

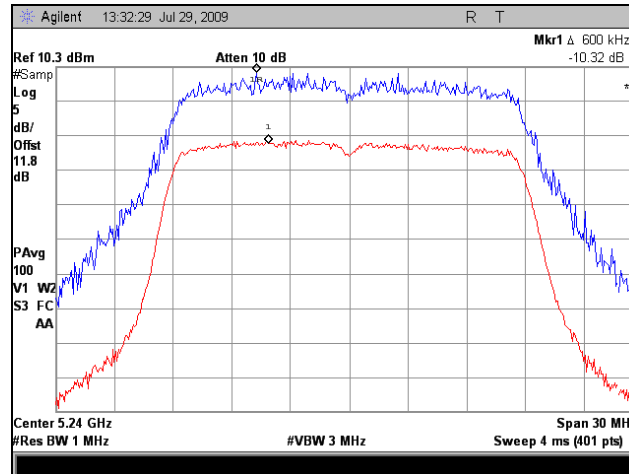


Plot 126. Peak Excursion Ratio, Port 1, 802.11n 40MHz, 5670 MHz

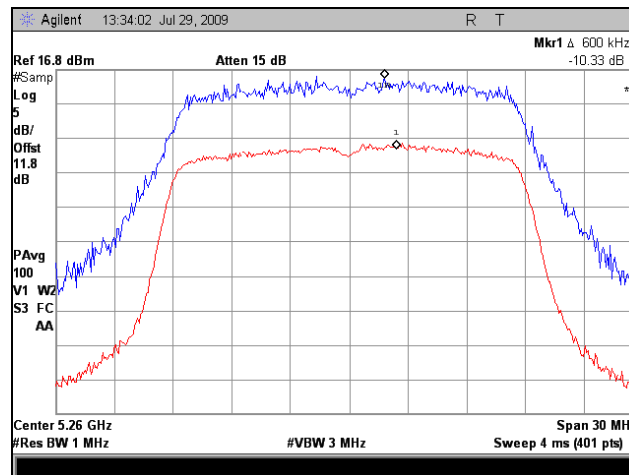
### Peak Excursion Ratio, Port 2, 802.11n 20MHz



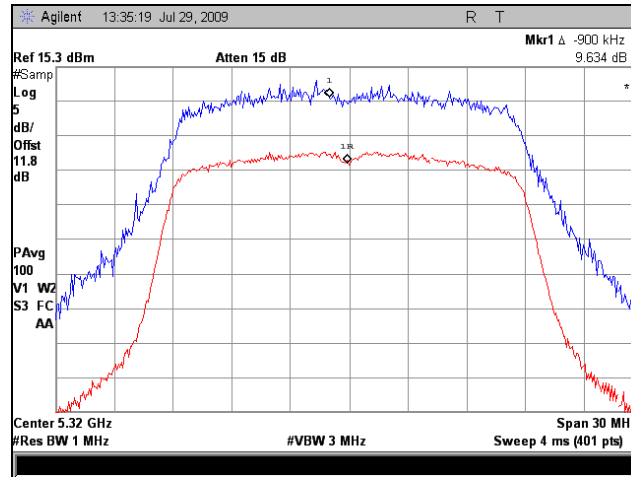
Plot 127. Peak Excursion, Port 2, 802.11n 20MHz, 5180 MHz



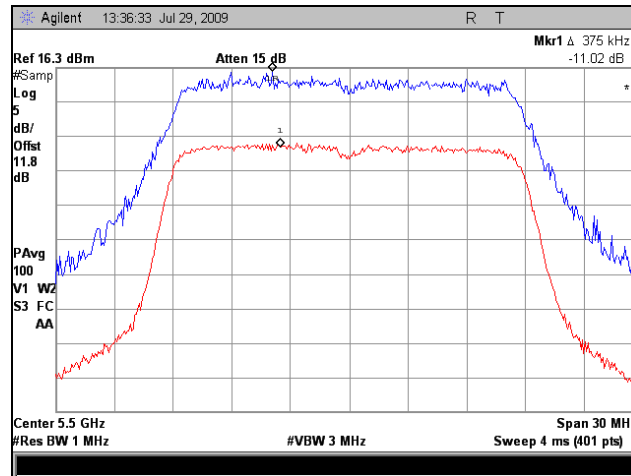
Plot 128. Peak Excursion, Port 2, 802.11n 20MHz, 5240 MHz



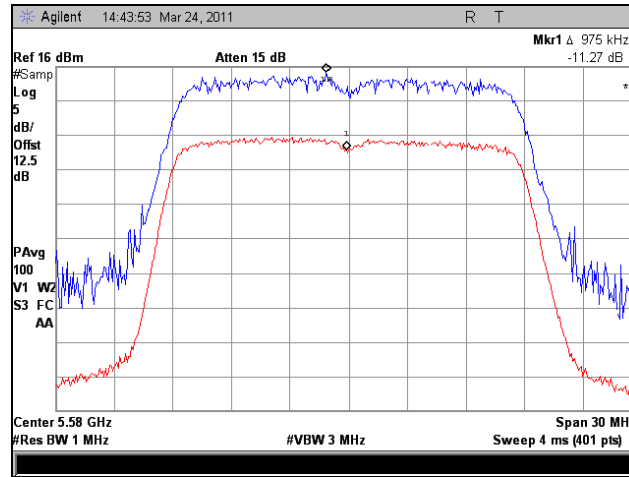
Plot 129. Peak Excursion, Port 2, 802.11n 20MHz, 5260 MHz



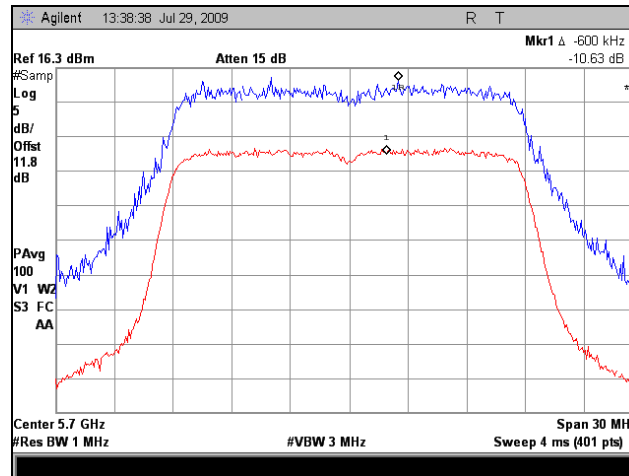
Plot 130. Peak Excursion, Port 2, 802.11n 20MHz, 5320 MHz



Plot 131. Peak Excursion, Port 2, 802.11n 20MHz, 5500 MHz

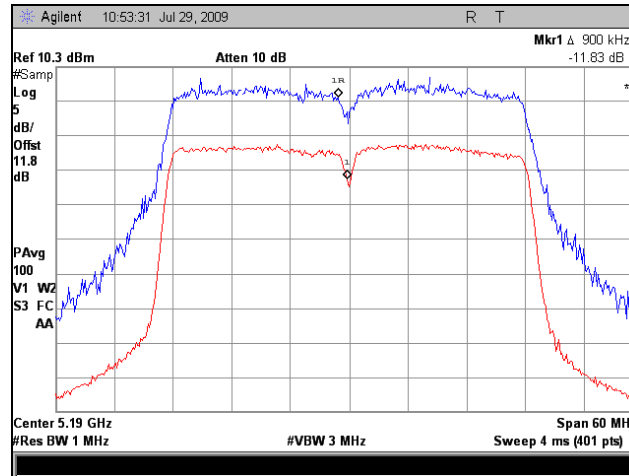


Plot 132. Peak Excursion, Port 2, 802.11n 20MHz, 5580 MHz

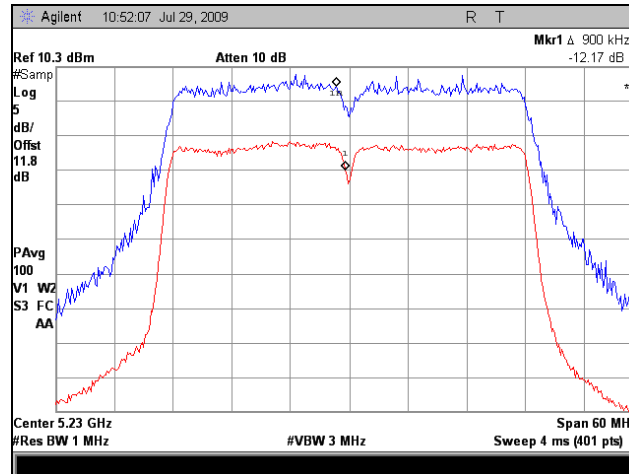


Plot 133. Peak Excursion Ratio, Port 2, 802.11n 20MHz, 5700 MHz

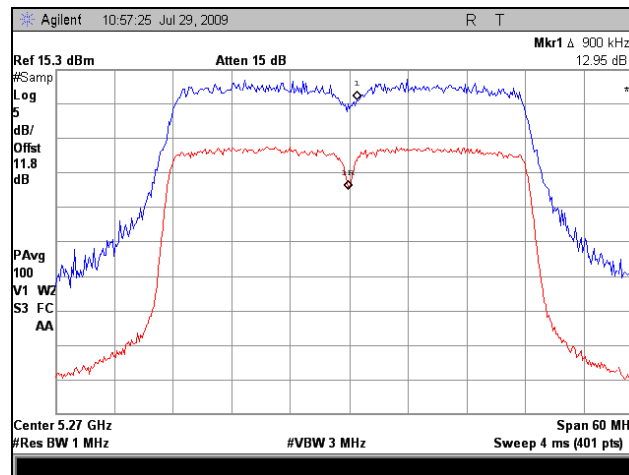
## Peak Excursion Ratio, Port 2, 802.11n 40MHz



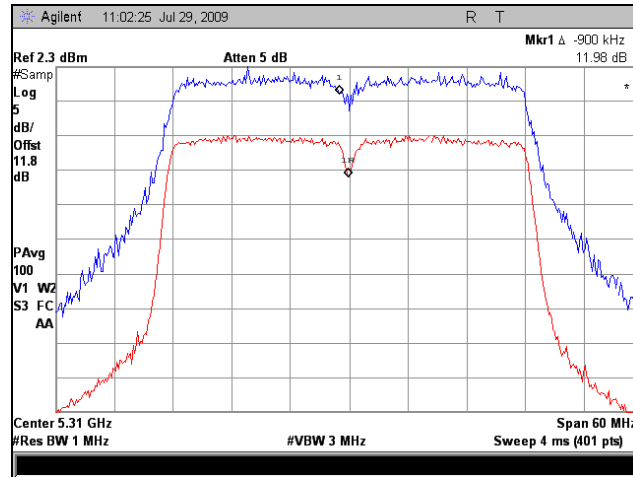
Plot 134. Peak Excursion, Port 2, 802.11n 40MHz, 5190 MHz



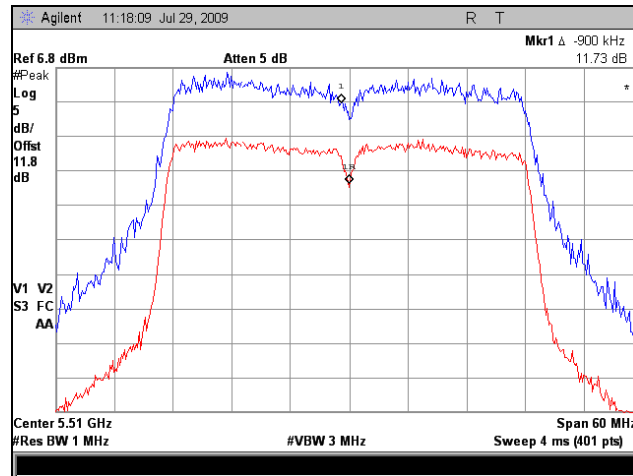
Plot 135. Peak Excursion, Port 2, 802.11n 40MHz, 5230 MHz



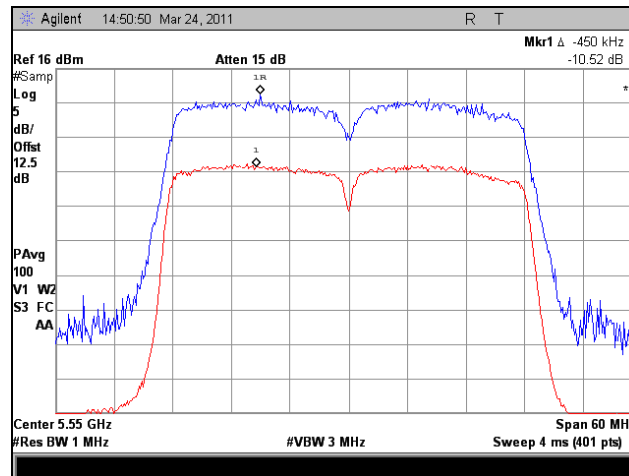
Plot 136. Peak Excursion, Port 2, 802.11n 40MHz, 5270 MHz



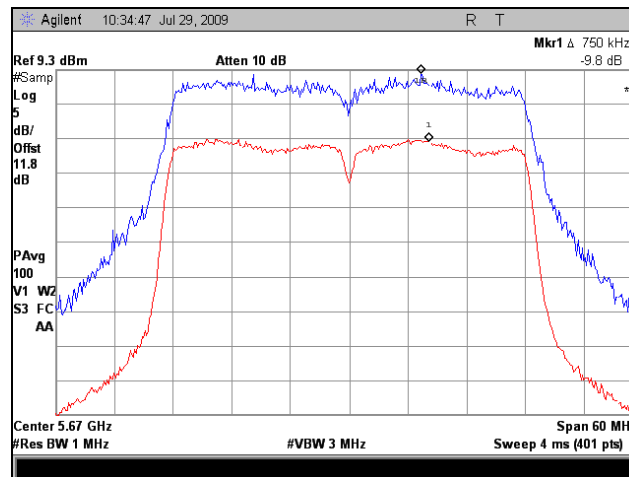
Plot 137. Peak Excursion, Port 2, 802.11n 40MHz, 5310 MHz



Plot 138. Peak Excursion, Port 2, 802.11n 40MHz, 5510 MHz

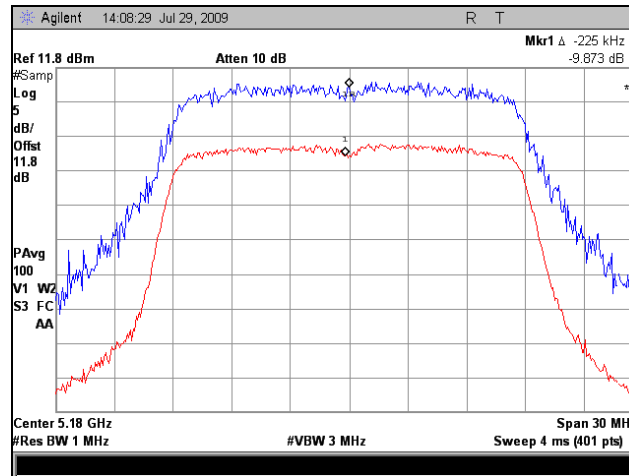


Plot 139. Peak Excursion, Port 2, 802.11n 40MHz, 5550 MHz

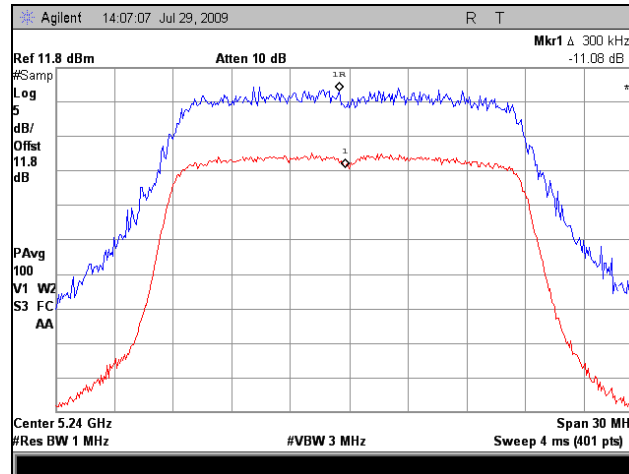


Plot 140. Peak Excursion, Port 2, 802.11n 40MHz, 5670 MHz

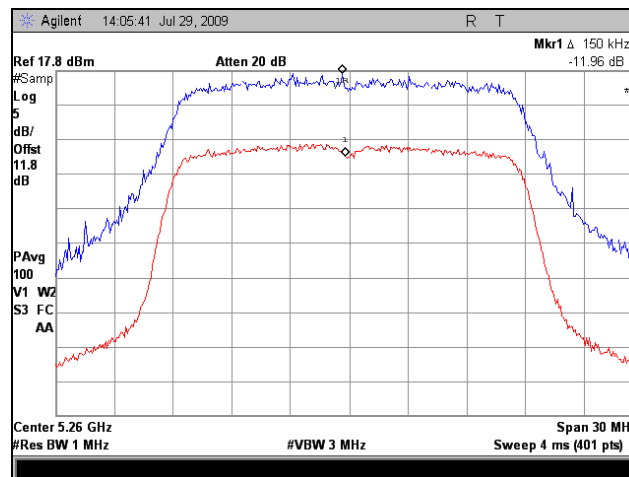
### Peak Excursion Ratio, Port 3, 802.11n 20MHz



Plot 141. Peak Excursion, Port 3, 802.11n 20MHz, 5180 MHz

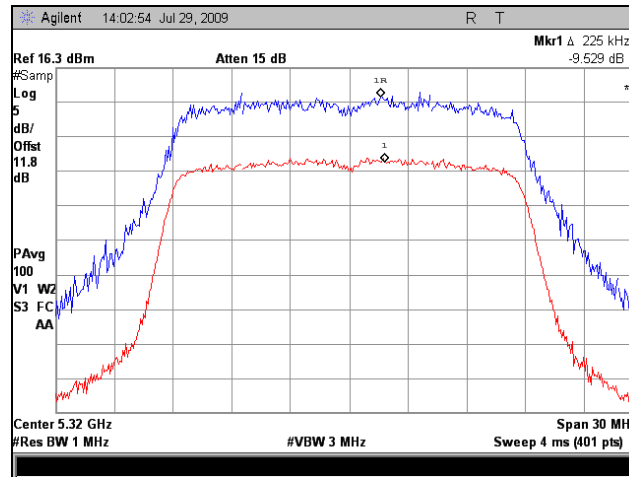


Plot 142. Peak Excursion, Port 3, 802.11n 20MHz, 5240 MHz

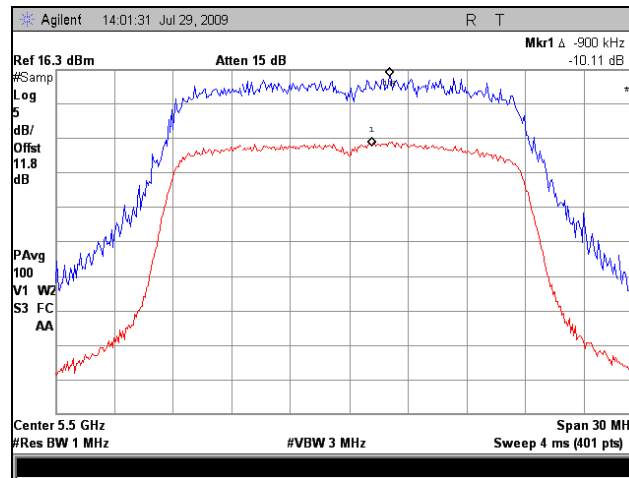


Plot 143. Peak Excursion, Port 3, 802.11n 20MHz, 5260 MHz

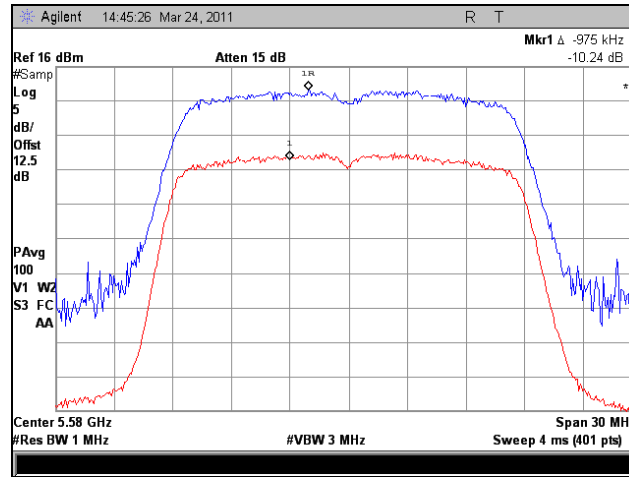




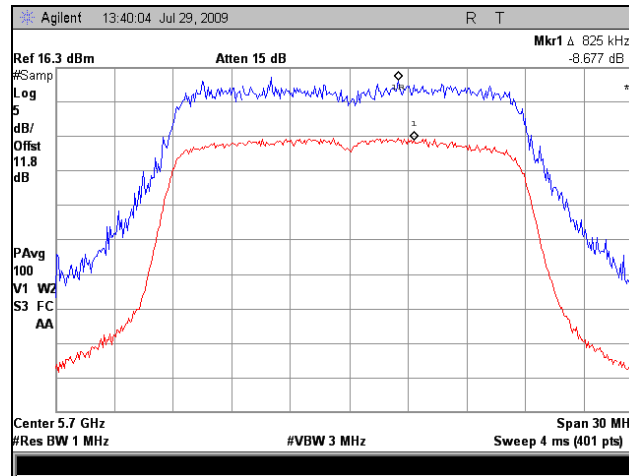
Plot 144. Peak Excursion, Port 3, 802.11n 20MHz, 5320 MHz



Plot 145. Peak Excursion, Port 3, 802.11n 20MHz, 5500 MHz

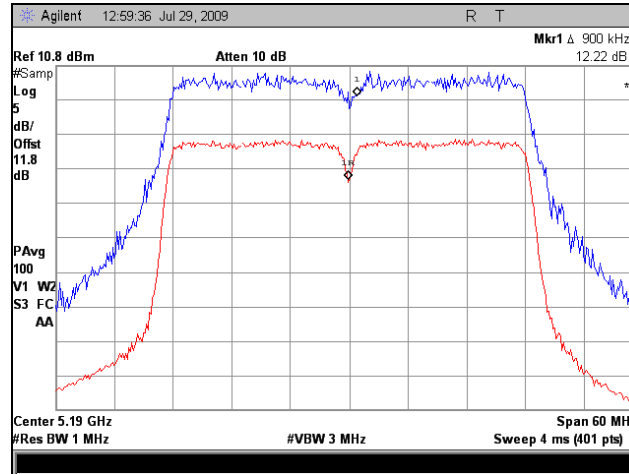


Plot 146. Peak Excursion, Port 3, 802.11n 20MHz, 5580 MHz

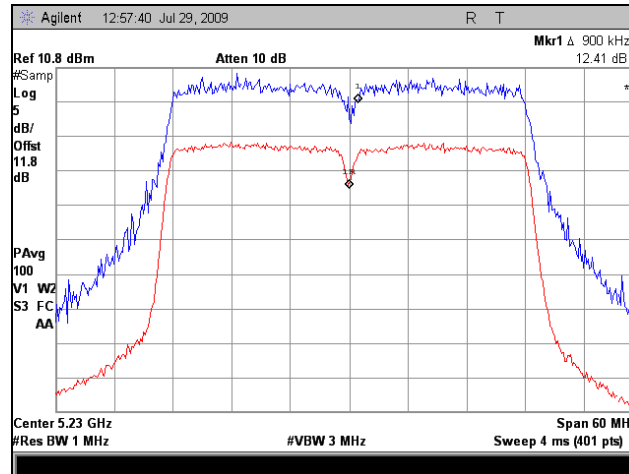


Plot 147. Peak Excursion Ratio, Port 3, 802.11n 20MHz, 5700 MHz

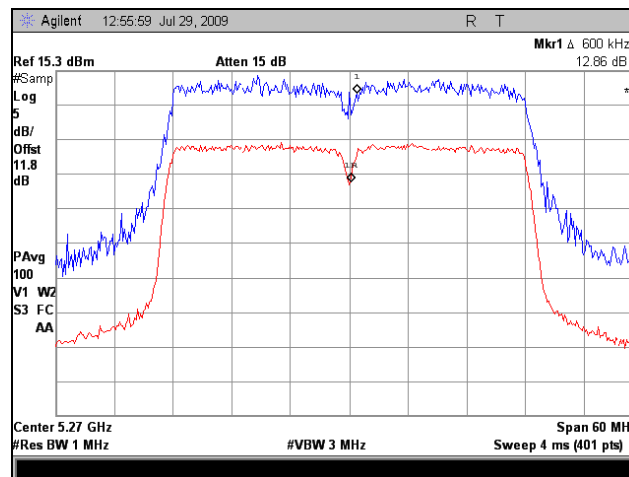
**Peak Excursion Ratio, Port 3, 802.11n 40MHz**



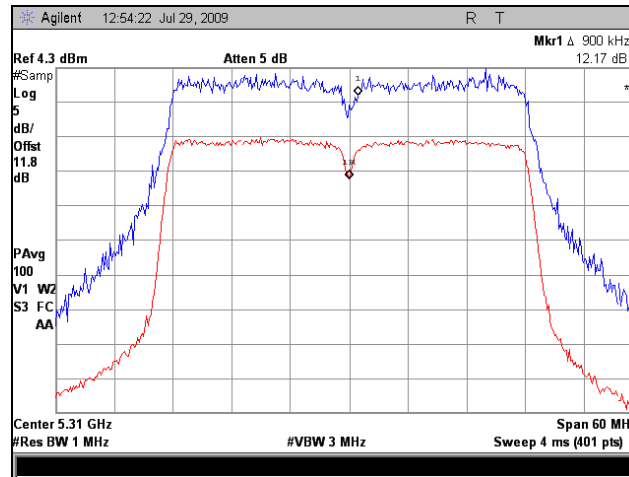
**Plot 148. Peak Excursion, Port 3, 802.11n 40MHz, 5190 MHz**



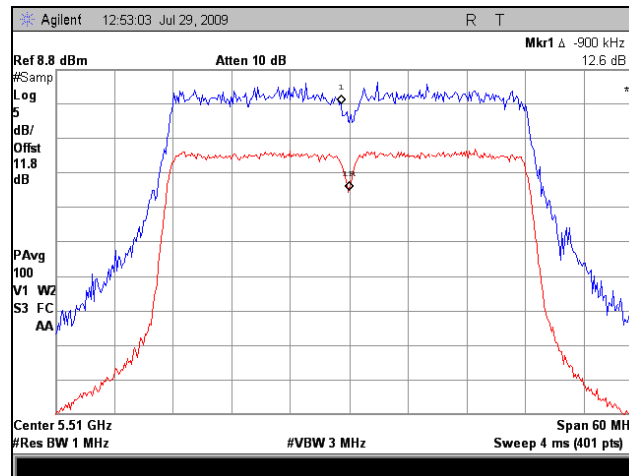
**Plot 149. Peak Excursion, Port 3, 802.11n 40MHz, 5230 MHz**



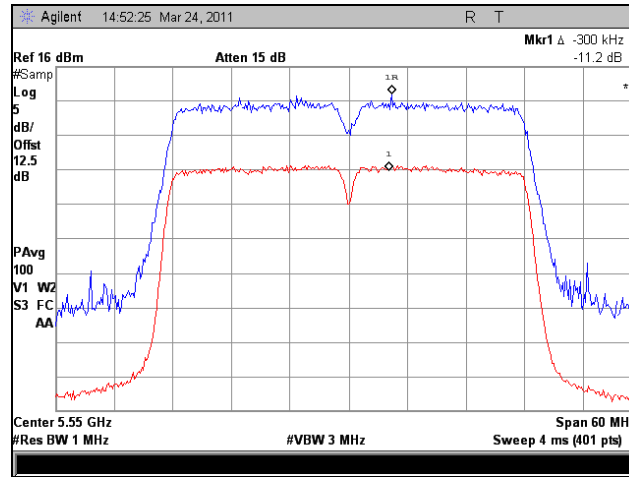
**Plot 150. Peak Excursion, Port 3, 802.11n 40MHz, 5270 MHz**



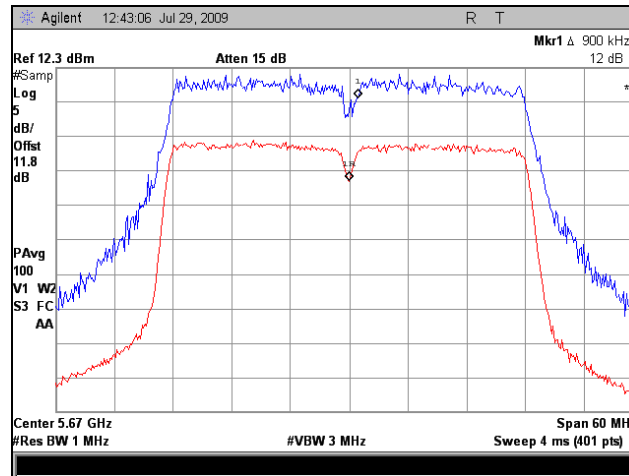
**Plot 151. Peak Excursion, Port 3, 802.11n 40MHz, 5310 MHz**



**Plot 152. Peak Excursion, Port 3, 802.11n 40MHz, 5510 MHz**



Plot 153. Peak Excursion, Port 3, 802.11n 40MHz, 5550 MHz



Plot 154. Peak Excursion, Port 3, 802.11n 40MHz, 5670 MHz

## Electromagnetic Compatibility Criteria for Intentional Radiators

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

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

§ 15.407(b)(1): In any 1MHz bandwidth outside the frequency band 5.15-5.25GHz in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power shall not exceed -27dBm.

§ 15.407(b)(2): In any 1MHz bandwidth outside the frequency band 5.25-5.35GHz in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power shall not exceed -27dBm.

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

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110-----	16.42–16.423	399.9–410	4.5–5.15
<sup>1</sup> 0.495–0.505-----	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905-----	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128-----	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775-----	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775-----	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218-----	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825-----	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225-----	123–138	2200–2300	14.47–14.5
8.291–8.294-----	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366-----	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675-----	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475-----	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293-----	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025-----	240–285	3345.8–3358 36.	43–36.5
12.57675–12.57725-----	322–335.4	3600–4400	( <sup>2</sup> )

**Table 27. Restricted Bands of Operation**

**Test Procedure:** The EUT was installed placed on a 0.8m-high wooden table inside a semi-anechoic chamber. The harmonic frequencies the carriers were recorded for reference for final measurements. A receiving horn antenna was placed 3m away from the EUT. Unless otherwise specified, measurements were made using 1MHz RBW & 1MHz VBW for peak measurements and 1MHz RBW & 10Hz VBW for average measurements on a spectrum analyzer.

For each harmonic of the carrier frequency, the turntable was rotated, the positions of the interface cables were varied, and the antenna height was varied between 1 m and 4 m, in order to find the maximum radiated emissions.

The equipment isotropic radiated power (EIRP) at -27dBm/MHz was converted to field strength at 68.23dBuV/m. At the band edge of each band, the EIRP energy measurement is integrated to show the total power over 1MHz.

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

**Test Engineer(s):** Minh Ly

**Test Date(s):** 07/28/09 - 08/11/09

## Electromagnetic Compatibility Criteria for Intentional Radiators

### Harmonic Emissions Requirements – Radiated (Port 1, 802.11a)

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.36	V	46.45	35.34	38.18	6.92	56.22	Peak	74	-17.78
10.36	V	31.42	35.34	38.18	6.92	41.19	Avg.	54	-12.81
15.54	V	46.06	34.83	38.08	8.89	58.20	Peak	74	-15.80
15.54	V	31.96	34.83	38.08	8.89	44.10	Avg.	54	-9.90

**Table 28. Radiated Harmonics, Port 1, 802.11a, 5 dBi Omni, 5180 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.48	V	44.55	35.23	38.19	6.85	54.36	Peak	74	-19.64
10.48	V	31.1	35.23	38.19	6.85	40.91	Avg.	54	-13.09
15.72	V	44.02	34.92	37.73	8.88	55.71	Peak	74	-18.29
15.72	V	32.04	34.92	37.73	8.88	43.73	Avg.	54	-10.27

**Table 29. Radiated Harmonics, Port 1, 802.11a, 5 dBi Omni, 5240 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.52	V	44.44	35.19	38.21	6.84	54.30	Peak	74	-19.70
10.52	V	30.84	35.19	38.21	6.84	40.70	Avg.	54	-13.30
15.78	V	44.84	34.97	37.68	8.86	56.42	Peak	74	-17.58
15.78	V	32	34.97	37.68	8.86	43.58	Avg.	54	-10.42

**Table 30. Radiated Harmonics, Port 1, 802.11a, 5 dBi Omni, 5260 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.



Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.64	V	48.33	35.03	38.29	6.83	58.42	Peak	74	-15.58
10.64	V	35.4	35.03	38.29	6.83	45.49	Avg.	54	-8.51
15.96	V	44.83	35.09	37.68	8.87	56.29	Peak	74	-17.71
15.96	V	32.56	35.09	37.68	8.87	44.02	Avg.	54	-9.98

**Table 31. Radiated Harmonics, Port 1, 802.11a, 5 dBi Omni, 5320 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11	V	46.9	34.81	38.70	6.98	57.77	Peak	74	-16.23
11	V	31.39	34.81	38.70	6.98	42.26	Avg.	54	-11.74
16.5	V	47.75	34.60	38.80	9.70	61.65	Peak	74	-12.35
16.5	V	33.13	34.60	38.80	9.70	47.03	Avg.	54	-6.97

**Table 32. Radiated Harmonics, Port 1, 802.11a, 5 dBi Omni, 5500 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11.16	V	46.16	34.76	39.14	7.30	57.84	Peak	74	-16.16
11.16	V	31.07	34.76	39.14	7.30	42.75	Avg.	54	-11.25
16.74	V	43.69	34.36	40.73	9.66	59.72	Peak	74	-14.28
16.74	V	30.22	34.36	40.73	9.66	46.25	Avg.	54	-7.75

**Table 33. Radiated Harmonics, Port 1, 802.11a, 5 dBi Omni, 5580 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11.4	V	45.44	34.81	39.63	7.63	57.89	Peak	74	-16.11
11.4	V	31.56	34.81	39.63	7.63	44.01	Avg.	54	-9.99
17.1	V	46.72	34.15	42.41	9.77	64.75	Peak	74	-9.25
17.1	V	30.48	34.15	42.41	9.77	48.51	Avg.	54	-5.49

**Table 34. Radiated Harmonics, Port 1, 802.11a, 5 dBi Omni, 5700 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

### Harmonic Emissions Requirements – Radiated (802.11n 20MHz)

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.36	V	45.6	35.34	38.18	6.92	55.37	Peak	74	-18.63
10.36	V	32.12	35.34	38.18	6.92	41.89	Avg.	54	-12.11
15.54	V	45.5	34.83	38.08	8.89	57.64	Peak	74	-16.36
15.54	V	31.7	34.83	38.08	8.89	43.84	Avg.	54	-10.16

**Table 35. Radiated Harmonics, 802.11n 20MHz, 5 dBi Omni, 5180 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.48	V	45.47	35.23	38.19	6.85	55.28	Peak	74	-18.72
10.48	V	31.46	35.23	38.19	6.85	41.27	Avg.	54	-12.73
15.72	V	45.12	34.92	37.73	8.88	56.81	Peak	74	-17.19
15.72	V	31.87	34.92	37.73	8.88	43.56	Avg.	54	-10.44

**Table 36. Radiated Harmonics, 802.11n 20MHz, 5 dBi Omni, 5240 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.52	V	44.32	35.19	38.21	6.84	54.18	Peak	74	-19.82
10.52	V	30.83	35.19	38.21	6.84	40.69	Avg.	54	-13.31
15.78	V	45.82	34.97	37.68	8.86	57.40	Peak	74	-16.60
15.78	V	31.82	34.97	37.68	8.86	43.40	Avg.	54	-10.60

**Table 37. Radiated Harmonics, 802.11n 20MHz, 5 dBi Omni, 5260 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.64	V	49.51	35.03	38.29	6.83	59.60	Peak	74	-14.40
10.64	V	35.19	35.03	38.29	6.83	45.28	Avg.	54	-8.72
15.96	V	44.82	35.09	37.68	8.87	56.28	Peak	74	-17.72
15.96	V	31.94	35.09	37.68	8.87	43.40	Avg.	54	-10.60

**Table 38. Radiated Harmonics, 802.11n 20MHz, 5 dBi Omni, 5320 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11	V	43.89	34.81	38.70	6.98	54.76	Peak	74	-19.24
11	V	30.44	34.81	38.70	6.98	41.31	Avg.	54	-12.69
16.5	V	46.58	34.60	38.80	9.70	60.48	Peak	74	-13.52
16.5	V	32.09	34.60	38.80	9.70	45.99	Avg.	54	-8.01

**Table 39. Radiated Harmonics, 802.11n 20MHz, 5 dBi Omni, 5500 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11.16	V	43.65	34.76	39.14	7.30	55.33	Peak	74	-18.67
11.16	V	30.51	34.76	39.14	7.30	42.19	Avg.	54	-11.81
16.74	V	43.71	34.36	40.73	9.66	59.74	Peak	74	-14.26
16.74	V	31.35	34.36	40.73	9.66	47.38	Avg.	54	-6.62

**Table 40. Radiated Harmonics, 802.11n 20MHz, 5 dBi Omni, 5580 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11.4	V	47.21	34.81	39.63	7.63	59.66	Peak	74	-14.34
11.4	V	33.76	34.81	39.63	7.63	46.21	Avg.	54	-7.79
17.1	V	46.79	34.15	42.41	9.77	64.82	Peak	74	-9.18
17.1	V	30.57	34.15	42.41	9.77	48.60	Avg.	54	-5.40

**Table 41. Radiated Harmonics, 802.11n 20MHz, 5 dBi Omni, 5700 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

### Harmonic Emissions Requirements – Radiated (802.11n 40MHz)

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.38	V	45.49	35.32	38.18	6.91	55.25	Peak	74	-18.75
10.38	V	32.48	35.32	38.18	6.91	42.24	Avg.	54	-11.76
15.57	V	44.48	34.84	38.00	8.89	56.53	Peak	74	-17.47
15.57	V	31.52	34.84	38.00	8.89	43.57	Avg.	54	-10.43

**Table 42. Radiated Harmonics, 802.11n 40MHz, 5 dBi Omni, 5190 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.46	V	44.03	35.25	38.18	6.85	53.82	Peak	74	-20.18
10.46	V	31.93	35.25	38.18	6.85	41.72	Avg.	54	-12.28
15.69	V	44.84	34.90	37.77	8.88	56.59	Peak	74	-17.41
15.69	V	31.79	34.90	37.77	8.88	43.54	Avg.	54	-10.46

**Table 43. Radiated Harmonics, 802.11n 40MHz, 5 dBi Omni, 5230 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.54	V	43.8	35.16	38.22	6.83	53.69	Peak	74	-20.31
10.54	V	31.33	35.16	38.22	6.83	41.22	Avg.	54	-12.78
15.81	V	47.46	34.99	37.67	8.85	59.00	Peak	74	-15.00
15.81	V	30.03	34.99	37.67	8.85	41.57	Avg.	54	-12.43

**Table 44. Radiated Harmonics, 802.11n 40MHz, 5 dBi Omni, 5270 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
10.62	V	45.59	35.06	38.27	6.83	55.63	Peak	74	-18.37
10.62	V	33.72	35.06	38.27	6.83	43.76	Avg.	54	-10.24
15.93	V	45.07	35.07	37.67	8.86	56.52	Peak	74	-17.48
15.93	V	31.72	35.07	37.67	8.86	43.17	Avg.	54	-10.83

**Table 45. Radiated Harmonics, 802.11n 40MHz, 5 dBi Omni, 5310 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11.02	V	44.02	34.80	38.73	7.00	54.95	Peak	74	-19.05
11.02	V	30.76	34.80	38.73	7.00	41.69	Avg.	54	-12.31
16.53	V	44.15	34.55	38.94	9.72	58.25	Peak	74	-15.75
16.53	V	31.44	34.55	38.94	9.72	45.54	Avg.	54	-8.46

**Table 46. Radiated Harmonics, 802.11n 40MHz, 5 dBi Omni, 5510 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11.1	V	43.74	34.76	39.09	7.26	55.33	Peak	74	-18.67
11.1	V	30.77	34.76	39.09	7.26	42.36	Avg.	54	-11.64
16.65	V	44	34.37	40.51	9.67	59.82	Peak	74	-14.18
16.65	V	31.04	34.37	40.51	9.67	46.86	Avg.	54	-7.14

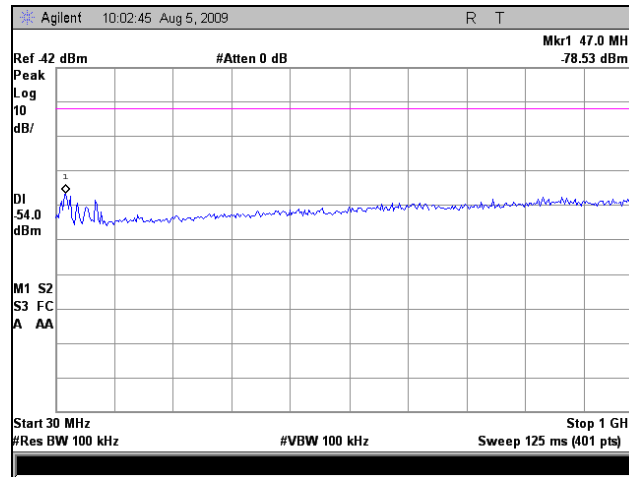
**Table 47. Radiated Harmonics, 802.11n 40MHz, 5 dBi Omni, 5550 MHz**

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

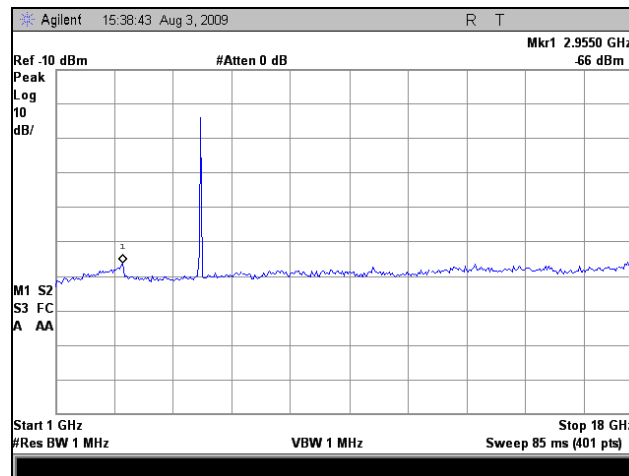
Freq.	Antenna Polarity	Raw Amp. @ 3 m	P. Amp.	Ant. Cor. Factor	Cable Loss	EUT Field Strength Final Amp.	Limit Detector Peak / Avg.	Limit @ 3 m	Delta
(GHz)	(H/V)	(Peak) / (Avg.)	(dB)	(dB/m)	(dB)	(dBuV/m)	(Peak) / (Avg.)	(dBuV/m)	(dB)
11.34	V	43.11	34.78	39.50	7.56	55.38	Peak	74	-18.62
11.34	V	30.63	34.78	39.50	7.56	42.90	Avg.	54	-11.10
17.01	V	42.99	34.24	42.05	9.68	60.48	Peak	74	-13.52
17.01	V	30.85	34.24	42.05	9.68	48.34	Avg.	54	-5.66

**Table 48. Radiated Harmonics, 802.11n 40MHz, 5 dBi Omni, 5670 MHz**

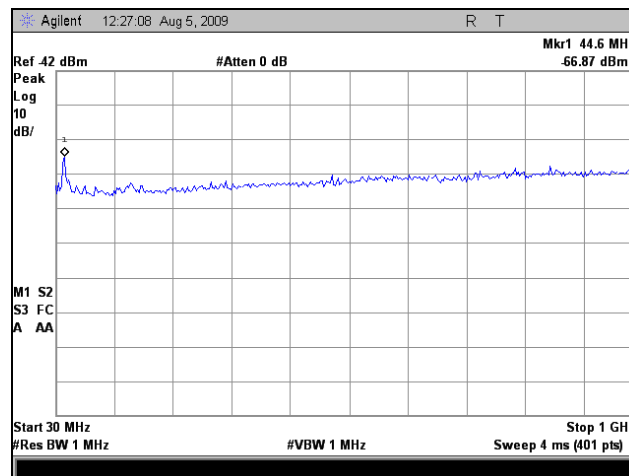
§ 15.209 Radiated Emissions Limits, Port 1, 802.11a



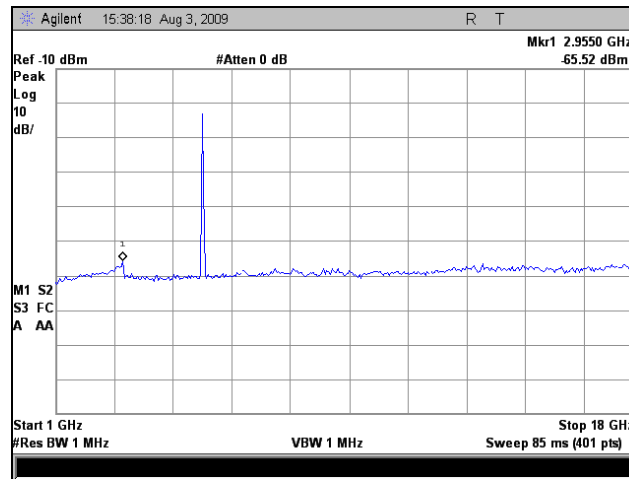
Plot 155. Radiated Spurious, Port 1, 802.11a, 5180 MHz, 30 MHz – 1 GHz



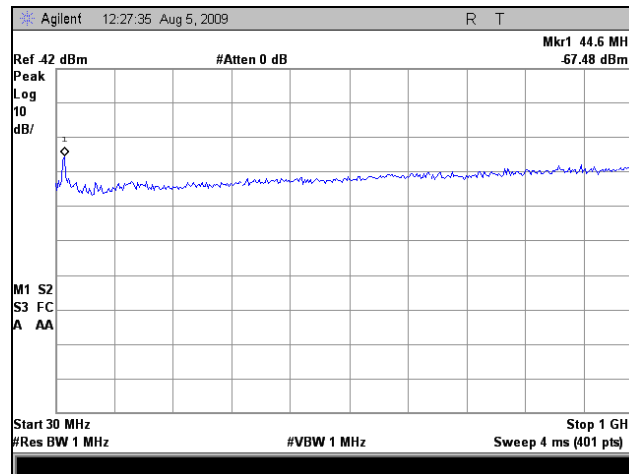
Plot 156. Radiated Spurious, Port 1, 802.11a, 5180 MHz, 1 GHz – 18 GHz



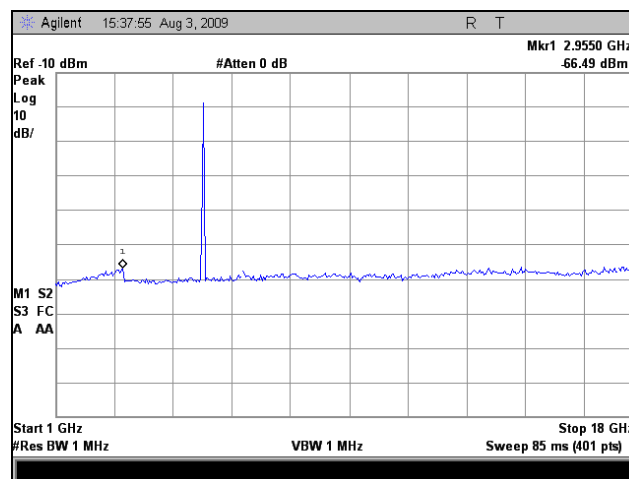
Plot 157. Radiated Spurious, Port 1, 802.11a, 5240 MHz, 30 MHz – 1 GHz



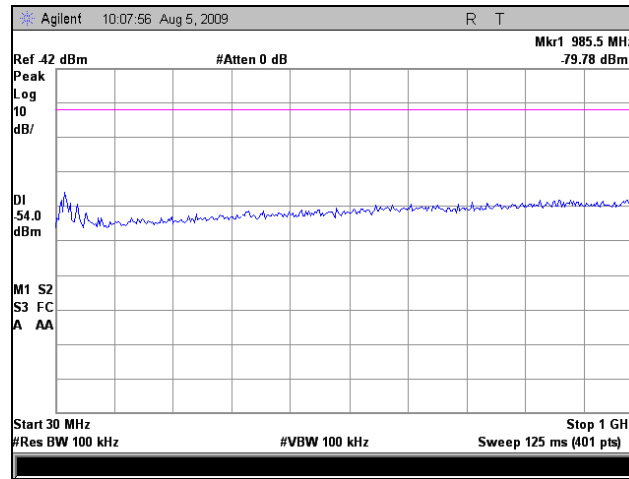
Plot 158. Radiated Spurious, Port 1, 802.11a, 5240 MHz, 1 GHz – 18 GHz



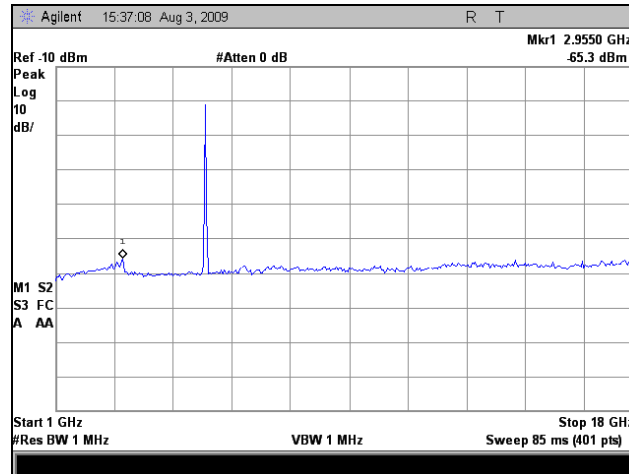
Plot 159. Radiated Spurious, Port 1, 802.11a, 5260 MHz, 30 MHz – 1 GHz



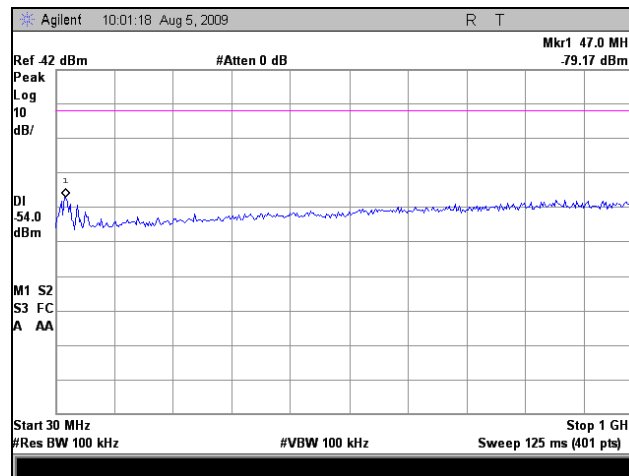
Plot 160. Radiated Spurious, Port 1, 802.11a, 5260 MHz, 1 GHz – 18 GHz



Plot 161. Radiated Spurious, Port 1, 802.11a, 5320 MHz, 30 MHz – 1 GHz

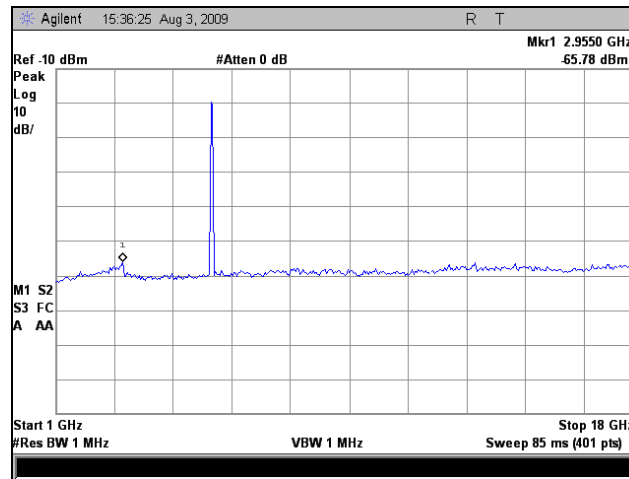


Plot 162. Radiated Spurious, Port 1, 802.11a, 5320 MHz, 1 GHz – 18 GHz

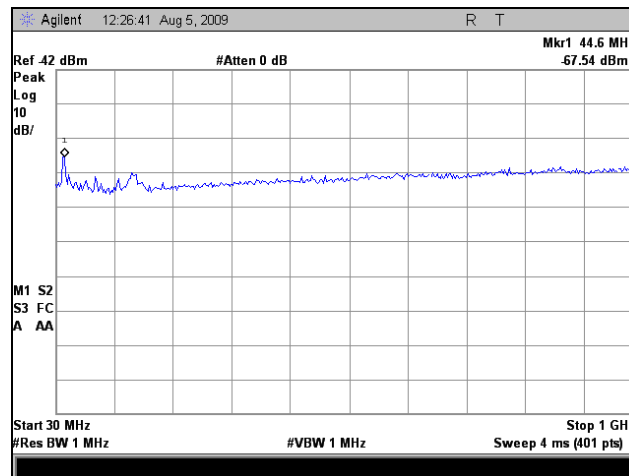


Plot 163. Radiated Spurious, Port 1, 802.11a, 5500 MHz, 30 MHz – 1 GHz

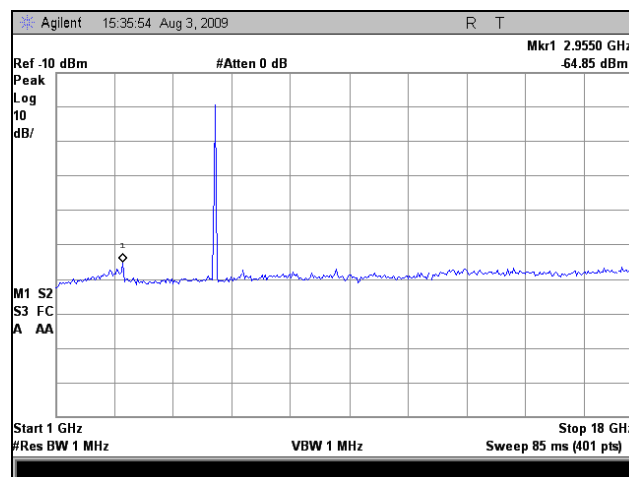




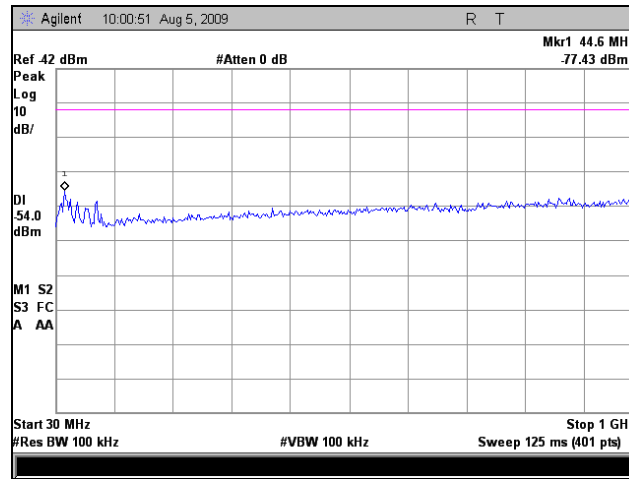
Plot 164. Radiated Spurious, Port 1, 802.11a, 5500 MHz, 1 GHz – 18 GHz



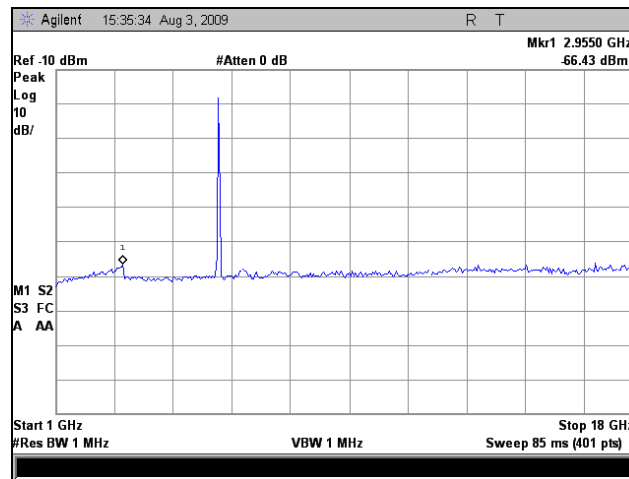
Plot 165. Radiated Spurious, Port 1, 802.11a, 5580 MHz, 30 MHz – 1 GHz



Plot 166. Radiated Spurious, Port 1, 802.11a, 5580 MHz, 1 GHz – 18 GHz

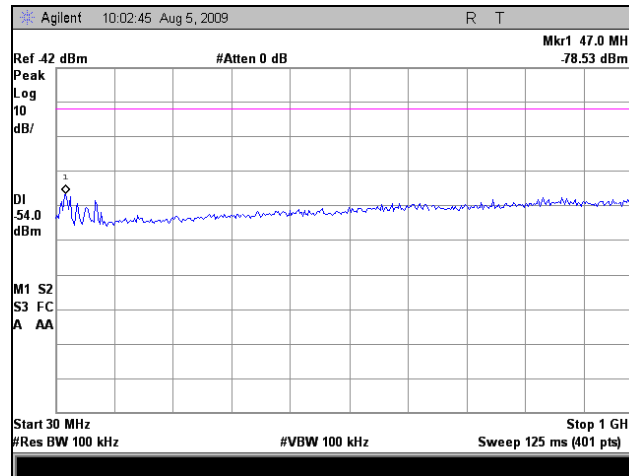


Plot 167. Radiated Spurious, Port 1, 802.11a, 5700 MHz, 30 MHz – 1 GHz

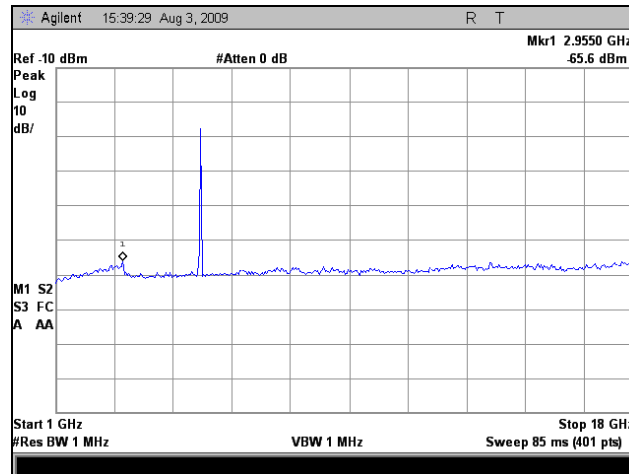


Plot 168. Radiated Spurious, Port 1, 802.11a, 5700 MHz, 1 GHz – 18 GHz

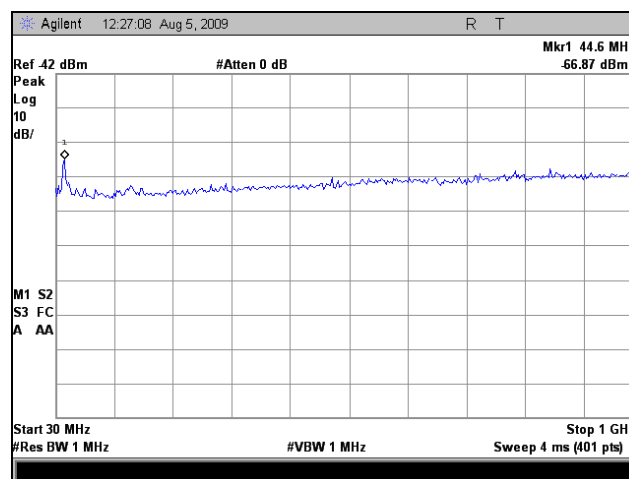
§ 15.209 Radiated Emissions Limits, 802.11n 20MHz



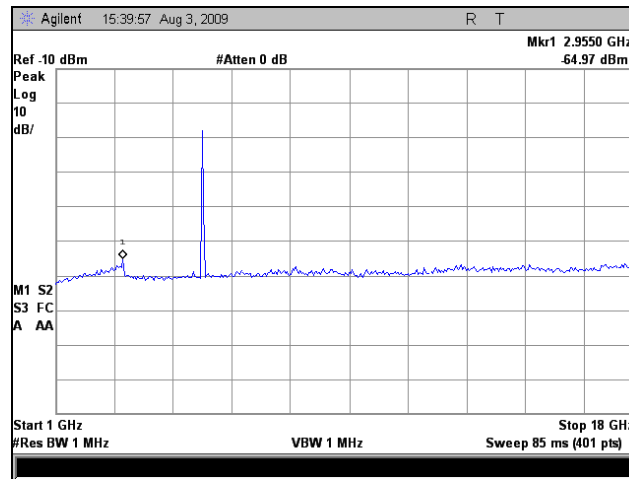
Plot 169. Radiated Spurious, 802.11n 20MHz, 5180 MHz, 30 MHz – 1 GHz



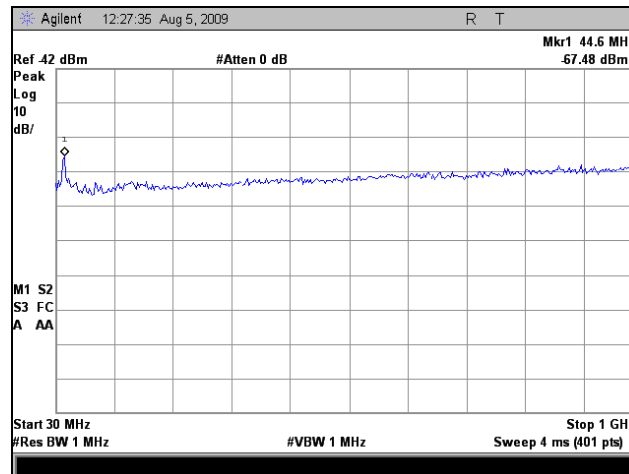
Plot 170. Radiated Spurious, 802.11n 20MHz, 5180 MHz, 1 GHz – 18 GHz



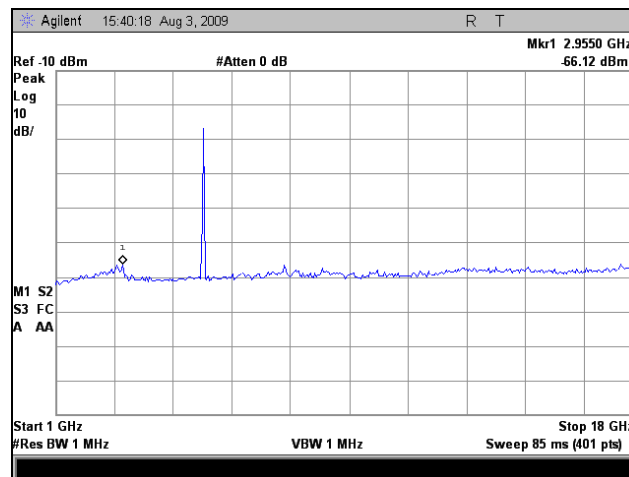
Plot 171. Radiated Spurious, 802.11n 20MHz, 5240 MHz, 30 MHz – 1 GHz



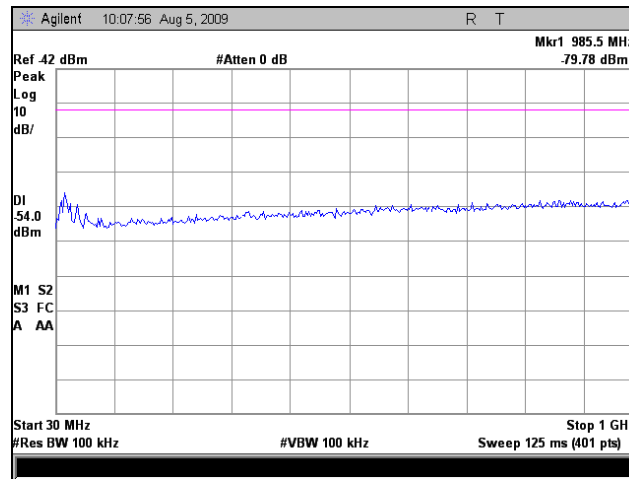
Plot 172. Radiated Spurious, 802.11n 20MHz, 5240 MHz, 1 GHz – 18 GHz



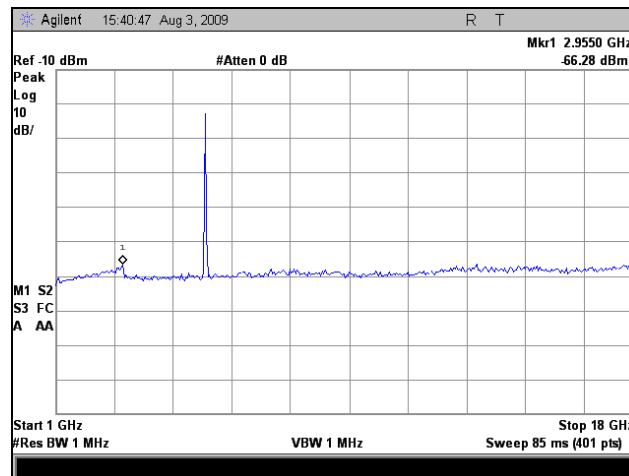
Plot 173. Radiated Spurious, 802.11n 20MHz, 5260 MHz, 30 MHz – 1 GHz



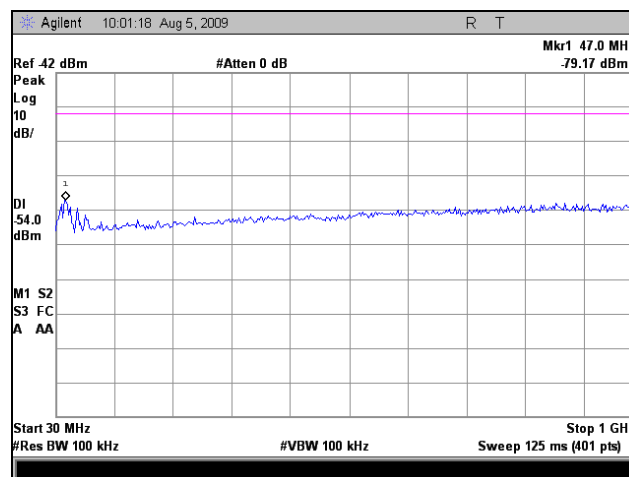
Plot 174. Radiated Spurious, 802.11n 20MHz, 5260 MHz, 1 GHz – 18 GHz



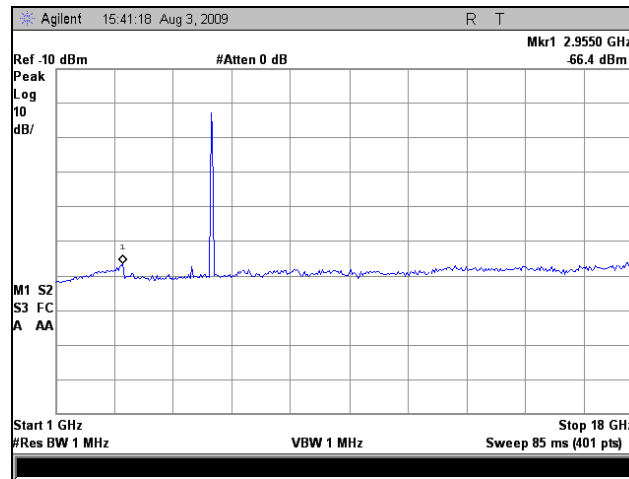
Plot 175. Radiated Spurious, 802.11n 20MHz, 5320 MHz, 30 MHz – 1 GHz



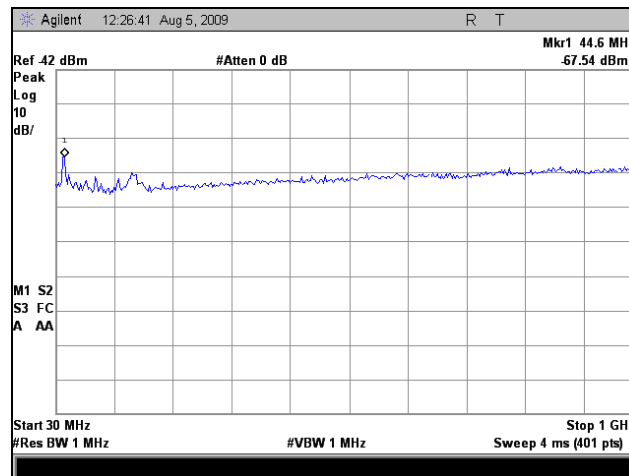
Plot 176. Radiated Spurious, 802.11n 20MHz, 5320 MHz, 1 GHz – 18 GHz



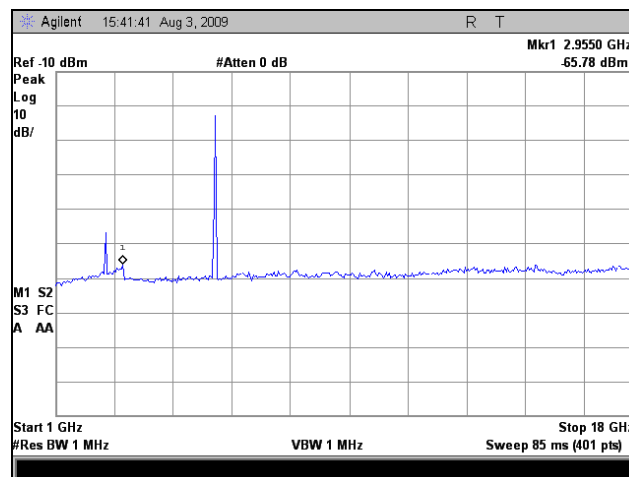
Plot 177. Radiated Spurious, 802.11n 20MHz, 5500 MHz, 30 MHz – 1 GHz



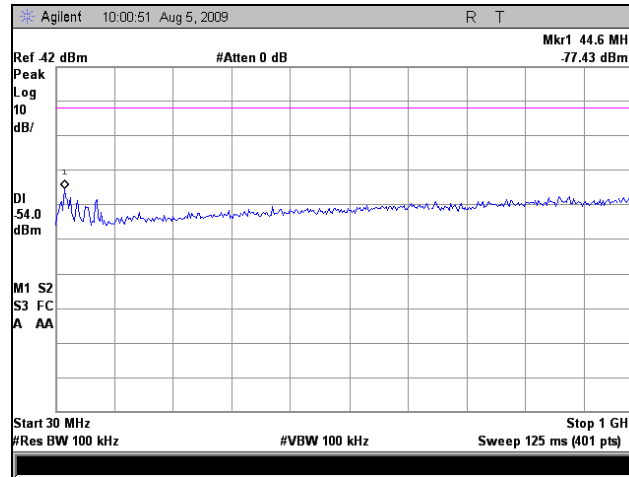
Plot 178. Radiated Spurious, 802.11n 20MHz, 5500 MHz, 1 GHz – 18 GHz



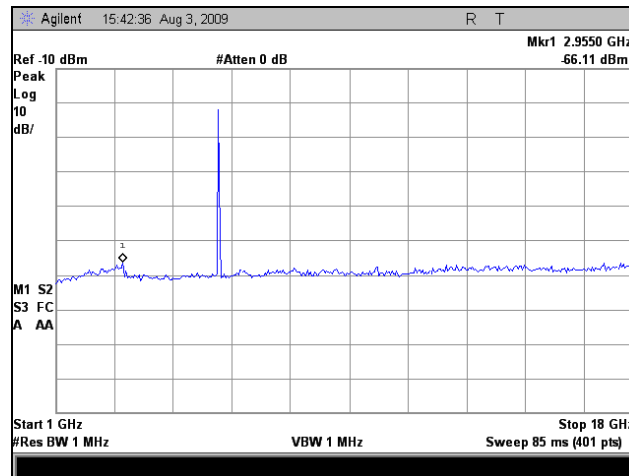
Plot 179. Radiated Spurious, 802.11n 20MHz, 5580 MHz, 30 MHz – 1 GHz



Plot 180. Radiated Spurious, 802.11n 20MHz, 5580 MHz, 1 GHz – 18 GHz

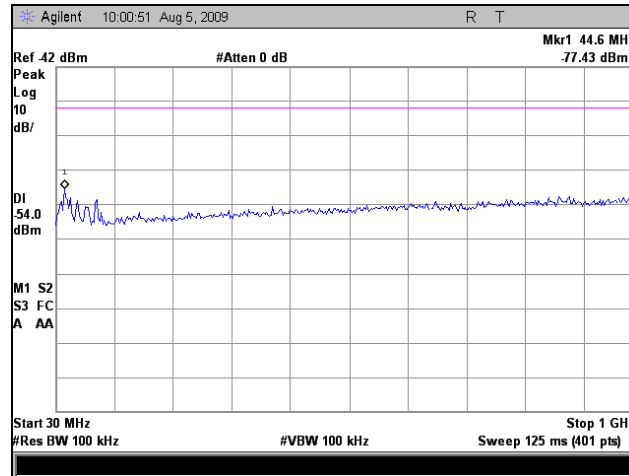


Plot 181. Radiated Spurious, 802.11n 20MHz, 5700 MHz, 30 MHz – 1 GHz

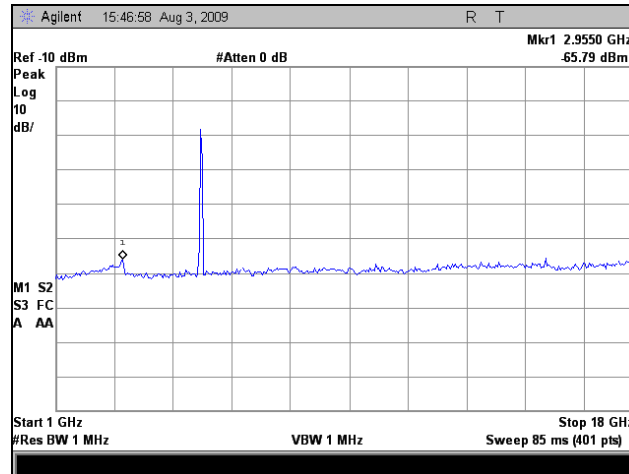


Plot 182. Radiated Spurious, 802.11n 20MHz, 5700 MHz, 1 GHz – 18 GHz

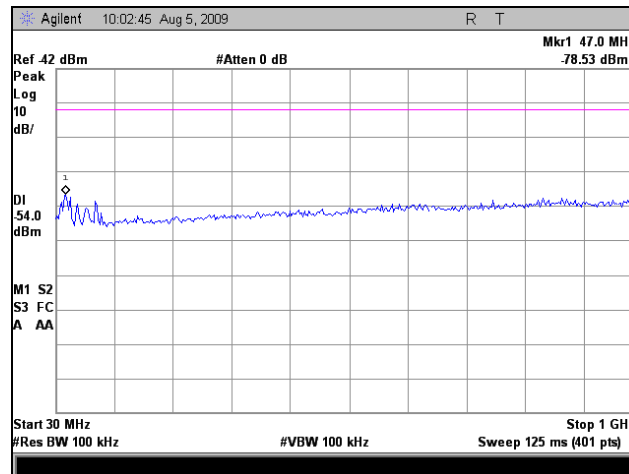
§ 15.209 Radiated Emissions Limits, 802.11n 40MHz



Plot 183. Radiated Spurious, 802.11n 40MHz, 5190 MHz, 30 MHz – 1 GHz

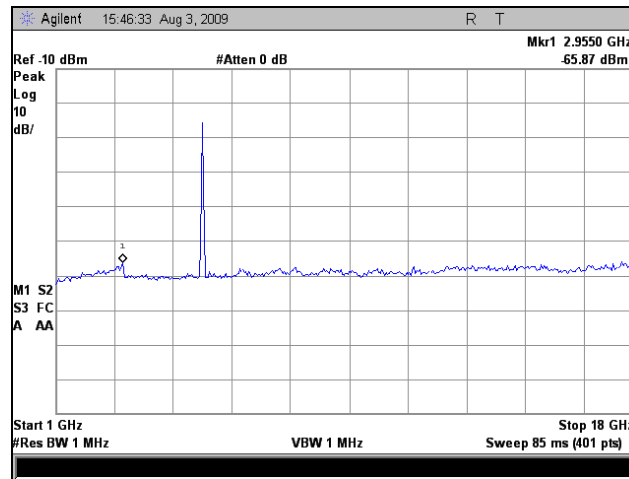


Plot 184. Radiated Spurious, 802.11n 40MHz, 5190 MHz, 1 GHz – 18 GHz

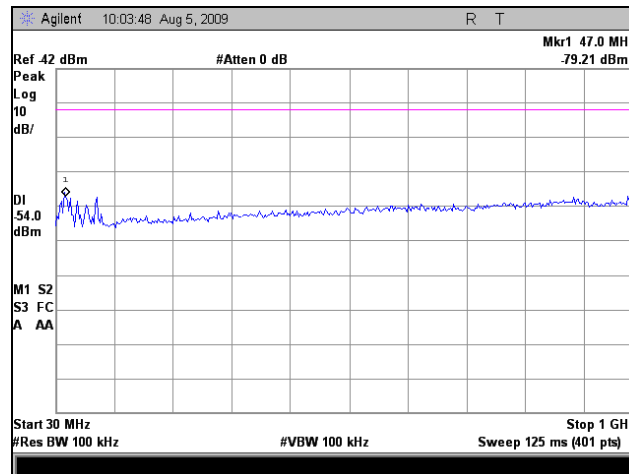


Plot 185. Radiated Spurious, 802.11n 40MHz, 5230 MHz, 30 MHz – 1 GHz

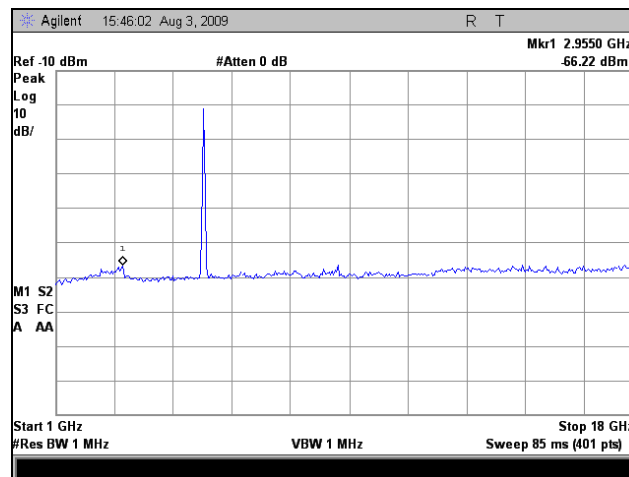




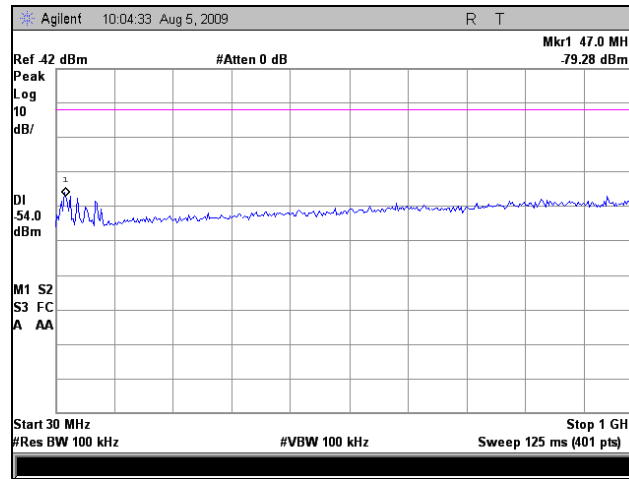
Plot 186. Radiated Spurious, 802.11n 40MHz, 5230 MHz, 1 GHz – 18 GHz



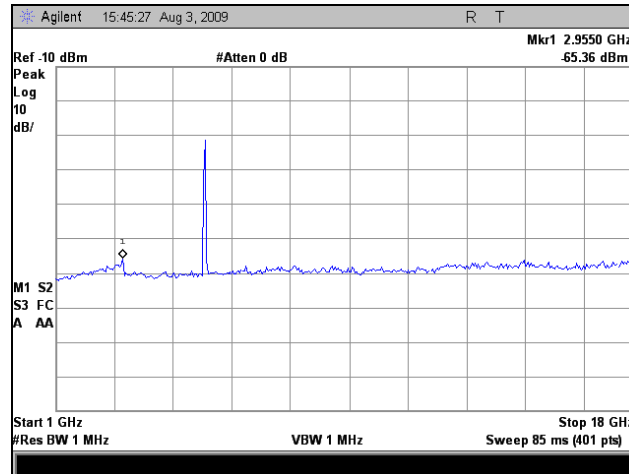
Plot 187. Radiated Spurious, 802.11n 40MHz, 5270 MHz, 30 MHz – 1 GHz



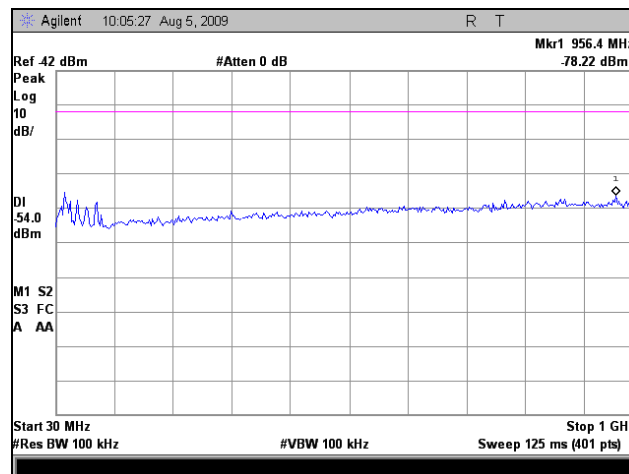
Plot 188. Radiated Spurious, 802.11n 40MHz, 5270 MHz, 1 GHz – 18 GHz



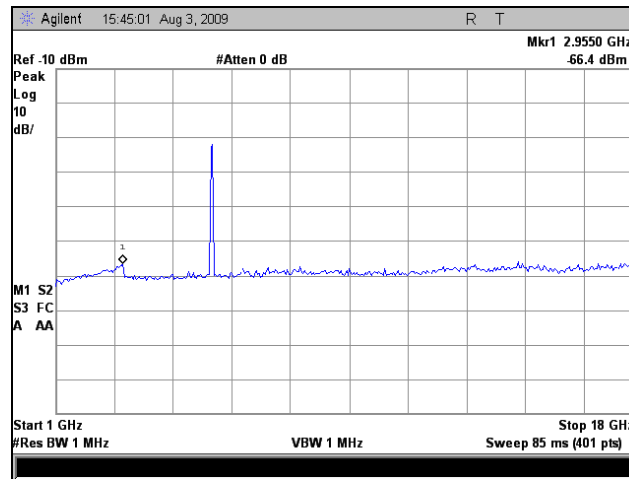
Plot 189. Radiated Spurious, 802.11n 40MHz, 5310 MHz, 30 MHz – 1 GHz



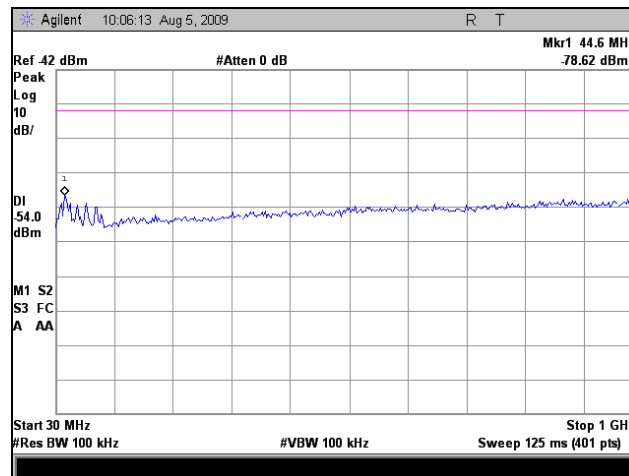
Plot 190. Radiated Spurious, 802.11n 40MHz, 5310 MHz, 1 GHz – 18 GHz



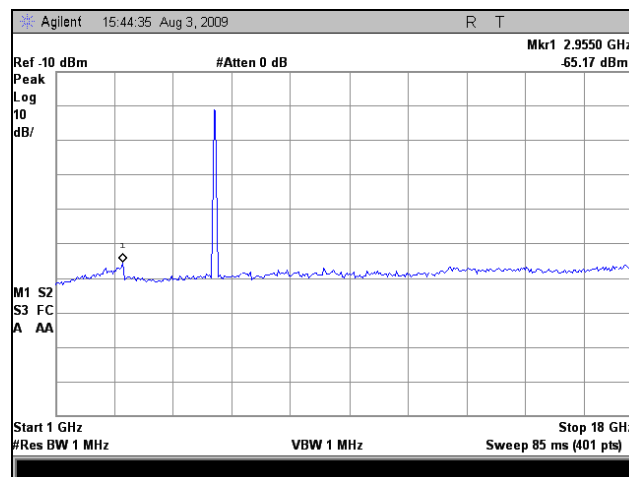
Plot 191. Radiated Spurious, 802.11n 40MHz, 5510 MHz, 30 MHz – 1 GHz



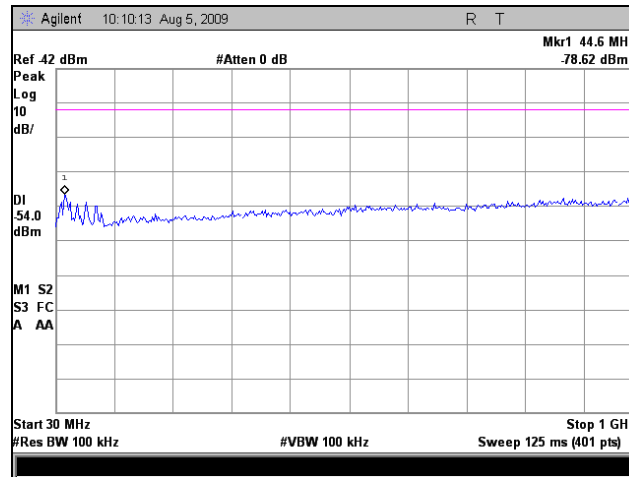
Plot 192. Radiated Spurious, 802.11n 40MHz, 5510 MHz, 1 GHz – 18 GHz



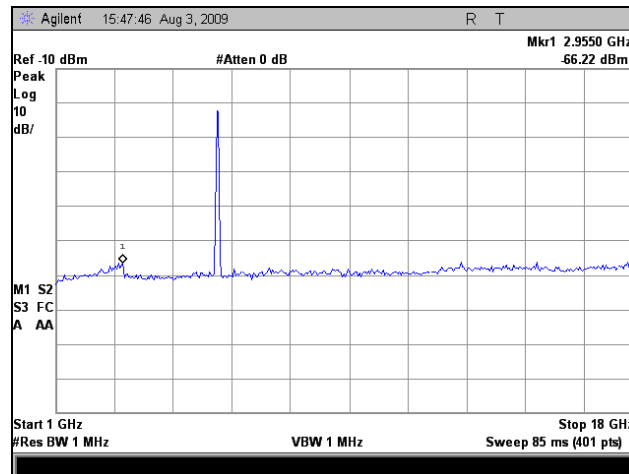
Plot 193. Radiated Spurious, 802.11n 40MHz, 5550 MHz, 30 MHz – 1 GHz



Plot 194. Radiated Spurious, 802.11n 40MHz, 5550 MHz, 1 GHz – 18 GHz



Plot 195. Radiated Spurious, 802.11n 40MHz, 5670 MHz, 30 MHz – 1 GHz



Plot 196. Radiated Spurious, 802.11n 40MHz, 5670 MHz, 1 GHz – 18 GHz

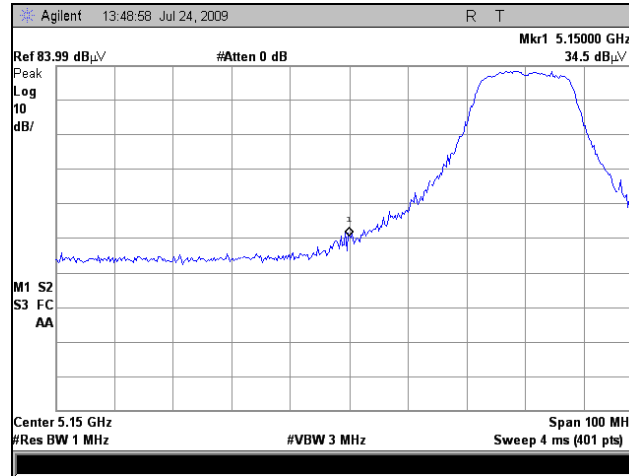
**EIRP**

5dBi Omni Antenna								
802.11a	Band Edge Freq	Uncorrected Peak (dBuV)	Cable Loss	ACF	DCF	Corrected	Limit (dBuV/m)	Margin
	5150 MHz	19.28	6.9	35	9.54	51.64	68.23	-16.59
	5350 MHz	21.22	7.03	35	9.54	53.71	68.23	-14.52
	5470 MHz	26.19	7.03	35	9.54	58.68	68.23	-9.55
	5725 MHz	32.2	7.5	35	9.54	65.16	68.23	-3.07
802.11n 20MHz	Band Edge Freq	Uncorrected Peak (dBuV)	Cable Lost	ACF	DCF	Corrected	Limit (dBuV/m)	Margin
	5150 MHz	34.53	6.9	35	9.54	66.89	68.23	-1.34
	5350 MHz	21.33	7.03	35	9.54	53.82	68.23	-14.41
	5470 MHz	26.95	7.03	35	9.54	59.44	68.23	-8.79
	5725 MHz	32.73	7.5	35	9.54	65.69	68.23	-2.54
802.11n 40MHz	Band Edge Freq	Uncorrected Peak (dBuV)	Cable Lost	ACF	DCF	Corrected	Limit (dBuV/m)	Margin
	5150 MHz	34.04	6.9	35	9.54	66.4	68.23	-1.83
	5350 MHz	20.94	7.03	35	9.54	53.43	68.23	-14.8
	5470 MHz	25.91	7.03	35	9.54	58.4	68.23	-9.83
	5725 MHz	34.19	7.5	35	9.54	67.15	68.23	-1.08

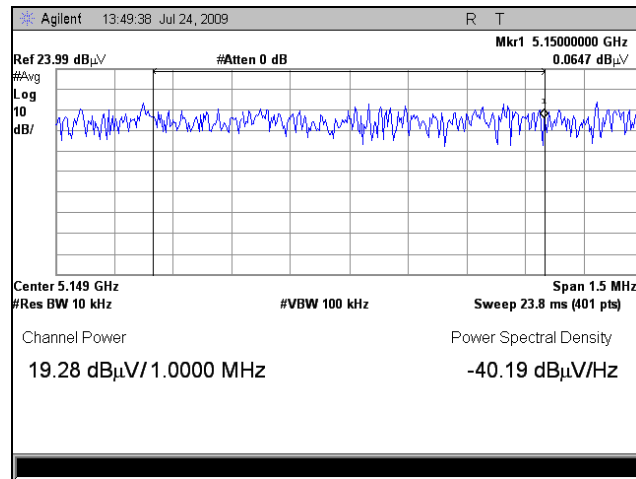
**Table 49. EIRP Calculation**

Note: EIRP Limit -27dBm/MHz = 68.23dBuV/m

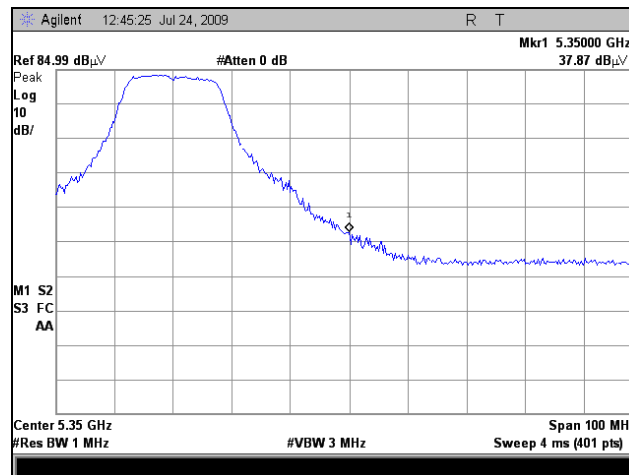
## EIRP, Port 1, 802.11a



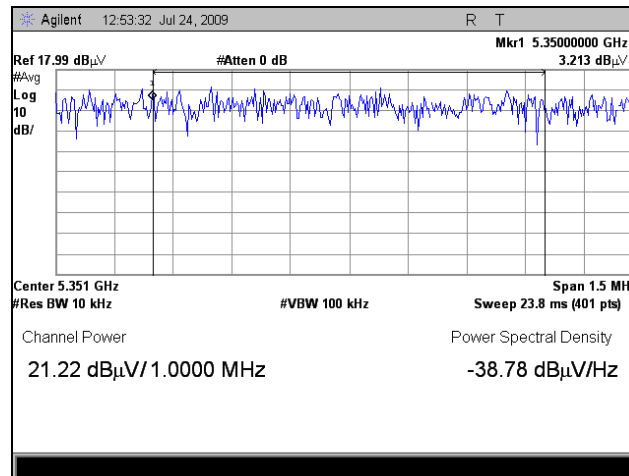
Plot 197. EIRP, Port 1, 802.11a, 5150 MHz Peak



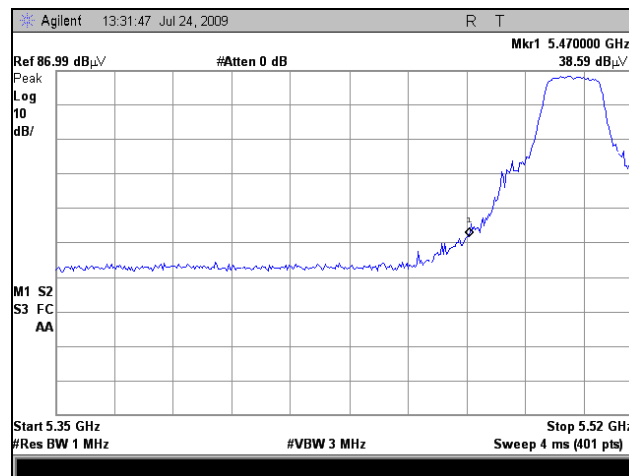
Plot 198. EIRP, Port 1, 802.11a, 5150 MHz Over 1 MHz



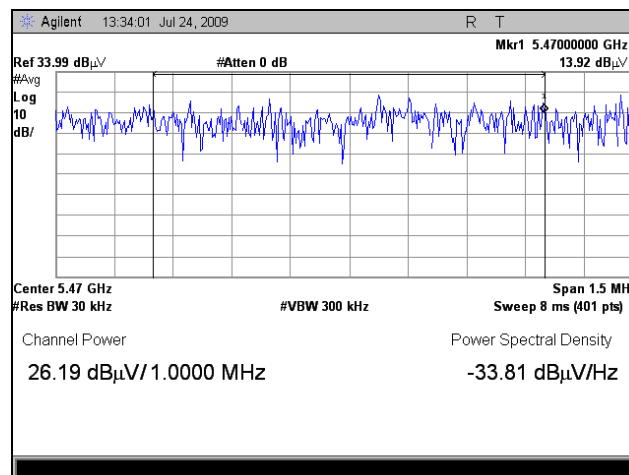
Plot 199. EIRP, Port 1, 802.11a, 5350 MHz Peak



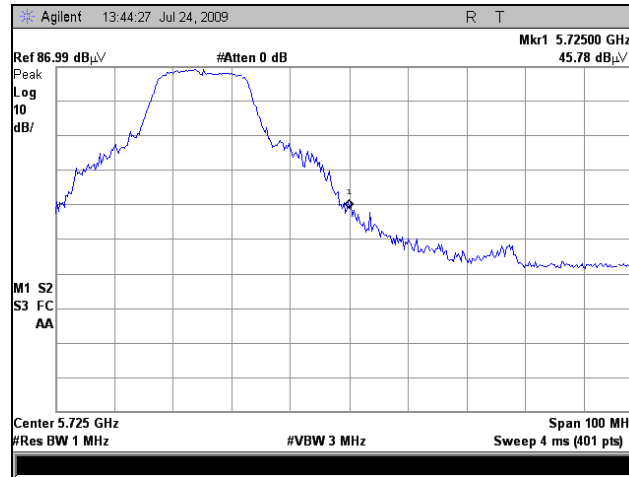
**Plot 200. EIRP, Port 1, 802.11a, 5350 MHz Over 1 MHz**



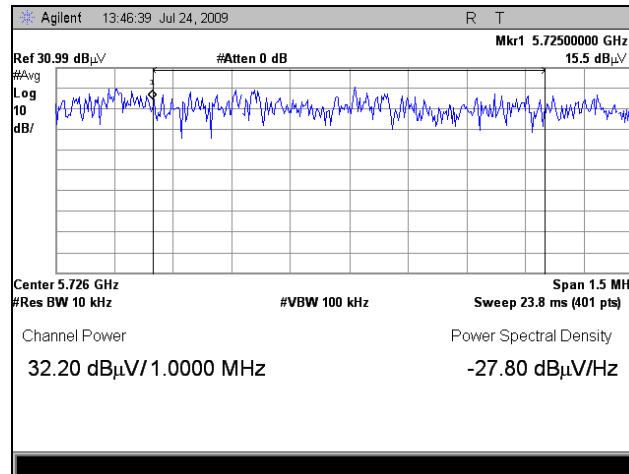
**Plot 201. EIRP, Port 1, 802.11a, 5470 MHz Peak**



**Plot 202. EIRP, Port 1, 802.11a, 5470 MHz Over 1 MHz**



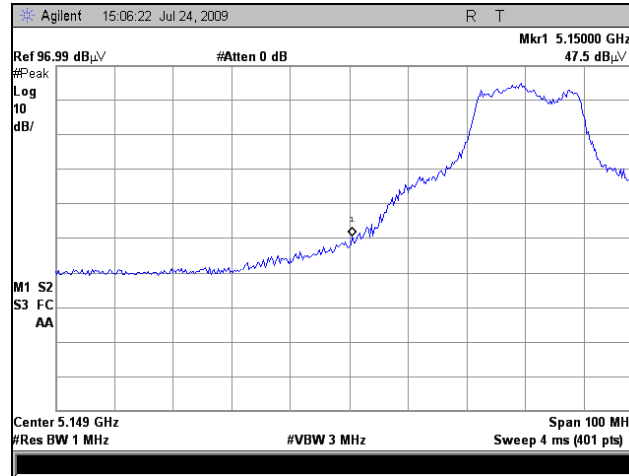
**Plot 203. EIRP, Port 1, 802.11a, 5725 MHz Peak**



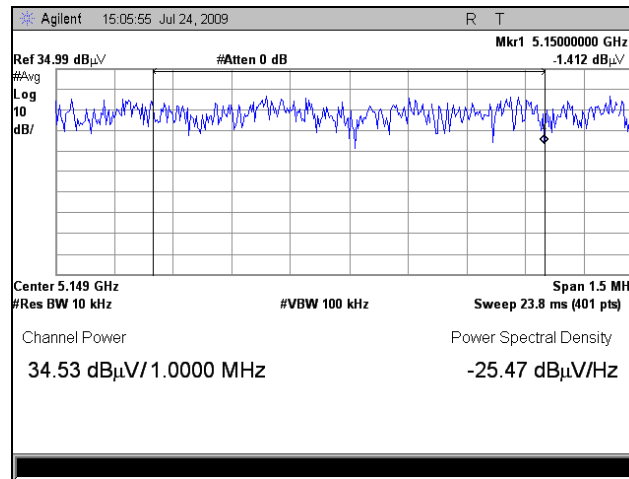
**Plot 204. EIRP, Port 1, 802.11a, 5725 MHz Over 1 MHz**



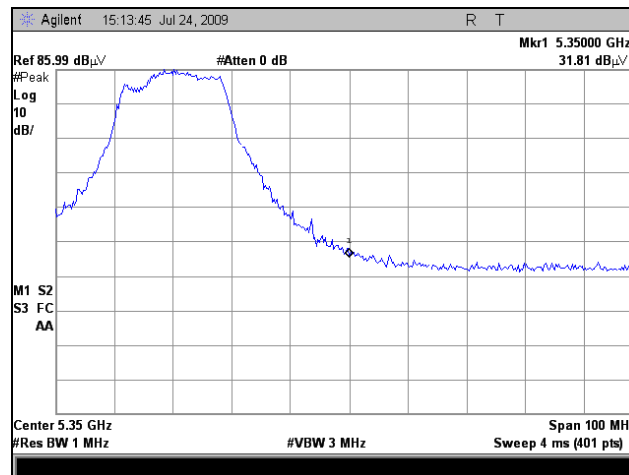
## EIRP, 802.11n 20MHz



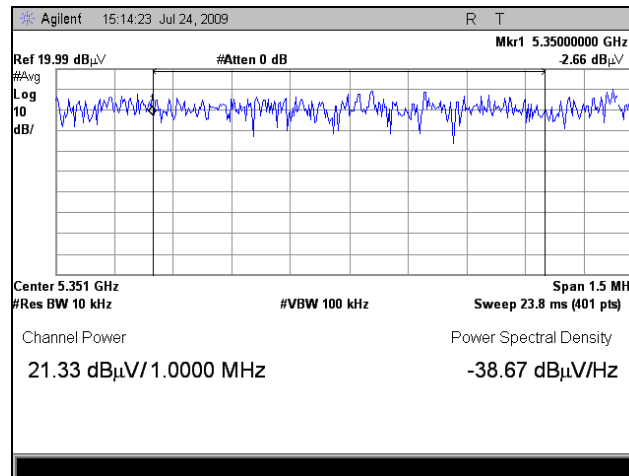
Plot 205. EIRP, 802.11n 20MHz, 5150 MHz Peak



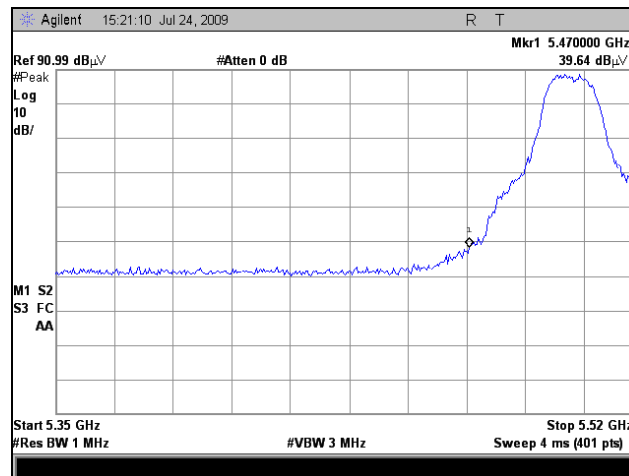
Plot 206. EIRP, 802.11n 20MHz, 5150 MHz Over 1 MHz



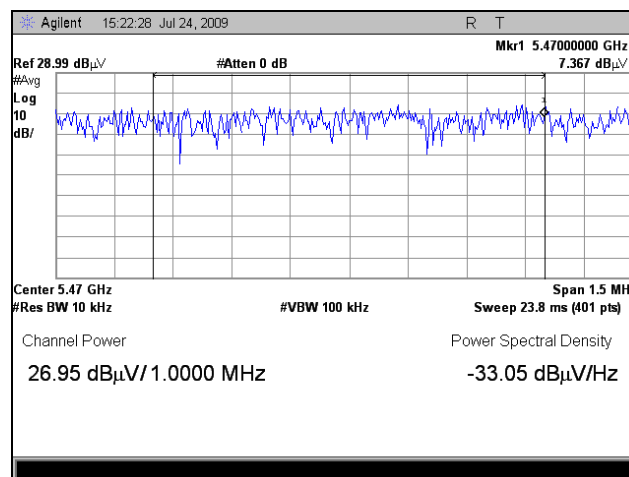
Plot 207. EIRP, 802.11n 20MHz, 5350 MHz Peak



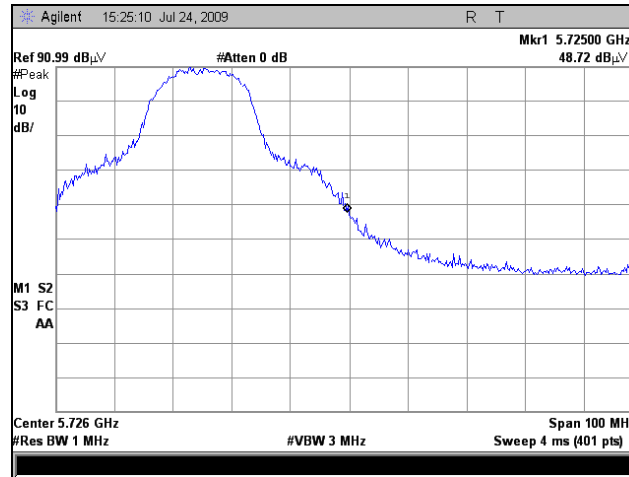
**Plot 208. EIRP, 802.11n 20MHz, 5350 MHz Over 1 MHz**



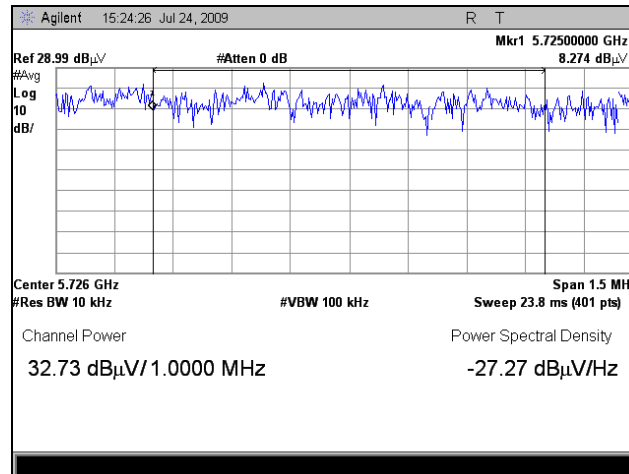
**Plot 209. EIRP, 802.11n 20MHz, 5470 MHz Peak**



**Plot 210. EIRP, 802.11n 20MHz, 5470 MHz Over 1 MHz**

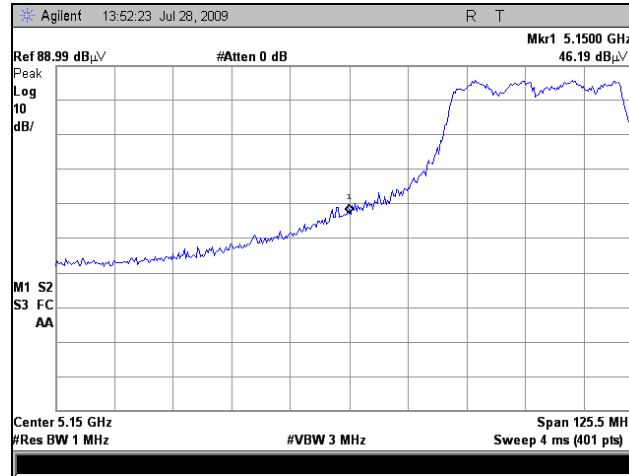


Plot 211. EIRP, 802.11n 20MHz, 5725 MHz Peak

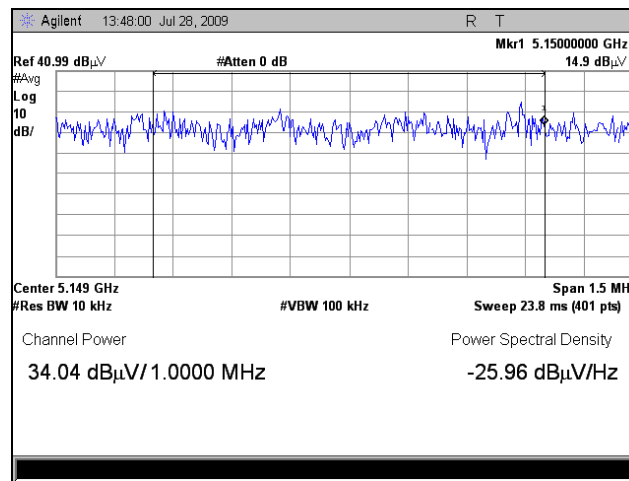


Plot 212. EIRP, 802.11n 20MHz, 5725 MHz Over 1 MHz

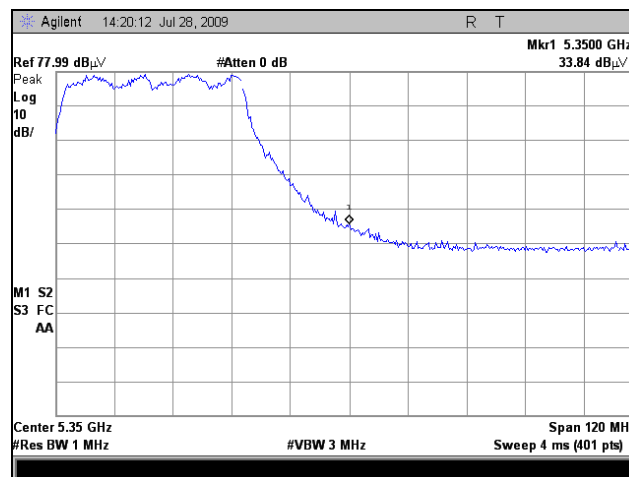
## EIRP, 802.11n 40MHz



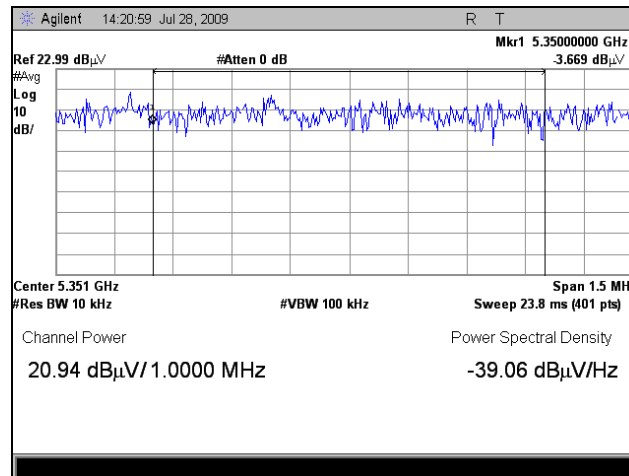
Plot 213. EIRP, 802.11n 40MHz, 5150 MHz Peak



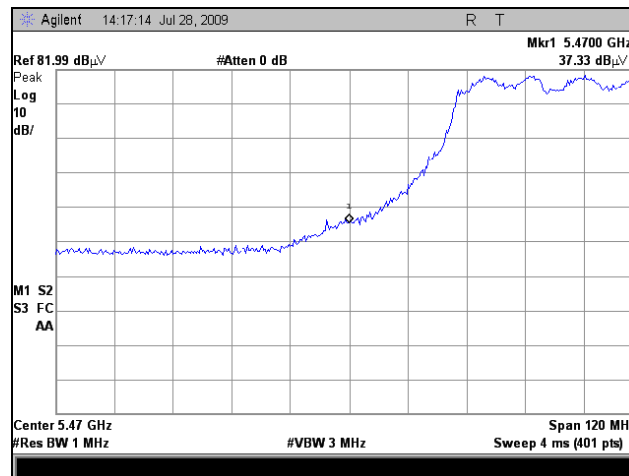
Plot 214. EIRP, 802.11n 40MHz, 5150 MHz Over 1 MHz



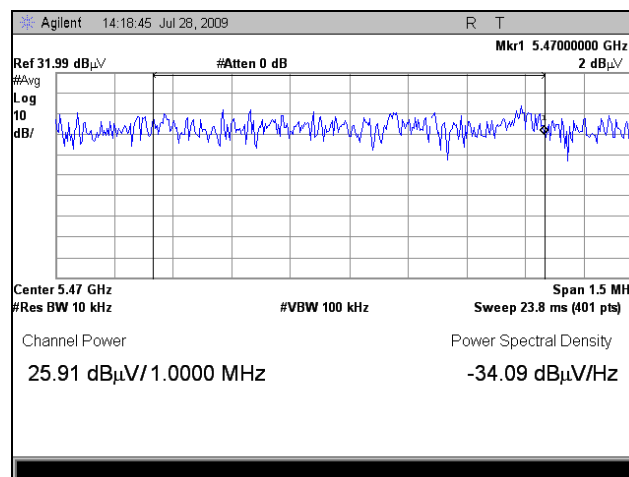
Plot 215. EIRP, 802.11n 40MHz, 5350 MHz Peak



Plot 216. EIRP, 802.11n 40MHz, 5350 MHz Over 1 MHz



Plot 217. EIRP, 802.11n 40MHz, 5470 MHz Peak



Plot 218. EIRP, 802.11n 40MHz, 5470 MHz Over 1 MHz