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

November 15, 2010

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

Dear Paul Richards,

Enclosed is the EMC Wireless test report for compliance testing of the Firetide, Inc., Firetide Outdoor MIMO Access Points, Model 5200 as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15, Subpart B, ICES-003, Issue 4 February 2004 for a Class A Digital Device, and FCC Part 15.407 and Industry Canada RSS-210, Annex 9, Issue 7, June 2007 for Intentional Radiators.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Firetide, Inc.\EMCS82555B-FCC407)

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Electromagnetic Compatibility Criteria
Test Report

for the

Firetide, Inc.
Firetide Outdoor MIMO Access Points, Model 5200

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

MET Report: EMCS82555B-FCC407

November 15, 2010

Prepared For:

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

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

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

Shawn McMillen, Wireless Manager
Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	November 15, 2010	Initial Issue.

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List of Terms and Abbreviations

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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Firetide, Inc. Firetide Outdoor MIMO Access Points, Model 5200, with the requirements of FCC Part 15, §15.407 and Industry Canada RSS-210 Annex 9. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Firetide Outdoor MIMO Access Points, Model 5200. 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 Firetide Outdoor MIMO Access Points, Model 5200, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, §15.407 and Industry Canada RSS-210, Annex 9, in accordance with Firetide, Inc., quote number 2381. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference	Industry Canada Reference	Description	Results
47 CFR Part 15.107 (a)	ICES-003 Issue 4 February 2004	Conducted Emission Limits for a Class A Digital Device	Compliant
47 CFR Part 15.109 (a)	ICES-003 Issue 4 February 2004	Radiated Emission Limits for a Class A Digital Device	Compliant
15.203	RSS-GEN 7.1.4	Antenna Requirements	Compliant
15.207	RSS-GEN 7.2.2; RSS-210 2.2	AC Conducted Emissions 150KHz – 30MHz	Compliant
15.403 (i)	A8.2	26dB Occupied Bandwidth	Compliant
15.407 (a)(3)	A9.2(3)	Conducted Transmitter Output Power	Compliant
15.407 (a)(3)	A9.2(3)	Power Spectral Density	Compliant
15.407 (a)(6)	N/A	Peak Excursion	Compliant
15.407 (b)(4), (6)	A9.3(4)	Undesirable Emissions (15.205/15.209 - General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Compliant
15.407(f)	RSS-GEN	RF Exposure	Compliant
15.407(g)	2.1	Frequency Stability	Compliant
N/A	RSS-Gen(4.8)	Receiver Spurious Emissions	Compliant

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

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Firetide, Inc. to perform testing on the Firetide Outdoor MIMO Access Points, Model 5200, under Firetide, Inc.' quote number 9FIR2707R3.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Firetide, Inc. Firetide Outdoor MIMO Access Points, Model 5200.

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

Model(s) Tested:	Firetide Outdoor MIMO Access Points, Model 5200	
Model(s) Covered:	Firetide Outdoor MIMO Access Points, Model 5200	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: REP-5200-1 IC ID: 1988A-5200	
	Type of Modulations:	OFDM
	Emission Designators:	D7D
	Equipment Code:	NII
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Minh Ly	
Report Date(s):	November 15, 2010	

Table 2. EUT Summary

B. References

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

Table 3. References

C. Test Site

All radio testing was performed at MET Laboratories, Inc., 3162 Belick Street, Santa Clara, CA 95054. All digital testing was preformed 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. Indoor MIMO Access Points, Model 5100, Equipment Under Test (EUT), utiliizies Wistron DNMA-83 mini PCI radios.

Photograph 1. Top View of EUT

Photograph 2. Rear View of EUT

E. Equipment Configuration

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

Ref. ID	Name / Description	Model Number	Part Number	Serial Number	Rev. #
A	Firetide Outdoor AP	5200	5200	NA	1
B	PoE Injector (PhiHong)	PoE30U-560	PoE30U-560	P71300181A1	NA

Table 4. Equipment Configuration

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	Customer Supplied Calibration Data
D	Laptop computer	Dell	vostro 1000	N/A

Table 5. Support Equipment

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
1	DC Power	DC power input from SELV	1	1	N	N/A
2	Ethernet	IP connection to host computer	1	10	N	N/A

Table 6. Ports and Cabling Information

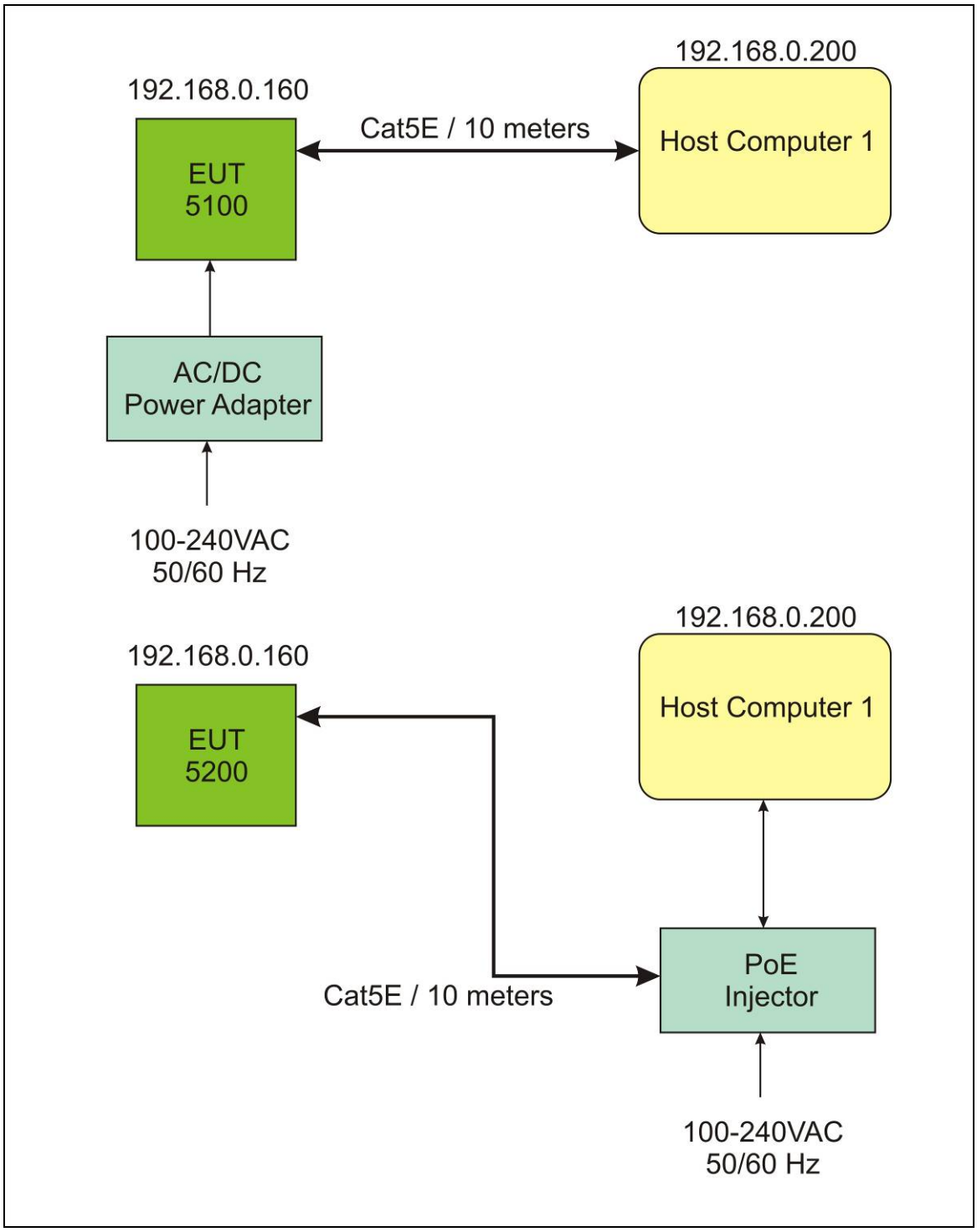


Figure 1. Setup Block Diagram

H. Mode of Operation

Operation can be monitored using by pinging the EUT or running ART.

I. Method of Monitoring

IP connectivity is maintained with the EUT. If IP connectivity is lost, EUT connectivity shall be re-established upon power up or re-boot.

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.

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

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

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

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

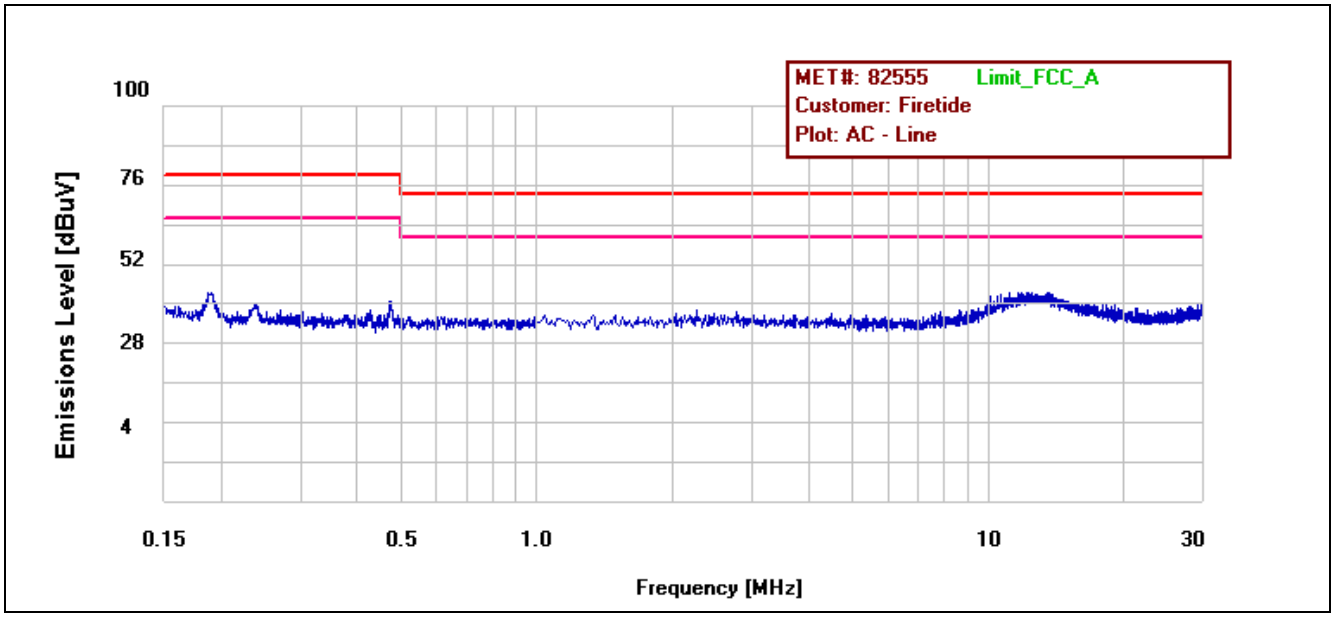
Test Engineer(s): Kenshi Chung

Test Date(s): 08/17/10

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

Line	Freq (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass	Notes
AC - Line	0.1895	40.79	79	-38.21	Pass	37.68	66	-28.32	Pass	Measured Emission was below applicable limits
AC - Line	0.2359	36.91	79	-42.09	Pass	32.77	66	-33.23	Pass	Measured Emission was below applicable limits
AC - Line	0.4745	37.64	79	-41.36	Pass	34.24	66	-31.76	Pass	Measured Emission was below applicable limits
AC - Line	13.550	37.74	73	-35.26	Pass	31.42	60	-28.58	Pass	Measured Emission was below applicable limits

Table 8. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz), PoE30U-560

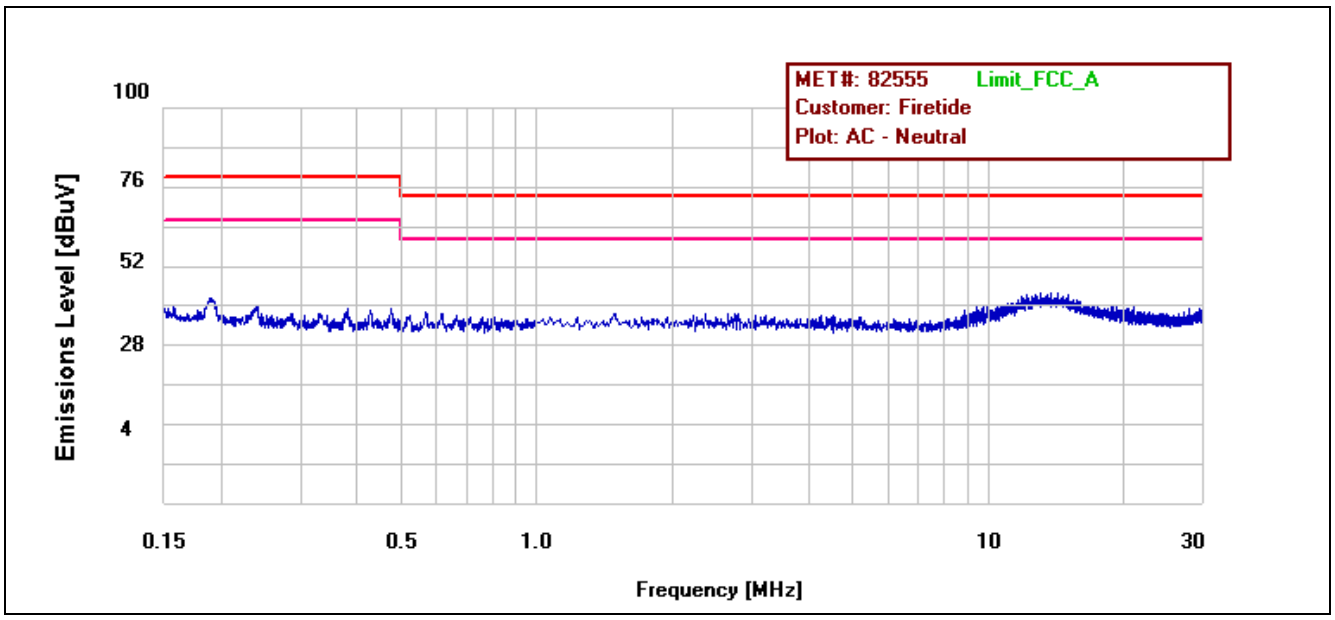


Plot 1. Conducted Emission, Phase Line Plot, PoE30U-560

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

Line	Freq (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass	Notes
AC - Neutral	0.1882	39.46	79	-39.54	Pass	36.77	66	-29.23	Pass	Measured Emission was below applicable limits
AC - Neutral	0.2367	36.28	79	-42.72	Pass	32.21	66	-33.79	Pass	Measured Emission was below applicable limits
AC - Neutral	13.050	37.48	73	-35.52	Pass	31.24	60	-28.76	Pass	Measured Emission was below applicable limits

Table 9. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz), PoE30U-560



Plot 2. Conducted Emission, Neutral Line Plot, PoE30U-560

Conducted Emission Limits Test Setup

Photograph 3. Conducted Emissions, Test Setup PoE30U-560

Radiated Emission Limits

§ 15.109 Radiated Emissions Limits

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

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

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

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

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

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

Test Engineer(s): Anderson Soungpanya

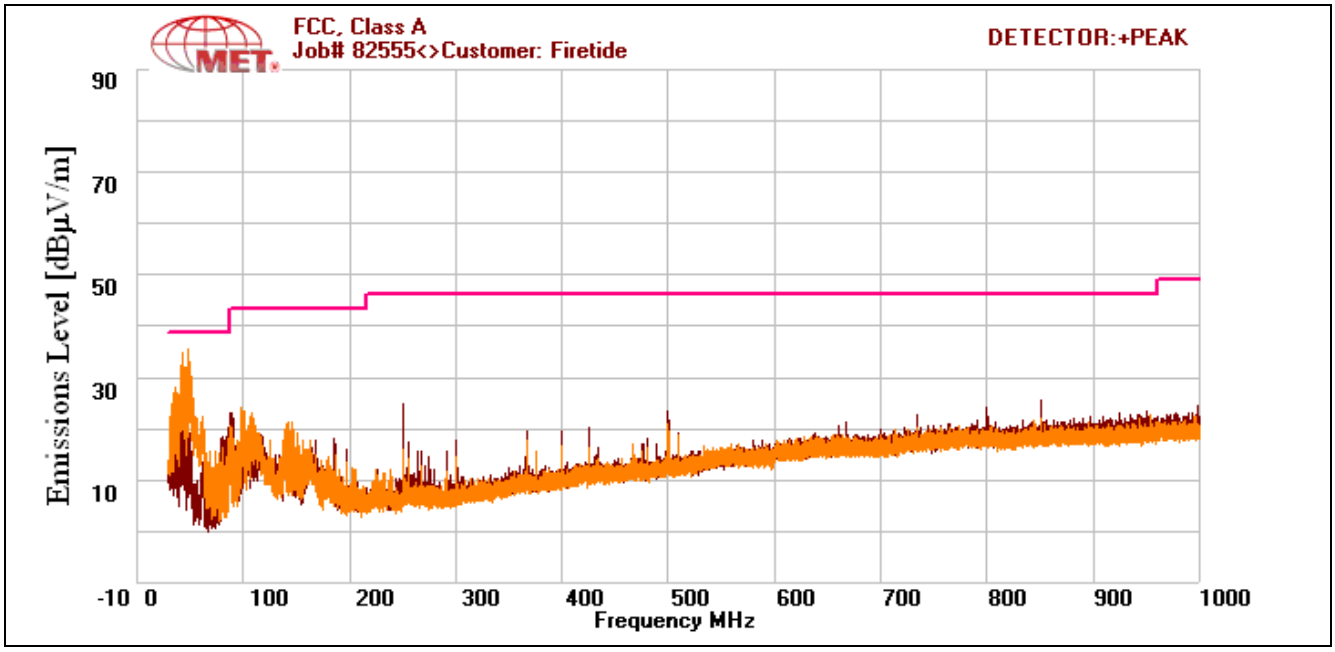
Test Date(s): 08/13/10

Radiated Emissions Limits Test Results, Class A

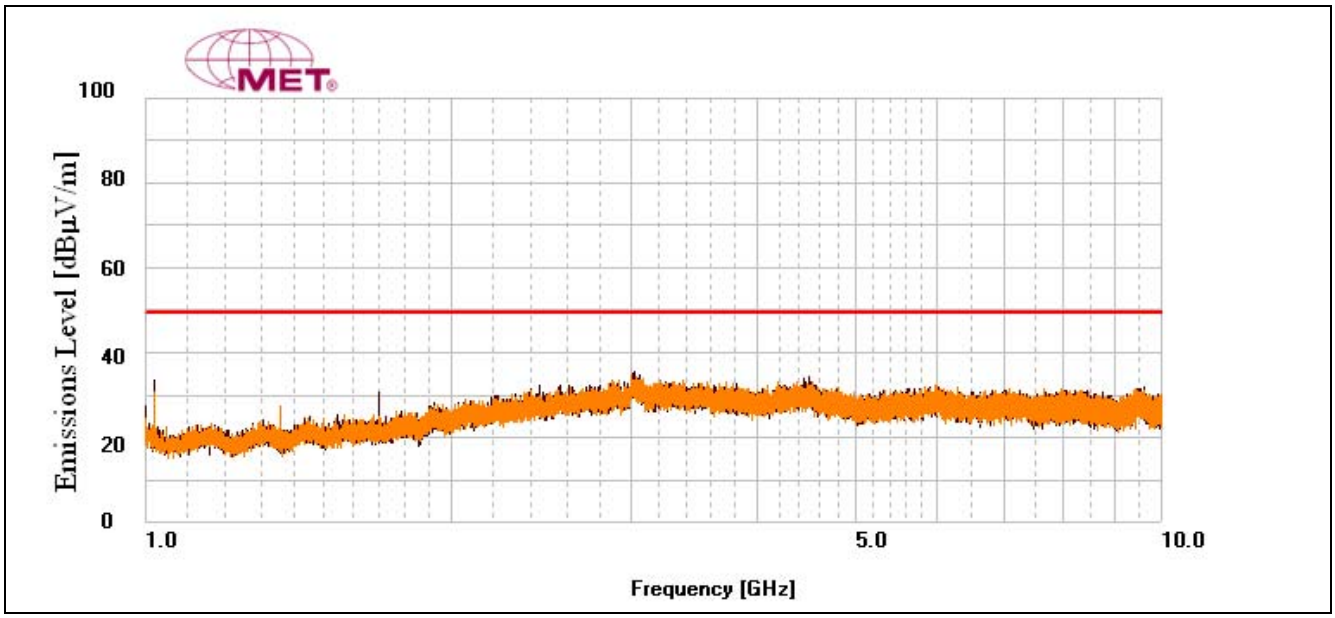
Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
47.97	V	299	100	36.34	8.406	0	1.762	-10.46	36.048	39	-2.952
98.49	V	148	100	17.55	12.338	0	2.817	-10.46	22.245	43.5	-21.255
143.31	V	351	100	15.21	12.135	0	3.309	-10.46	20.194	43.5	-23.306
250	H	294	110	18.52	12.9	0	3.74	-10.46	24.7	46.4	-21.7
500	H	83	190	11.21	18	0	4.72	-10.46	23.47	46.4	-22.93
850	H	86	112	10.79	21.4	0	6.38	-10.46	28.11	46.4	-18.29
1019	H	214	100	74.93	27.257	77.179	7.558	-10.46	22.106	54	-31.894
1019	V	124	100	78.27	27.257	77.179	7.558	-10.46	25.446	54	-28.554

Table 11. Radiated Emissions Limits, Test Results

Note: The EUT was tested at 3 m.



Plot 3. Radiated Emissions, 30 MHz - 1 GHz



Plot 4. Radiated Emissions, Above 1 GHz

Radiated Emission Limits Test Setup

Photograph 4. Radiated Emission, Test Setup

IV. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

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

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

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The unit is professionally installed. Therefore, the EUT as tested is compliant with the criteria of §15.203.

Frequency	Gain/Model	Manufacturer
See Antenna Datasheet Provided by Client	3dBi Omni	See Antenna Datasheet Provided by Client
See Antenna Datasheet Provided by Client	9dBi Omni	See Antenna Datasheet Provided by Client
See Antenna Datasheet Provided by Client	16dBi Sector	See Antenna Datasheet Provided by Client
See Antenna Datasheet Provided by Client	19dBi Panel	See Antenna Datasheet Provided by Client

Test Engineer(s): Anderson Soungpanya

Test Date(s): 08/25/10

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

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

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

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

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

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

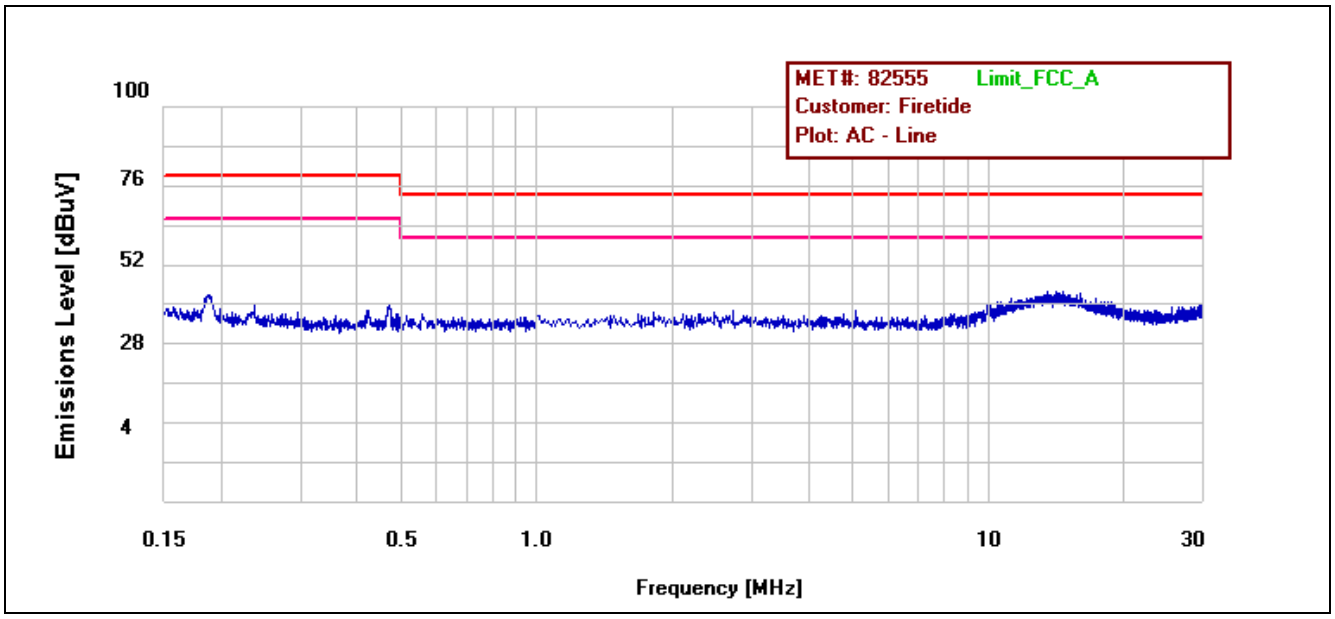
Test Engineer(s): Kenshi Chung

Test Date(s): 08/17/10

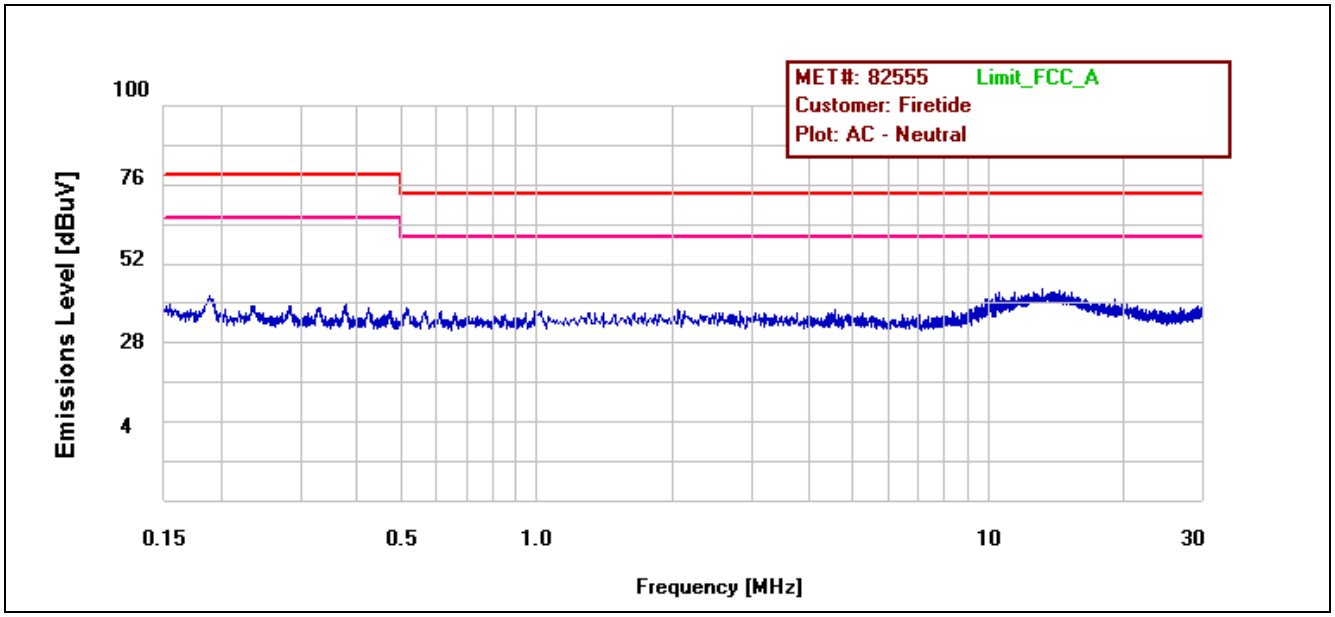
Conducted Emissions - Voltage, AC Power, (120V/60Hz)

Line	Freq (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass	Notes
AC - Line	0.1875	40.94	79	-38.06	Pass	36.99	66	-29.01	Pass	Measured Emission was below applicable limits
AC - Line	0.2345	35.89	79	-43.11	Pass	30.72	66	-35.28	Pass	Measured Emission was below applicable limits
AC - Line	0.471	37.29	79	-41.71	Pass	33.91	66	-32.09	Pass	Measured Emission was below applicable limits
AC - Line	13.175	37.58	73	-35.42	Pass	31.48	60	-28.52	Pass	Measured Emission was below applicable limits
AC - Neutral	0.1887	39.31	79	-39.69	Pass	36.23	66	-29.77	Pass	Measured Emission was below applicable limits
AC - Neutral	0.3275	35.71	79	-43.29	Pass	30.95	66	-35.05	Pass	Measured Emission was below applicable limits
AC - Neutral	13.950	38.4	73	-34.6	Pass	31.94	60	-28.06	Pass	Measured Emission was below applicable limits

Table 13. Conducted Emissions - Voltage, AC Power



Plot 5. Conducted Emission, Phase Line Plot



Plot 6. Conducted Emission, Neutral Line Plot

Conducted Emission Limits Test Setup

Photograph 5. Conducted Emissions (15.207) Test Setup PoE30U-560

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 403(c) 26dB Bandwidth

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

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

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

Test Engineer(s): Anderson Soungpanya

Test Date(s): 08/25/10

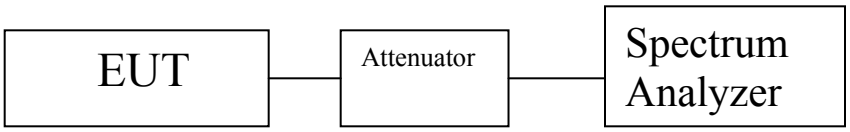


Figure 2. Occupied Bandwidth, Test Setup

Mode	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5745	24.426	16.7153
	5785	23.790	16.6020
	5805	22.232	16.6446
802.11n 20 MHz	5745	27.927	17.8939
	5785	24.681	17.7777
	5805	23.048	17.7955
802.11n 40 MHz	5755	48.035	37.0219
	5795	47.647	36.6549

Table 14. Occupied Bandwidth, Test Results, Port 1

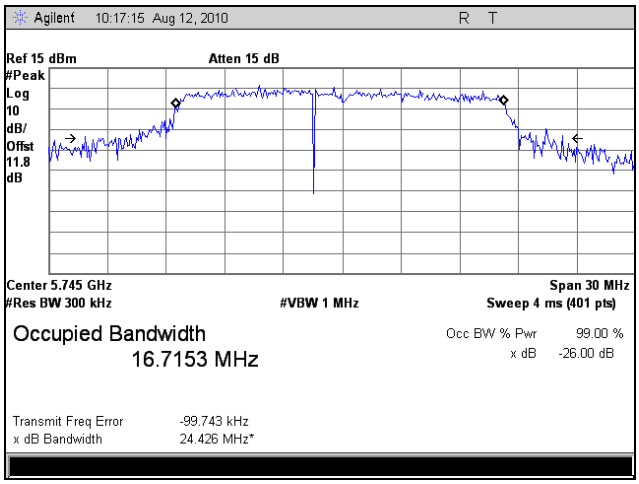
Mode	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11n 20 MHz	5745	27.819	17.8961
	5785	23.534	17.7584
	5805	24.308	17.8193
802.11n 40 MHz	5755	57.461	36.9817
	5795	52.625	36.7242

Table 15. Occupied Bandwidth, Test Results, Port 2

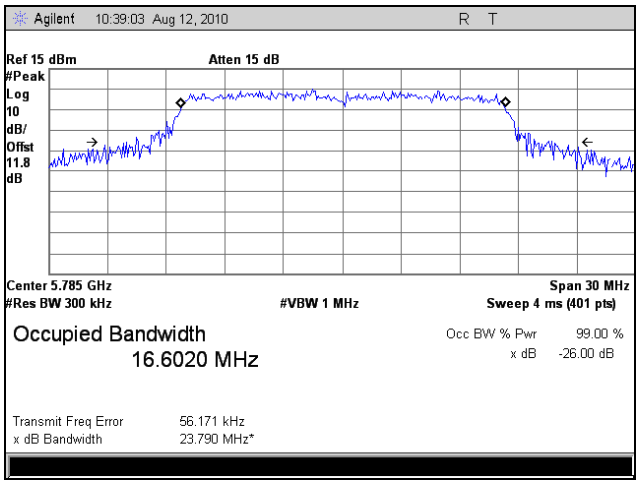
Mode	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11n 20 MHz	5745	24.251	17.9459
	5785	22.452	17.6860
	5805	22.948	17.7643
802.11n 40 MHz	5755	44.775	36.4060
	5795	45.232	36.8720

Table 16. Occupied Bandwidth, Test Results, Port 3

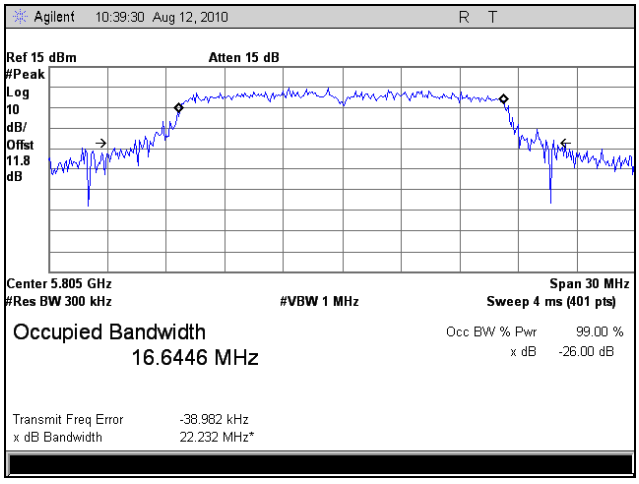
Occupied Bandwidth Test Results, 802.11a, Port 1



Plot 7. Occupied Bandwidth, 802.11a, Low Channel, Port 1

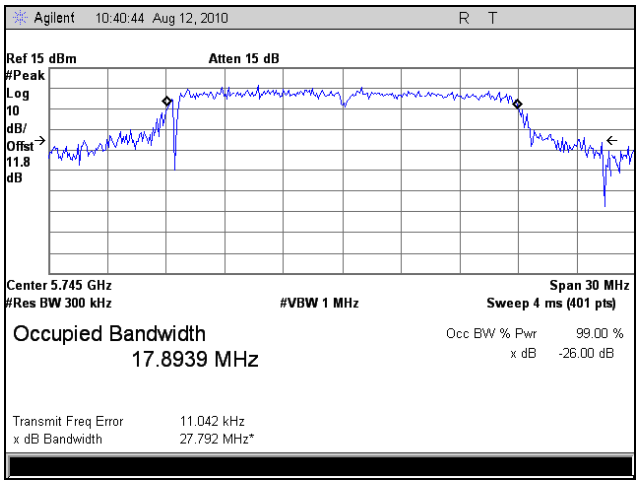


Plot 8. Occupied Bandwidth, 802.11a, Mid Channel, Port 1

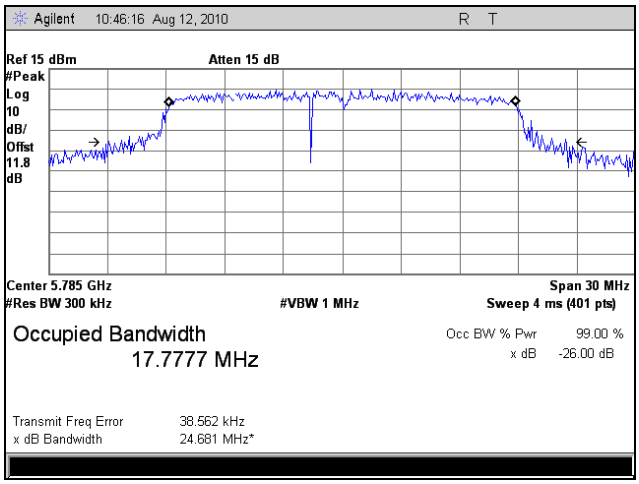


Plot 9. Occupied Bandwidth, 802.11a, High Channel, Port 1

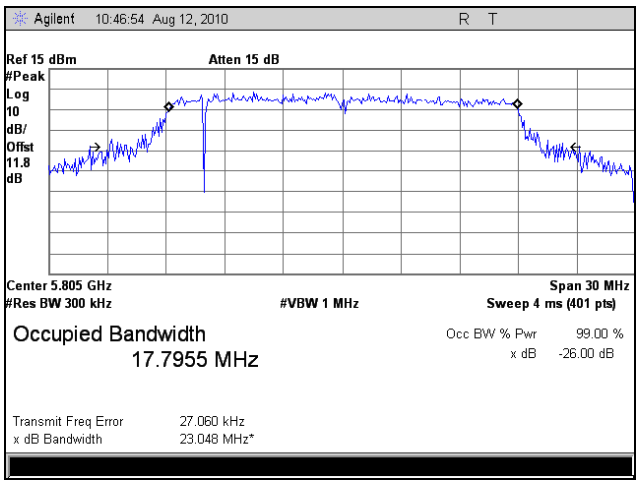
Occupied Bandwidth Test Results, 802.11n 20 MHz, Port 1



Plot 10. Occupied Bandwidth, 802.11n 20 MHz, Low Channel, Port 1

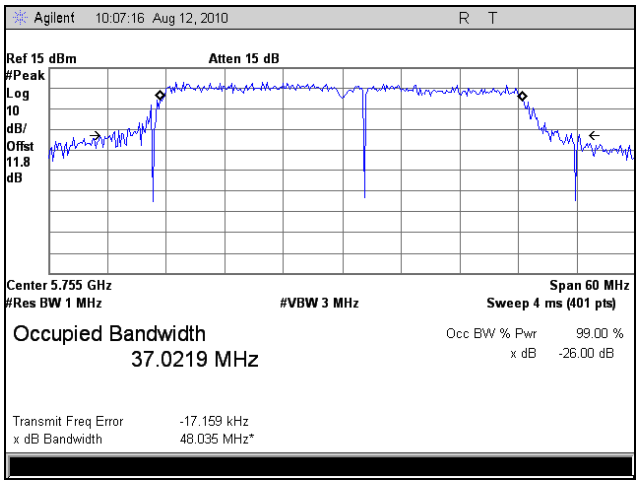


Plot 11. Occupied Bandwidth, 802.11n 20 MHz, Mid Channel, Port 1

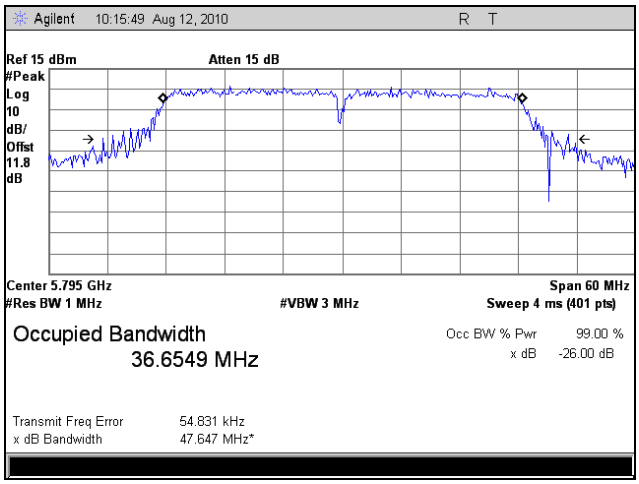


Plot 12. Occupied Bandwidth, 802.11n 20 MHz, High Channel, Port 1

Occupied Bandwidth Test Results, 802.11n 40 MHz, Port 1

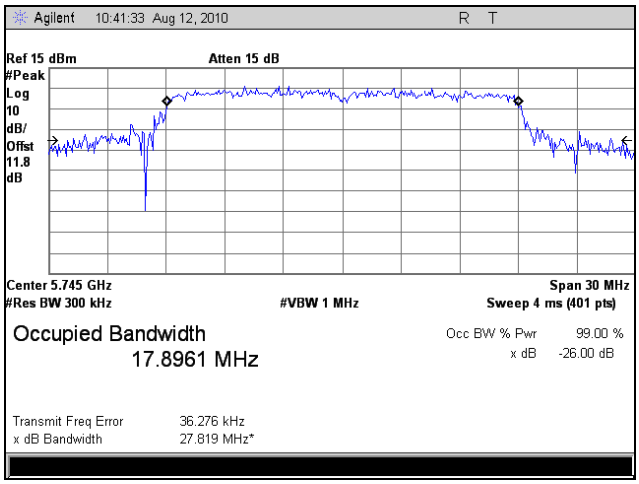


Plot 13. Occupied Bandwidth, 802.11n 40 MHz, Low Channel, Port 1

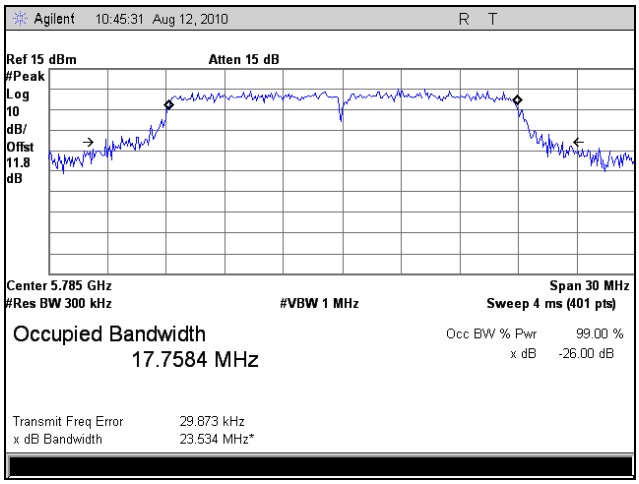


Plot 14. Occupied Bandwidth, 802.11n 40 MHz, High Channel, Port 1

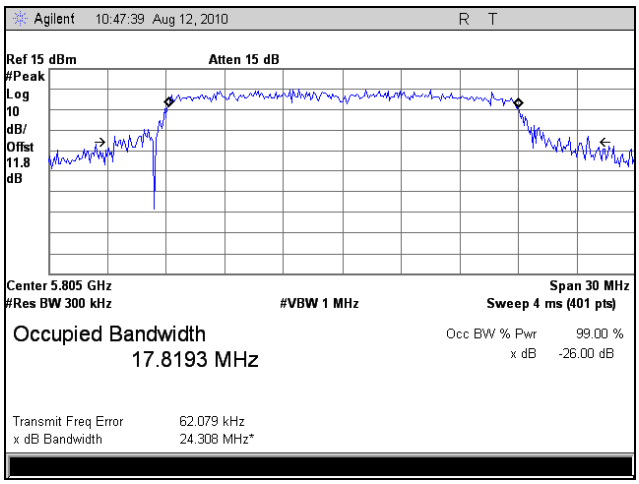
Occupied Bandwidth Test Results, 802.11n 20 MHz, Port 2



Plot 15. Occupied Bandwidth, 802.11n 20 MHz, Low Channel, Port 2

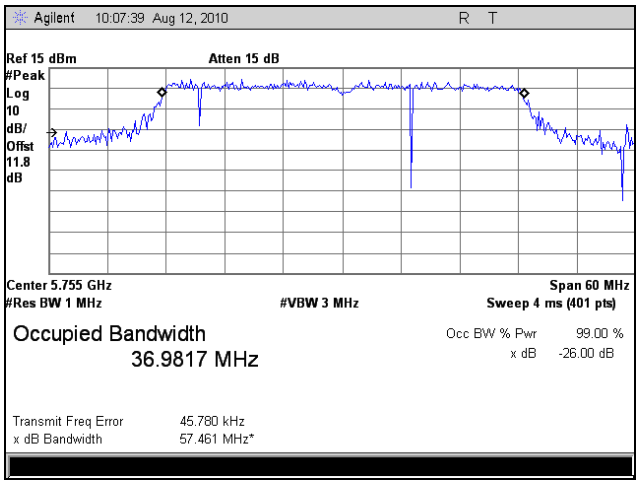


Plot 16. Occupied Bandwidth, 802.11n 20 MHz, Mid Channel, Port 2

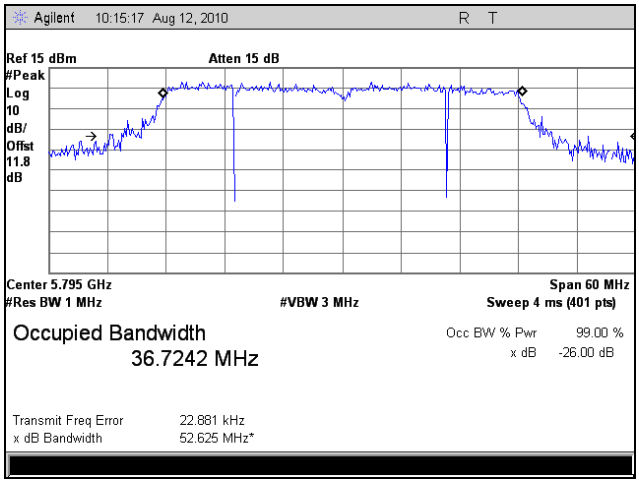


Plot 17. Occupied Bandwidth, 802.11n 20 MHz, High Channel, Port 2

Occupied Bandwidth Test Results, 802.11n 40 MHz, Port 2

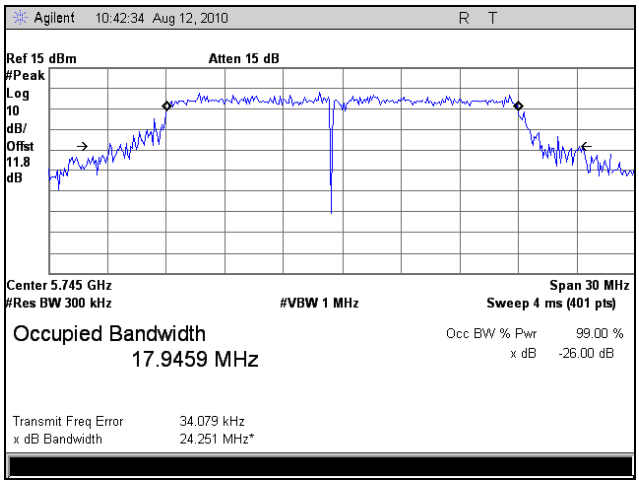


Plot 18. Occupied Bandwidth, 802.11n 40 MHz, Low Channel, Port 2

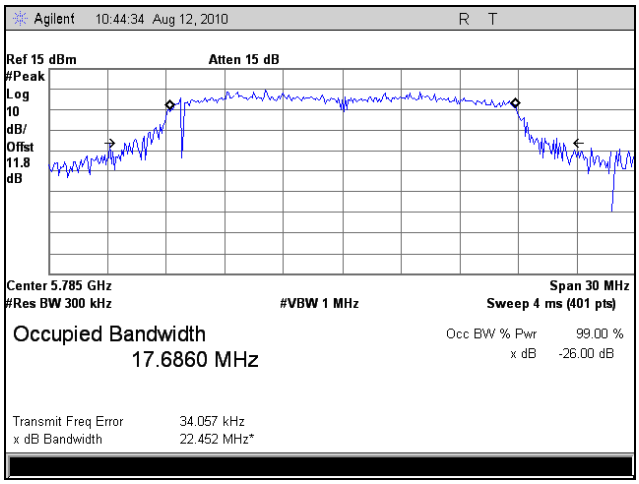


Plot 19. Occupied Bandwidth, 802.11n 40 MHz, High Channel, Port 2

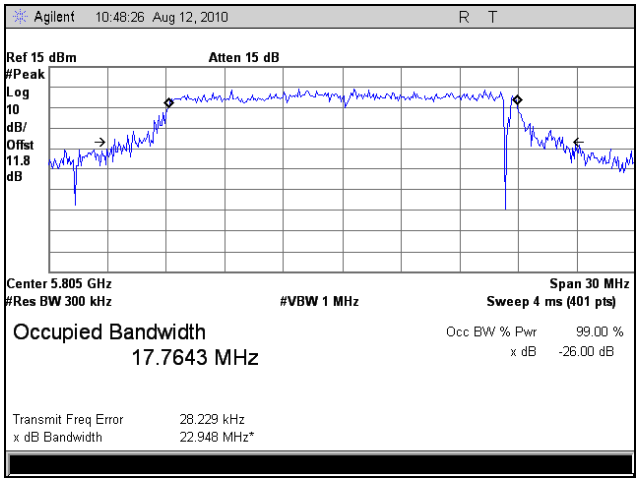
Occupied Bandwidth Test Results, 802.11n 20 MHz, Port 3



Plot 20. Occupied Bandwidth, 802.11n 20 MHz, Low Channel, Port 3

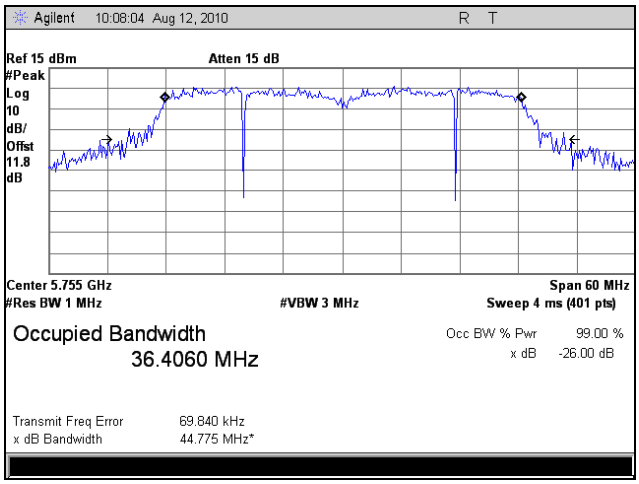


Plot 21. Occupied Bandwidth, 802.11n 20 MHz, Mid Channel, Port 3

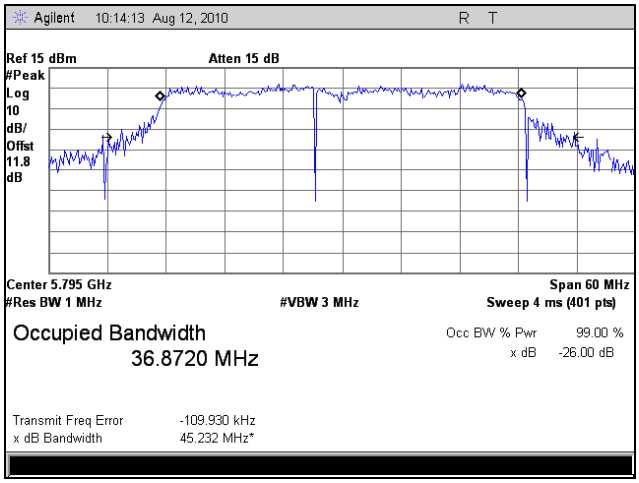


Plot 22. Occupied Bandwidth, 802.11n 20 MHz, High Channel, Port 3

Occupied Bandwidth Test Results, 802.11n 40 MHz, Port 3



Plot 23. Occupied Bandwidth, 802.11n 40 MHz, Low Channel, Port 3



Plot 24. Occupied Bandwidth, 802.11n 40 MHz, High Channel, Port 3

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 407(a)(3) RF Power Output

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

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

Table 17. Output Power Requirements from §15.407

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

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

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

Test Engineer(s): Anderson Soungpanya

Test Date(s): 08/31/10

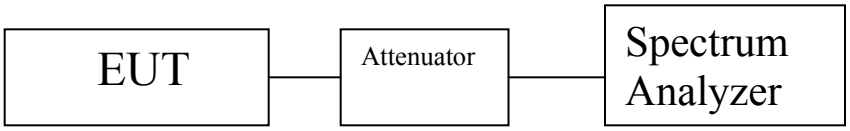


Figure 3. Power Output Test Setup

Mode	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Limit (W)
802.11a	5745	14.42	27.67	1
	5785	13.29	21.33	1
	5805	12.38	17.30	1
802.11n 20MH	5745	14.29	26.85	1
	5785	13.35	21.63	1
	5805	9.45	8.81	1
802.11n 40 MHz	5755	14.57	28.64	1
	5795	13.47	22.23	1

Table 18. RF Power Output, Test Results, Port 1

Mode	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Limit (W)
802.11n 20MH	5745	15.23	33.34	1
	5785	13.37	21.73	1
	5805	10.50	11.22	1
802.11n 40 MHz	5755	15.12	32.51	1
	5795	14.41	27.61	1

Table 19. RF Power Output, Test Results, Port 2

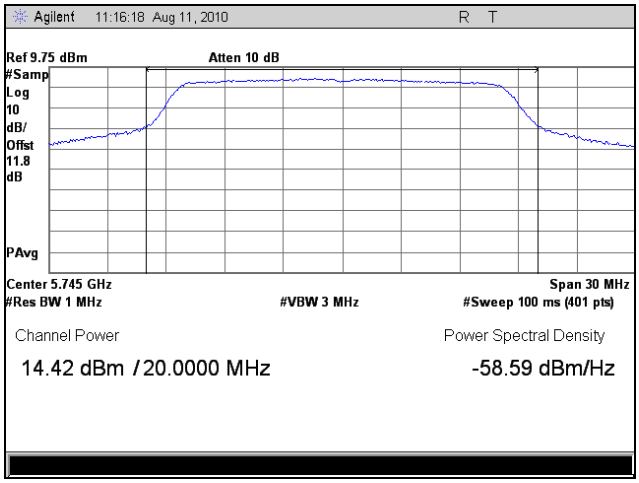
Mode	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Limit (W)
802.11n 20MH	5745	11.45	13.96	1
	5785	13.57	22.75	1
	5805	11.37	13.71	1
802.11n 40 MHz	5755	13.19	20.84	1
	5795	14.10	25.70	1

Table 20. RF Power Output, Test Results, Port 3

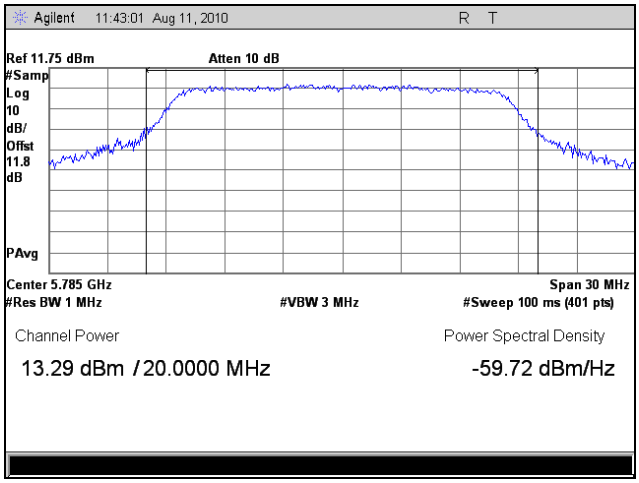
Mode	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	Limit (W)
802.11n 20MH	5745	18.70	74.15	1
	5785	18.20	66.11	1
	5805	15.28	33.74	1
802.11n 40 MHz	5755	19.14	81.99	1
	5795	18.78	75.54	1

Table 21. RF Power Output, Test Results, Combined Ports

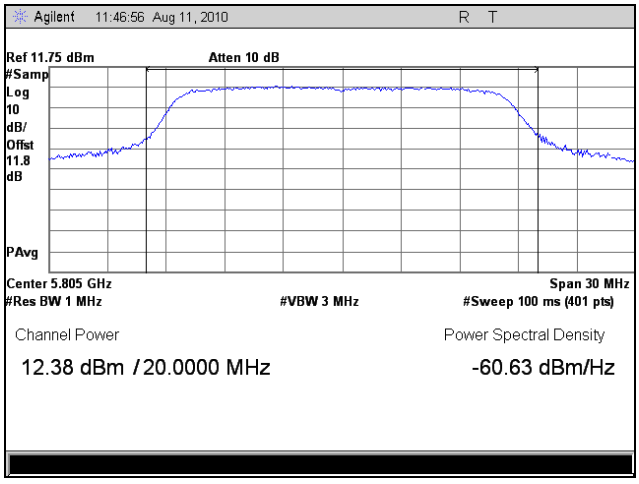
RF Output Power Test Results, 802.11a, Port 1



Plot 25. RF Power Output, 802.11a, Low Channel, Port 1

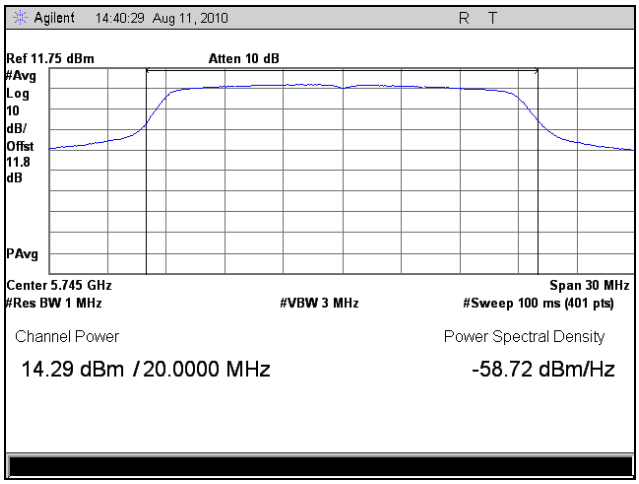


Plot 26. RF Power Output, 802.11a, Mid Channel, Port 1

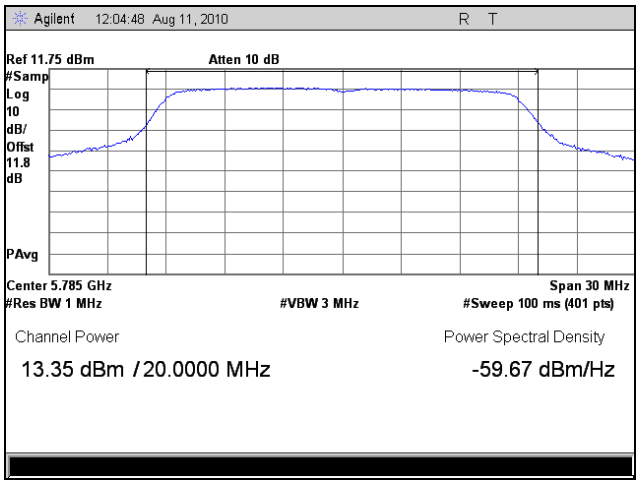


Plot 27. RF Power Output, 802.11a, High Channel, Port 1

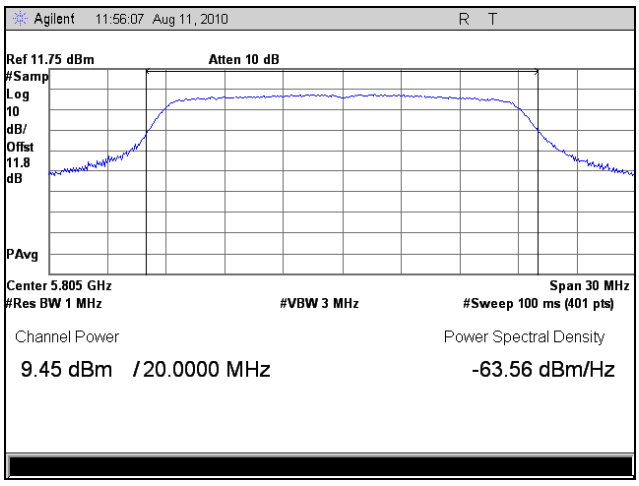
RF Output Power Test Results, 802.11n 20 MHz, Port 1



Plot 28. RF Power Output, 802.11n 20 MHz, Low Channel, Port 1

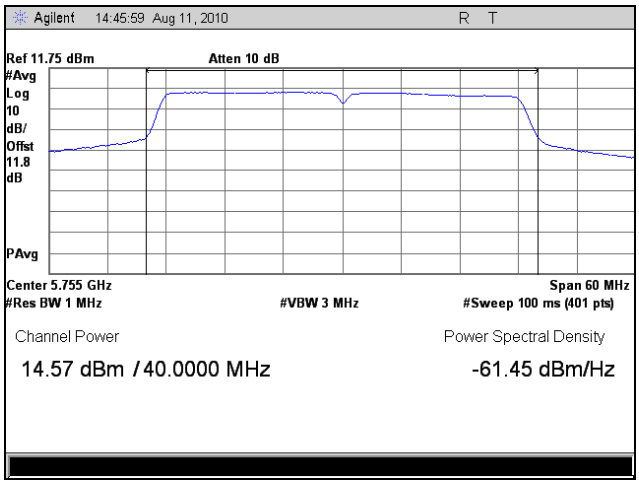


Plot 29. RF Power Output, 802.11n 20 MHz, Mid Channel, Port 1

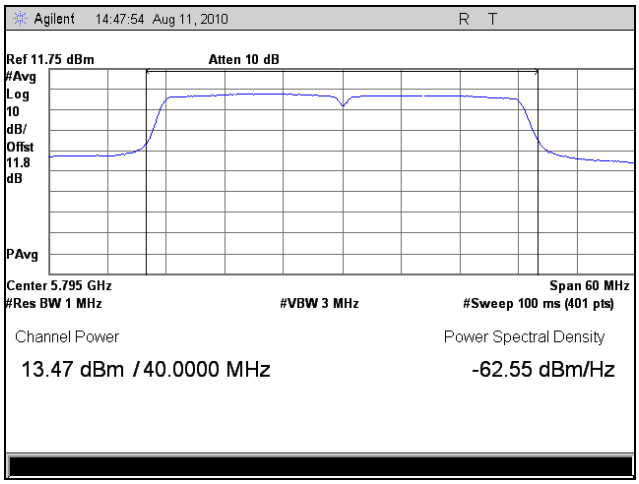


Plot 30. RF Power Output, 802.11n 20 MHz, High Channel, Port 1

RF Output Power Test Results, 802.11n 40 MHz, Port 1

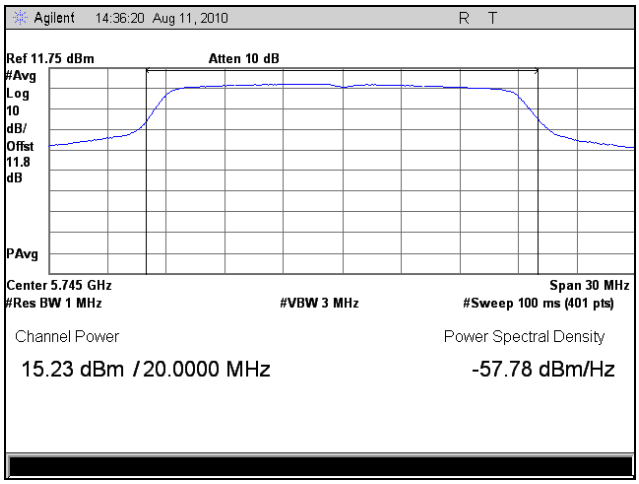


Plot 31. RF Power Output, 802.11n 40 MHz, Low Channel, Port 1

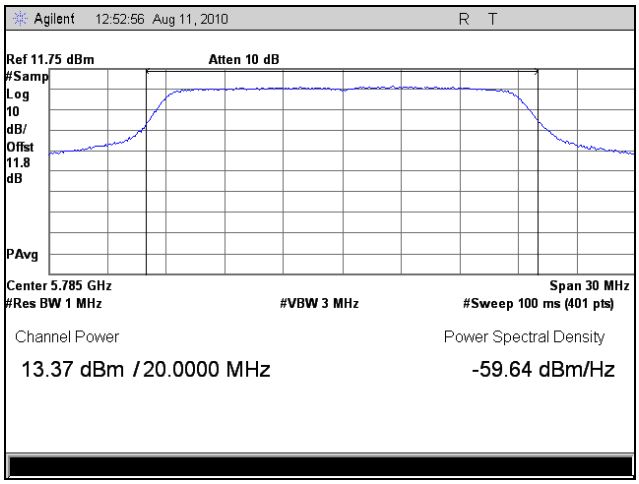


Plot 32. RF Power Output, 802.11n 40 MHz, High Channel, Port 1

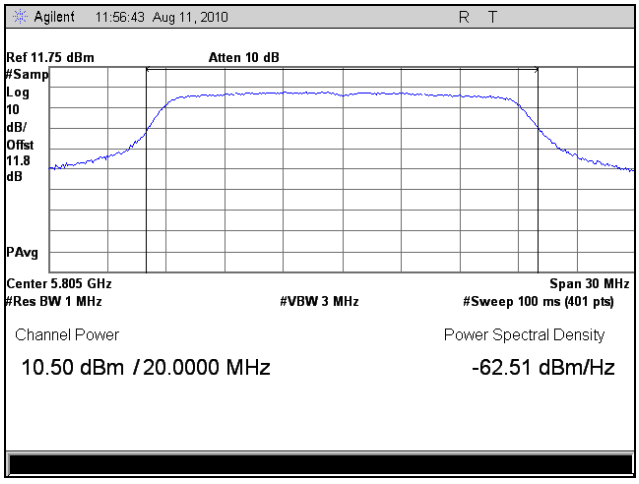
RF Output Power Test Results, 802.11n 20 MHz, Port 2



Plot 33. RF Power Output, 802.11n 20 MHz, Low Channel, Port 2

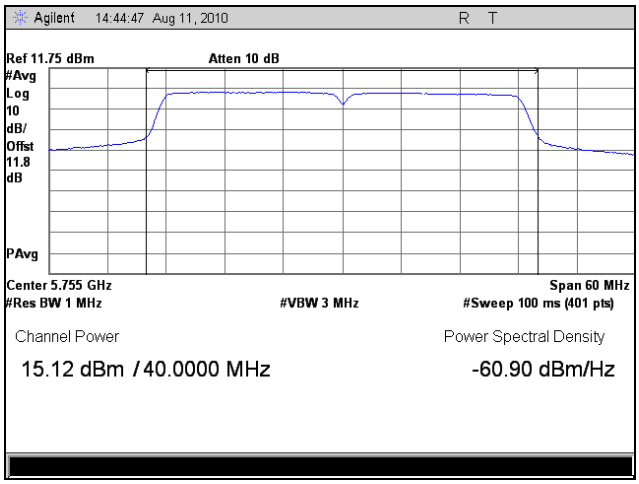


Plot 34. RF Power Output, 802.11n 20 MHz, Mid Channel, Port 2

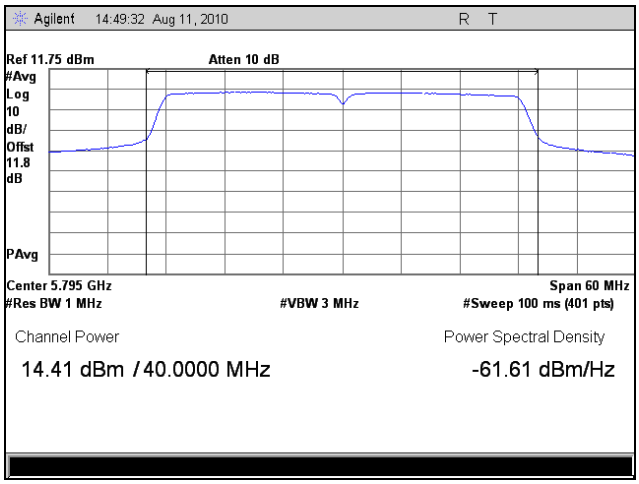


Plot 35. RF Power Output, 802.11n 20 MHz, High Channel, Port 2

RF Output Power Test Results, 802.11n 40 MHz, Port 2

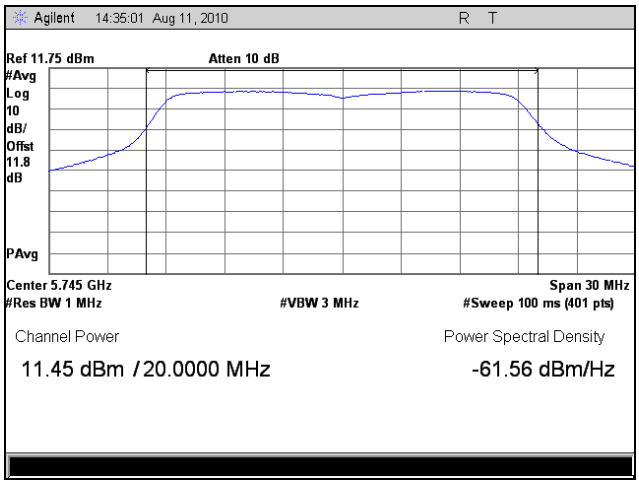


Plot 36. RF Power Output, 802.11n 40 MHz, Low Channel, Port 2

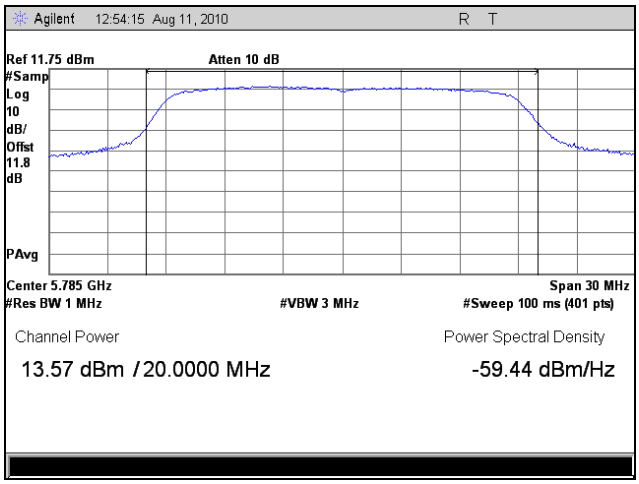


Plot 37. RF Power Output, 802.11n 40 MHz, High Channel, Port 2

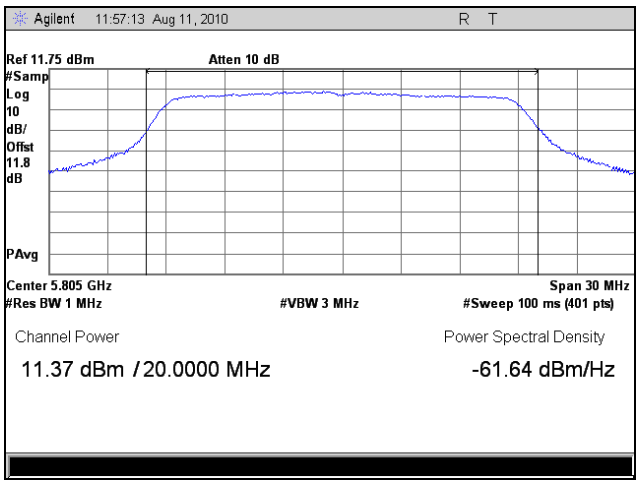
RF Output Power Test Results, 802.11n 20 MHz, Port 3



Plot 38. RF Power Output, 802.11n 20 MHz, Low Channel, Port 3

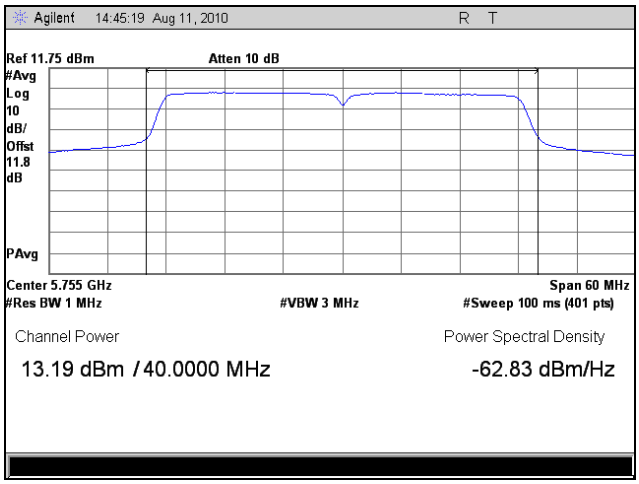


Plot 39. RF Power Output, 802.11n 20 MHz, Mid Channel, Port 3

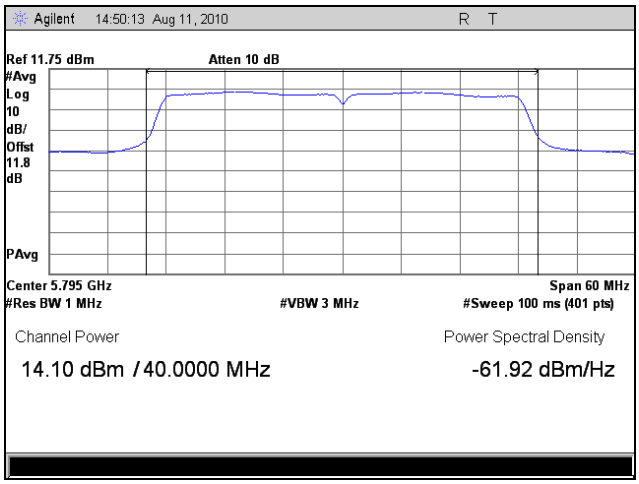


Plot 40. RF Power Output, 802.11n 20 MHz, High Channel, Port 3

RF Output Power Test Results, 802.11n 40 MHz, Port 3



Plot 41. RF Power Output, 802.11n 40 MHz, Low Channel, Port 3



Plot 42. RF Power Output, 802.11n 40 MHz, High Channel, Port 3

§ 15.407(f) RF Exposure

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

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

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

$$S = P G / 4\pi R^2$$

where,

S = Power Density mW/m^2
P = Power (mW)
R = Distance to the center of radiation of the antenna
G = Maximum antenna gain

Maximum antenna gain for EUT = 19 dBi = 79.4

MPE Limit Calculation: EUT's operating frequency is 5745 - 5805 MHz;. Highest conducted power = 19.14dBm (82mW). Therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2.**

P = 82.0 mW
S=1
R = 20 cm
G = 79.4

$R = (82*79.4/ 4*3.14*1.0)^{1/2} = (6516.284/ 12.56)^{1/2}$ = **22.77cm**

Electromagnetic Compatibility Criteria for Intentional Radiators

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

Test Requirements: **§ 15.407(a)(3):** The peak power spectral density shall not exceed 17 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, Omni directional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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

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

Test Engineer(s): Anderson Soungpanya

Test Date(s): 08/31/10

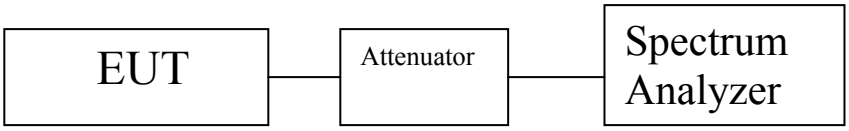


Figure 4. Power Spectral Density Test Setup

Mode	Frequency (MHz)	PSD (dBm)
802.11a	5745	3.84
	5785	2.314
	5805	1.737
802.11n 20 MHz	5745	3.552
	5785	1.991
	5805	2.021
802.11n 40 MHz	5755	0.155
	5795	-0.711

Table 22. Power Spectral Density, Test Results, Port 1

Mode	Frequency (MHz)	PSD (dBm)
802.11n 20 MHz	5745	4.309
	5785	2.450
	5805	2.690
802.11n 40 MHz	5755	0.338
	5795	0.047

Table 23. Power Spectral Density, Test Results, Port 2

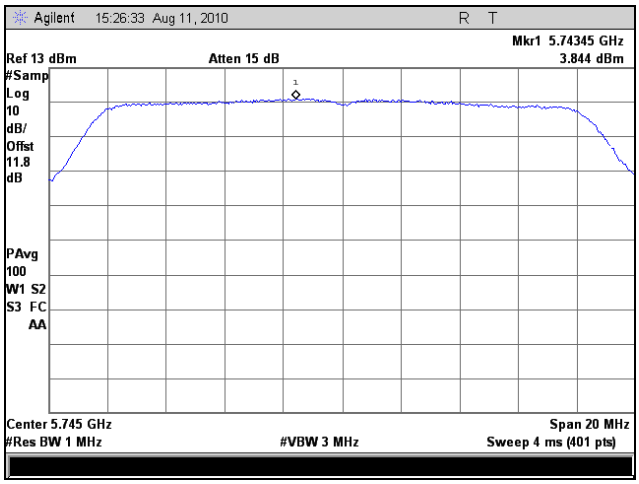
Mode	Frequency (MHz)	PSD (dBm)
802.11n 20 MHz	5745	0.784
	5785	1.863
	5805	3.862
802.11n 40 MHz	5755	-1.214
	5795	0.271

Table 24. Power Spectral Density, Test Results, Port 3

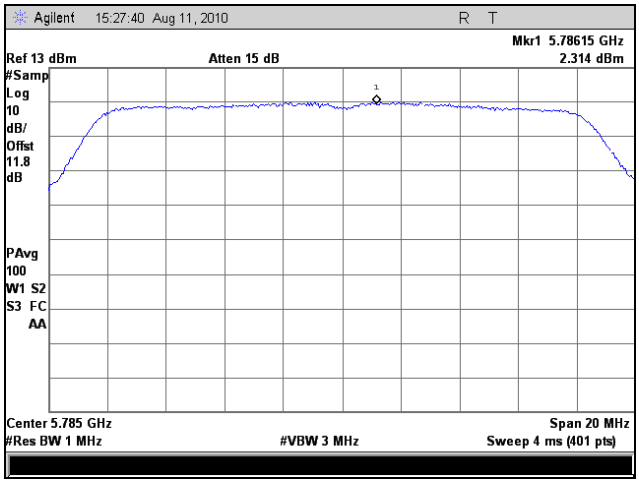
Mode	Frequency (MHz)	PSD (dBm)
802.11n 20 MHz	5745	9.188
	5785	8.058
	5805	8.632
802.11n 40 MHz	5755	6.646
	5795	5.287

Table 25. Power Spectral Density, Test Results, Combined Ports

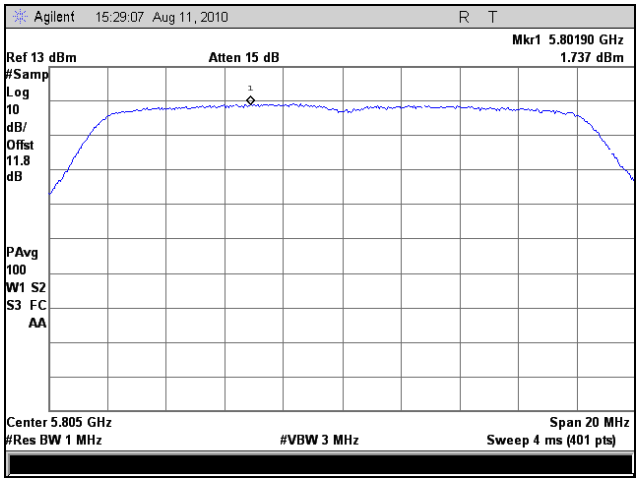
Power Spectral Density Test Results, 802.11a, Port 1



Plot 43. Power Spectral Density, 802.11a, Low Channel, Port 1

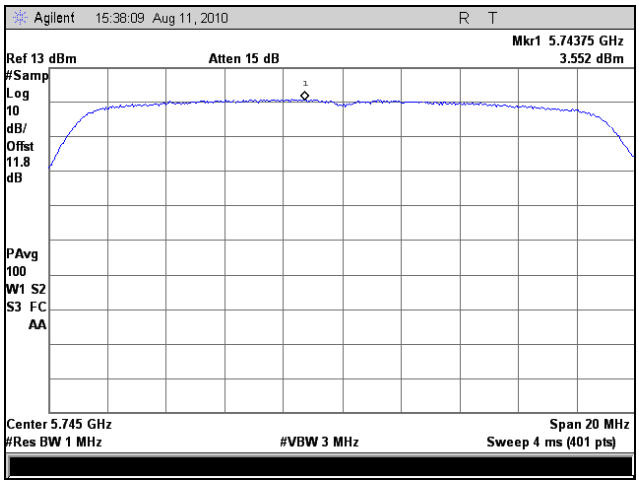


Plot 44. Power Spectral Density, 802.11a, Mid Channel, Port 1

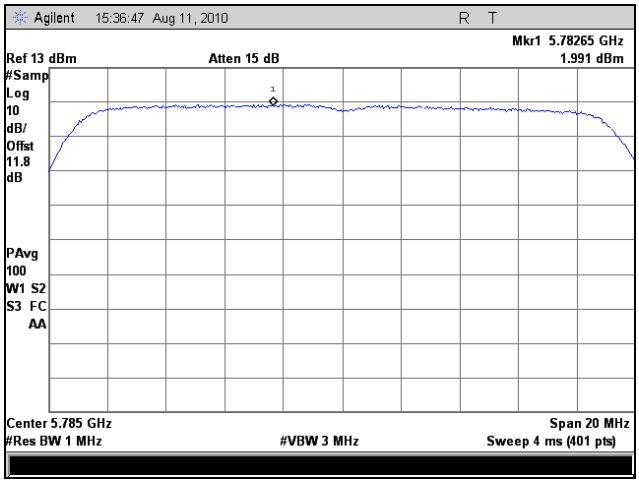


Plot 45. Power Spectral Density, 802.11a, High Channel, Port 1

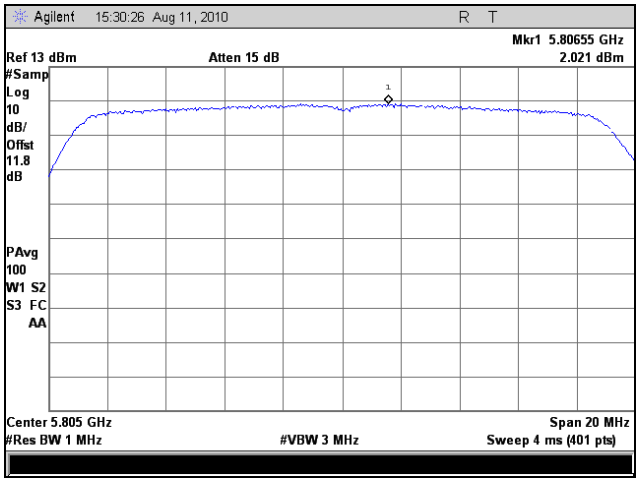
Power Spectral Density Test Results, 802.11n 20 MHz, Port 1



Plot 46. Power Spectral Density, 802.11n 20 MHz, Low Channel, Port 1

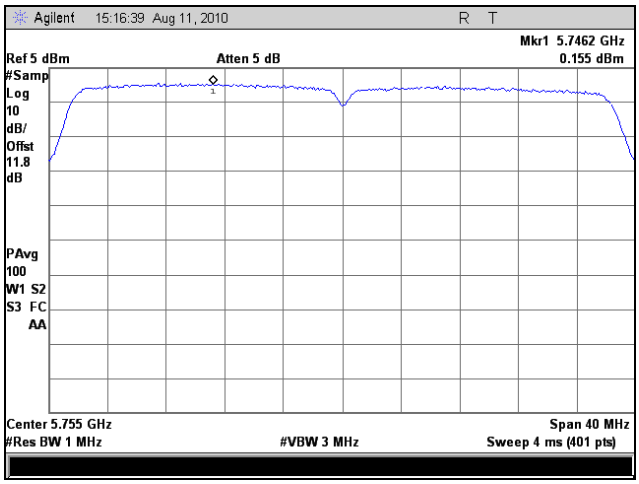


Plot 47. Power Spectral Density, 802.11n 20 MHz, Mid Channel, Port 1

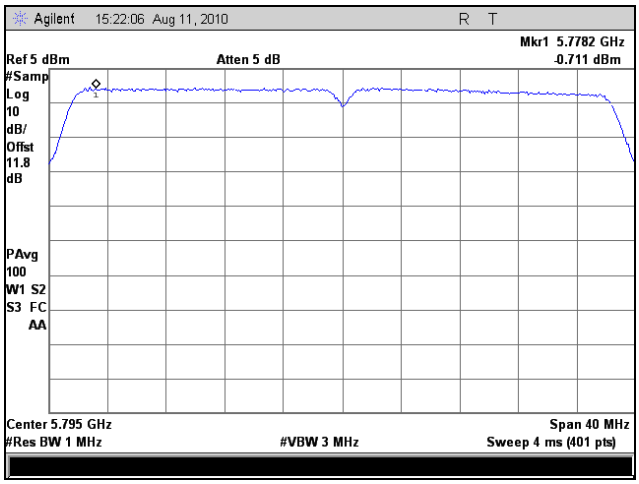


Plot 48. Power Spectral Density, 802.11n 20 MHz, High Channel, Port 1

Power Spectral Density Test Results, 802.11n 40 MHz, Port 1

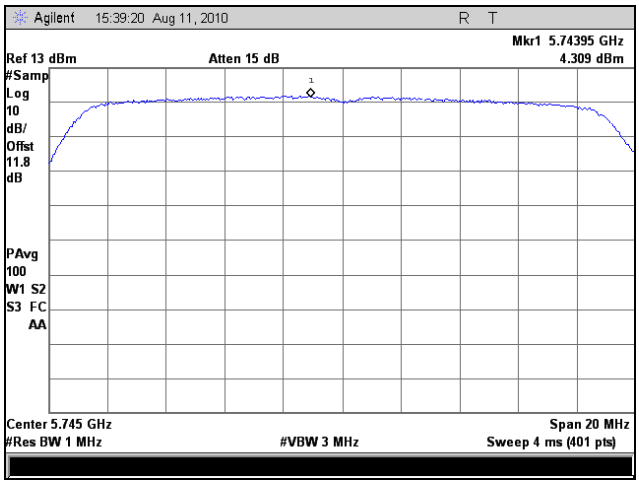


Plot 49. Power Spectral Density, 802.11n 40 MHz, Low Channel, Port 1

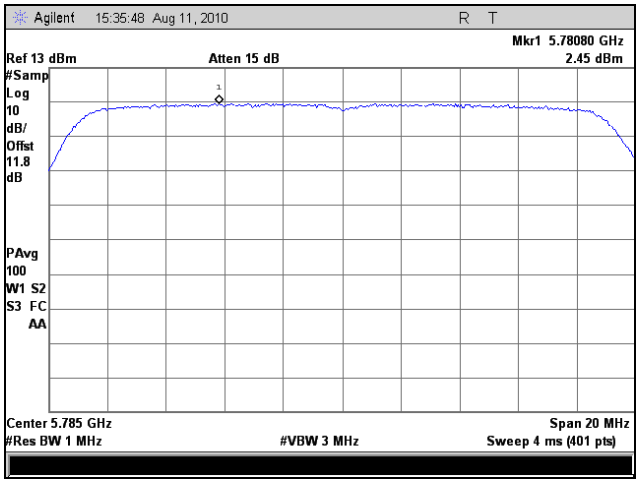


Plot 50. Power Spectral Density, 802.11n 40 MHz, High Channel, Port 1

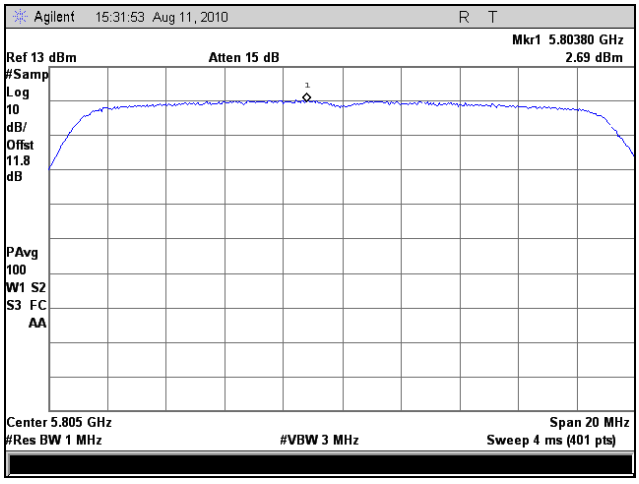
Power Spectral Density Test Results, 802.11n 20 MHz, Port 2



Plot 51. Power Spectral Density, 802.11n 20 MHz, Low Channel, Port 2

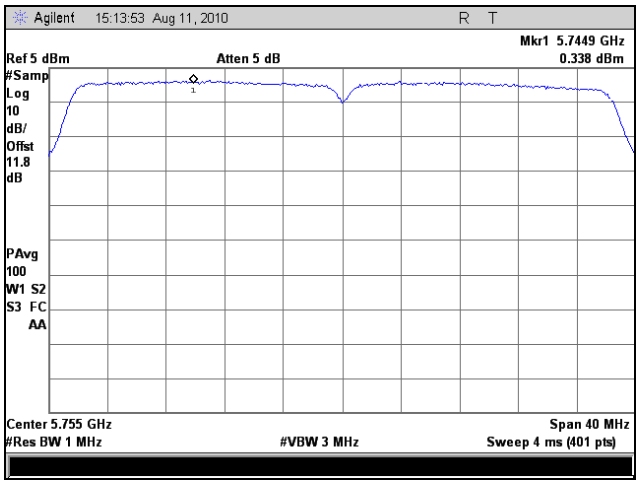


Plot 52. Power Spectral Density, 802.11n 20 MHz, Mid Channel, Port 2

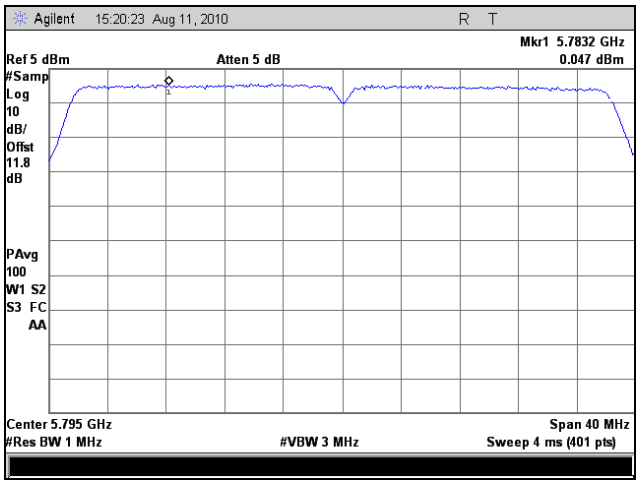


Plot 53. Power Spectral Density, 802.11n 20 MHz, High Channel, Port 2

Power Spectral Density Test Results, 802.11n 40 MHz, Port 2

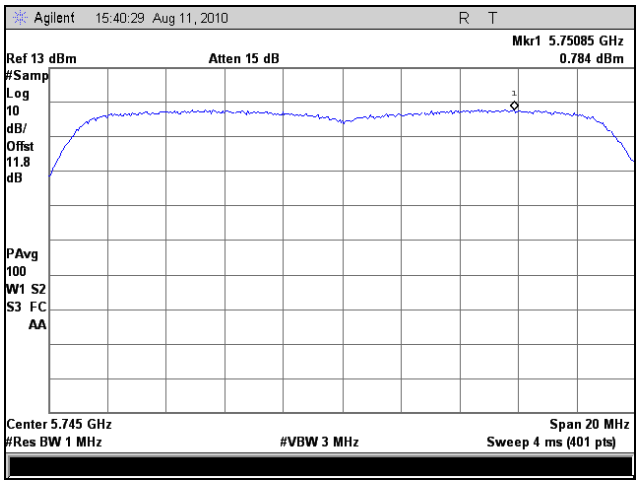


Plot 54. Power Spectral Density, 802.11n 40 MHz, Low Channel, Port 2

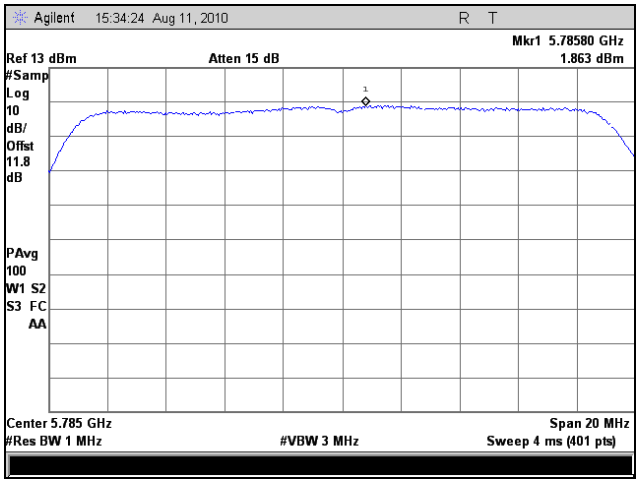


Plot 55. Power Spectral Density, 802.11n 40 MHz, High Channel, Port 2

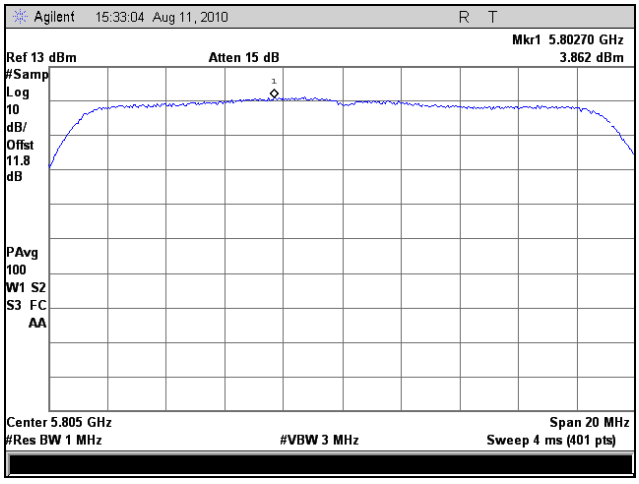
Power Spectral Density Test Results, 802.11n 20 MHz, Port 3



Plot 56. Power Spectral Density, 802.11n 20 MHz, Low Channel, Port 3

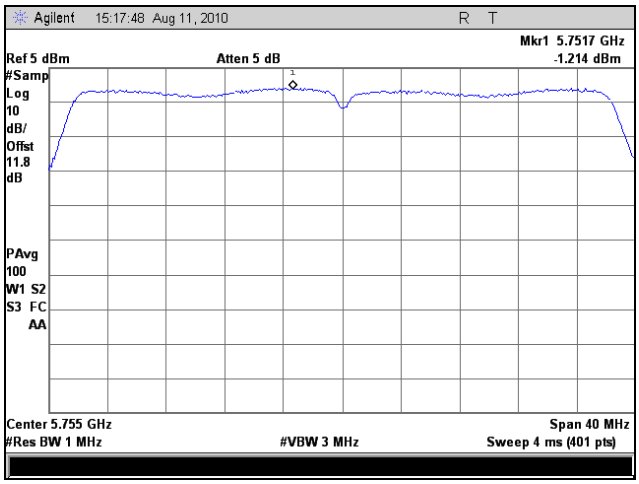


Plot 57. Power Spectral Density, 802.11n 20 MHz, Mid Channel, Port 3

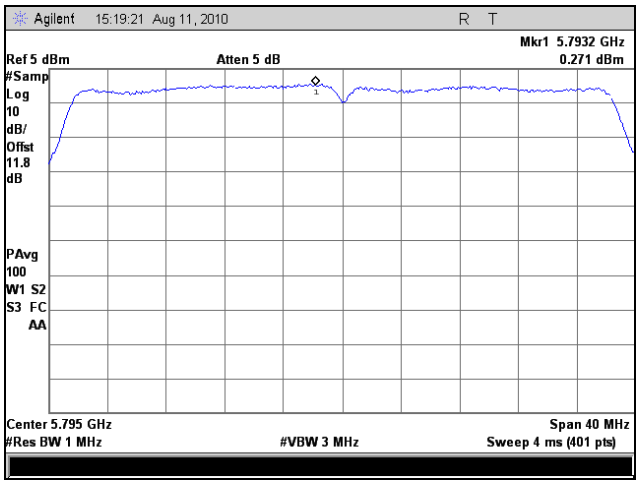


Plot 58. Power Spectral Density, 802.11n 20 MHz, High Channel, Port 3

Power Spectral Density Test Results, 802.11n 40 MHz, Port 3

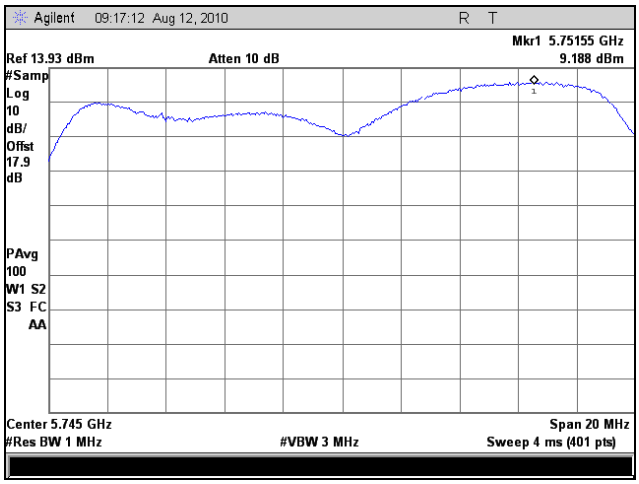


Plot 59. Power Spectral Density, 802.11n 40 MHz, Low Channel, Port 3

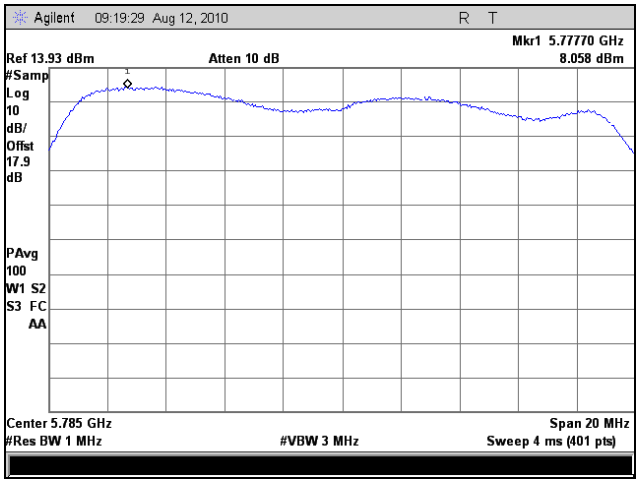


Plot 60. Power Spectral Density, 802.11n 40 MHz, High Channel, Port 3

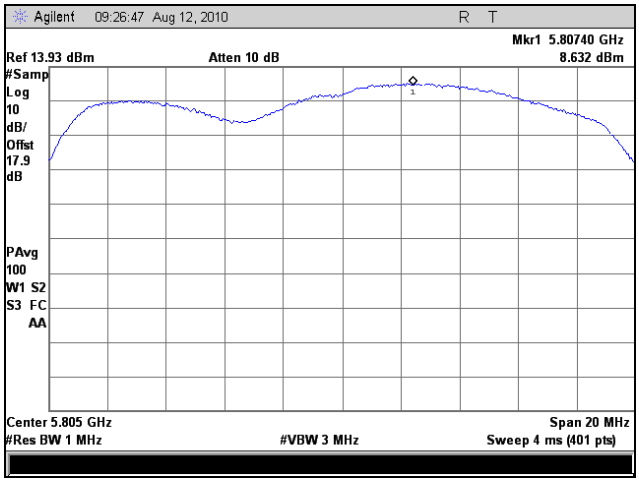
Power Spectral Density Test Results, 802.11n 20 MHz, Combined Ports



Plot 61. Power Spectral Density, 802.11n 20 MHz, Low Channel, Combined Ports

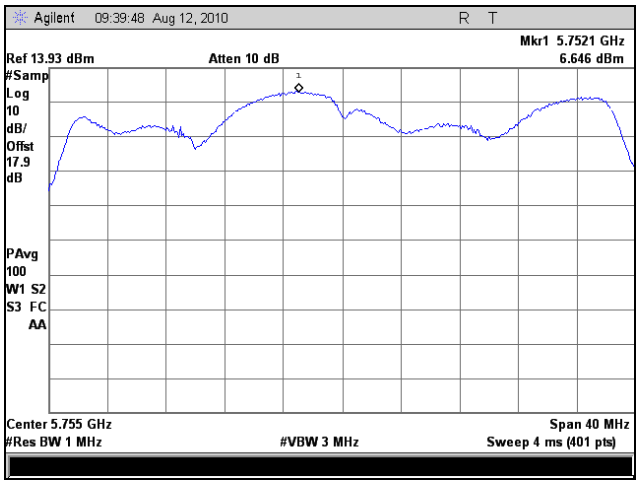


Plot 62. Power Spectral Density, 802.11n 20 MHz, Mid Channel, Combined Ports

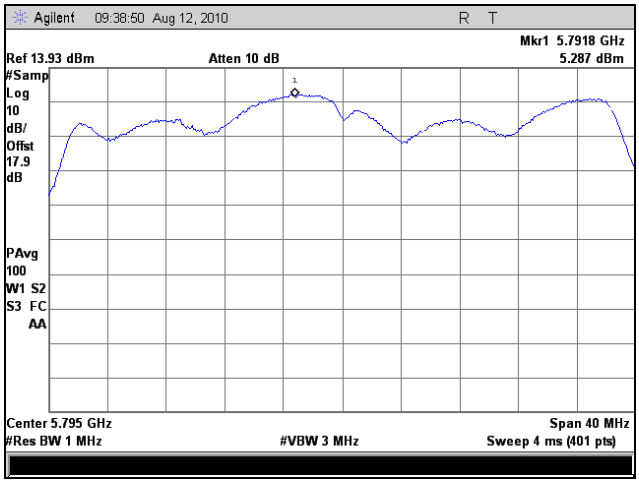


Plot 63. Power Spectral Density, 802.11n 20 MHz, High Channel, Combined Ports

Power Spectral Density Test Results, 802.11n 40 MHz, Combined Ports



Plot 64. Power Spectral Density, 802.11n 40 MHz, Low Channel, Combined Ports



Plot 65. Power Spectral Density, 802.11n 40 MHz, High Channel, Combined Ports

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(a)(6) Peak Excursion Ratio

Test Requirements: **§ 15.407(a)(6):** The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Procedure: The EUT was connected directly to the spectrum analyzer through cabling and attenuation. The 1st trace on the spectrum analyzer was set to RBW=1MHz, VBW=3MHz. The peak detector mode was used and the trace max held. The 2nd trace on the spectrum analyzer was set according to measurement method #1 from the FCC Public Notice DA 02-2138 for making conducted power measurements.

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

Test Engineer(s): Anderson Soungpanya

Test Date(s): 08/31/10

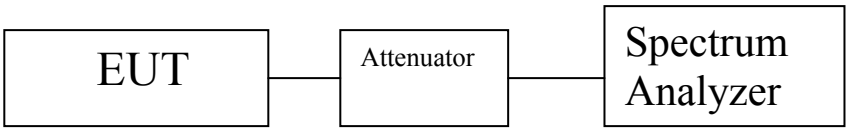
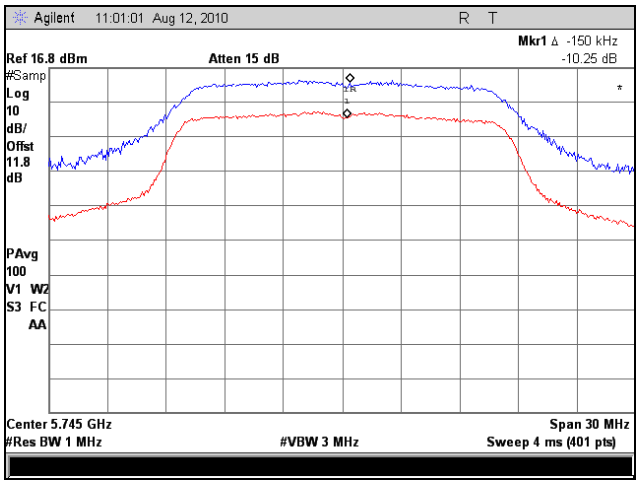
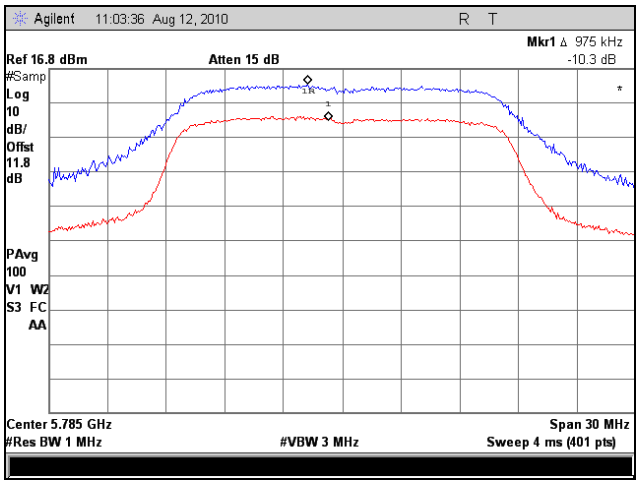


Figure 5. Peak Excursion Ration Test Setup

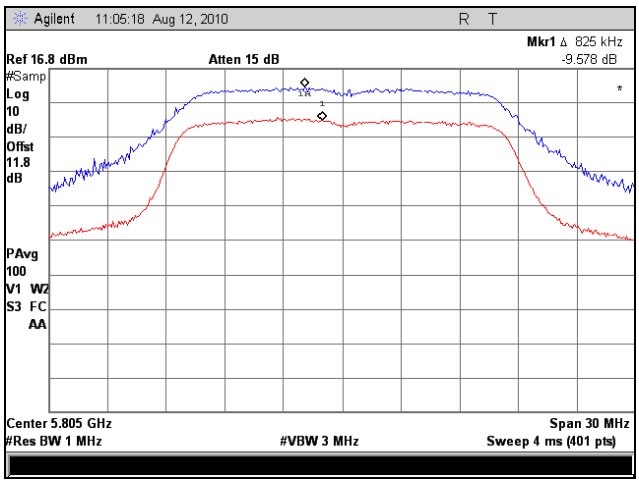
Peak Excursion Test Results, 802.11a, Port 1



Plot 66. Peak Excursion Ratio, 802.11a, Low Channel, Port 1

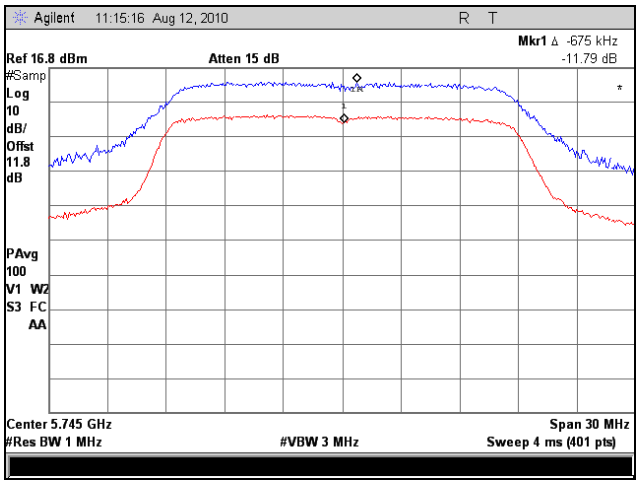


Plot 67. Peak Excursion Ratio, 802.11a, Mid Channel, Port 1

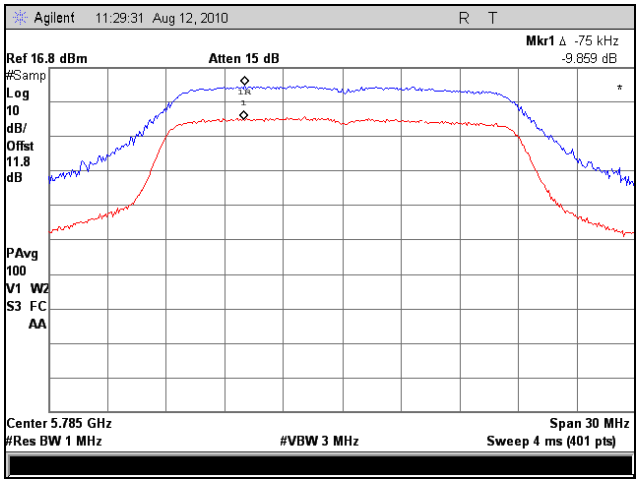


Plot 68. Peak Excursion Ratio, 802.11a, High Channel, Port 1

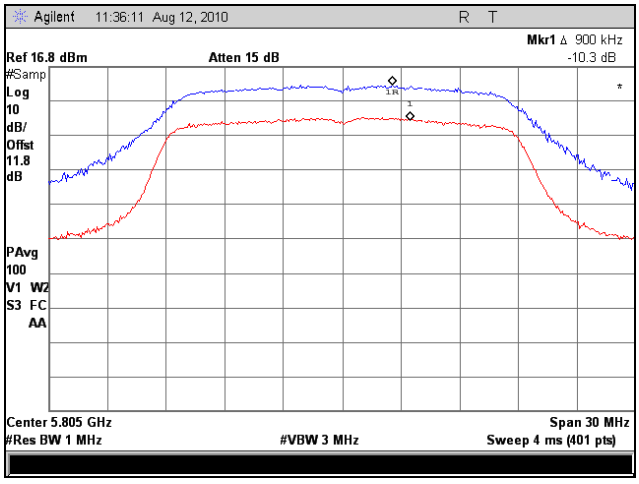
Peak Excursion Test Results, 802.11n 20 MHz, Port 1



Plot 69. Peak Excursion Ratio, 802.11n 20 MHz, Low Channel, Port 1

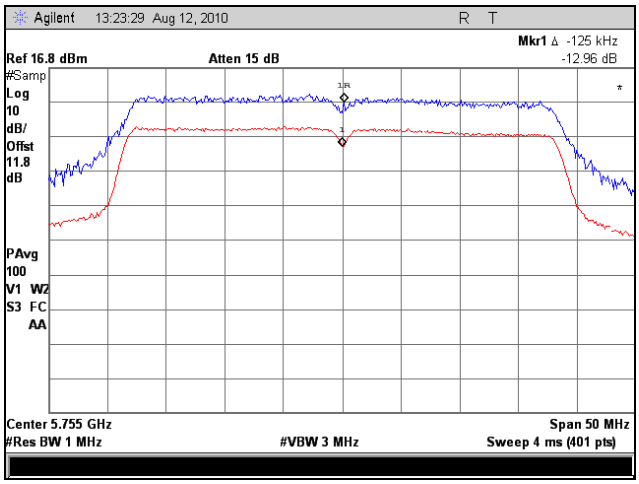


Plot 70. Peak Excursion Ratio, 802.11n 20 MHz, Mid Channel, Port 1

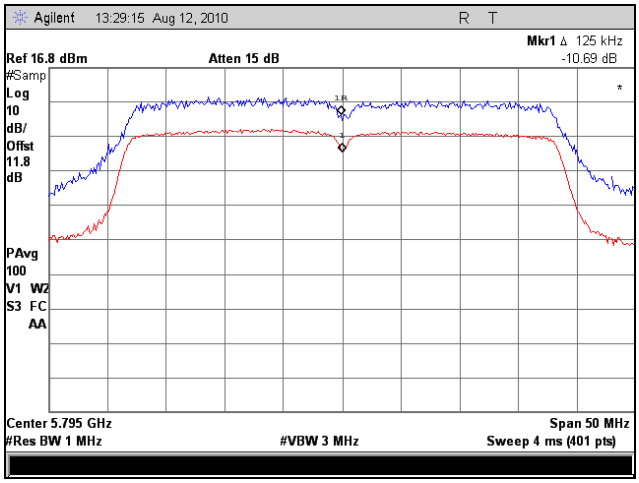


Plot 71. Peak Excursion Ratio, 802.11n 20 MHz, High Channel, Port 1

Peak Excursion Test Results, 802.11n 40 MHz, Port 1

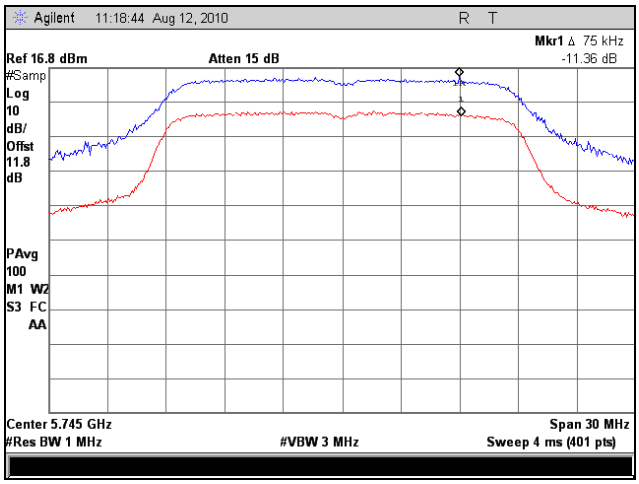


Plot 72. Peak Excursion Ratio, 802.11n 40 MHz, Low Channel, Port 1

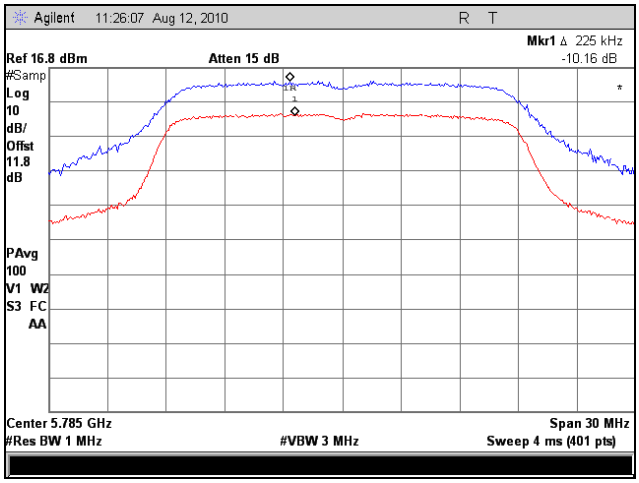


Plot 73. Peak Excursion Ratio, 802.11n 40 MHz, High Channel, Port 1

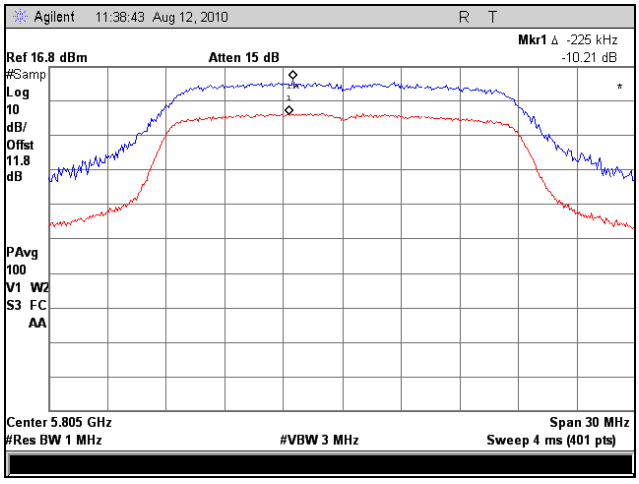
Peak Excursion Test Results, 802.11n 20 MHz, Port 2



Plot 74. Peak Excursion Ratio, 802.11n 20 MHz, Low Channel, Port 2

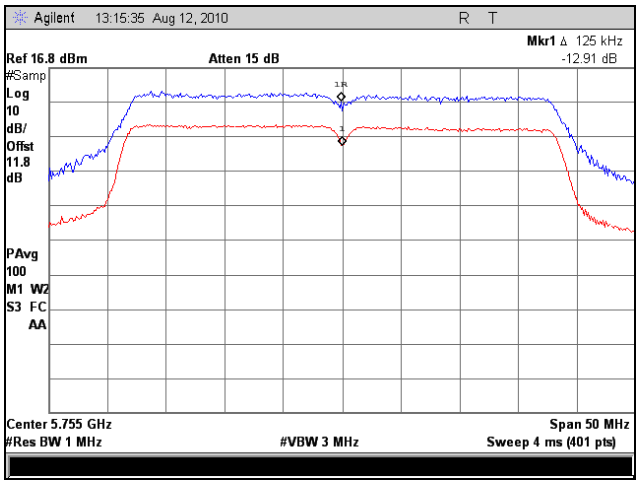


Plot 75. Peak Excursion Ratio, 802.11n 20 MHz, Mid Channel, Port 2

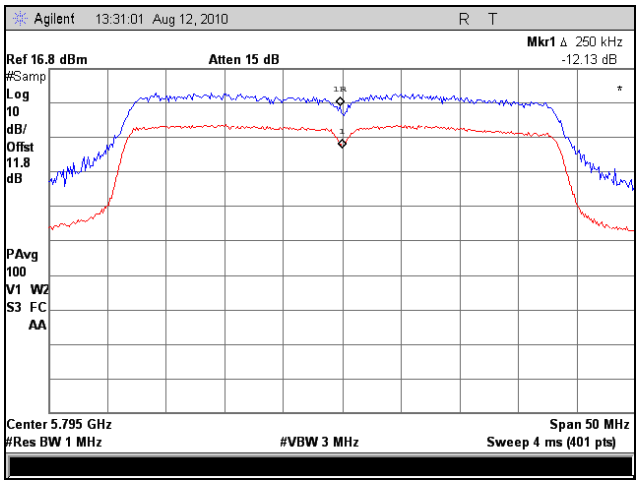


Plot 76. Peak Excursion Ratio, 802.11n 20 MHz, High Channel, Port 2

Peak Excursion Test Results, 802.11n 40 MHz, Port 2

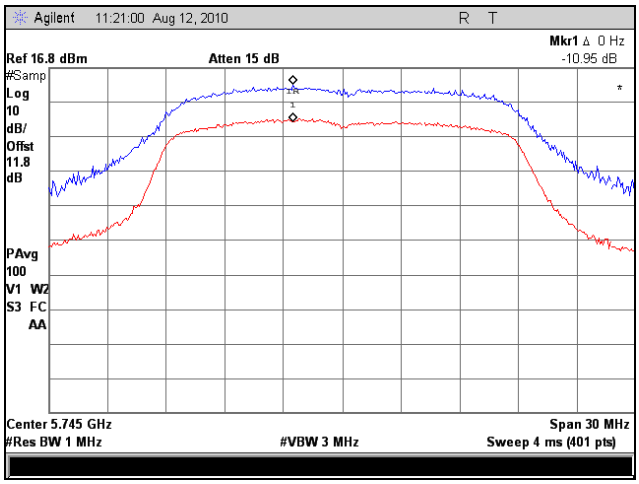


Plot 77. Peak Excursion Ratio, 802.11n 40 MHz, Low Channel, Port 2

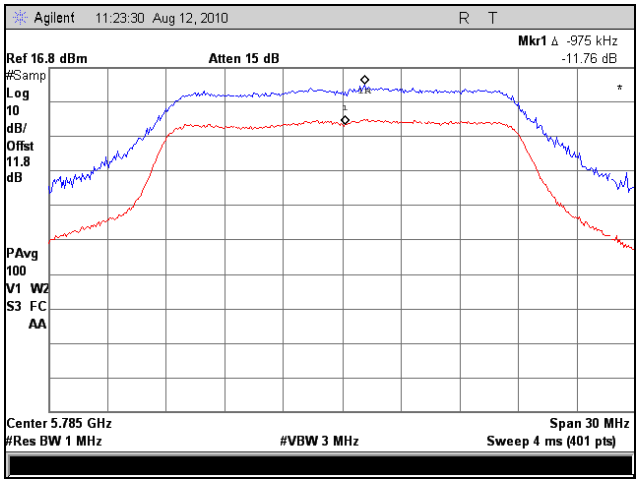


Plot 78. Peak Excursion Ratio, 802.11n 40 MHz, High Channel, Port 2

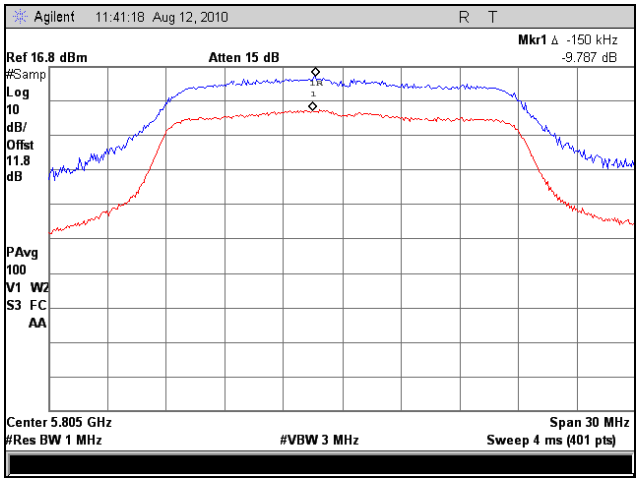
Peak Excursion Test Results, 802.11n 20 MHz, Port 3



Plot 79. Peak Excursion Ratio, 802.11n 20 MHz, Low Channel, Port 3

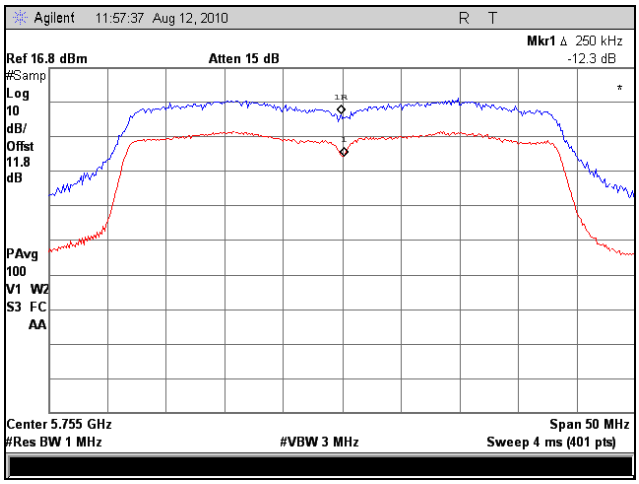


Plot 80. Peak Excursion Ratio, 802.11n 20 MHz, Mid Channel, Port 3

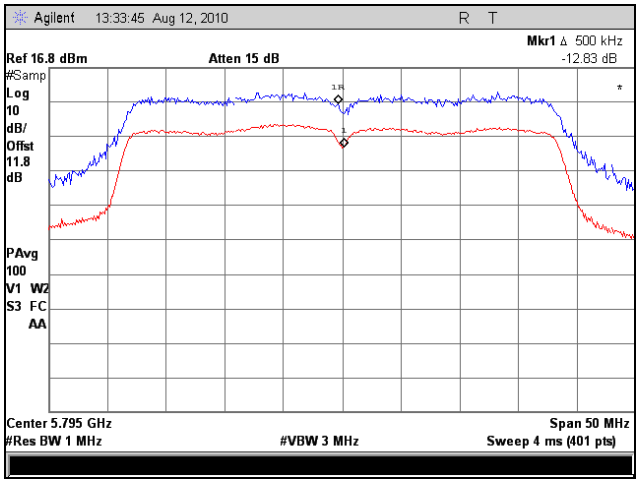


Plot 81. Peak Excursion Ratio, 802.11n 20 MHz, High Channel, Port 3

Peak Excursion Test Results, 802.11n 40 MHz, Port 3



Plot 82. Peak Excursion Ratio, 802.11n 40 MHz, Low Channel, Port 3



Plot 83. Peak Excursion Ratio, 802.11n 40 MHz, High Channel, Port 3

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(b) Undesirable Emissions

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

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

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

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

Test Procedure: The transmitter was placed on a wooden stand inside in a semi-anechoic chamber. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast height to determine worst case orientation for maximum emissions.

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

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

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

Test Engineer(s): Anderson Soungpanya

Test Date(s): 08/25/10

Harmonic and Spurious Emissions Requirements – Radiated, 9 dBi Omni Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.49	V	44.48	34.52	30.43	6.92	-9.54	37.77	Peak	74	-36.23
11.49	V	33.29	34.52	30.43	6.92	-9.54	26.58	Avg.	54	-27.42
17.235	V	43.31	33.67	32.19	9.70	-9.54	41.99	Peak	74	-32.01
17.235	V	32.89	33.67	32.19	9.70	-9.54	31.57	Avg.	54	-22.43

Table 26. Radiated Spurs, Test Results, 802.11a, Low Channel, 9 dBi Omni Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.57	V	43.55	34.56	30.50	7.01	-9.54	36.96	Peak	74	-37.04
11.57	V	32.9	34.56	30.50	7.01	-9.54	26.31	Avg.	54	-27.69
17.355	V	43.49	33.59	32.15	9.80	-9.54	42.31	Peak	74	-31.69
17.355	V	33.01	33.59	32.15	9.80	-9.54	31.83	Avg.	54	-22.17

Table 27. Radiated Spurs, Test Results, 802.11a, Mid Channel, 9 dBi Omni Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.61	V	43.41	34.59	30.53	7.09	-9.54	36.91	Peak	74	-37.09
11.61	V	32.93	34.59	30.53	7.09	-9.54	26.43	Avg.	54	-27.57
17.415	V	43.34	33.57	32.14	9.85	-9.54	42.22	Peak	74	-31.78
17.415	V	33.18	33.57	32.14	9.85	-9.54	32.06	Avg.	54	-21.94

Table 28. Radiated Spurs, Test Results, 802.11a, High Channel, 9 dBi Omni Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, 9 dBi Omni Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.49	V	43.63	34.52	30.43	6.92	-9.54	36.92	Peak	74	-37.08
11.49	V	33.05	34.52	30.43	6.92	-9.54	26.34	Avg.	54	-27.66
17.235	V	43.76	33.67	32.19	9.70	-9.54	42.44	Peak	74	-31.56
17.235	V	33.15	33.67	32.19	9.70	-9.54	31.83	Avg.	54	-22.17

Table 29. Radiated Spurs, Test Results, 802.11n 20 MHz, Low Channel, 9 dBi Omni Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.57	V	43.8	34.56	30.50	7.01	-9.54	37.21	Peak	74	-36.79
11.57	V	32.92	34.56	30.50	7.01	-9.54	26.33	Avg.	54	-27.67
17.355	V	44.37	33.59	32.15	9.80	-9.54	43.19	Peak	74	-30.81
17.355	V	33.06	33.59	32.15	9.80	-9.54	31.88	Avg.	54	-22.12

Table 30. Radiated Spurs, Test Results, 802.11n 20 MHz, Mid Channel, 9 dBi Omni Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.61	V	43.47	34.59	30.53	7.09	-9.54	36.97	Peak	74	-37.03
11.61	V	32.96	34.59	30.53	7.09	-9.54	26.46	Avg.	54	-27.54
17.415	V	43.44	33.57	32.14	9.85	-9.54	42.32	Peak	74	-31.68
17.415	V	33.11	33.57	32.14	9.85	-9.54	31.99	Avg.	54	-22.01

Table 31. Radiated Spurs, Test Results, 802.11n 20 MHz, High Channel, 9 dBi Omni Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, 9 dBi Omni Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.51	V	44.69	34.53	30.44	6.94	-9.54	38.00	Peak	74	-36.00
11.51	V	32.31	34.53	30.44	6.94	-9.54	25.62	Avg.	54	-28.38
17.265	V	44.76	33.64	32.18	9.72	-9.54	43.48	Peak	74	-30.52
17.265	V	32.34	33.64	32.18	9.72	-9.54	31.06	Avg.	54	-22.94

Table 32. Radiated Spurs, Test Results, 802.11n 40 MHz, Low Channel, 9 dBi Omni Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.59	V	44.32	34.57	30.51	7.05	-9.54	37.77	Peak	74	-36.23
11.59	V	32.87	34.57	30.51	7.05	-9.54	26.32	Avg.	54	-27.68
17.385	V	44.38	33.58	32.15	9.82	-9.54	43.23	Peak	74	-30.77
17.385	V	32.44	33.58	32.15	9.82	-9.54	31.29	Avg.	54	-22.71

Table 33. Radiated Spurs, Test Results, 802.11n 40 MHz, High Channel, 9 dBi Omni Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, Panel Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.49	V	43.45	34.52	30.43	6.92	-9.54	36.74	Peak	74	-37.26
11.49	V	32.48	34.52	30.43	6.92	-9.54	25.77	Avg.	54	-28.23
17.235	V	43.26	33.67	32.19	9.70	-9.54	41.94	Peak	74	-32.06
17.235	V	32.08	33.67	32.19	9.70	-9.54	30.76	Avg.	54	-23.24

Table 34. Radiated Spurs, Test Results, 802.11a, Low Channel, Panel Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.57	V	43.27	34.56	30.50	7.01	-9.54	36.68	Peak	74	-37.32
11.57	V	32.05	34.56	30.50	7.01	-9.54	25.46	Avg.	54	-28.54
17.355	V	43.54	33.59	32.15	9.80	-9.54	42.36	Peak	74	-31.64
17.355	V	31.85	33.59	32.15	9.80	-9.54	30.67	Avg.	54	-23.33

Table 35. Radiated Spurs, Test Results, 802.11a, Mid Channel, Panel Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.61	V	43.49	34.59	30.53	7.09	-9.54	36.99	Peak	74	-37.01
11.61	V	32.21	34.59	30.53	7.09	-9.54	25.71	Avg.	54	-28.29
17.415	V	44.31	33.57	32.14	9.85	-9.54	43.19	Peak	74	-30.81
17.415	V	31.89	33.57	32.14	9.85	-9.54	30.77	Avg.	54	-23.23

Table 36. Radiated Spurs, Test Results, 802.11a, High Channel, Panel Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, Panel Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.49	V	44.28	34.52	30.43	6.92	-9.54	37.57	Peak	74	-36.43
11.49	V	32.04	34.52	30.43	6.92	-9.54	25.33	Avg.	54	-28.67
17.235	V	43.81	33.67	32.19	9.70	-9.54	42.49	Peak	74	-31.51
17.235	V	31.87	33.67	32.19	9.70	-9.54	30.55	Avg.	54	-23.45

Table 37. Radiated Spurs, Test Results, 802.11n 20 MHz, Low Channel, Panel Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.57	V	43.63	34.56	30.50	7.01	-9.54	37.04	Peak	74	-36.96
11.57	V	31.96	34.56	30.50	7.01	-9.54	25.37	Avg.	54	-28.63
17.355	V	44.24	33.59	32.15	9.80	-9.54	43.06	Peak	74	-30.94
17.355	V	31.84	33.59	32.15	9.80	-9.54	30.66	Avg.	54	-23.34

Table 38. Radiated Spurs, Test Results, 802.11n 20 MHz, Mid Channel, Panel Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.61	V	43.18	34.59	30.53	7.09	-9.54	36.68	Peak	74	-37.32
11.61	V	32.02	34.59	30.53	7.09	-9.54	25.52	Avg.	54	-28.48
17.415	V	43.24	33.57	32.14	9.85	-9.54	42.12	Peak	74	-31.88
17.415	V	31.93	33.57	32.14	9.85	-9.54	30.81	Avg.	54	-23.19

Table 39. Radiated Spurs, Test Results, 802.11n 20 MHz, High Channel, Panel Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, Panel Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.51	V	44.28	34.53	30.44	6.94	-9.54	37.59	Peak	74	-36.41
11.51	V	32.74	34.53	30.44	6.94	-9.54	26.05	Avg.	54	-27.95
17.265	V	43.81	33.64	32.18	9.72	-9.54	42.53	Peak	74	-31.47
17.265	V	32.01	33.64	32.18	9.72	-9.54	30.73	Avg.	54	-23.27

Table 40. Radiated Spurs, Test Results, 802.11n 40 MHz, Low Channel, Panel Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.59	V	44.61	34.57	30.51	7.05	-9.54	38.06	Peak	74	-35.94
11.59	V	32.19	34.57	30.51	7.05	-9.54	25.64	Avg.	54	-28.36
17.385	V	44.81	33.58	32.15	9.82	-9.54	43.66	Peak	74	-30.34
17.385	V	32.17	33.58	32.15	9.82	-9.54	31.02	Avg.	54	-22.98

Table 41. Radiated Spurs, Test Results, 802.11n 40 MHz, High Channel, Panel Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, Sector Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.49	V	44.71	34.52	30.43	6.92	-9.54	38.00	Peak	74	-36.00
11.49	V	32.77	34.52	30.43	6.92	-9.54	26.06	Avg.	54	-27.94
17.235	V	43.31	33.67	32.19	9.70	-9.54	41.99	Peak	74	-32.01
17.235	V	32.49	33.67	32.19	9.70	-9.54	31.17	Avg.	54	-22.83

Table 42. Radiated Spurs, Test Results, 802.11a, Low Channel, Sector Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.57	V	43.76	34.56	30.50	7.01	-9.54	37.17	Peak	74	-36.83
11.57	V	32.49	34.56	30.50	7.01	-9.54	25.90	Avg.	54	-28.10
17.355	V	44.14	33.59	32.15	9.80	-9.54	42.96	Peak	74	-31.04
17.355	V	32.43	33.59	32.15	9.80	-9.54	31.25	Avg.	54	-22.75

Table 43. Radiated Spurs, Test Results, 802.11a, Mid Channel, Sector Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.61	V	43.52	34.59	30.53	7.09	-9.54	37.02	Peak	74	-36.98
11.61	V	31.43	34.59	30.53	7.09	-9.54	24.93	Avg.	54	-29.07
17.415	V	43.57	33.57	32.14	9.85	-9.54	42.45	Peak	74	-31.55
17.415	V	32.25	33.57	32.14	9.85	-9.54	31.13	Avg.	54	-22.87

Table 44. Radiated Spurs, Test Results, 802.11a, High Channel, Sector Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, Sector Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.49	V	44.13	34.52	30.43	6.92	-9.54	37.42	Peak	74	-36.58
11.49	V	32.61	34.52	30.43	6.92	-9.54	25.90	Avg.	54	-28.10
17.235	V	43.82	33.67	32.19	9.70	-9.54	42.50	Peak	74	-31.50
17.235	V	32.29	33.67	32.19	9.70	-9.54	30.97	Avg.	54	-23.03

Table 45. Radiated Spurs, Test Results, 802.11n 20 MHz, Low Channel, Sector Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.57	V	43.5	34.56	30.50	7.01	-9.54	36.91	Peak	74	-37.09
11.57	V	32.39	34.56	30.50	7.01	-9.54	25.80	Avg.	54	-28.20
17.355	V	43.28	33.59	32.15	9.80	-9.54	42.10	Peak	74	-31.90
17.355	V	32.22	33.59	32.15	9.80	-9.54	31.04	Avg.	54	-22.96

Table 46. Radiated Spurs, Test Results, 802.11n 20 MHz, Mid Channel, Sector Antenna

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

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.61	V	43.92	34.59	30.53	7.09	-9.54	37.42	Peak	74	-36.58
11.61	V	32.28	34.59	30.53	7.09	-9.54	25.78	Avg.	54	-28.22
17.415	V	43.52	33.57	32.14	9.85	-9.54	42.40	Peak	74	-31.60
17.415	V	32.19	33.57	32.14	9.85	-9.54	31.07	Avg.	54	-22.93

Table 47. Radiated Spurs, Test Results, 802.11n 20 MHz, High Channel, Sector Antenna

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

Harmonic and Spurious Emissions Requirements – Radiated, Sector Antenna

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.51	V	44.91	34.53	30.44	6.94	-9.54	38.22	Peak	74	-35.78
11.51	V	32.57	34.53	30.44	6.94	-9.54	25.88	Avg.	54	-28.12
17.265	V	43.73	33.64	32.18	9.72	-9.54	42.45	Peak	74	-31.55
17.265	V	32.36	33.64	32.18	9.72	-9.54	31.08	Avg.	54	-22.92

Table 48. Radiated Spurs, Test Results, 802.11n 40 MHz, Low Channel, Sector Antenna

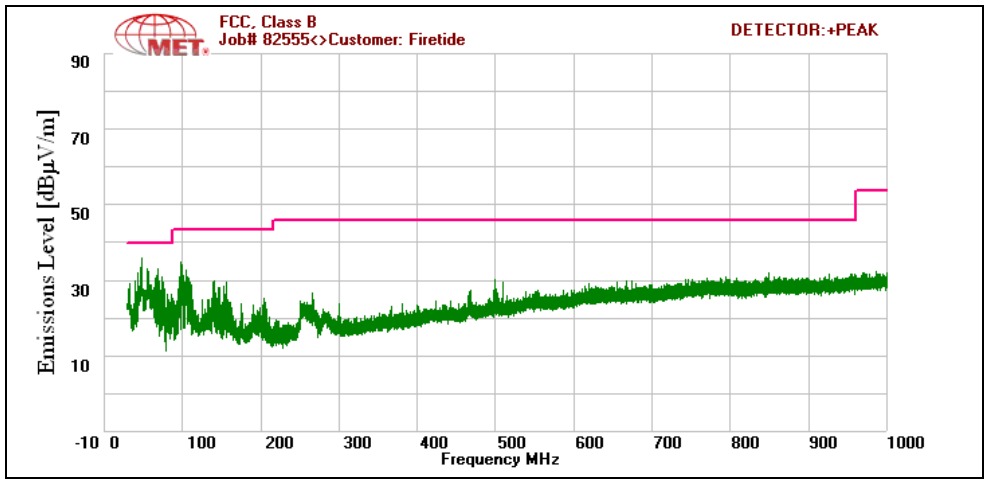
Note: All other emissions were measured at the noise floor of the spectrum analyzer.

Freq. (GHz)	Antenna Polarity (H/V)	Raw Amp. @ 1 m (dBuV/m)	P. Amp (dB)	Ant. Cor. Factor (dB/m)	Cable Loss (dB)	Distance Correction Factor 1m to 3m (dBuV/m)	EUT Field Strength Final Amp. (dBuV/m)	Limit Detector Peak / Avg. (Peak) / (Avg.)	Limit @ 3 m (dBuV/m)	Delta (dB)
11.59	V	43.73	34.57	30.51	7.05	-9.54	37.18	Peak	74	-36.82
11.59	V	32.23	34.57	30.51	7.05	-9.54	25.68	Avg.	54	-28.32
17.385	V	43.49	33.58	32.15	9.82	-9.54	42.34	Peak	74	-31.66
17.385	V	32.3	33.58	32.15	9.82	-9.54	31.15	Avg.	54	-22.85

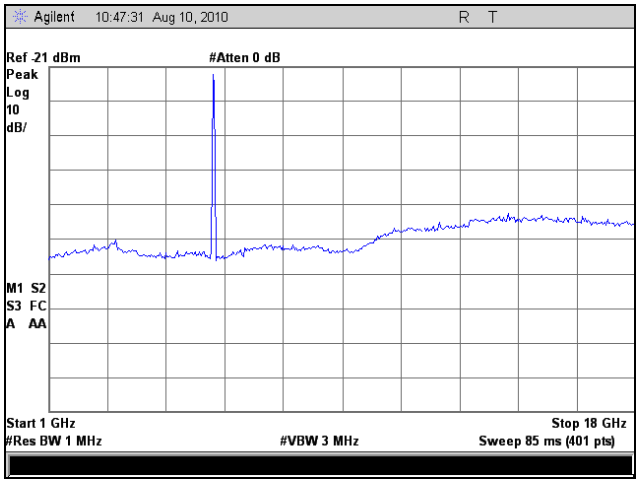
Table 49. Radiated Spurs, Test Results, 802.11n 40 MHz, High Channel, Sector Antenna

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

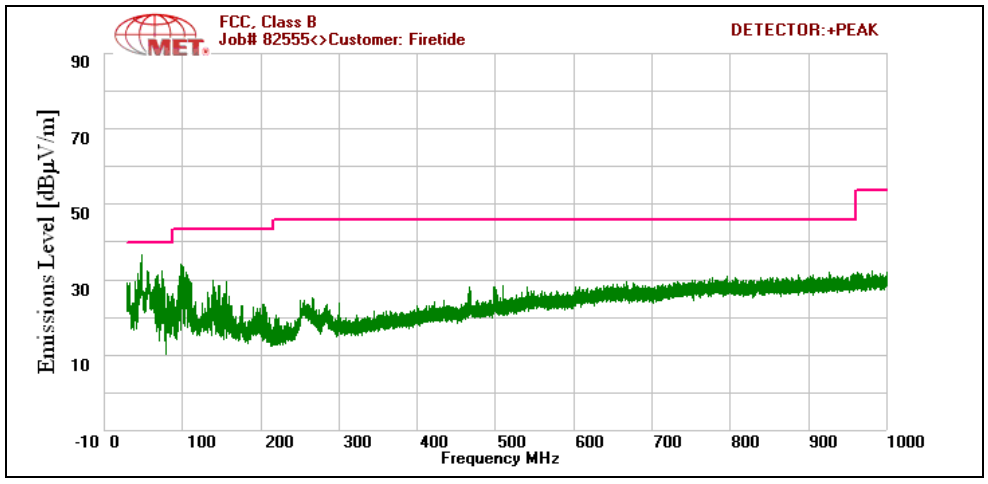
Radiated Spurious Emissions Test Results, 802.11a, 9 dBi Antenna



Plot 84. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, Low Channel, 9 dBi Omni Antenna

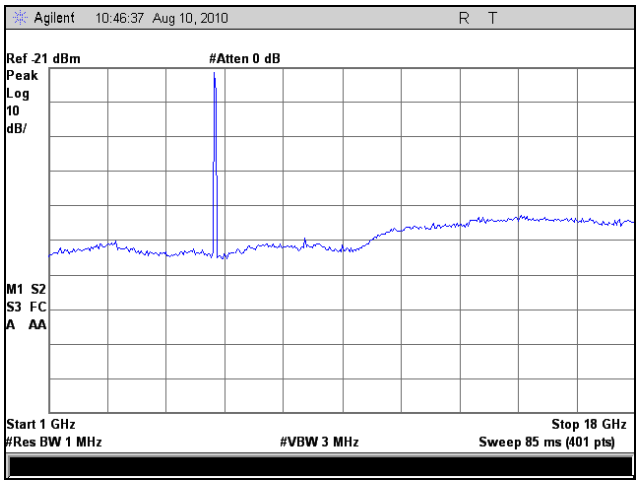


Plot 85. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, Low Channel, 9 dBi Omni Antenna

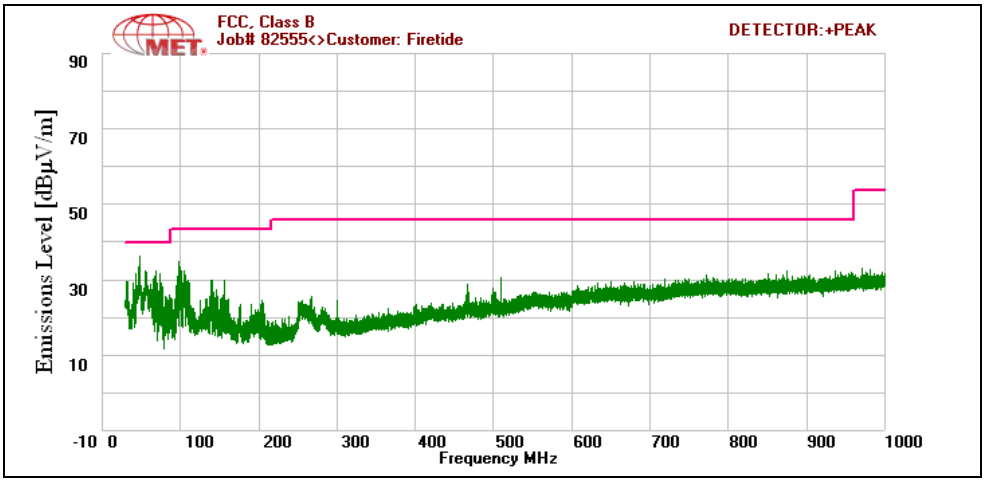


Plot 86. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, Mid Channel, 9 dBi Omni Antenna

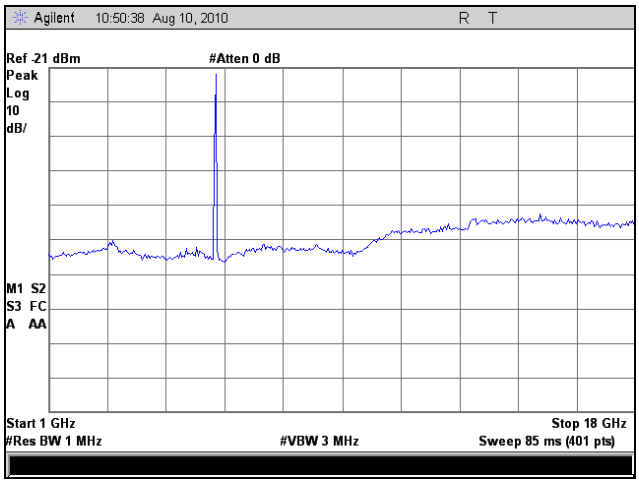
Radiated Spurious Emissions Test Results, 802.11a, 9 dBi Antenna



Plot 87. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, Mid Channel, 9 dBi Omni Antenna

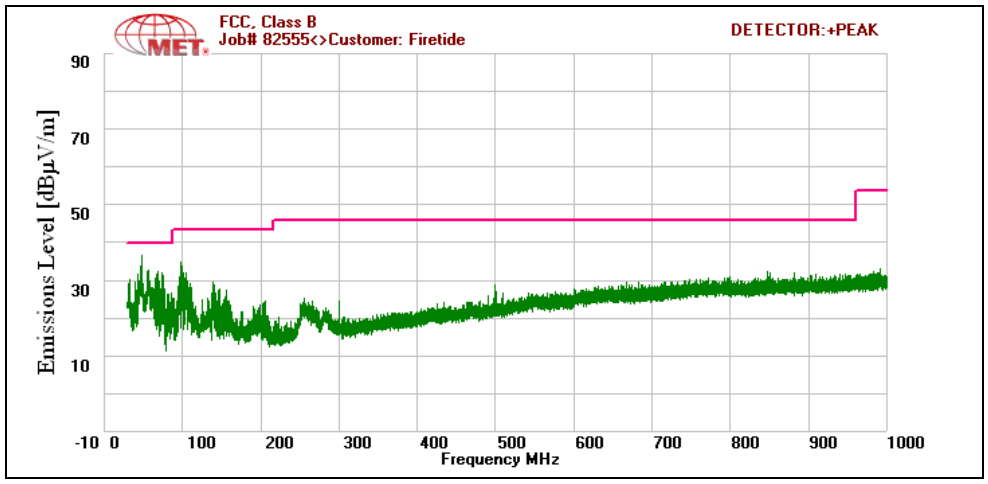


Plot 88. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, High Channel, 9 dBi Omni Antenna

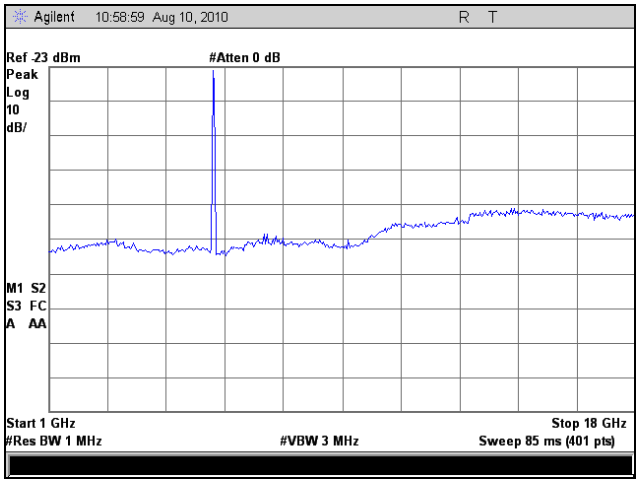


Plot 89. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, High Channel, 9 dBi Omni Antenna

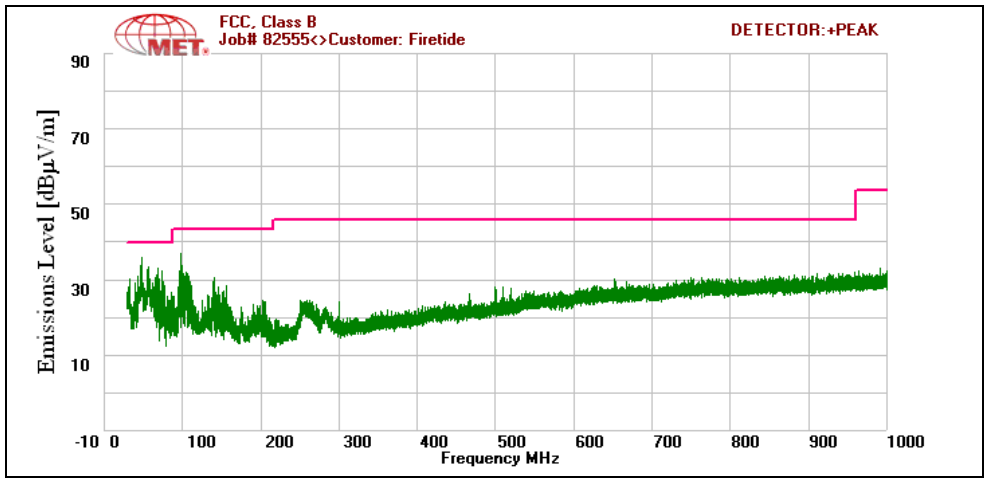
Radiated Spurious Emissions Test Results, 802.11n 20 MHz, 9 dBi Antenna



Plot 90. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, Low Channel, 9 dBi Omni Antenna

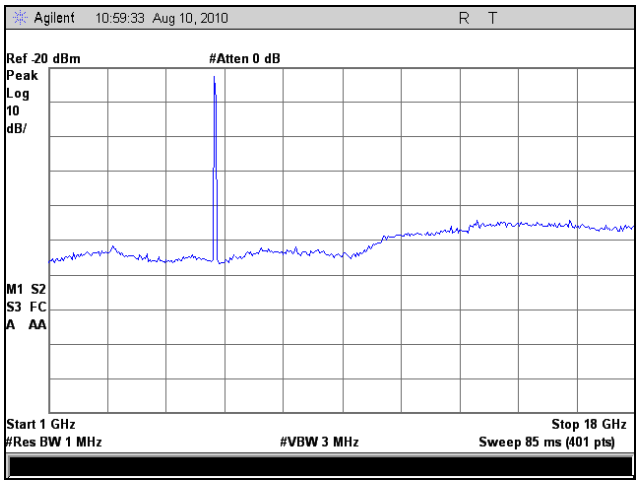


Plot 91. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, Low Channel, 9 dBi Omni Antenna

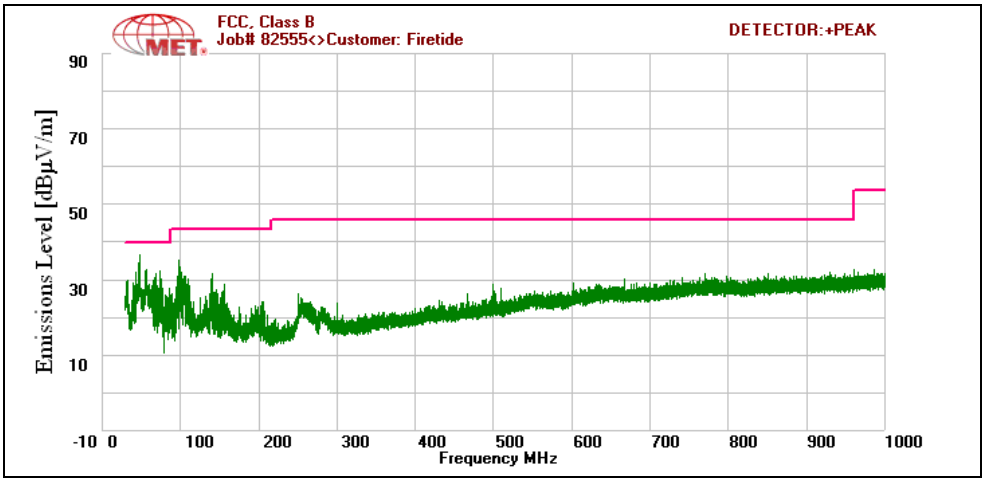


Plot 92. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, Mid Channel, 9 dBi Omni Antenna

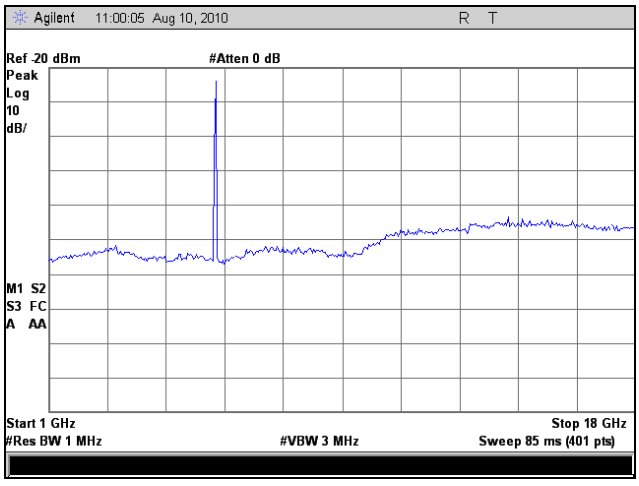
Radiated Spurious Emissions Test Results, 802.11n 20 MHz, 9 dBi Antenna



Plot 93. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, Mid Channel, 9 dBi Omni Antenna

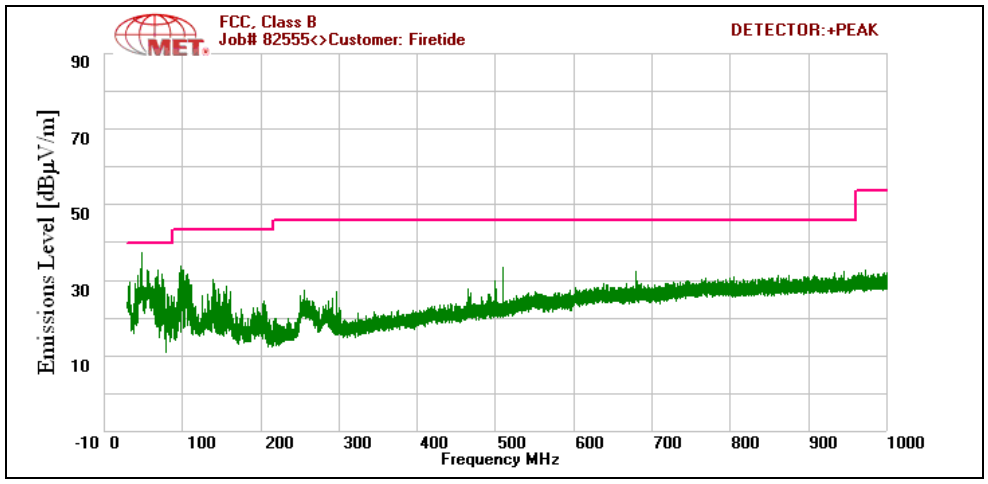


Plot 94. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, High Channel, 9 dBi Omni Antenna

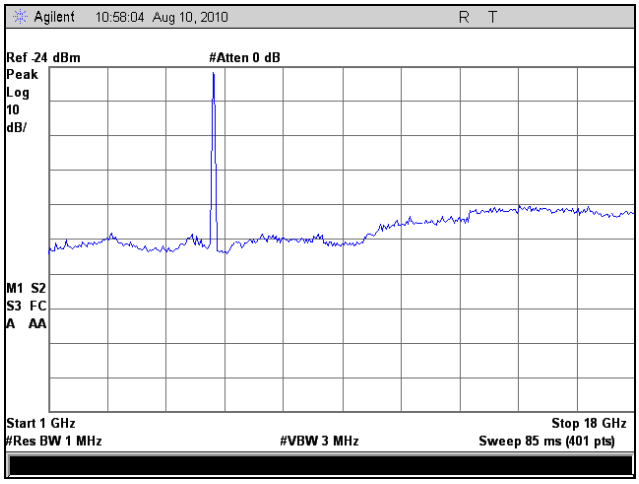


Plot 95. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, High Channel, 9 dBi Omni Antenna

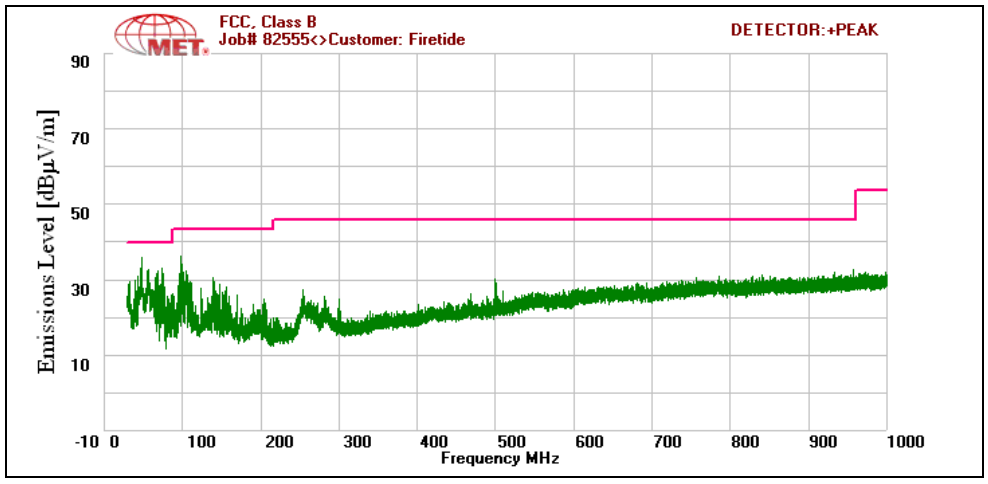
Radiated Spurious Emissions Test Results, 802.11n 40 MHz, 9 dBi Antenna



Plot 96. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 40 MHz, Low Channel, 9 dBi Omni Antenna

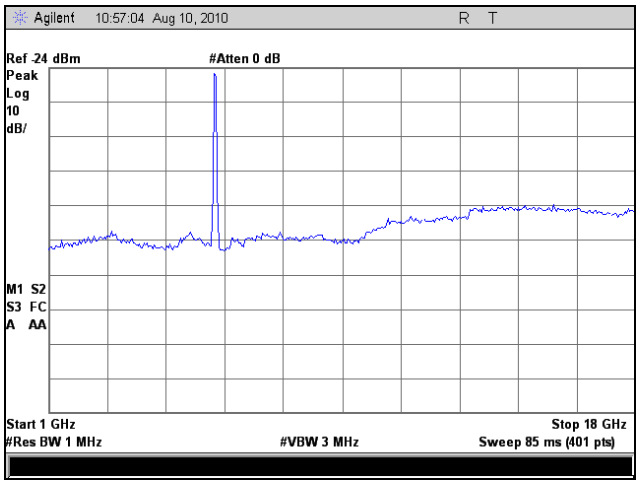


Plot 97. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 40 MHz, Low Channel, 9 dBi Omni Antenna



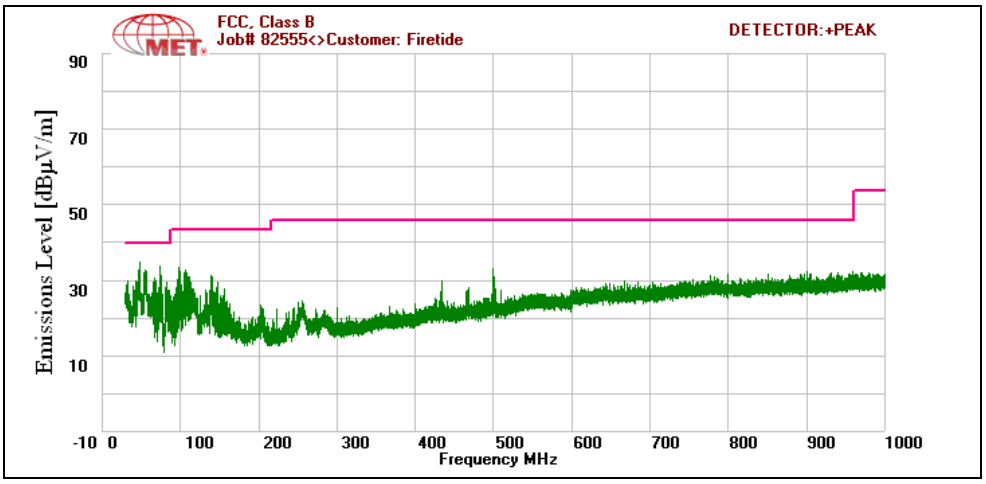
Plot 98. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 40 MHz, High Channel, 9 dBi Omni Antenna

Radiated Spurious Emissions Test Results, 802.11n 40 MHz, 9 dBi Antenna

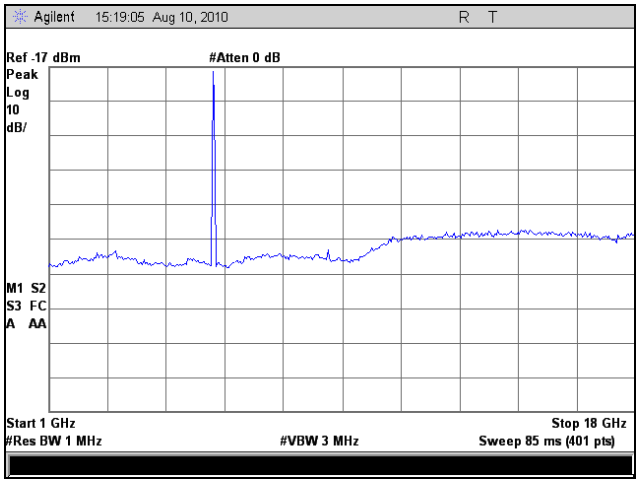


Plot 99. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 40 MHz, High Channel, 9 dBi Omni Antenna

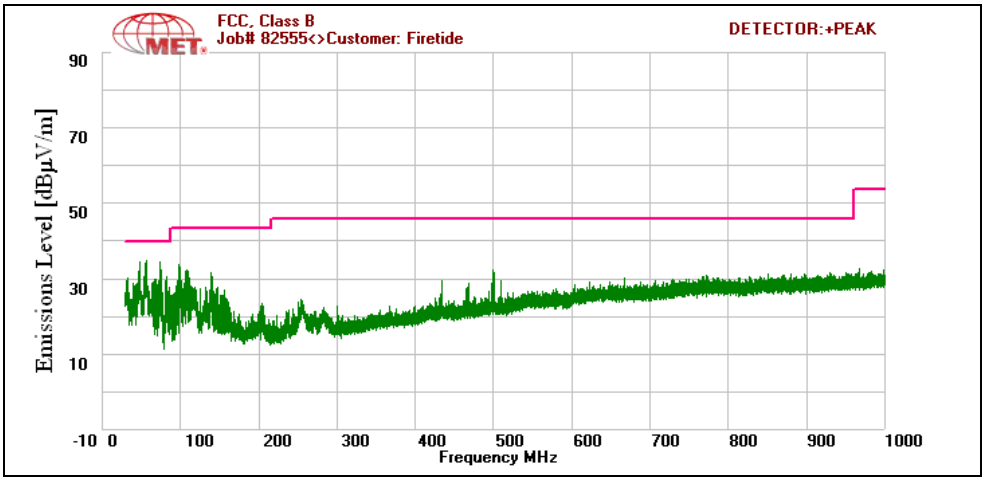
Radiated Spurious Emissions Test Results, 802.11a, Panel Antenna



Plot 100. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, Low Channel, Panel Antenna

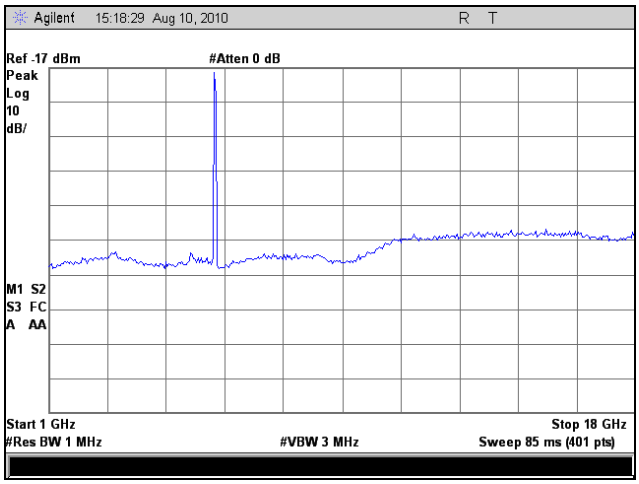


Plot 101. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, Low Channel, Panel Antenna

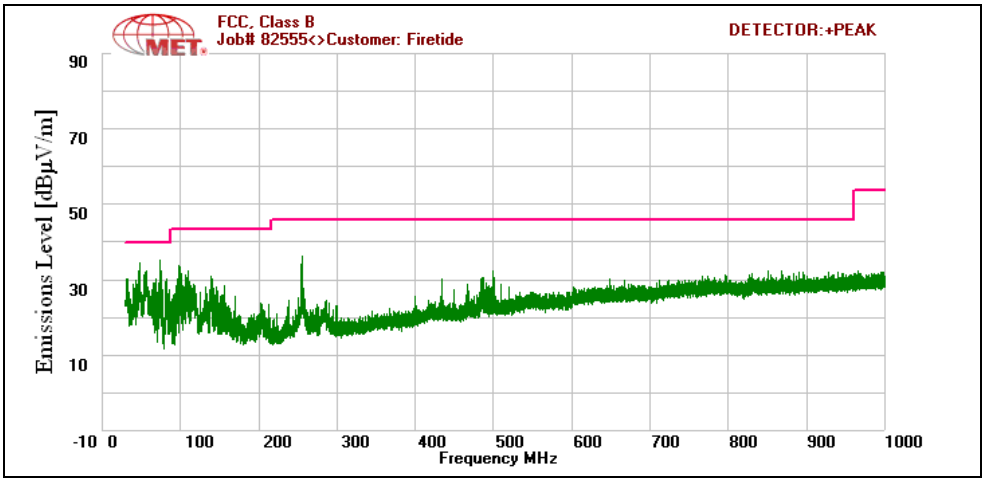


Plot 102. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, Mid Channel, Panel Antenna

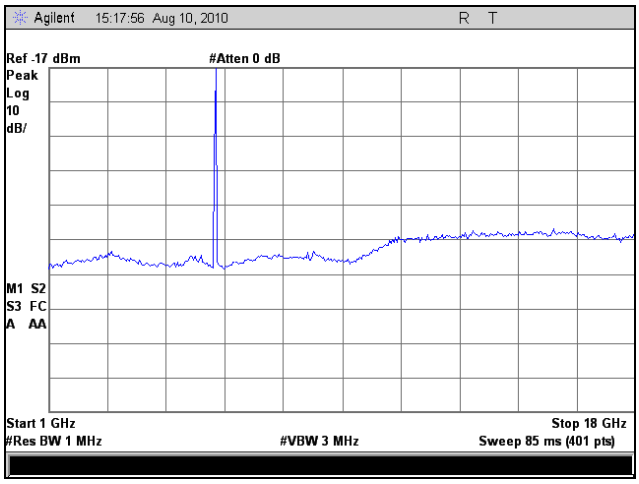
Radiated Spurious Emissions Test Results, 802.11a, Panel Antenna



Plot 103. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, Mid Channel, Panel Antenna

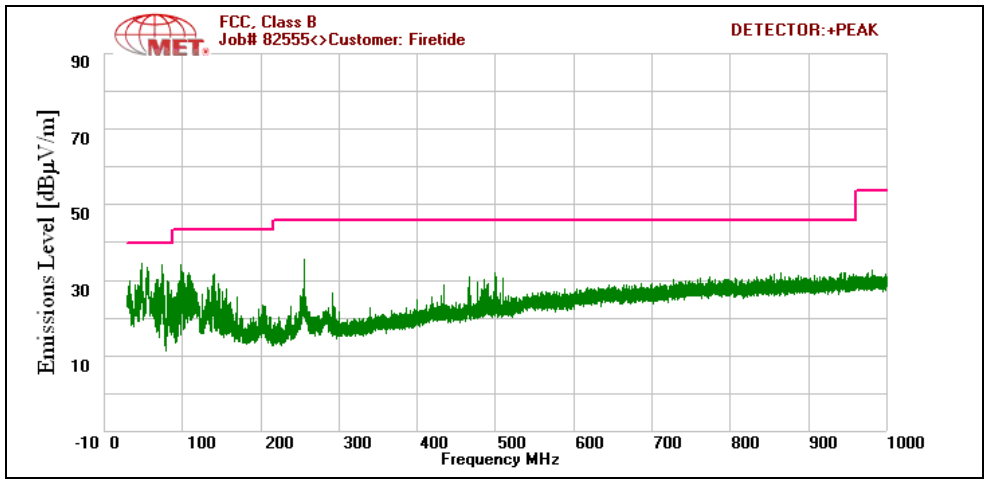


Plot 104. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, High Channel, Panel Antenna

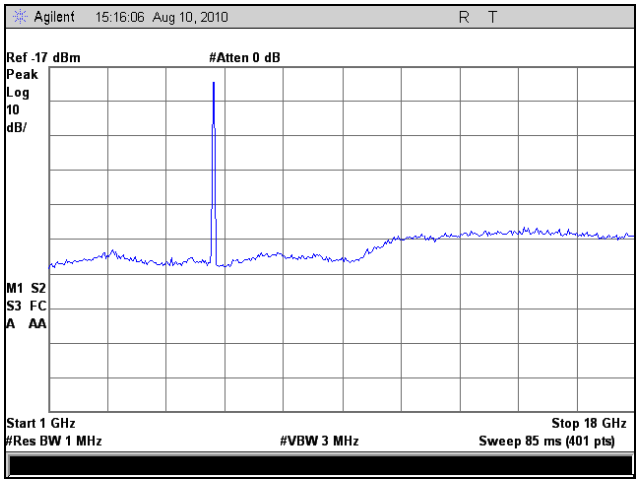


Plot 105. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, High Channel, Panel Antenna

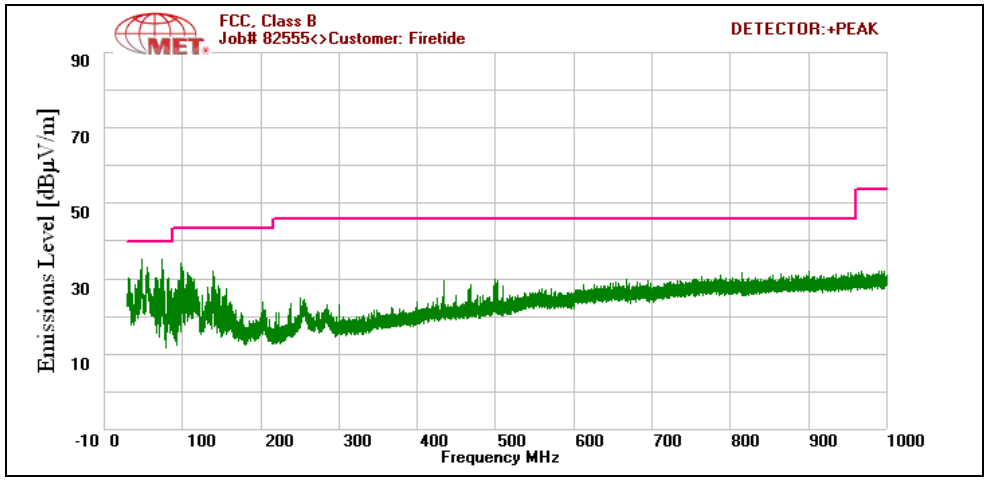
Radiated Spurious Emissions Test Results, 802.11n 20 MHz, Panel Antenna



Plot 106. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, Low Channel, Panel Antenna

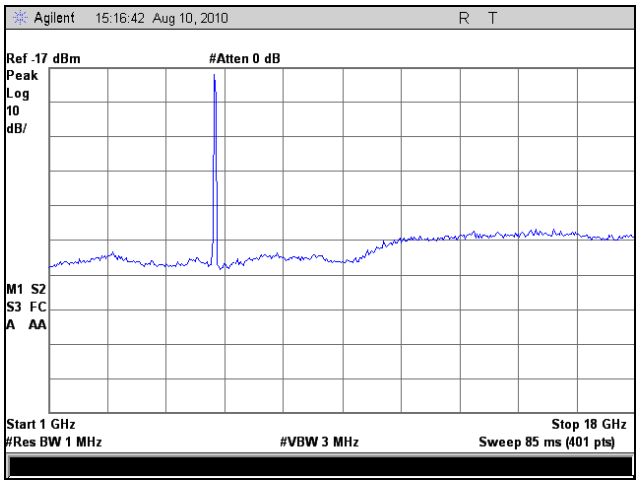


Plot 107. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, Low Channel, Panel Antenna

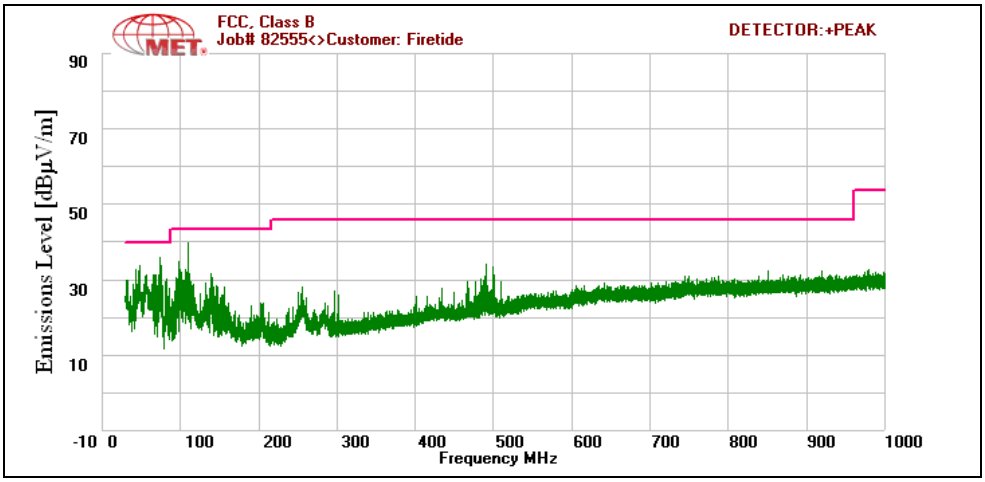


Plot 108. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, Mid Channel, Panel Antenna

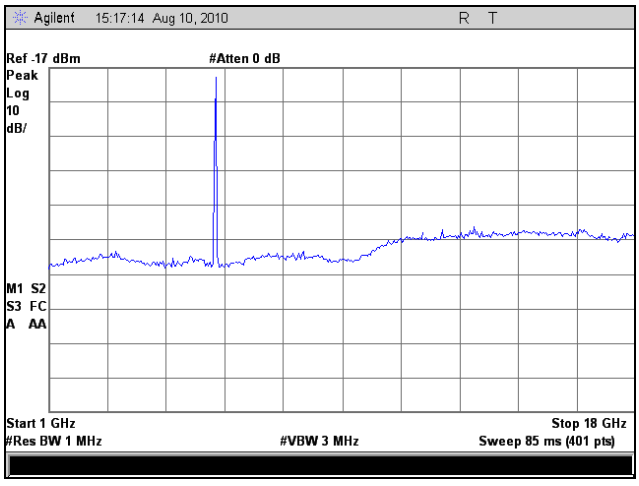
Radiated Spurious Emissions Test Results, 802.11n 20 MHz, Panel Antenna



Plot 109. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, Mid Channel, Panel Antenna

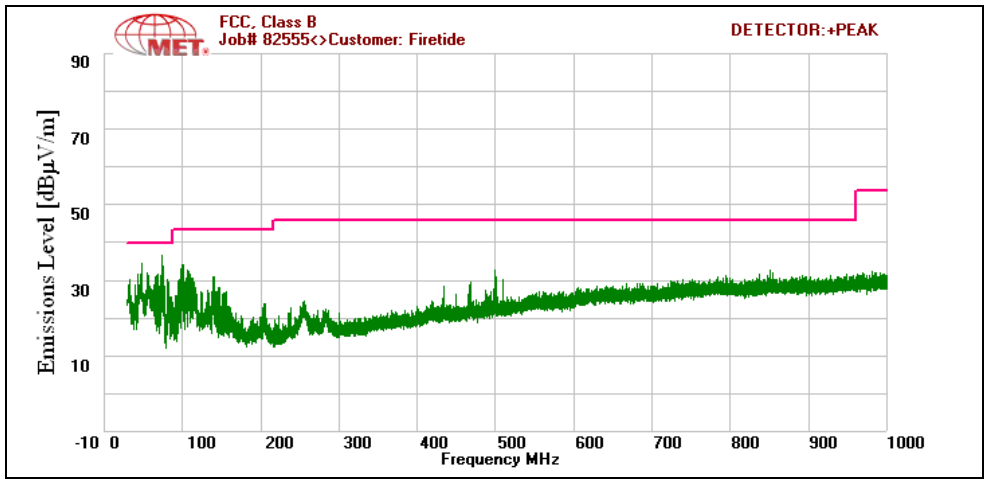


Plot 110. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, High Channel, Panel Antenna

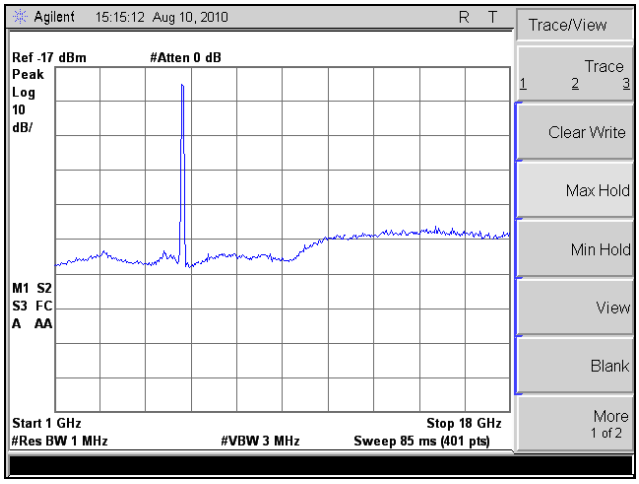


Plot 111. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, High Channel, Panel Antenna

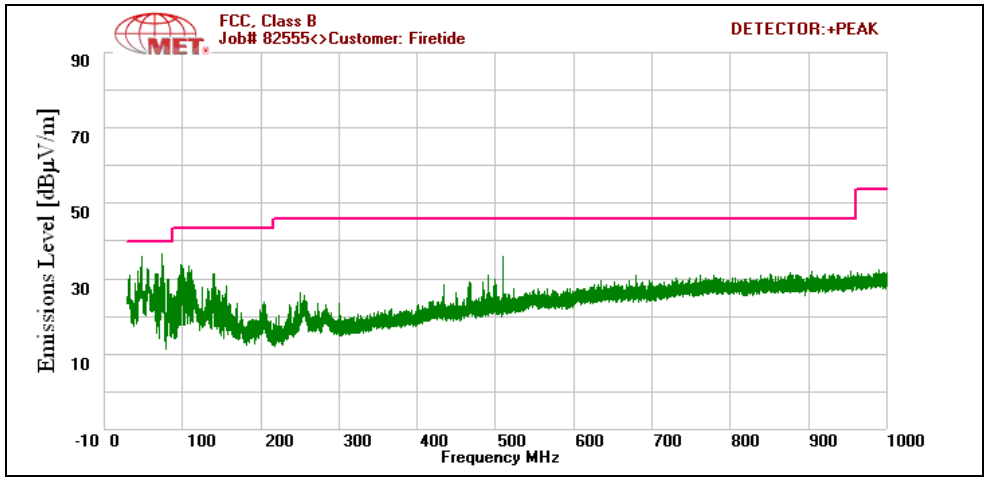
Radiated Spurious Emissions Test Results, 802.11n 40 MHz, Panel Antenna



Plot 112. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 40 MHz, Low Channel, Panel Antenna

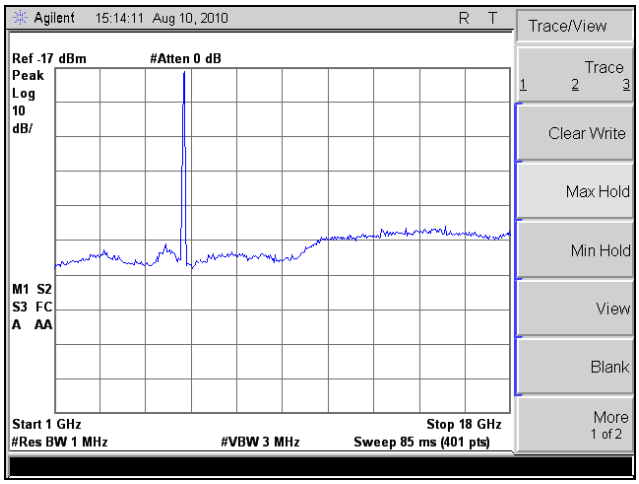


Plot 113. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 40 MHz, Low Channel, Panel Antenna



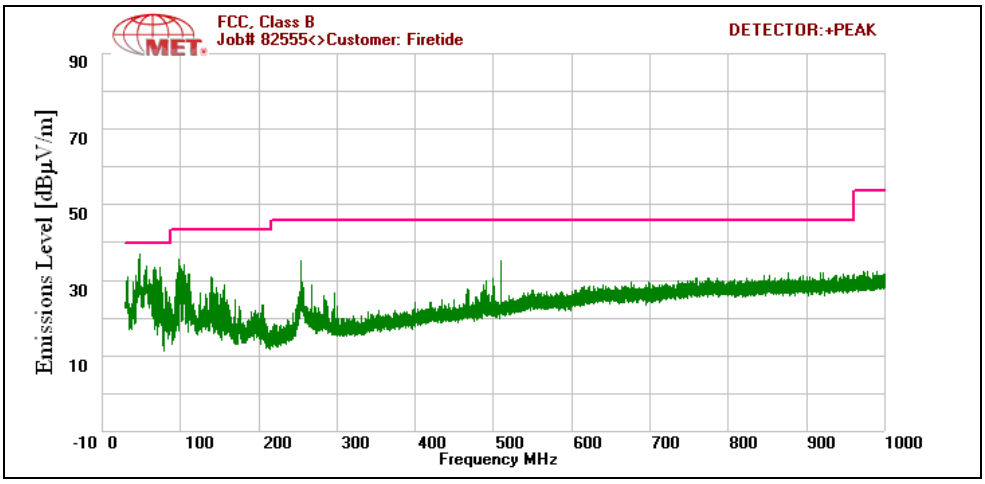
Plot 114. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 40 MHz, High Channel, Panel Antenna

Radiated Spurious Emissions Test Results, 802.11n 40 MHz, Panel Antenna

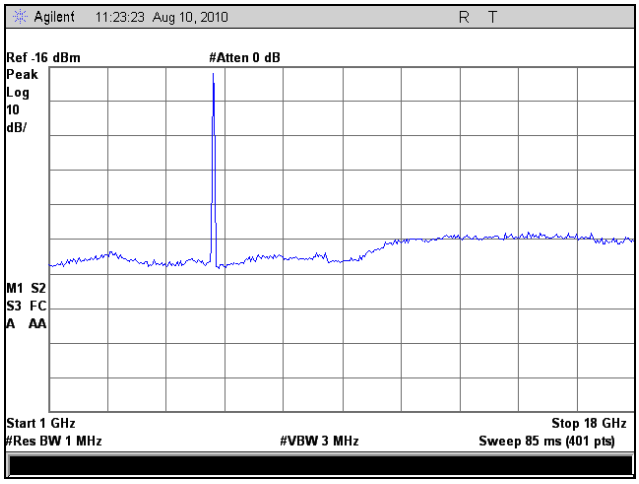


Plot 115. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 40 MHz, High Channel, Panel Antenna

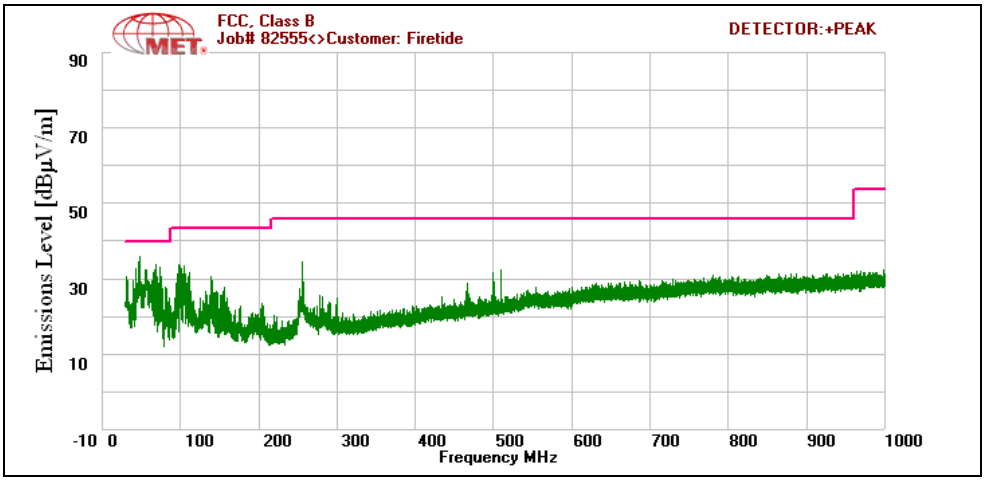
Radiated Spurious Emissions Test Results, 802.11a, Sector Antenna



Plot 116. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, Low Channel, Sector Antenna

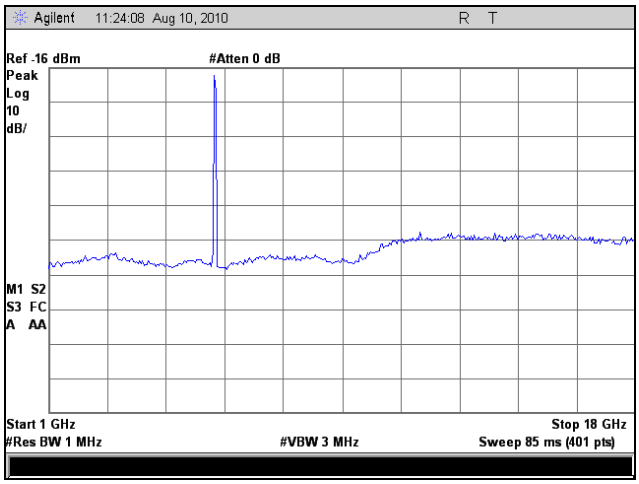


Plot 117. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, Low Channel, Sector Antenna

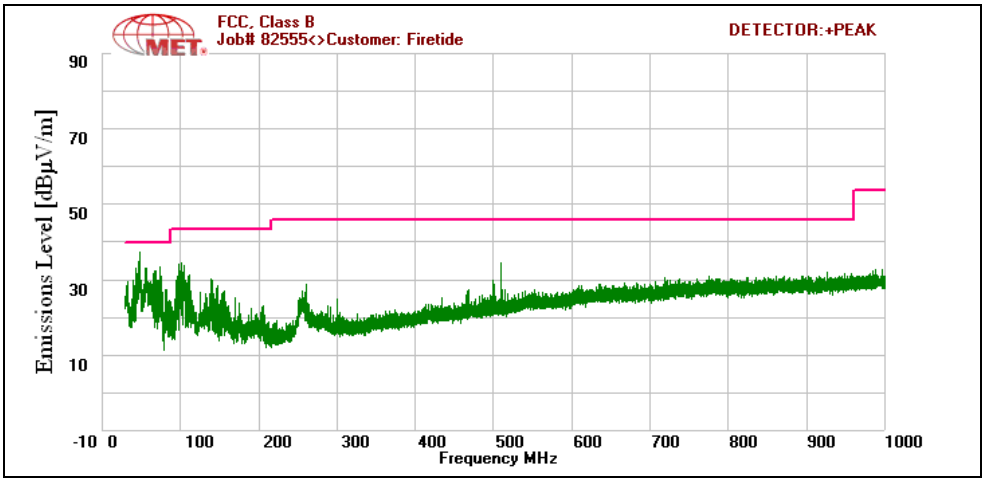


Plot 118. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, Mid Channel, Sector Antenna

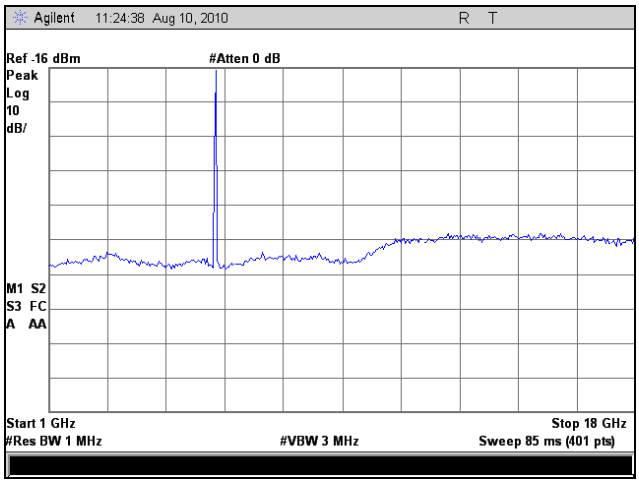
Radiated Spurious Emissions Test Results, 802.11a, Sector Antenna



Plot 119. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, Mid Channel, Sector Antenna

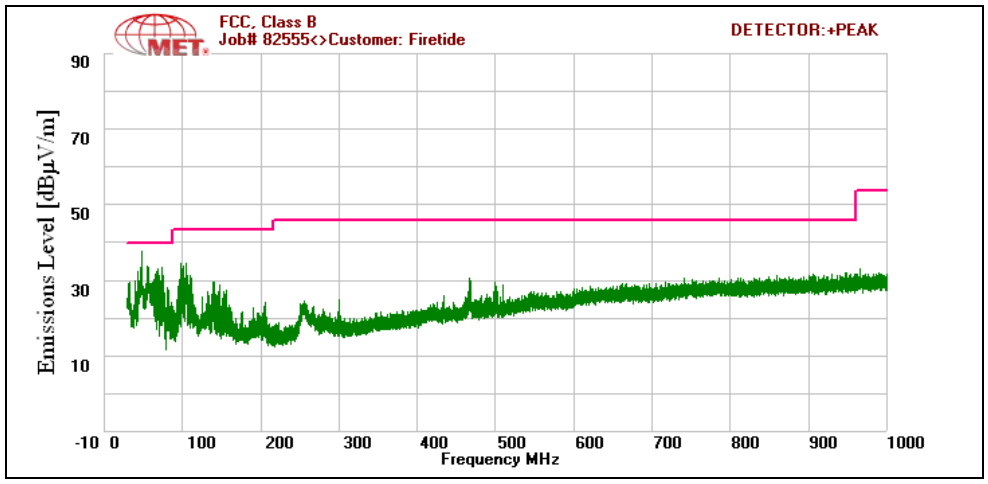


Plot 120. Radiated Spurs, 30 MHz – 1 GHz, 802.11a, High Channel, Sector Antenna

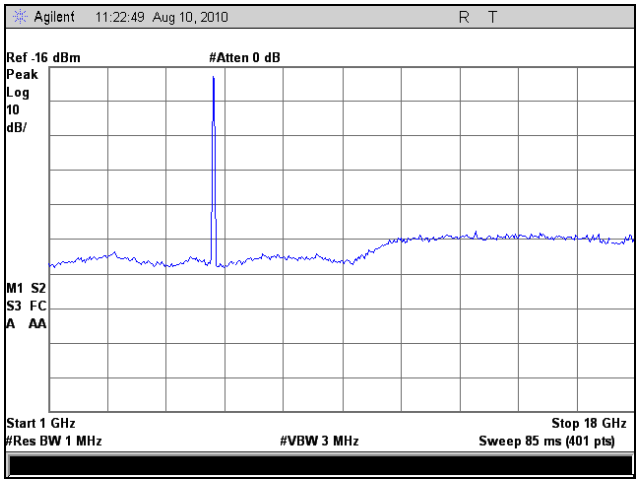


Plot 121. Radiated Spurs, 1 GHz – 18 GHz, 802.11a, High Channel, Sector Antenna

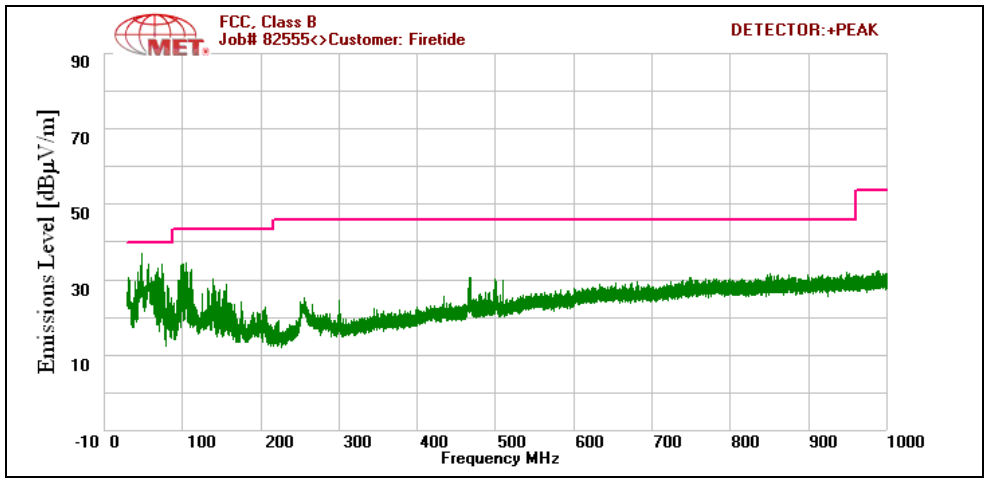
Radiated Spurious Emissions Test Results, 802.11n 20 MHz, Sector Antenna



Plot 122. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, Low Channel, Sector Antenna

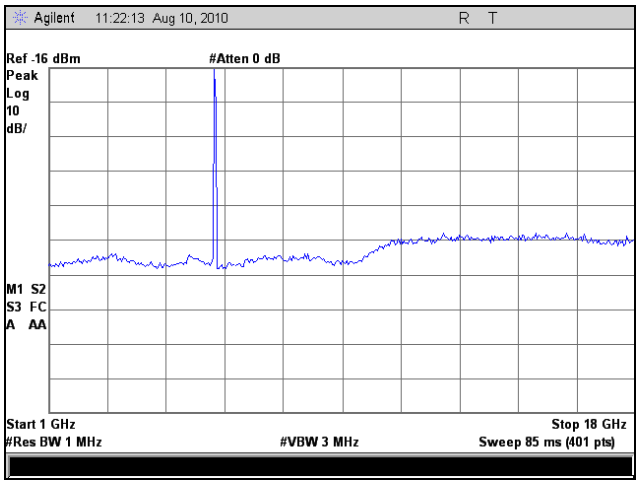


Plot 123. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, Low Channel, Sector Antenna

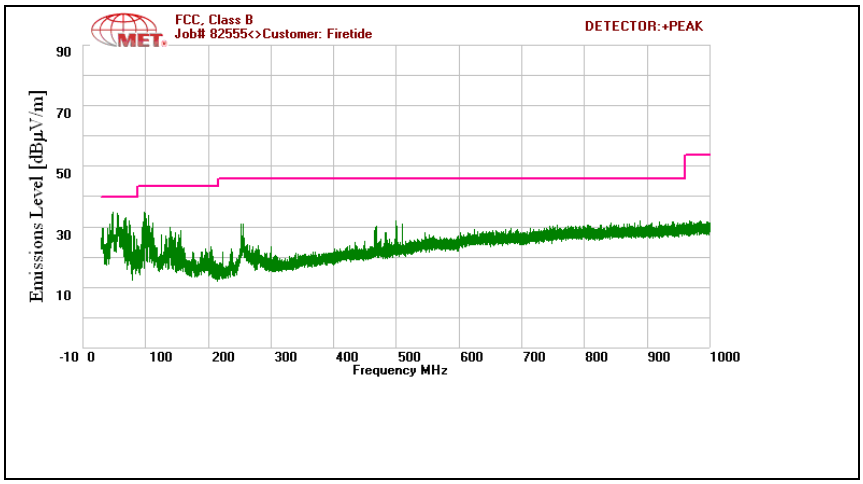


Plot 124. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, Mid Channel, Sector Antenna

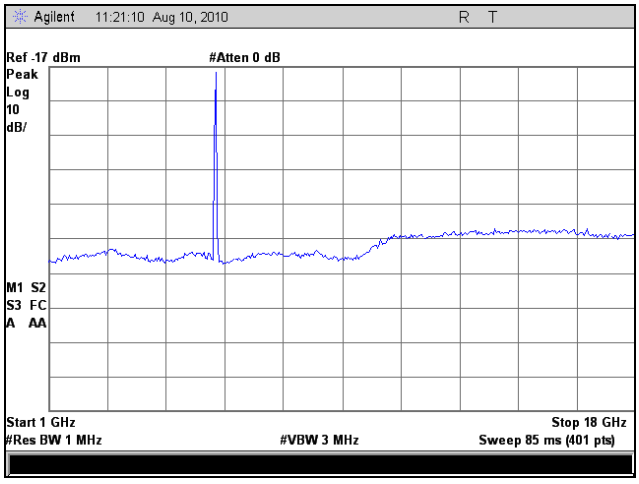
Radiated Spurious Emissions Test Results, 802.11n 20 MHz, Sector Antenna



Plot 125. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, Mid Channel, Sector Antenna

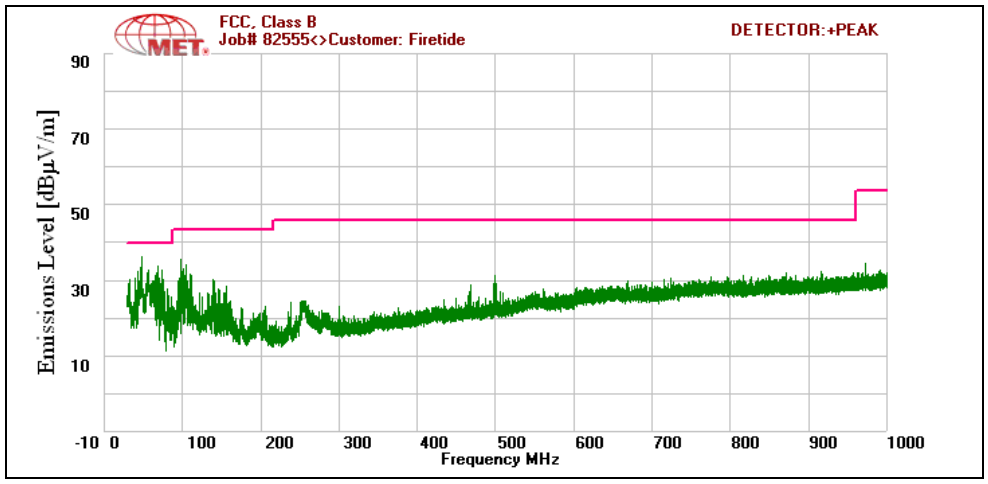


Plot 126. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 20 MHz, High Channel, Sector Antenna

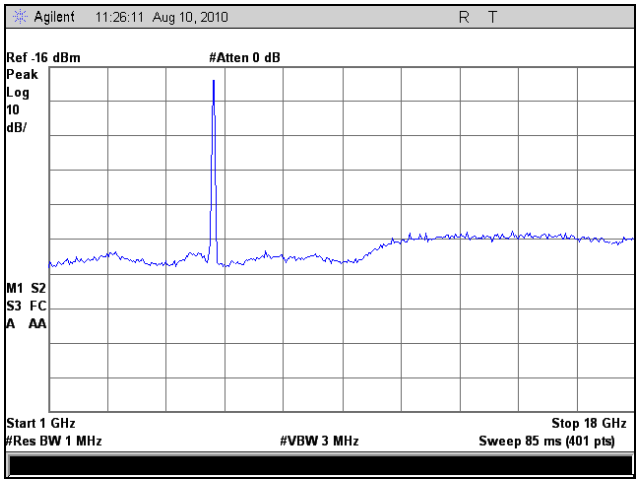


Plot 127. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 20 MHz, High Channel, Sector Antenna

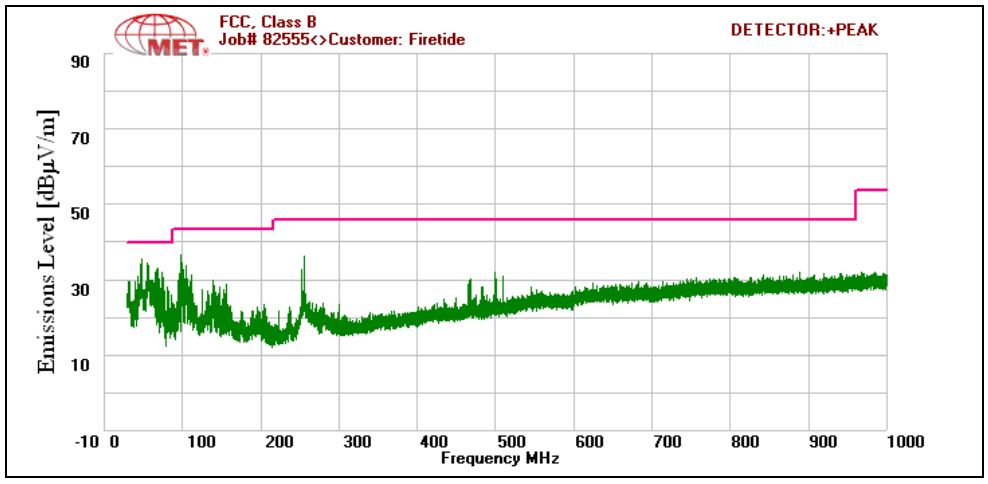
Radiated Spurious Emissions Test Results, 802.11n 40 MHz, Sector Antenna



Plot 128. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 40 MHz, Low Channel, Sector Antenna

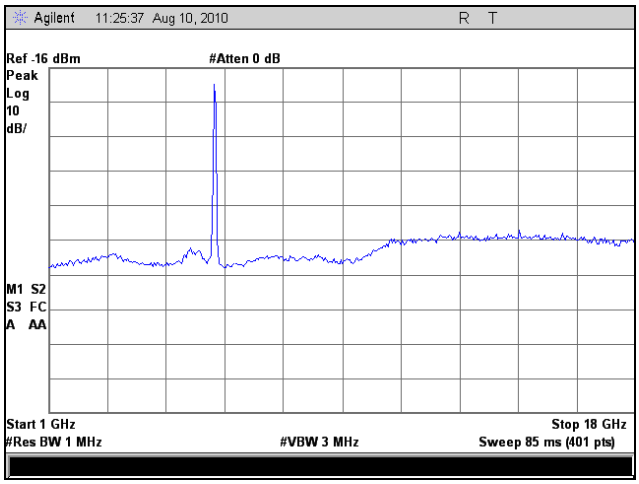


Plot 129. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 40 MHz, Low Channel, Sector Antenna



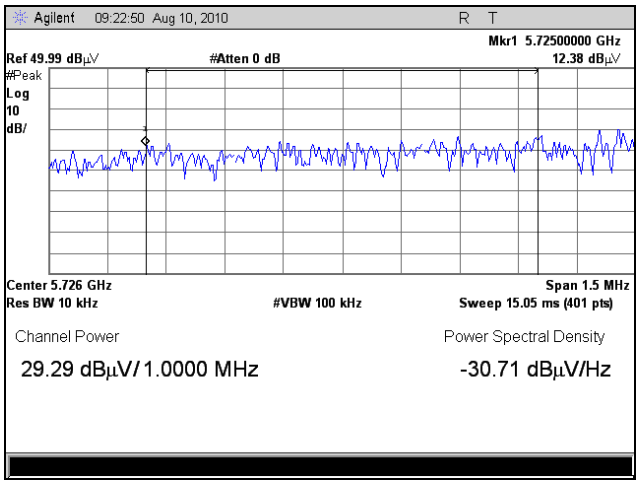
Plot 130. Radiated Spurs, 30 MHz – 1 GHz, 802.11n 40 MHz, High Channel, Sector Antenna

Radiated Spurious Emissions Test Results, 802.11n 40 MHz, Sector Antenna

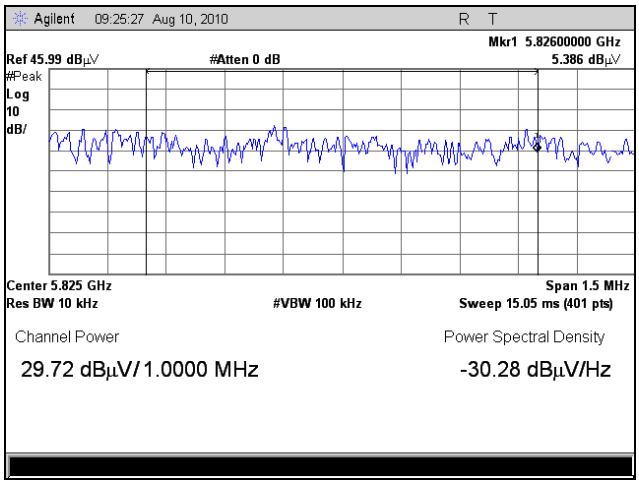


Plot 131. Radiated Spurs, 1 GHz – 18 GHz, 802.11n 40 MHz, High Channel, Sector Antenna

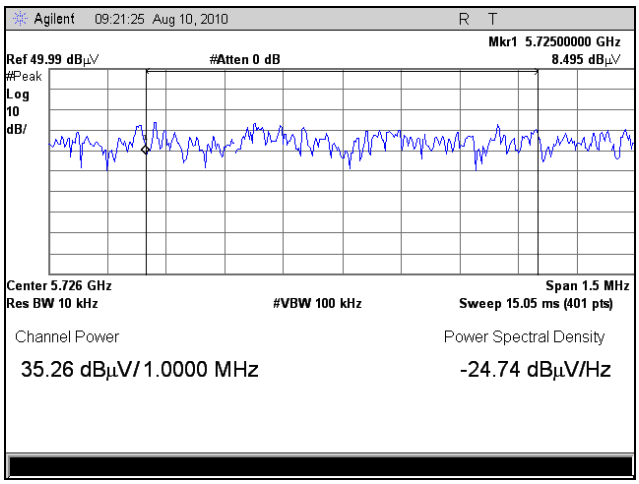
Radiated Band Edge Test Results, 9 dBi Omni Antenna



Plot 132. Radiated Band Edge, 802.11a, Low Channel, 9 dBi Omni Antenna

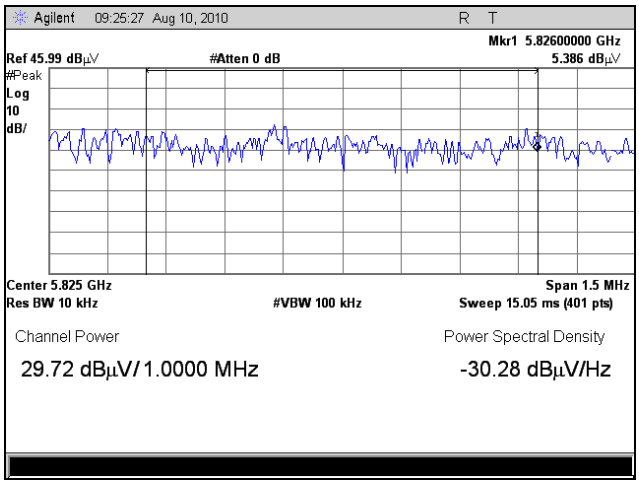


Plot 133. Radiated Band Edge, 802.11a, High Channel, 9 dBi Omni Antenna

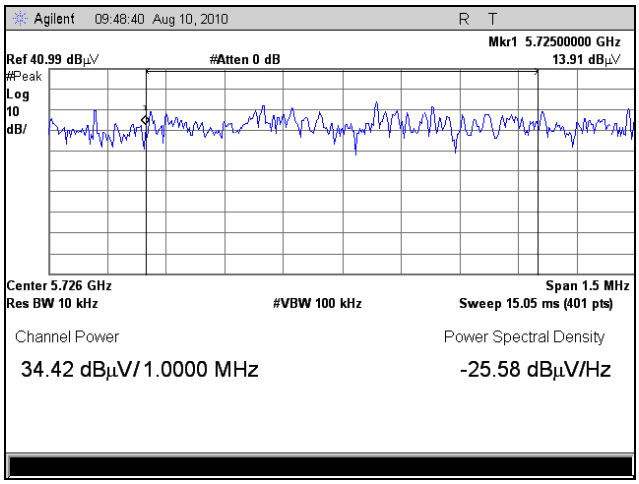


Plot 134. Radiated Band Edge, 802.11n 20 MHz, Low Channel, 9 dBi Omni Antenna

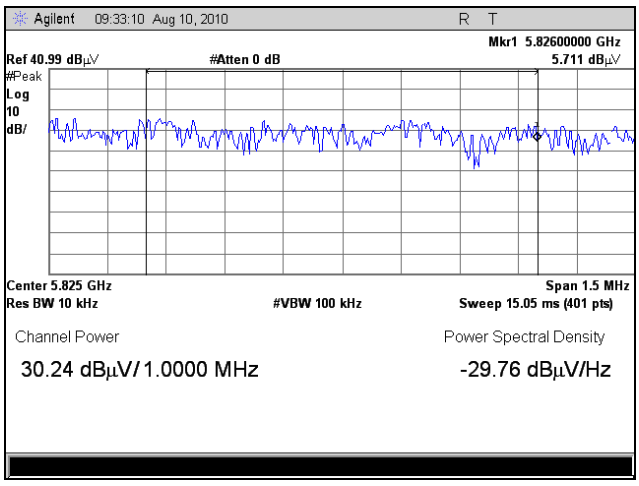
Radiated Band Edge Test Results, 9 dBi Omni Antenna



Plot 135. Radiated Band Edge, 802.11n 20 MHz, High Channel, 9 dBi Omni Antenna

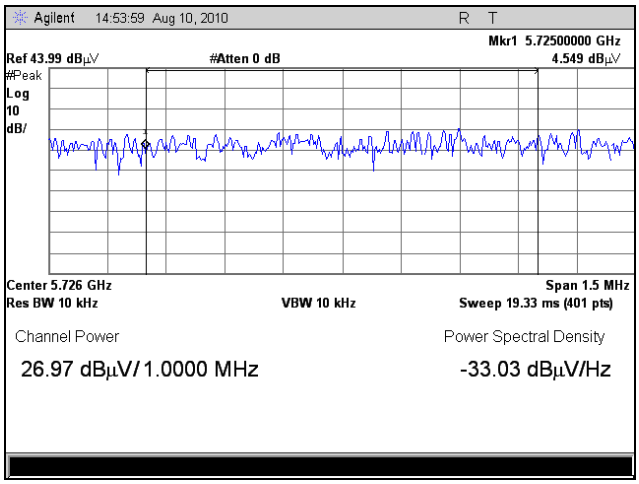


Plot 136. Radiated Band Edge, 802.11n 40 MHz, Low Channel, 9 dBi Omni Antenna

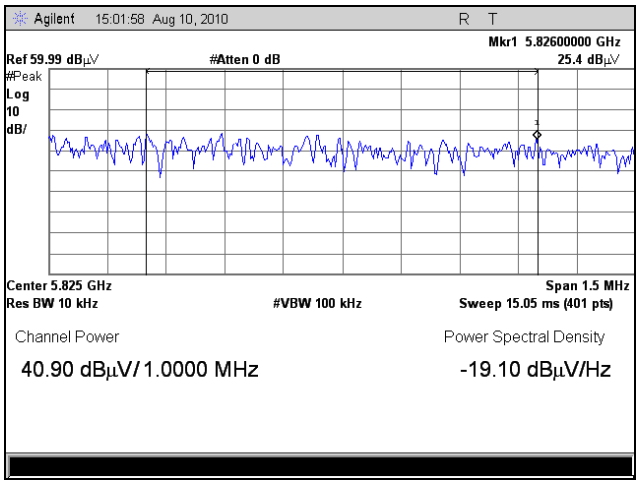


Plot 137. Radiated Band Edge, 802.11n 40 MHz, High Channel, 9 dBi Omni Antenna

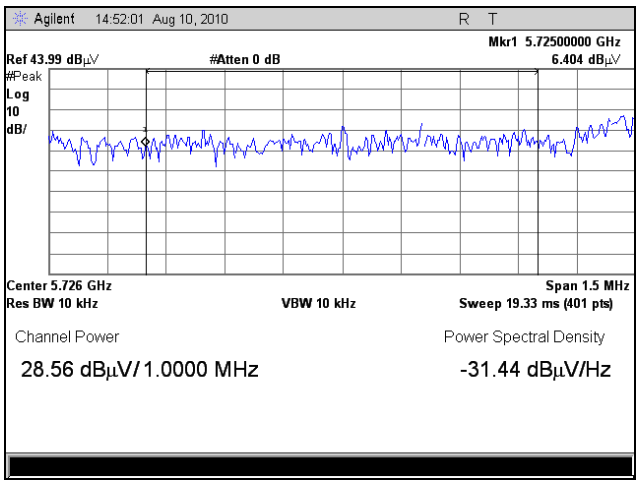
Radiated Band Edge Test Results, Panel Antenna



Plot 138. Radiated Band Edge, 802.11a, Low Channel, Panel Antenna

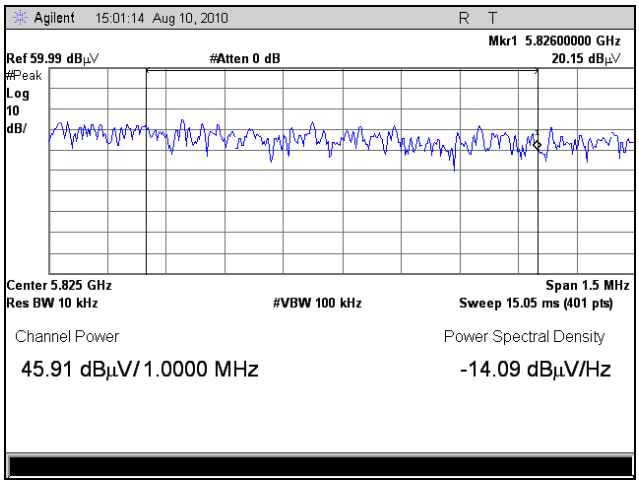


Plot 139. Radiated Band Edge, 802.11a, High Channel, Panel Antenna

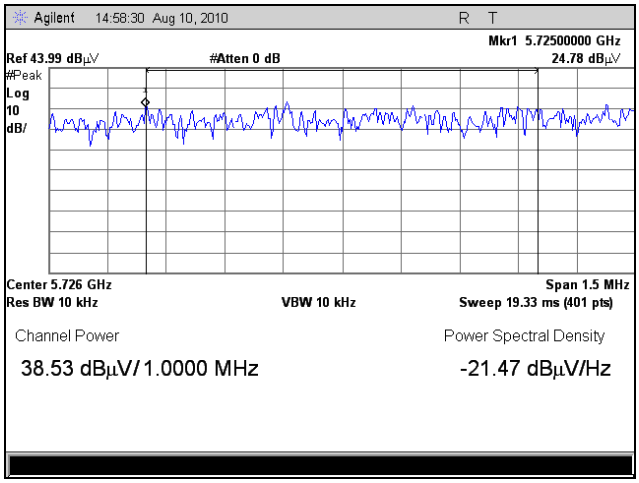


Plot 140. Radiated Band Edge, 802.11n 20 MHz, Low Channel, Panel Antenna

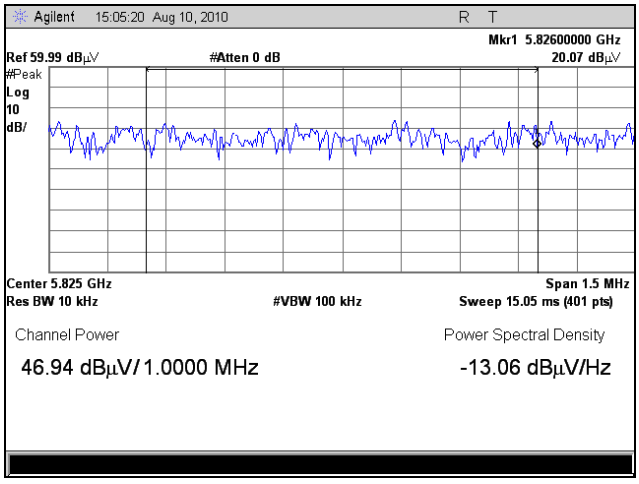
Radiated Band Edge Test Results, Panel Antenna



Plot 141. Radiated Band Edge, 802.11n 20 MHz, High Channel, Panel Antenna

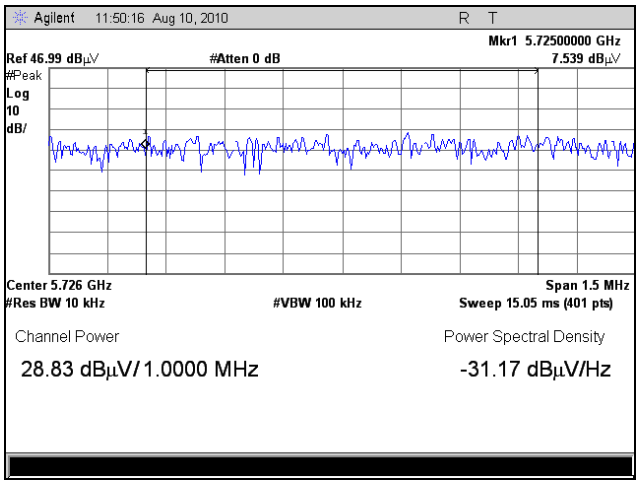


Plot 142. Radiated Band Edge, 802.11n 40 MHz, Low Channel, Panel Antenna

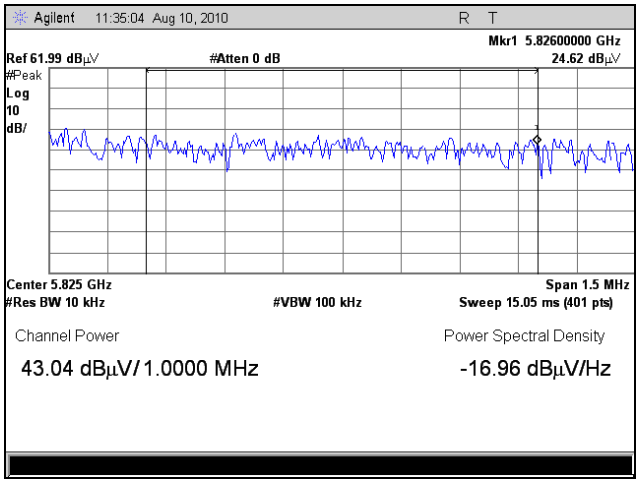


Plot 143. Radiated Band Edge, 802.11n 40 MHz, High Channel, Panel Antenna

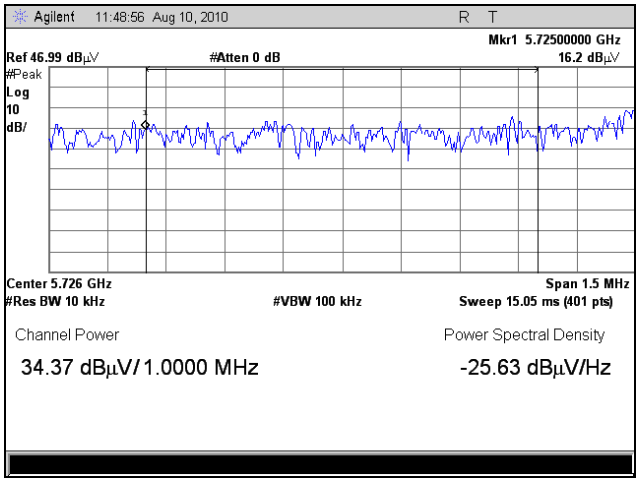
Radiated Band Edge Test Results, Sector Antenna



Plot 144. Radiated Band Edge, 802.11a, Low Channel, Sector Antenna

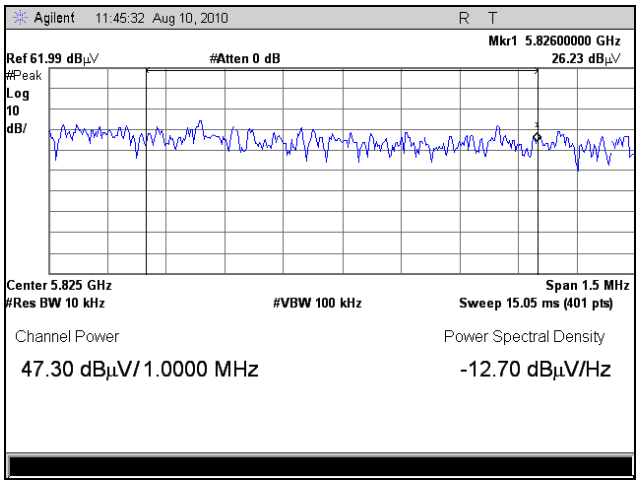


Plot 145. Radiated Band Edge, 802.11a, High Channel, Sector Antenna

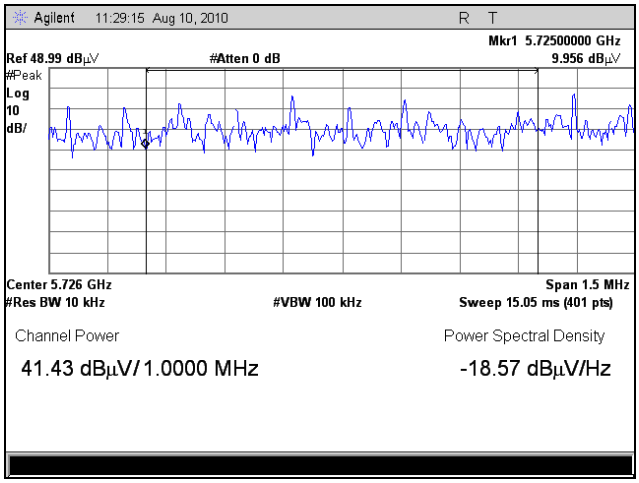


Plot 146. Radiated Band Edge, 802.11n 20 MHz, Low Channel, Sector Antenna

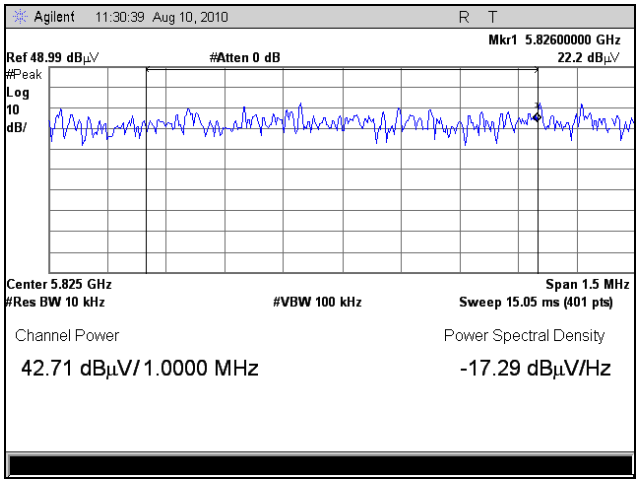
Radiated Band Edge Test Results, Sector Antenna



Plot 147. Radiated Band Edge, 802.11n 20 MHz, High Channel, Sector Antenna



Plot 148. Radiated Band Edge, 802.11n 40 MHz, Low Channel, Sector Antenna



Plot 149. Radiated Band Edge, 802.11n 40 MHz, High Channel, Sector Antenna

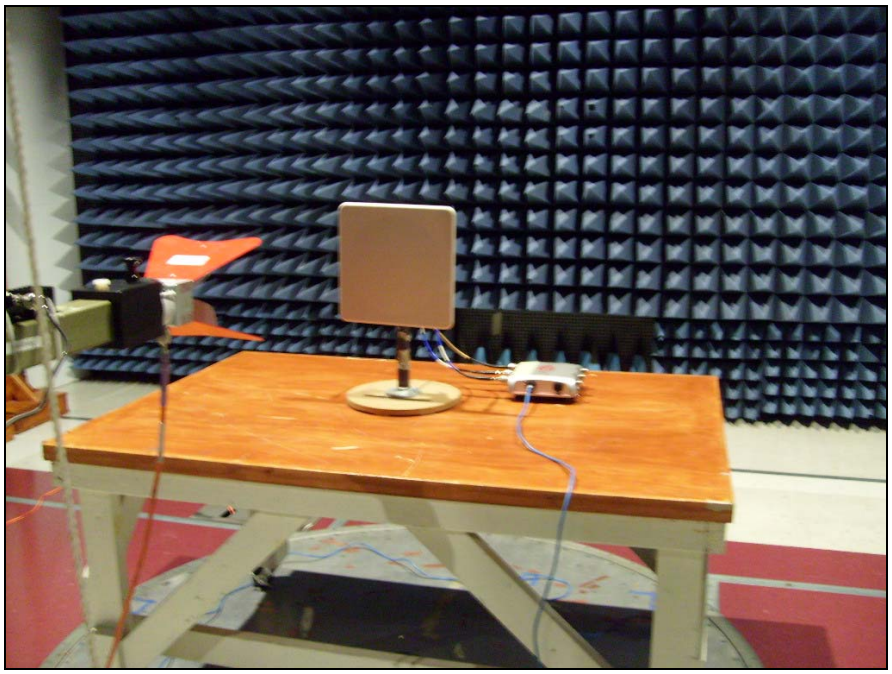
Electromagnetic Compatibility Criteria for Intentional Radiators

§15.407 (b)(3) Radiated Band Edge

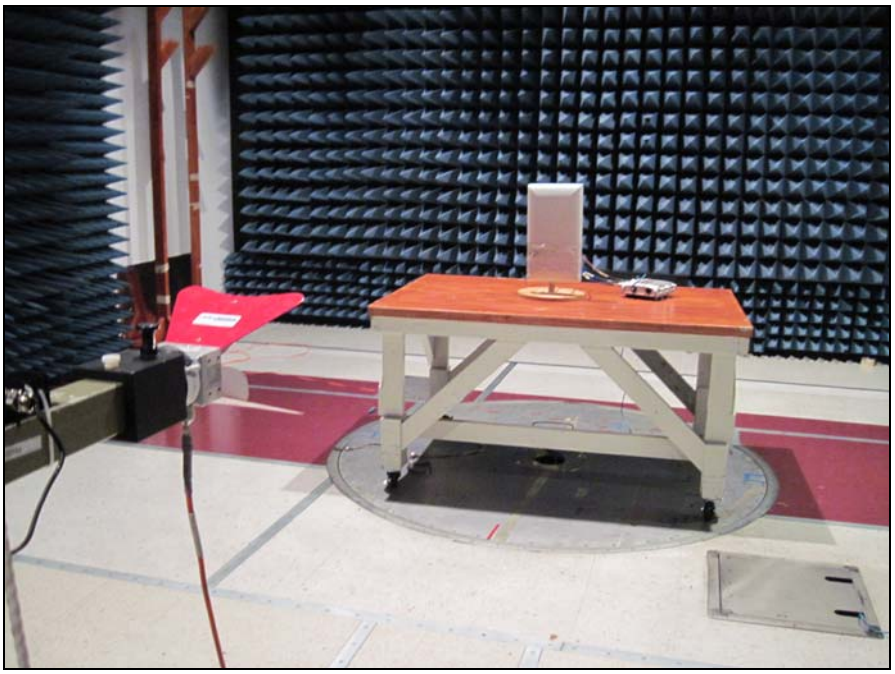
3dBi Omni Antenna								
a mode	Frequency MHz	Uncorrected Peak (dBuV)	Cable Loss	ACF	DCF	Corrected	Limit (dBuV/m)	Margin
	5745	28.17	5.21	35	9.54	58.84	78.26	-19.42
	5805	43.31	5.43	35	9.54	74.2	78.26	-4.06
HT 20	Frequency MHz	Uncorrected Peak (dBuV)	Cable Loss	ACF	DCF	Corrected	Limit (dBuV/m)	Margin
	5745	38.49	5.21	35	9.54	69.16	78.26	-9.1
	5805	47.1	5.43	35	9.54	77.99	78.26	-0.27
HT 40	Frequency MHz	Uncorrected Peak (dBuV)	Cable Loss	ACF	DCF	Corrected	Limit (dBuV/m)	Margin
	5755	41.11	5.21	35	9.54	71.78	78.26	-6.48
	5795	46.71	5.43	35	9.54	77.6	78.26	-0.66

Table 50. EIRP, 3 dBi Omni

Note: EIRP Limit -17dBm/MHz = 78.26dBuV/m



Photograph 6. EIRP, Test Setup, 1 m



Photograph 7. EIRP, Test Setup, 3 m

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(g) Frequency Stability

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

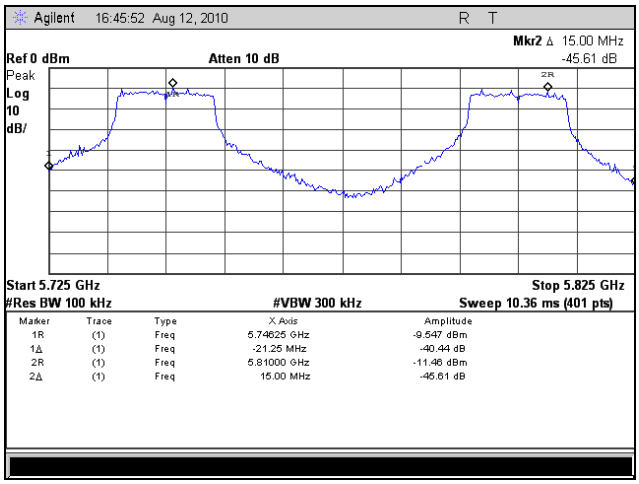
Test Procedure: The EUT was connected directly to a spectrum analyzer through a attenuator. The resolution band width of the spectrum analyzer was set to 100 KHz. A delta marker was used to verify that the carrier's peak to band edge remained at least 20dBc.

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

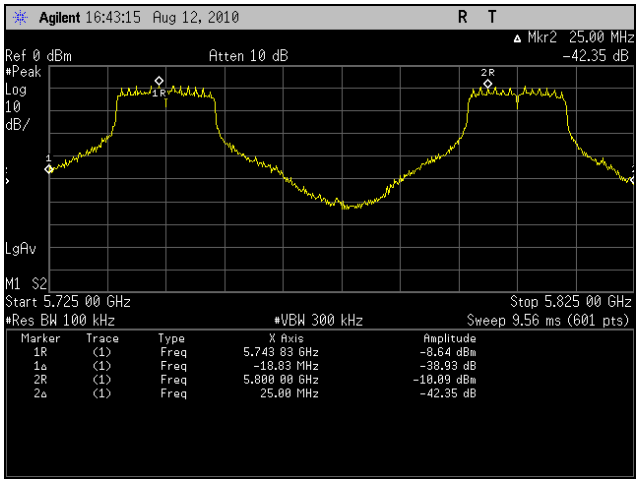
Test Engineer(s): Anderson Soungpanya

Test Date(s): 09/16/10

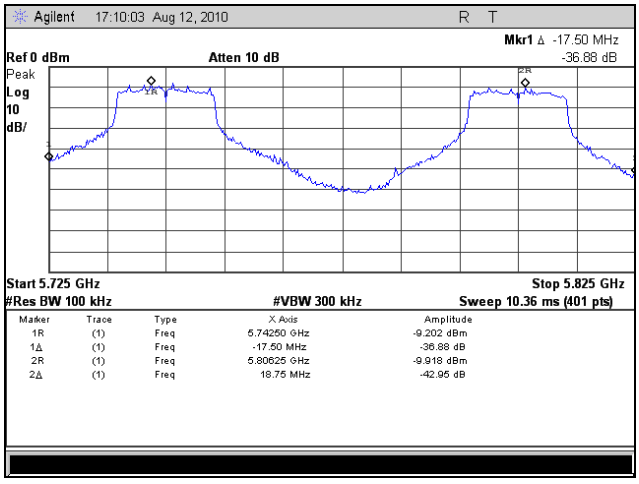
Frequency Stability Test Results, 802.11a



Plot 150. Frequency Stability, 802.11a, Min. Voltage, Min. Temperature

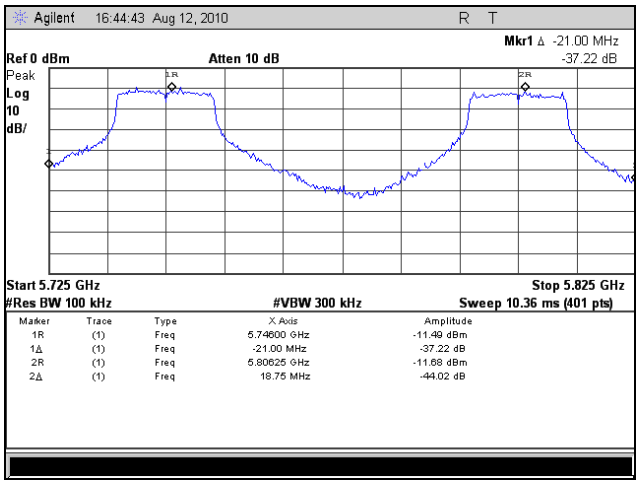


Plot 151. Frequency Stability, 802.11a, Min. Voltage, Nom. Temperature

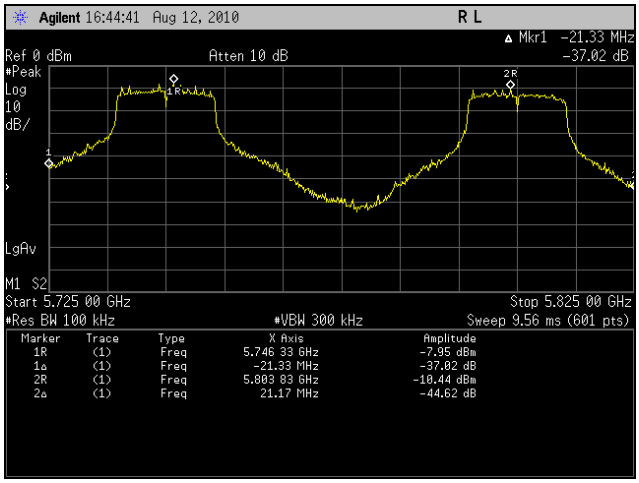


Plot 152. Frequency Stability, 802.11a, Min. Voltage, Max. Temperature

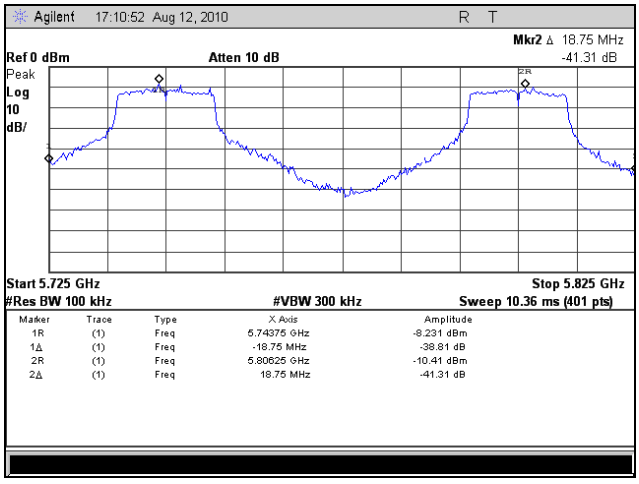
Frequency Stability Test Results, 802.11a



Plot 153. Frequency Stability, 802.11a, Nom. Voltage, Min. Temperature

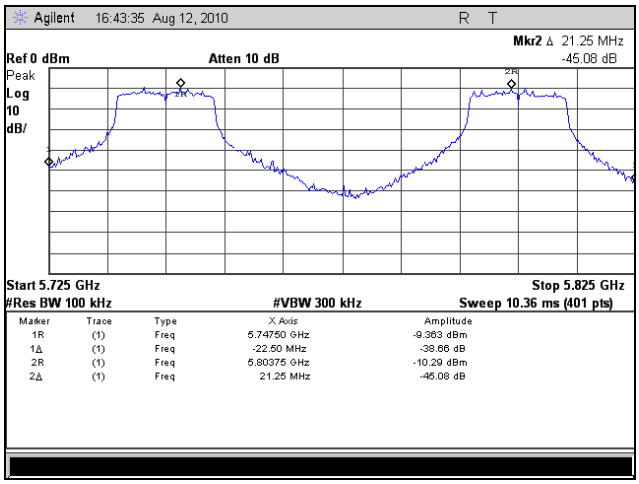


Plot 154. Frequency Stability, 802.11a, Nom. Voltage, Nom. Temperature

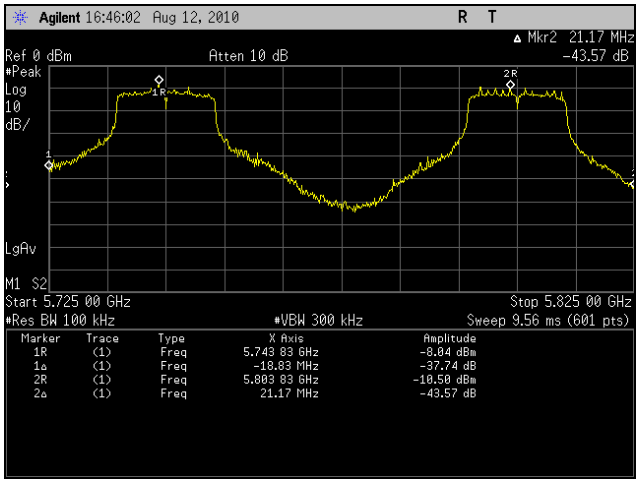


Plot 155. Frequency Stability, 802.11a, Nom. Voltage, Max. Temperature

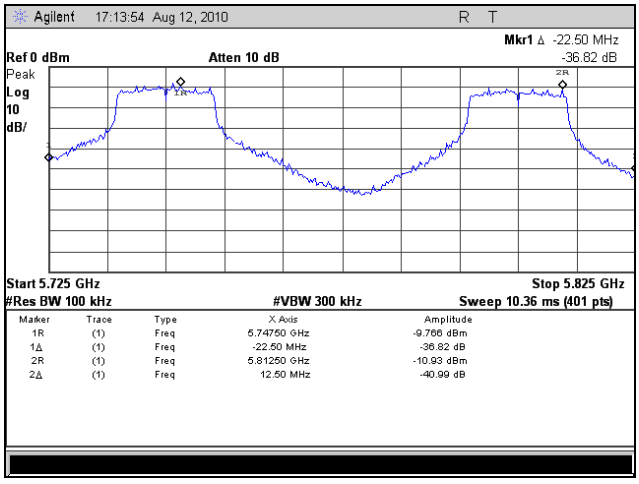
Frequency Stability Test Results, 802.11a



Plot 156. Frequency Stability, 802.11a, Max. Voltage, Min. Temperature

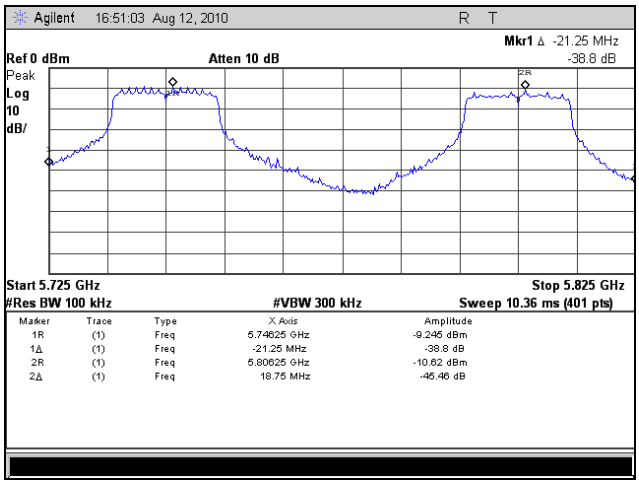


Plot 157. Frequency Stability, 802.11a, Max. Voltage, Nom. Temperature

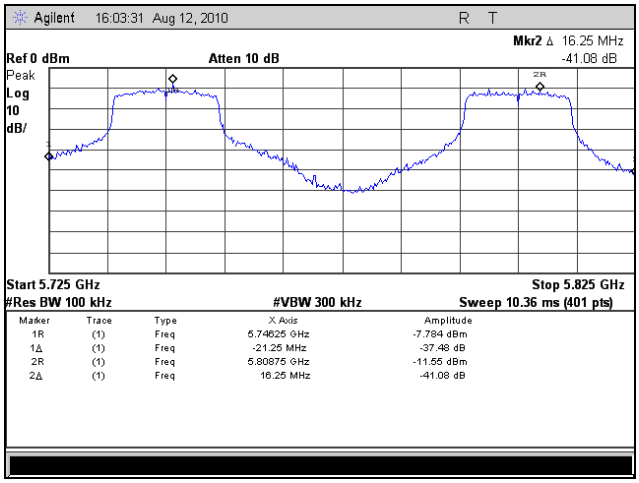


Plot 158. Frequency Stability, 802.11a, Max. Voltage, Max. Temperature

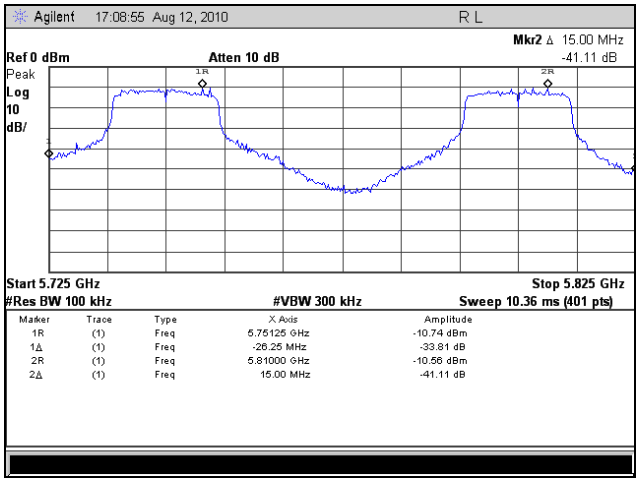
Frequency Stability Test Results, 802.11n 20 MHz



Plot 159. Frequency Stability, 802.11n 20 MHz, Min. Voltage, Min. Temperature

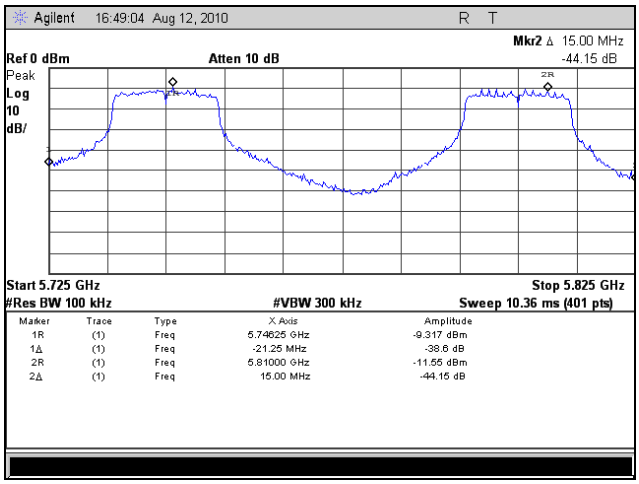


Plot 160. Frequency Stability, 802.11n 20 MHz, Min. Voltage, Nom. Temperature

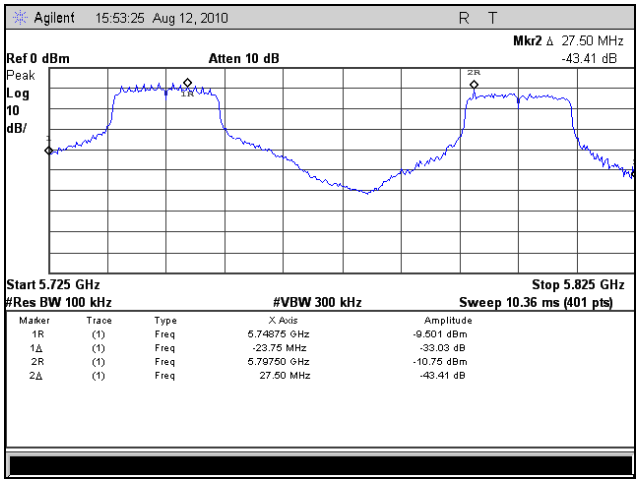


Plot 161. Frequency Stability, 802.11n 20 MHz, Min. Voltage, Max. Temperature

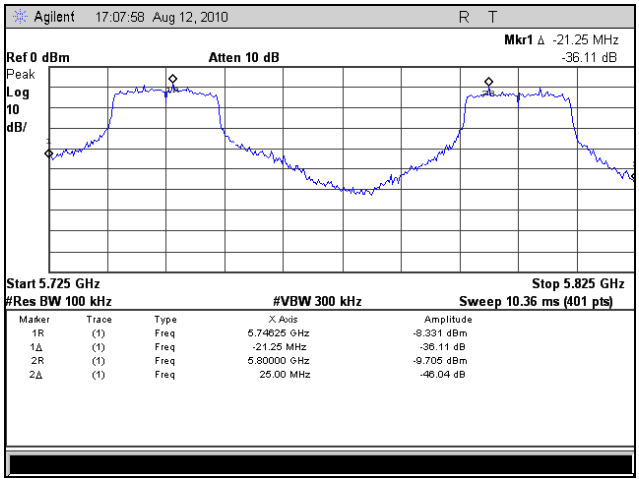
Frequency Stability Test Results, 802.11n 20 MHz



Plot 162. Frequency Stability, 802.11n 20 MHz, Nom. Voltage, Min. Temperature

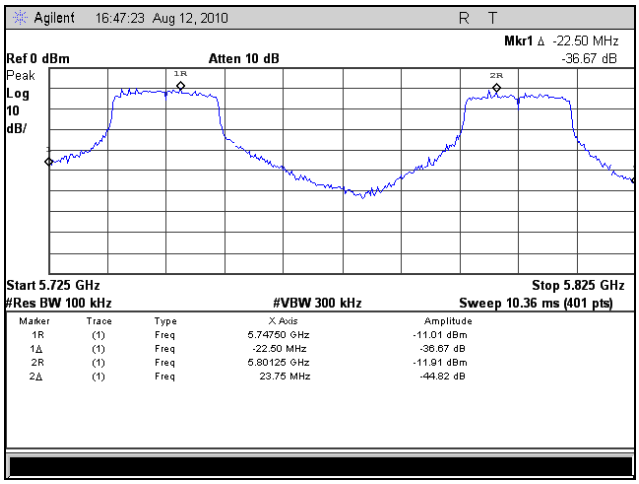


Plot 163. Frequency Stability, 802.11n 20 MHz, Nom. Voltage, Nom. Temperature

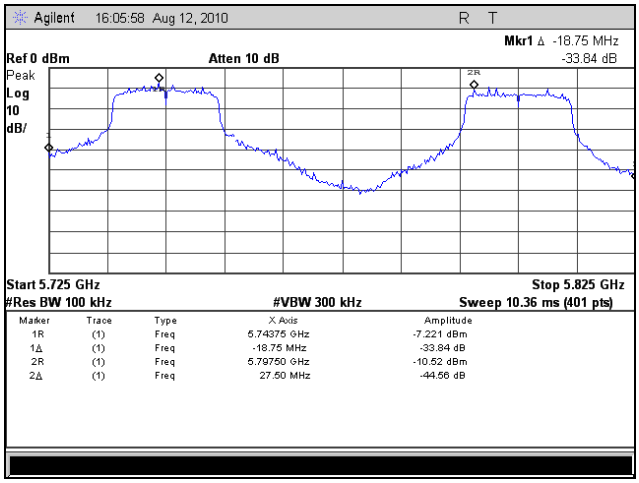


Plot 164. Frequency Stability, 802.11n 20 MHz, Nom. Voltage, Max. Temperature

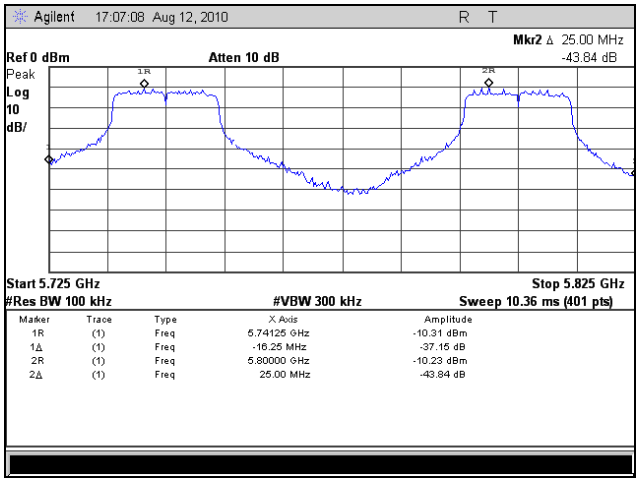
Frequency Stability Test Results, 802.11n 20 MHz



Plot 165. Frequency Stability, 802.11n 20 MHz, Max. Voltage, Min. Temperature

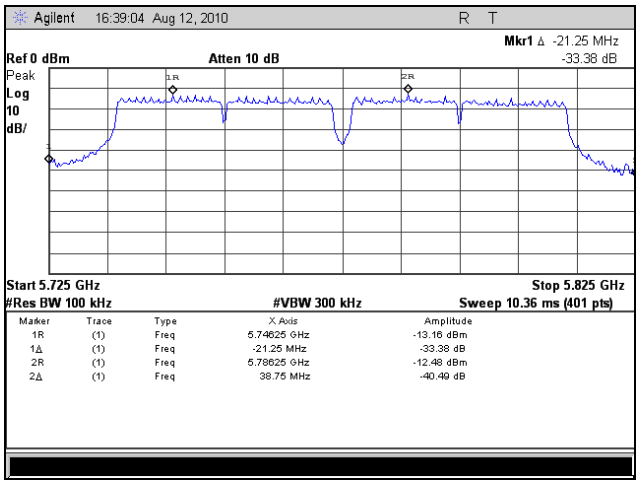


Plot 166. Frequency Stability, 802.11n 20 MHz, Max. Voltage, Nom. Temperature

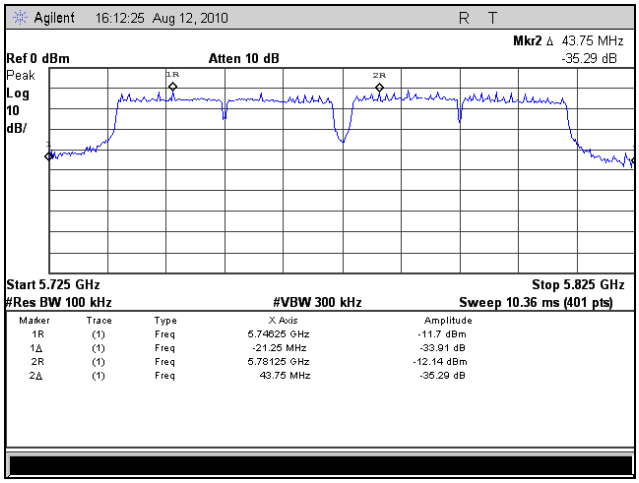


Plot 167. Frequency Stability, 802.11n 20 MHz, Max. Voltage, Max. Temperature

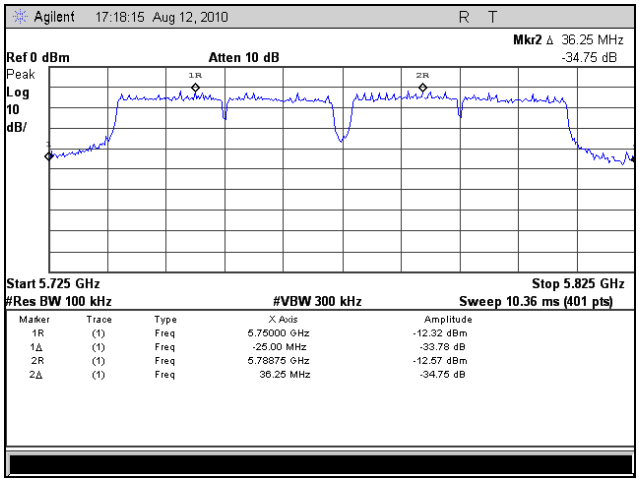
Frequency Stability Test Results, 802.11n 40 MHz



Plot 168. Frequency Stability, 802.11n 40 MHz, Min. Voltage, Min. Temperature

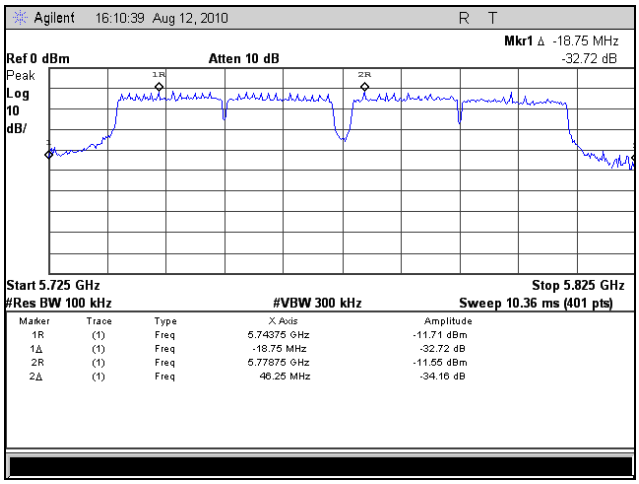


Plot 169. Frequency Stability, 802.11n 40 MHz, Min. Voltage, Nom. Temperature

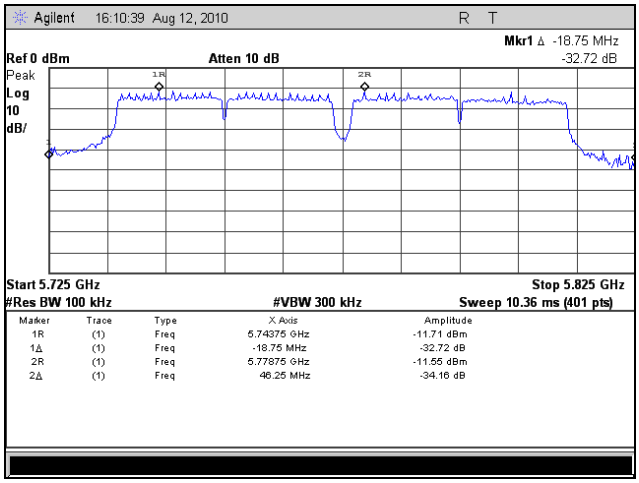


Plot 170. Frequency Stability, 802.11n 40 MHz, Min. Voltage, Max. Temperature

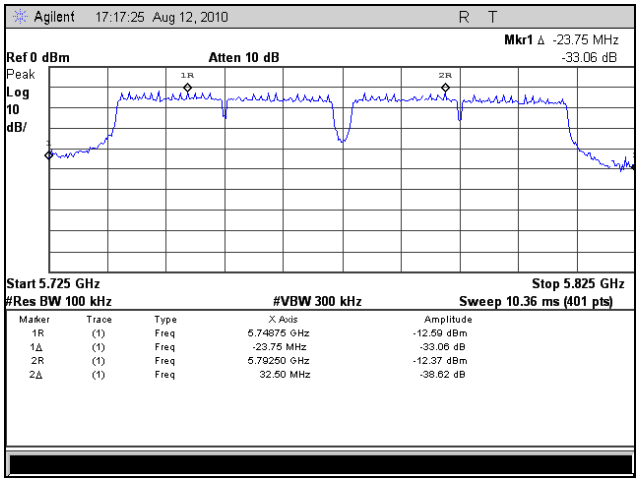
Frequency Stability Test Results, 802.11n 40 MHz



Plot 171. Frequency Stability, 802.11n 40 MHz, Nom. Voltage, Min. Temperature

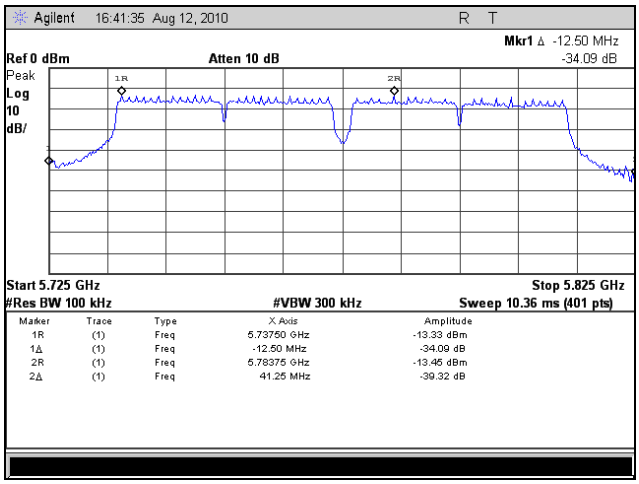


Plot 172. Frequency Stability, 802.11n 40 MHz, Nom. Voltage, Nom. Temperature

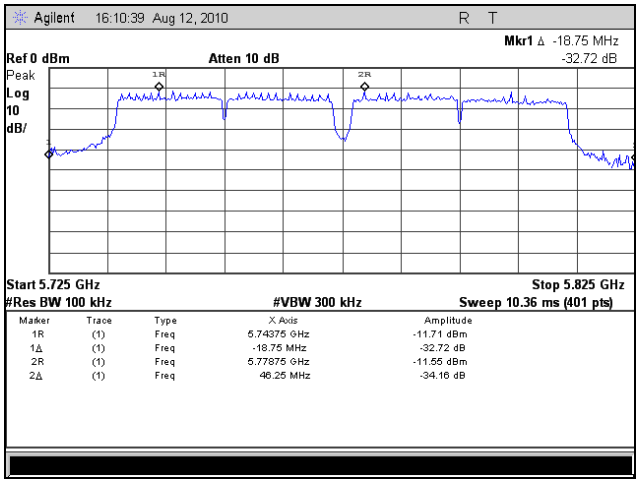


Plot 173. Frequency Stability, 802.11n 40 MHz, Nom. Voltage, Max. Temperature

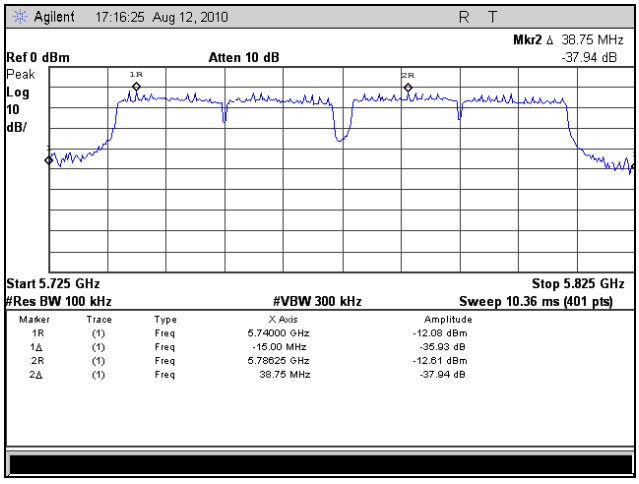
Frequency Stability Test Results, 802.11n 40 MHz



Plot 174. Frequency Stability, 802.11n 40 MHz, Max. Voltage, Min. Temperature



Plot 175. Frequency Stability, 802.11n 40 MHz, Max. Voltage, Nom. Temperature



Plot 176. Frequency Stability, 802.11n 40 MHz, Max. Voltage, Max. Temperature

Electromagnetic Compatibility Criteria for Intentional Radiators

RSS-GEN Receiver Spurious

Test Requirement: If the device has a detachable antenna of known antenna impedance, then the antenna conducted method is permitted in lieu of a radiated measurement.

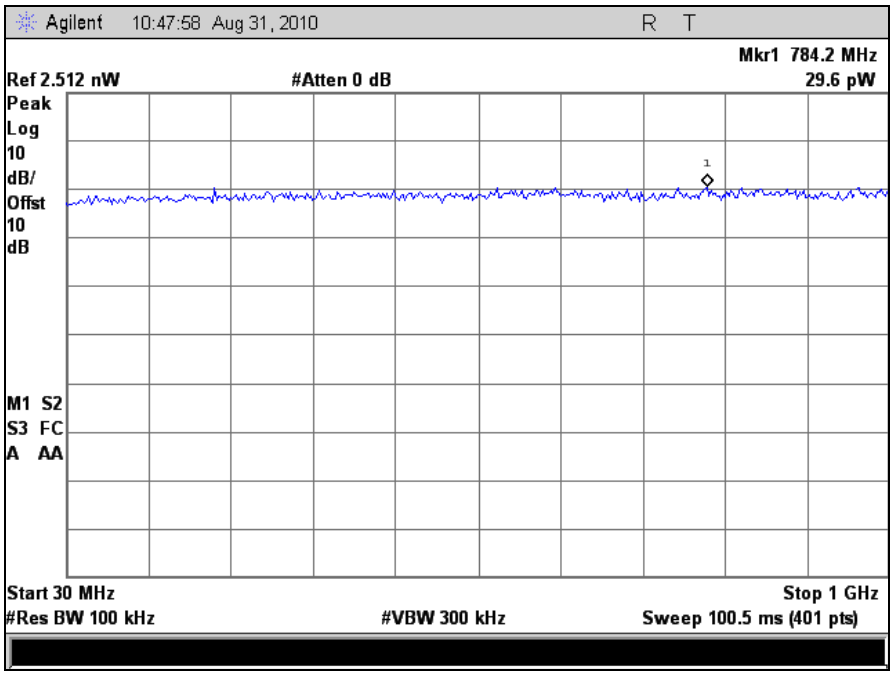
If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30 – 1000 MHz, or 5 nanowatts above 1 GHz.

Test Procedure: The EUT was directly connected to a spectrum analyzer. Testing was performed when the EUT was receiving. Testing was performed conducted.

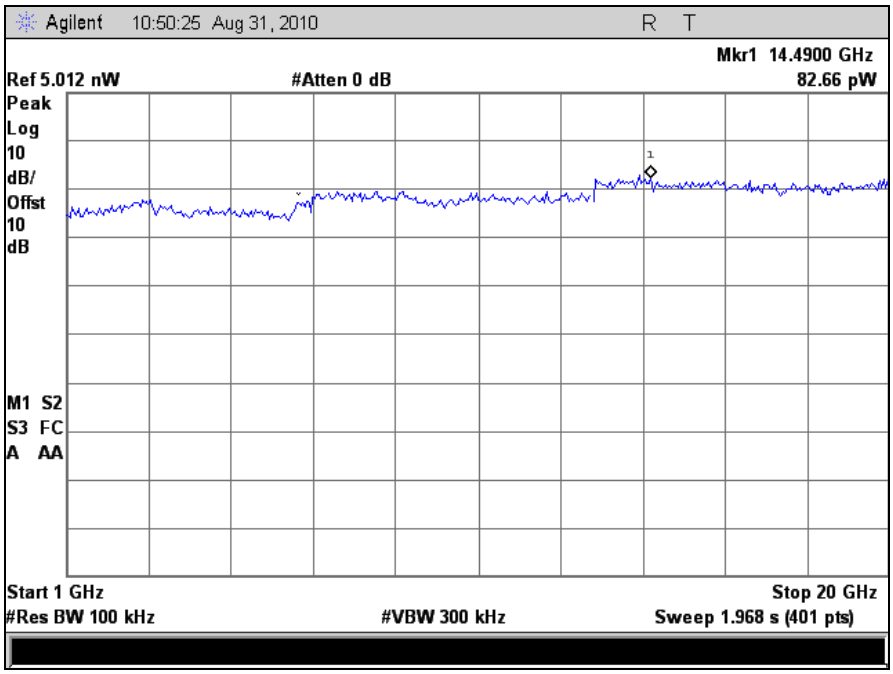
Results: The EUT as tested is compliant with the requirements of RSS-GEN.

Test Engineer(s): Anderson Soungpanya

Receiver Spurious Emissions Test Results



Plot 177. Receiver Spurious Emission, 3 0MHz – 1 GHz



Plot 178. Receiver Spurious Emission, 1 GHz – 20 GHz

IV. Test Equipment

Test Equipment

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

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2501	EMI RECEIVER	ROHDE&SCHWARZ	ESU40	06/03/2010	06/03/2011
1S2484	BILOG ANTENNA	TESEQ	CBL6112D	1/27/2009	1/27/2011
1S2399	TURNTABLE CONTROLLER	SUNOL SCIENCE	SC99V	NOT REQUIRED	
1S2522	DIGITAL THERMO/HYGROMETER	CONTROL COMPANY	11-661-7D	11/11/2009	11/11/2010
1S2482	5M CHAMBER	PANASHIELD	N/A	10/16/2009	10/16/2010
1S2603	DOUBLE RIDGED WAVEGUIDE HORN	ETS-LINGREN	3117	04/09/2009	04/09/2011
1S2121	PRE-AMPLIFIER	HEWLETT PACKARD	8449B	SEE NOTE	
N/A	HIGH PASS FILTER	MICRO-TRONICS	HPM13146	SEE NOTE	
1S2430	WIDEBAND POWER METER	ANRITSU COMPANY	ML2488A	05/26/2009	06/26/2010
1S2432	WIDEBAND POWER SENSOR	ANRITSU COMPANY	MA2491A	05/26/2009	06/26/2010
1S2034	COUPLER, DIRECTIONAL 1-20 GHZ	KRYTAR	101020020	SEE NOTE	
1S2583	SPECTRUM ANALYZER	AGILENT	E4447A	01/26/2010	01/26/2011
1S2460	ANALYZER, SPECTRUM 9 KHZ-40GHZ	AGILENT	E4407B	07/13/2010	07/213/2011
1S2229	TEMPERATURE CHAMBER	TENNY ENGINEERING	T63C	02/19/2010	02/19/2011
1S2128	HARMONIC MIXER	HEWLETT PACKARD	11970A	11/22/2008	11/22/2010
1S2129	HARMONIC MIXER	HEWLETT PACKARD	11970K	11/22/2008	11/22/2010

Table 51. Test Equipment List

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

V. Certification & User's Manual Information

Certification & User's Manual Information

A. Certification Information

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

§ 2.801 Radio-frequency device defined.

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

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

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

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

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

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

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

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

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

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

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

(i) Compliance testing;

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

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

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

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

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

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

Certification & User's Manual Information

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

§ 2.901 Basis and Purpose

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

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

§ 2.907 Certification.

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

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

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

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

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

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

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

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

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

Certification & User's Manual Information

Label and User's Manual Information

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

§ 15.19 Labeling requirements.

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

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

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

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

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

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

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

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

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

§ 15.21 Information to user.

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

Verification & User's Manual Information

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

§ 15.105 Information to the user.

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

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

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

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

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

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

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

End of Report

