MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
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3162 BELICK STREET ● SANTA CLARA, CA 95054 ● PHONE (408) 748-3585 ● FAX (510) 489-6372
13301 MCCALLEN PASS ● AUSTIN, TX 78753 ● PHONE (512) 287-2500 ● FAX (512) 287-2513

June 27, 2012

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

Dear Rajendran Chary,

Enclosed is the EMC Wireless test report for compliance testing of the Meru Networks, Inc., Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15, Subpart B, ICES-003, Issue 4 February 2004 for a Class B Digital Device and FCC Part 15 Subpart C, RSS-210, Issue 8, Dec. 2010 for Intentional Radiators.

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

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Meru Networks, Inc.\EMCS34526B-FCC247 Rev. 1)

Electromagnetic Compatibility Criteria
Test Report

for the

Meru Networks, Inc.
Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15 Subpart B & ICES-003
for Class B Digital Devices
&
15.247 Subpart C & RSS-210, Issue 8, Dec. 2010
for Intentional Radiators

MET Report: EMCS34526B-FCC247 Rev. 1

June 27, 2012

Prepared For:

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

Prepared By:
MET Laboratories, Inc.
3162 Belick St.
Santa Clara, CA 95054

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for Intentional Radiators

Anderson Soungpanya, 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 the FCC Rules Parts 15B, 15.247 and Industry Canada standards ICES-003, Issue 4 February 2004, RSS-210, Issue 8, Dec. 2010 under normal use and maintenance.

Shawn McMillen,
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	May 25, 2012	Initial Issue.
1	June 27, 2012	Revised to reflect engineer corrections.

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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**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
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 Meru Networks, Inc. Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i, with the requirements of Part 15, §15.247. 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 Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i. Meru Networks, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.247, in accordance with Meru Networks, Inc., purchase order number 103991. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference 47 CFR Part 15.247:2005	IC Reference RSS-210 Issue 8: 2010; RSS-GEN Issue 3: 2010	Description	Compliance
47 CFR Part 15.107 (a)	ICES-003 Issue 4 February 2004	Conducted Emission Limits for a Class B Digital Device	Compliant
47 CFR Part 15.109 (a)	ICES-003 Issue 4 February 2004	Radiated Emission Limits for a Class B Digital Device	Compliant
Title 47 of the CFR, Part 15 §15.203	N/A	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	RSS-GEN (7.2.4)	Conducted Emission Limits	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(2)	RSS-Gen(4.6)	6dB Occupied Bandwidth	Compliant
		99% Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(b)	RSS-210(A8.4)	Peak Power Output	Compliant
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	RSS-210(A8.5)	Radiated Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	RSS-210(A8.5)	RF Conducted Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	RSS-210(A8.5)	RF Conducted Band Edge	Compliant
Title 47 of the CFR, Part 15; §15.247(e)	RSS-210(A8.2)	Peak Power Spectral Density	Compliant
Title 47 of the CFR, Part 15 §15.247(i)	RSS-Gen(5.6) / RSS-102	Maximum Permissible Exposure (MPE)	Compliant
N/A	RSS-Gen(4.10)	Receiver Spurious Emissions	Compliant

Table 1. Executive Summary of EMC Part 15.247 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Meru Networks, Inc. to perform testing on the Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i, under Meru Networks, Inc.'s purchase order number 103991.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Meru Networks, Inc., Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i.

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

Model(s) Tested:	Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i	
Model(s) Covered:	Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i	
EUT Specifications:	Primary Power: 120-230 VAC, 50-60 Hz	
	Highest Clock Frequency: 66 MHz	
	FCC ID: RE7-AP332I IC: 6749A-AP332I	
	Type of Modulations:	DSSS, OFDM
	Equipment Code:	DTS
	Peak RF Output Power:	2.4 GHz – 27.15 dBm 5.8 GHz – 25.42 dBm
	EUT Frequency Ranges:	2412 – 2462 MHz; 5745 – 5825 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Anderson Soungpanya	
Report Date(s):	June 27, 2012	

Table 2. EUT Summary Table

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
RSS-210, Issue 8, Dec. 2010	Low-power Licence-exempt Radiocommunications Devices (All Frequency Bands): Category I Equipment
RSS-GEN, Issue 3, Dec. 2010	General Requirements and Information for the Certification of Radio Apparatus
ICES-003, Issue 4 February 2004	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

Radio testing was performed at MET Laboratories, Inc., 3162 Belick St., Santa Clara, CA 95054. Digital testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

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

D. Description of Test Sample

The Meru Networks, Inc. Dual Radio 802.11abgn 3x3 Access Point with internal antenna – AP322i, Equipment Under Test (EUT), is a wireless access point (WAP) that allows wireless devices to connect to a wired network using Wi-Fi, standard. The WAP usually connects to a router (via a wired network), and can relay data between the wireless devices (such as computers or printers) and wired devices on the network.

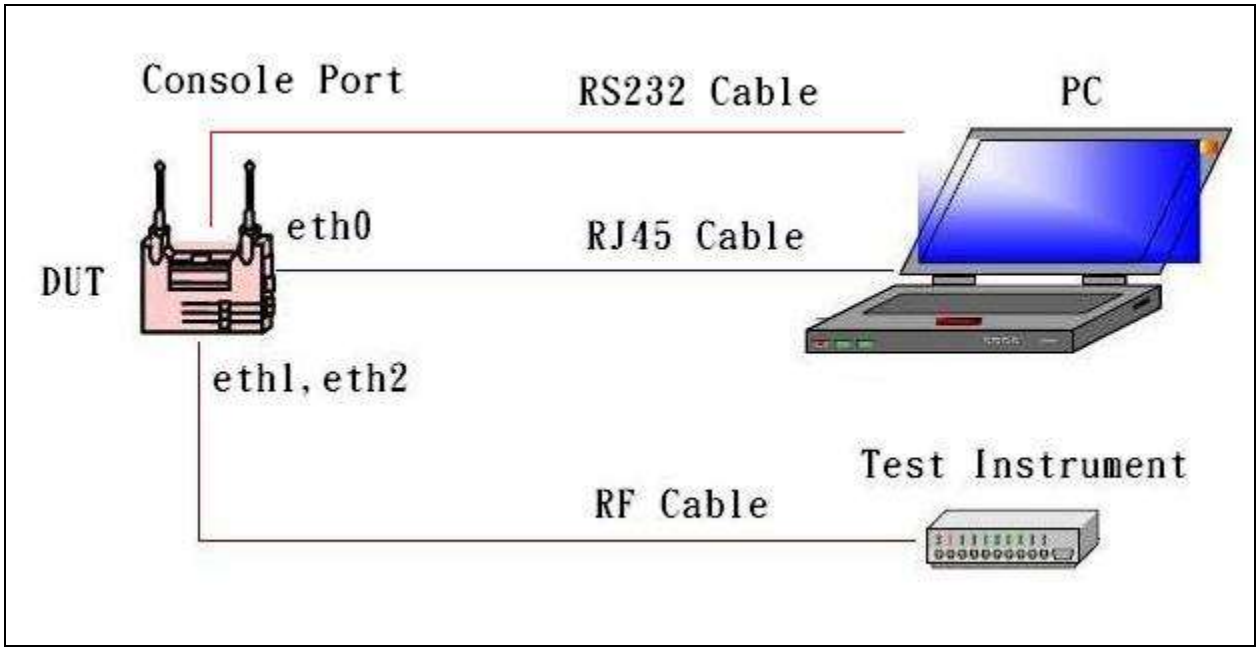


Figure 1. Block Diagram of Test Configuration

E. Support Equipment

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

SN	Type	Model and Serial Number	Quantity
2	AP433i	SN: 112A332e0DEE9D,112A332e0DEE9B, 112A332e0DEE9F	3
--	Antenna	ERU-ANT-PI622 Internal PIFA Dual-Band 3 x 3	--
10	PoE	PD-9001GR/AC	2
11	PoE	PS-9001G	2
12	Cable	Serial cable	2
13	Cable	Ethernet cable	4
--	--	AC-DC Adapter GS18A12-P1J	2

Table 4. Support Equipment

F. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
--	12V DC	DC power supply	1	1	N	--
--	Console Port	Serial cable	1	1	N	--
--	G1 PoE	Ethernet and PoE port	1	1	1	--

Table 5. Ports and Cabling Information

G. Mode of Operation

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

H. Method of Monitoring EUT Operation

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

I. 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.

J. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

Electromagnetic Compatibility Criteria

§ 15.107 Conducted Emissions Limits

Test Requirement(s):

15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 6. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

15.107 (b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 6. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

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

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

Test Procedures:

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

Test Results:

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

Test Engineer(s):

Jeff Pratt

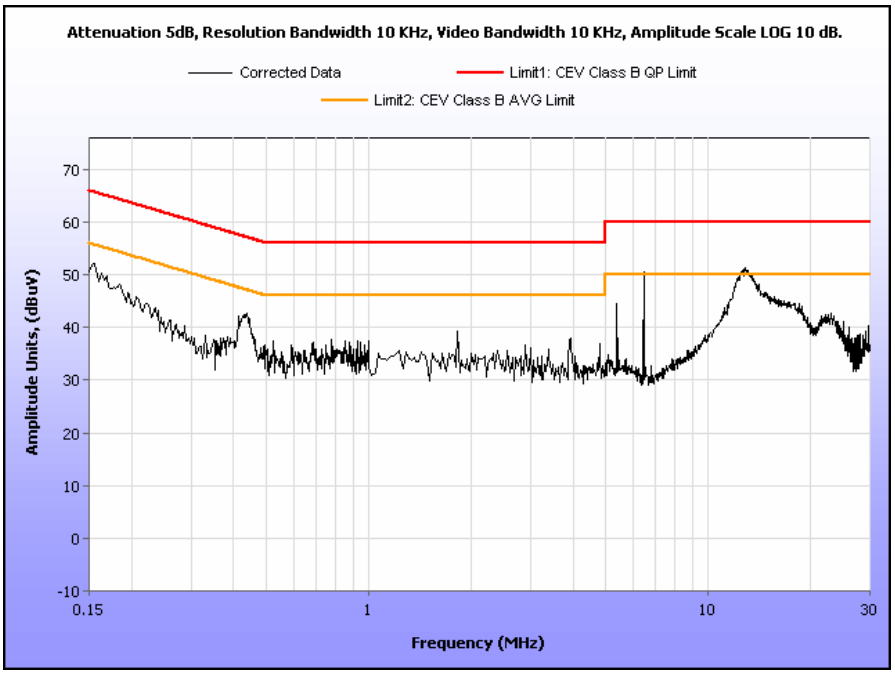
Test Date(s):

05/16/12

Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz), 9001GR

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.212	36.8746193	0.01	36.8846193	63.13	-26.245381	25.1343549	0.01	25.14435492	53.13	-27.9856
0.427	41.2215065	0	41.22150647	57.31	-16.088494	36.7895609	0	36.78956095	47.31	-10.5204
1.368	30.0975692	0	30.09756919	56	-25.902431	24.8657229	0	24.86572292	46	-21.1343
1.963	27.7013955	0.01	27.71139553	56	-28.288604	21.9312488	0.01	21.94124877	46	-24.0588
3.928	29.6001389	0.04	29.64013886	56	-26.359861	20.3989336	0.04	20.43893363	46	-25.5611
12.93	47.2496495	0.12	47.3696495	60	-12.630351	43.0212651	0.12	43.14126507	50	-6.85873

Table 7. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz), 9001GR

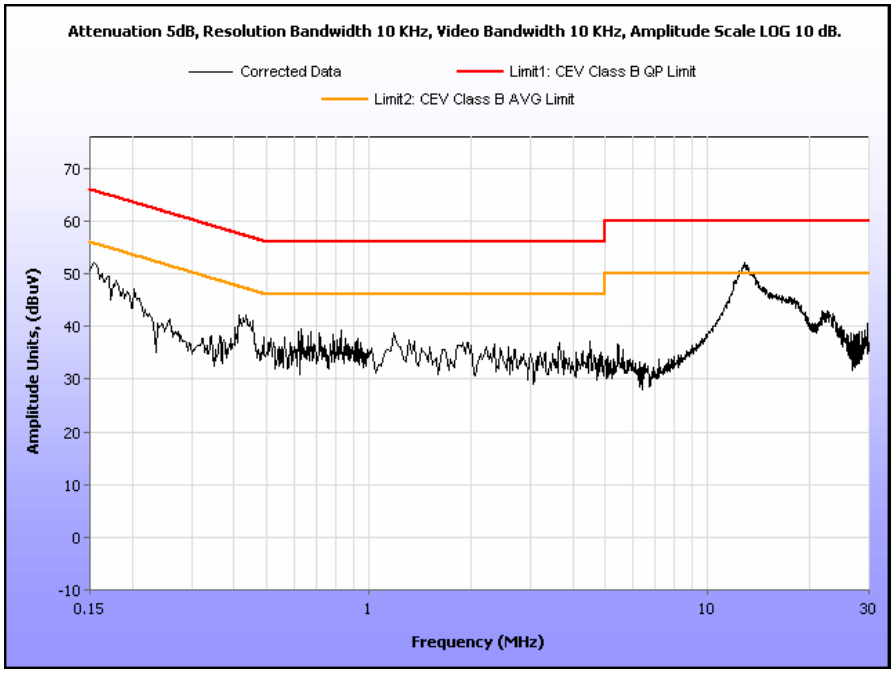


Plot 1. Conducted Emission, Phase Line Plot, 9001GR

Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz), 9001GR

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.154	43.1793052	0	43.17930521	65.78	-22.600695	31.5291306	0	31.52913065	55.78	-24.2509
0.43	39.8342655	0	39.83426551	57.25	-17.415734	35.1963775	0	35.19637755	47.25	-12.0536
1.053	27.4324385	0	27.43243854	56	-28.567561	14.6140309	0	14.61403089	46	-31.386
5.11	27.2872671	0.08	27.36726709	60	-32.632733	21.5836249	0.08	21.66362492	50	-28.3364
13	47.9726865	0.12	48.09268649	60	-11.907314	43.7504144	0.12	43.87041442	50	-6.12959
23.55	36.7744638	0.19	36.9644638	60	-23.035536	30.9481092	0.19	31.13810919	50	-18.8619

Table 8. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz), 9001GR

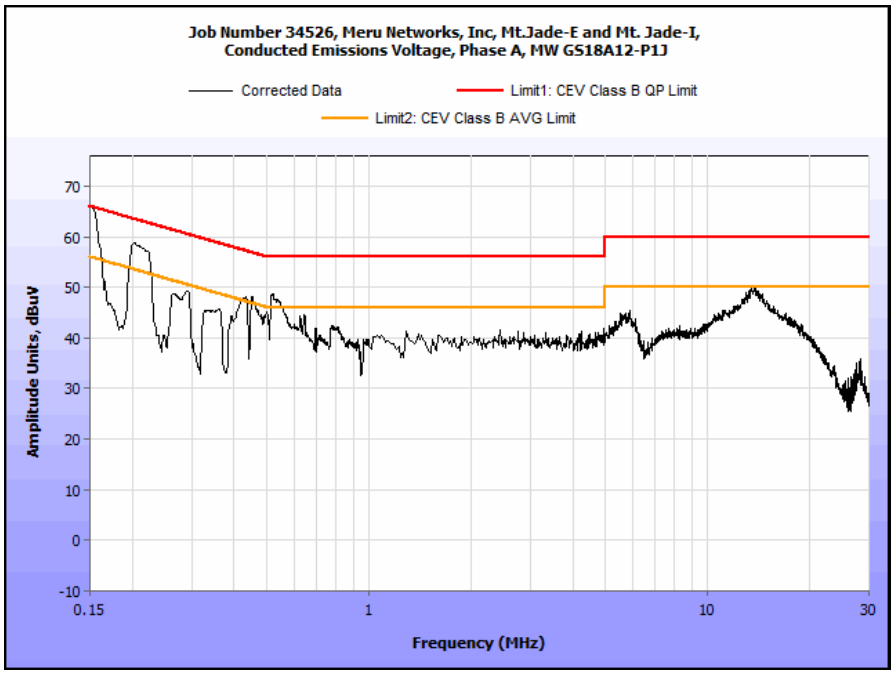


Plot 2. Conducted Emission, Neutral Line Plot, 9001GR

Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz), GS18A12-P1J

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.194	46.55	0	46.55	63.86	-17.31	40.32	0	40.32	53.86	-13.54
0.286	44.54	0.03	44.57	60.64	-16.07	32.36	0.03	32.39	50.64	-18.25
0.516	45.7	0	45.7	56	-10.3	31.14	0	31.14	46	-14.86
0.617	38.3	0	38.3	56	-17.7	26.17	0	26.17	46	-19.83
5.852	41.29	0.08	41.37	60	-18.63	35.74	0.08	35.82	50	-14.18
13.594	46.78	0.12	46.9	60	-13.1	40.7	0.12	40.82	50	-9.18

Table 9. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz), GS18A12-P1J

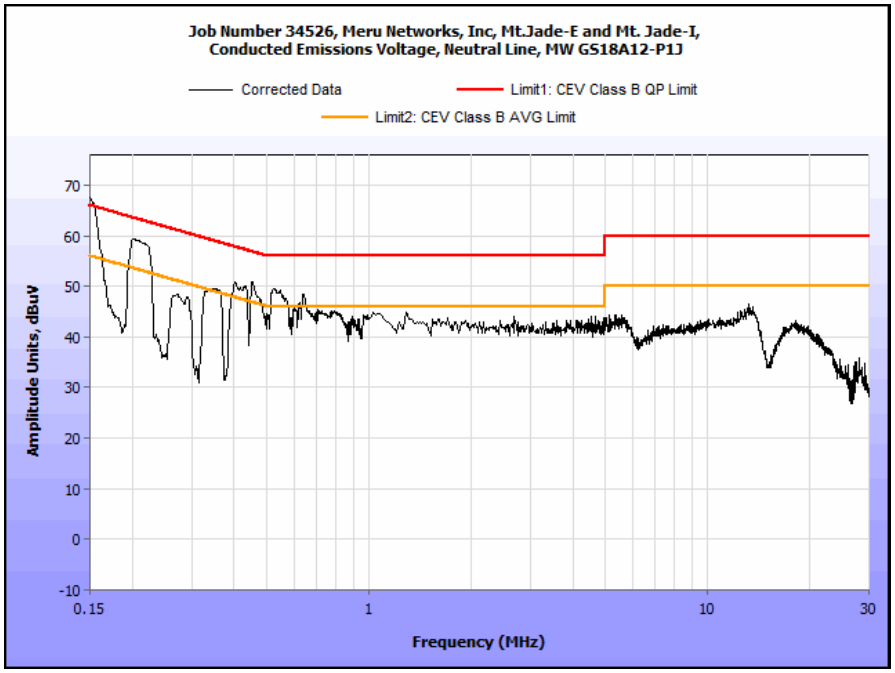


Plot 3. Conducted Emission, Phase Line Plot, GS18A12-P1J

Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz), GS18A12-P1J

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.194	57.91	0	57.91	63.86	-5.95	40.52	0	40.52	53.86	-13.34
0.432	46.72	0	46.72	57.21	-10.49	31.78	0	31.78	47.21	-15.43
0.451	48.94	0	48.94	56.86	-7.92	33.85	0	33.85	46.86	-13.01
0.531	46.32	0	46.32	56	-9.68	33.13	0	33.13	46	-12.87
5.475	40.4	0.1	40.5	60	-19.5	34.77	0.1	34.87	50	-15.13
13.546	42.82	0.12	42.94	60	-17.06	36.81	0.12	36.93	50	-13.07

Table 10. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz), GS18A12-P1J



Plot 4. Conducted Emission, Neutral Line Plot, GS18A12-P1J

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 11.

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 11.

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

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

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

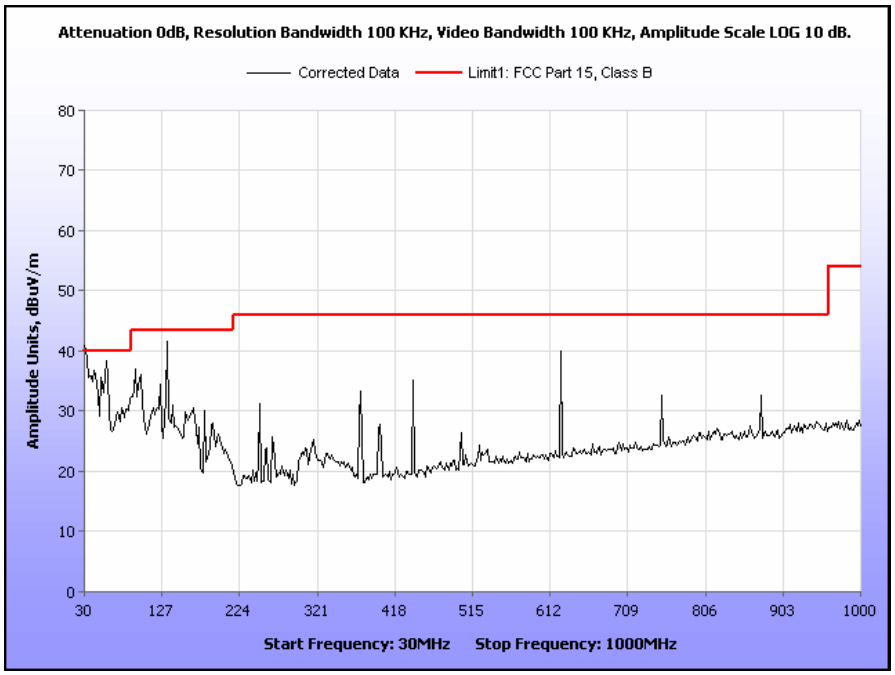
Test Engineer(s): Jeff Pratt

Test Date(s): 05/15/12

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
42.823609	32	H	2.23	6.02	12.24	0.43	0.00	18.69	40.00	-21.31
42.823609	362	V	1.02	19.90	12.24	0.43	0.00	32.57	40.00	-7.43
56.742485	346	H	1.01	8.46	7.50	0.52	0.00	16.48	40.00	-23.52
56.742485	3	V	1.01	24.80	7.50	0.52	0.00	32.82	40.00	-7.18
91.289579	319	H	2.24	14.81	8.16	0.74	0.00	23.71	43.50	-19.79
91.289579	115	V	1.20	22.32	8.16	0.74	0.00	31.22	43.50	-12.28
132.55411	309	H	1.50	14.67	13.66	0.92	0.00	29.25	43.50	-14.25
132.55411	43	V	1.01	21.85	13.66	0.92	0.00	36.43	43.50	-7.07
374.99352	1	H	1.01	20.35	15.60	1.54	0.00	37.49	46.00	-8.51
374.99352	324	V	1.00	17.12	15.60	1.54	0.00	34.26	46.00	-11.74
625.00754	226	H	1.01	16.39	19.80	2.09	0.00	38.28	46.00	-7.72
625.00754	83	V	1.01	20.21	19.80	2.09	0.00	42.10	46.00	-3.90

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

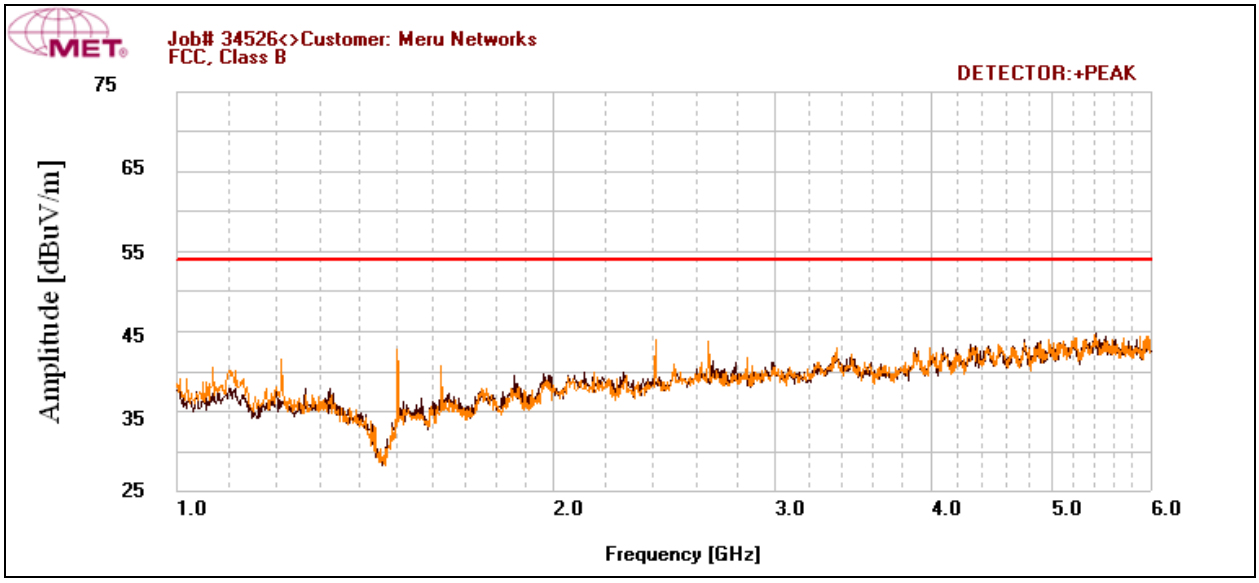


Plot 5. Radiated Emissions, 30 MHz - 1 GHz, FCC Limits

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
1500	H	10	100	69.11	25.723	54.06	0	0	40.773	54	-13.227
1500	V	280	100	71.82	25.723	54.06	0	0	43.483	54	-10.517
2412	V	315	100	67.31	28.491	55.379	0	0	40.422	54	-13.578

Table 13. Radiated Emissions Limits, Test Results, 1 GHz – 6 GHz, FCC Limits

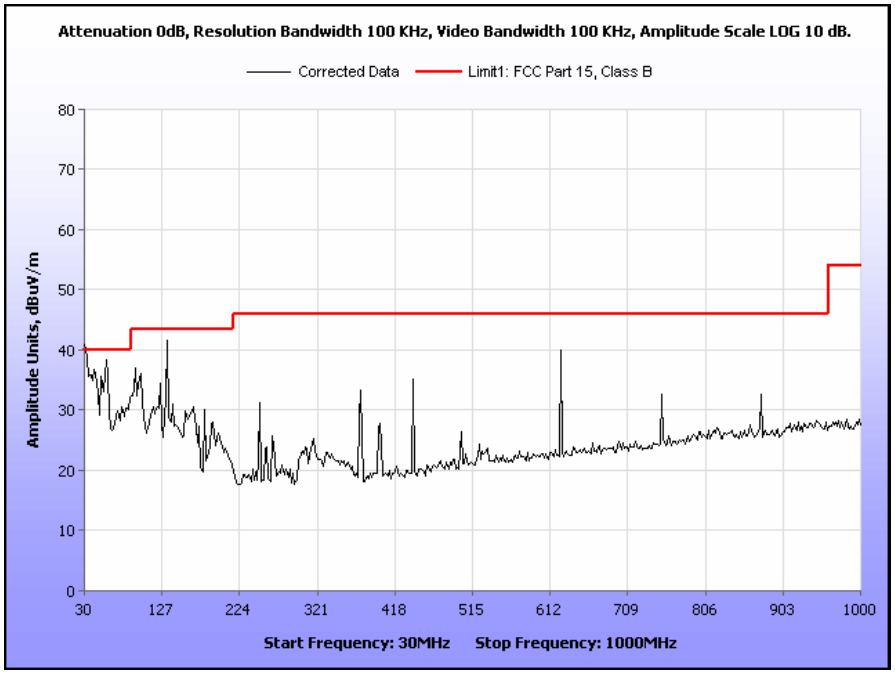


Plot 6. Radiated Emissions, 1 GHz – 6 GHz, FCC Limits

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
42.823609	32	H	2.23	6.02	12.24	0.43	10.46	8.23	30.00	-21.77
42.823609	362	V	1.02	19.90	12.24	0.43	10.46	22.11	30.00	-7.89
56.742485	346	H	1.01	8.46	7.50	0.52	10.46	6.02	30.00	-23.98
56.742485	3	V	1.01	24.80	7.50	0.52	10.46	22.36	30.00	-7.64
91.289579	319	H	2.24	14.81	8.16	0.74	10.46	13.25	30.00	-16.75
91.289579	115	V	1.20	22.32	8.16	0.74	10.46	20.76	30.00	-9.24
132.55411	309	H	1.50	14.67	13.66	0.92	10.46	18.79	30.00	-11.21
132.55411	43	V	1.01	21.85	13.66	0.92	10.46	25.97	30.00	-4.03
374.99352	1	H	1.01	20.35	15.60	1.54	10.46	27.03	37.00	-9.97
374.99352	324	V	1.00	17.12	15.60	1.54	10.46	23.80	37.00	-13.20
625.00754	226	H	1.01	16.39	19.80	2.09	10.46	27.82	37.00	-9.18
625.00754	83	V	1.01	20.21	19.80	2.09	10.46	31.64	37.00	-5.36

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



Plot 7. Radiated Emissions, ICES-003 Limits

IV. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

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

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

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

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

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

Results: The EUT as tested is compliant the criteria of §15.203. Units are professionally installed.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 04/27/12

Gain (dBi)		Antenna Type	Antenna Description	Manufacturer	Model Number
2.4 GHz	5 GHz				
4	5	Planar Inverted-F Antenna (PIFA)	Internal PIFA Dual-Band 3 x 3	Meru	ERU-ANT-PI622

Table 15. Antenna List

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s): **§ 15.207 (a):** For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 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 16. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a 0.8 m-high wooden table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2003 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to an EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on.

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

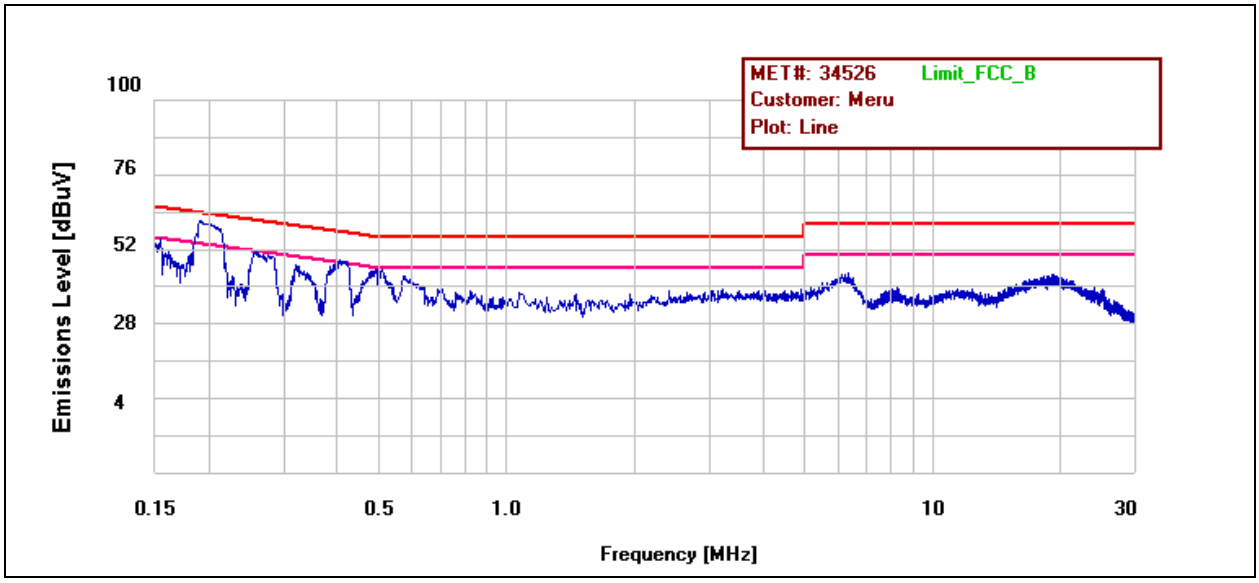
Test Engineer(s): Anderson Soungpanya

Test Date(s): 05/07/12

15.207(a) Conducted Emissions Test Results, 2.4 GHz

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
Line	.190	60.23	64.042	-3.812	Pass	39.01	54.042	-15.032	Pass
Line	.390	43.52	58.085	-14.565	Pass	30.34	48.085	-17.745	Pass
Line	.498	39.42	56.034	-16.614	Pass	28.45	46.034	-17.584	Pass

Table 17. Conducted Emissions, 15.207(a), Phase Line, Test Results, 2.4 GHz

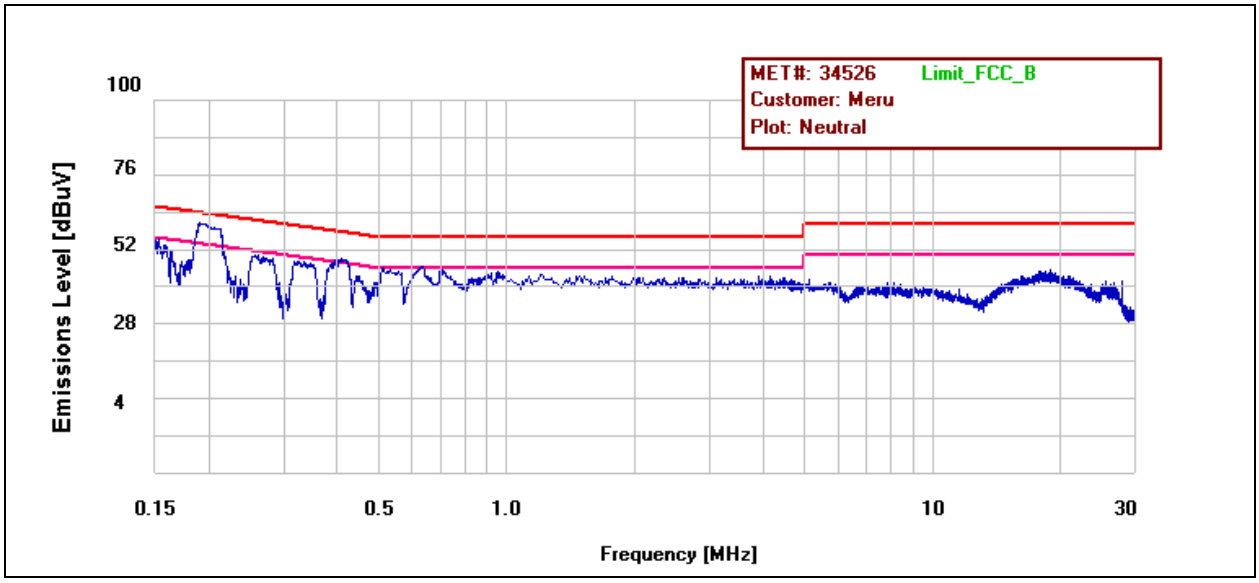


Plot 8. Conducted Emissions, 15.207(a), Phase Line, 2.4 GHz

15.207(a) Conducted Emissions Test Results

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
Neutral	.191	57.21	63.998	-6.788	Pass	37.57	53.998	-16.428	Pass
Neutral	.391	40.84	58.064	-17.224	Pass	29.58	48.064	-18.484	Pass
Neutral	.623	37.38	56	-18.62	Pass	29.01	46	-16.99	Pass

Table 18. Conducted Emissions, 15.207(a), Neutral Line, Test Results, 2.4 GHz

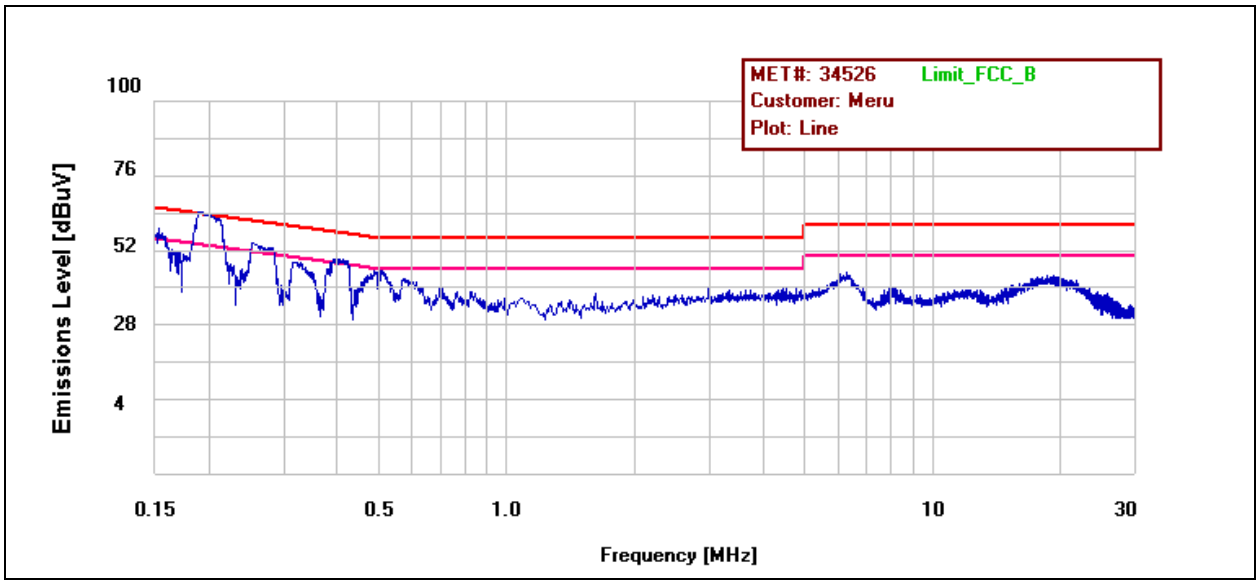


Plot 9. Conducted Emissions, 15.207(a), Neutral Line, 2.4 GHz

15.207(a) Conducted Emissions Test Results, 5 GHz

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
Line	.190	60.18	64.042	-3.862	Pass	38.57	54.042	-15.472	Pass
Line	.257	49.38	61.54	-12.16	Pass	32.26	51.54	-19.28	Pass
Line	.389	43.69	58.107	-14.417	Pass	29.857	48.107	-18.25	Pass
Line	.485	41.37	56.26	-14.89	Pass	28.107	46.26	-18.153	Pass

Table 19. Conducted Emissions, 15.207(a), Phase Line, Test Results, 5 GHz

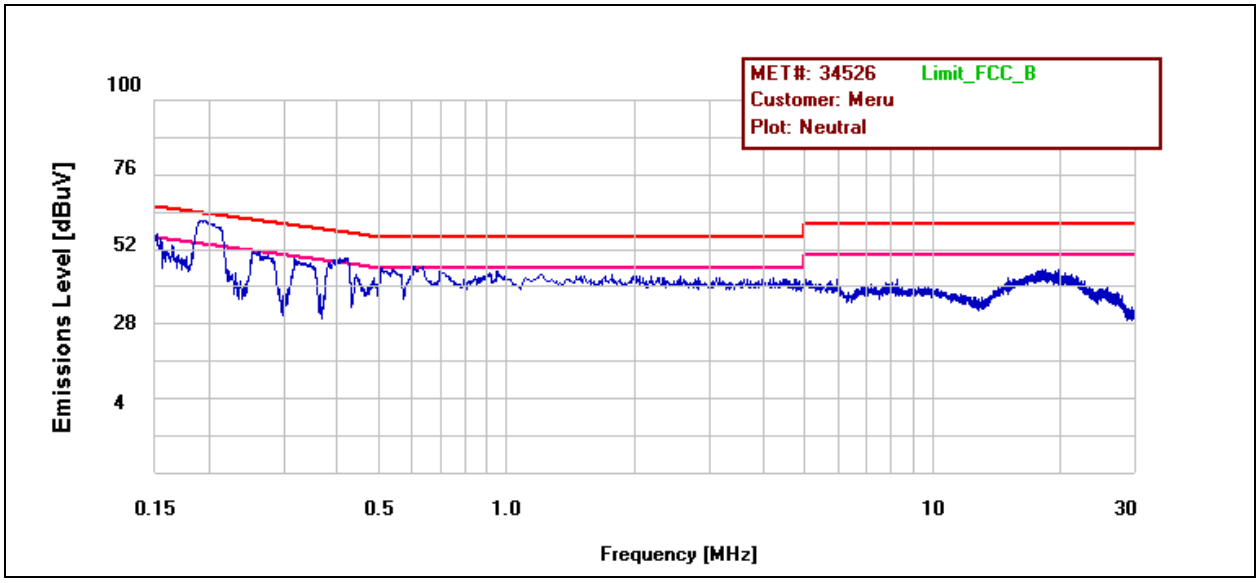


Plot 10. Conducted Emissions, 15.207(a), Phase Line, 5 GHz

15.207(a) Conducted Emissions Test Results

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
Neutral	.193	57.31	63.912	-6.602	Pass	38.43	53.912	-15.482	Pass
Neutral	.412	43.09	57.631	-14.541	Pass	30.54	47.631	-17.091	Pass
Neutral	.519	41.95	56	-14.05	Pass	28.42	46	-17.58	Pass

Table 20. Conducted Emissions, 15.207(a), Neutral Line, Test Results, 5 GHz



Plot 11. Conducted Emissions, 15.207(a), Neutral Line, 5 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(2) 6 dB and 99% Bandwidth

Test Requirements: **§ 15.247(a)(2):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Procedure: The transmitter was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately 1% of the total emission bandwidth, VBW > RBW. The 6 dB Bandwidth was measured and recorded. The measurements were performed on the low, mid and high channels.

Test Results The EUT was compliant with § 15.247 (a)(2).

The 6 dB and 99% Bandwidth was determined from the plots on the following pages.

Test Engineer(s): Lionel Gabrillo & Anderson Soungpanya

Test Date(s): 04/20/12 & 04/24/12

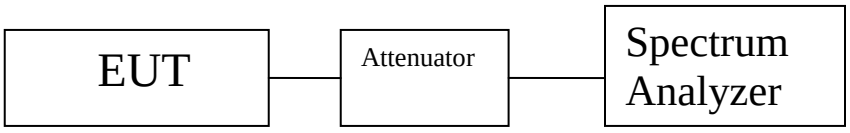


Figure 2. Block Diagram, Occupied Bandwidth Test Setup

Occupied Bandwidth Test Results, 2.4 GHz

Occupied Bandwidth			
	Carrier Channel	**Frequency (MHz)**	**Measured 6 dB Bandwidth (MHz)**
802.11b	Low	2412	8.290
	Mid	2437	8.325
	High	2462	7.506
802.11g	Low	2412	16.377
	Mid	2437	16.401
	High	2462	16.551
802.11n 20 MHz Port 1	Low	2412	16.386
	Mid	2437	17.620
	High	2462	17.665
802.11n 20 MHz Port 2	Low	2412	17.685
	Mid	2437	17.598
	High	2462	17.406
802.11n 20 MHz Port 3	Low	2412	17.688
	Mid	2437	17.735
	High	2462	17.679
802.11n 40 MHz Port 1	Low	2422	36.086
	Mid	2437	36.410
	High	2452	36.181
802.11n 40 MHz Port 2	Low	2422	36.271
	Mid	2437	36.389
	High	2452	35.812
802.11n 40 MHz Port 3	Low	2422	36.039
	Mid	2437	36.313
	High	2452	35.947

Table 21. 6 dB Occupied Bandwidth, Test Results, 2.4 GHz

Occupied Bandwidth			
	Carrier Channel	**Frequency (MHz)**	**Measured 99% Bandwidth (MHz)**
802.11b	Low	2412	10.0718
	Mid	2437	10.0200
	High	2462	10.0784
802.11g	Low	2412	16.5519
	Mid	2437	16.5327
	High	2462	16.5091
802.11n 20 MHz Port 1	Low	2412	17.3477
	Mid	2437	17.8095
	High	2462	17.6473
802.11n 20 MHz Port 2	Low	2412	17.8002
	Mid	2437	17.7673
	High	2462	17.8033
802.11n 20 MHz Port 3	Low	2412	17.7930
	Mid	2437	17.7430
	High	2462	17.7063
802.11n 40 MHz Port 1	Low	2422	36.624
	Mid	2437	36.7935
	High	2452	36.5498
802.11n 40 MHz Port 2	Low	2422	36.5271
	Mid	2437	35.9683
	High	2452	36.3784
802.11n 40 MHz Port 3	Low	2422	36.1227
	Mid	2437	36.6028
	High	2452	36.5593

Table 22. 99% Occupied Bandwidth, Test Results, 2.4 GHz

Occupied Bandwidth Test Results, 5 GHz

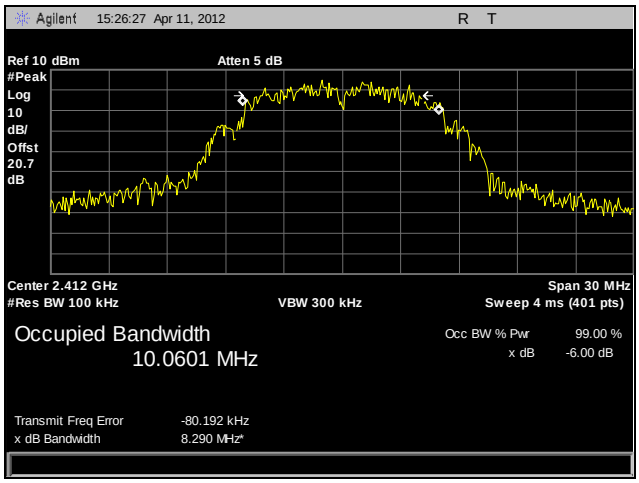
Occupied Bandwidth			
	Carrier Channel	**Frequency (MHz)**	**Measured 6 dB Bandwidth (MHz)**
802.11a	Low	5745	16.437
	Mid	5785	16.481
	High	5825	16.508
802.11n 20 MHz Port 1	Low	5745	17.552
	Mid	5785	17.702
	High	5825	17.605
802.11n 20 MHz Port 2	Low	5745	17.633
	Mid	5785	17.595
	High	5825	17.398
802.11n 20 MHz Port 3	Low	5745	17.488
	Mid	5785	17.651
	High	5825	17.661
802.11n 40 MHz Port 1	Low	5755	36.041
	High	5795	36.353
802.11n 40 MHz Port 2	Low	5755	36.319
	High	5795	36.344
802.11n 40 MHz Port 3	Low	5755	36.322
	High	5795	35.923

Table 23. 6 dB Occupied Bandwidth, Test Results, 5 GHz

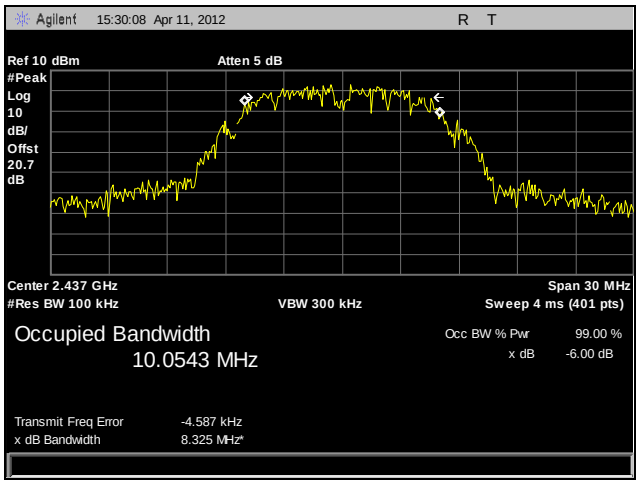
Occupied Bandwidth			
	Carrier Channel	**Frequency (MHz)**	**Measured 99% Bandwidth (MHz)**
802.11a	Low	5745	16.6286
	Mid	5785	16.6218
	High	5825	16.6519
802.11n 20 MHz Port 1	Low	5745	17.7334
	Mid	5785	17.7410
	High	5825	17.7622
802.11n 20 MHz Port 2	Low	5745	17.8069
	Mid	5785	17.7242
	High	5825	17.8827
802.11n 20 MHz Port 3	Low	5745	17.7815
	Mid	5785	17.7707
	High	5825	17.7418
802.11n 40 MHz Port 1	Low	5755	36.2602
	High	5795	36.3667
802.11n 40 MHz Port 2	Low	5755	36.1383
	High	5795	36.3789
802.11n 40 MHz Port 3	Low	5755	36.3719
	High	5795	36.3016

Table 24. 99% Occupied Bandwidth, Test Results, 5 GHz

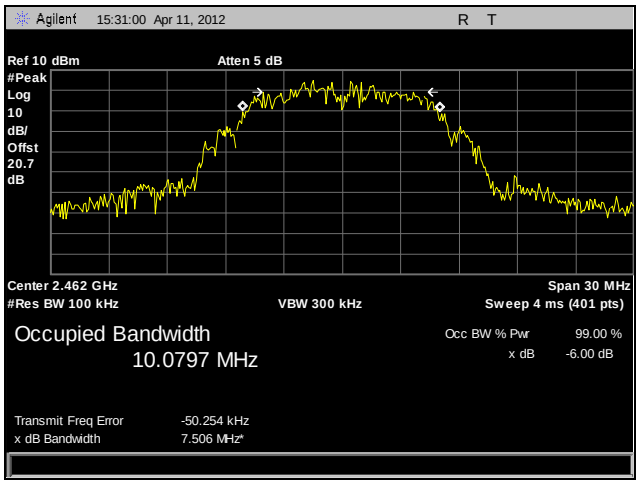
6 dB Occupied Bandwidth Test Results, 802.11b, 2.4 GHz



Plot 12. 6 dB Occupied Bandwidth, Low Channel, 802.11b, 2.4 GHz

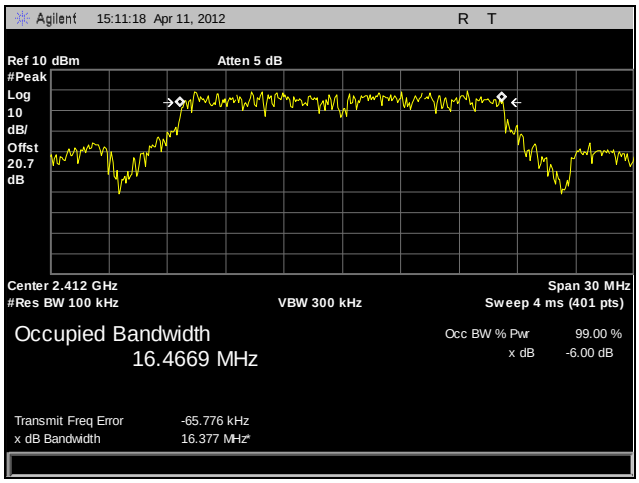


Plot 13. 6 dB Occupied Bandwidth, Mid Channel, 802.11b, 2.4 GHz

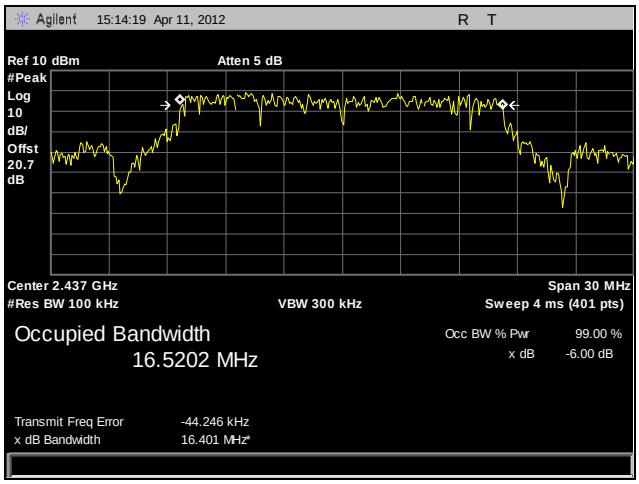


Plot 14. 6 dB Occupied Bandwidth, High Channel, 802.11b, 2.4 GHz

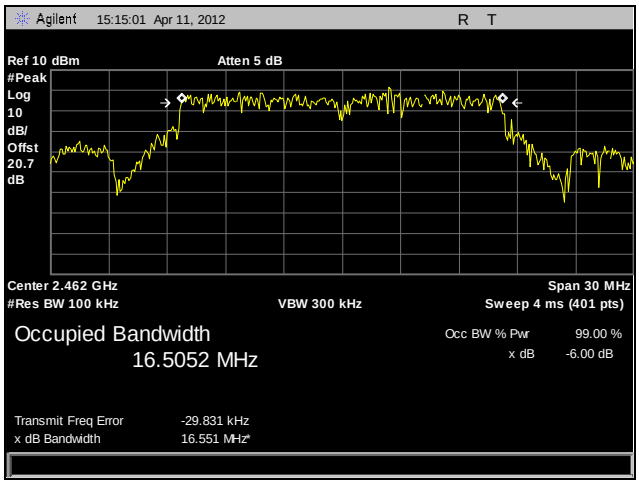
6 dB Occupied Bandwidth Test Results, 802.11g, 2.4 GHz



Plot 15. 6 dB Occupied Bandwidth, Low Channel, 802.11g, 2.4 GHz

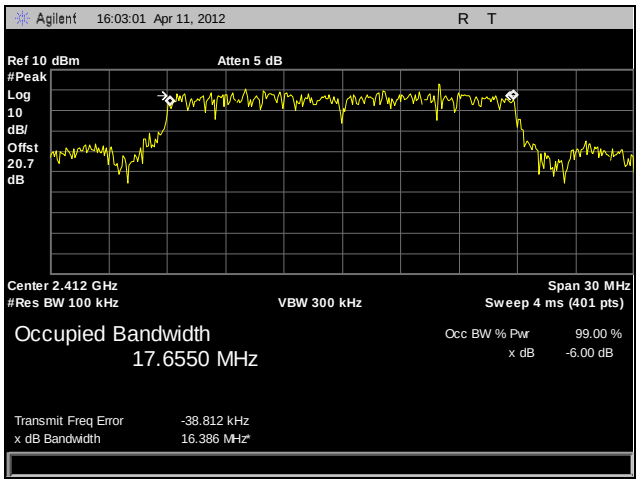


Plot 16. 6 dB Occupied Bandwidth, Mid Channel, 802.11g, 2.4 GHz

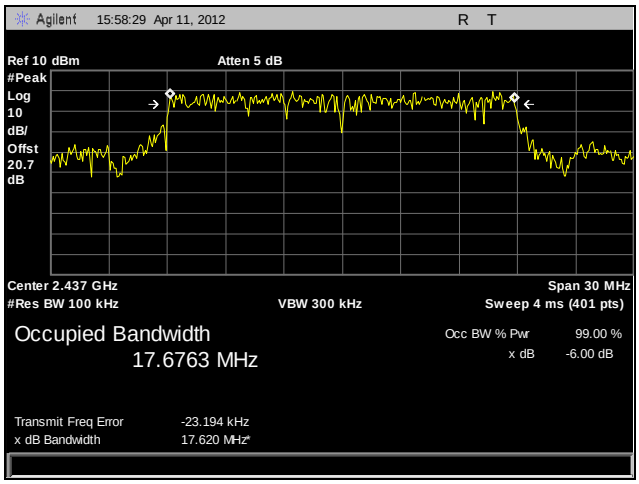


Plot 17. 6 dB Occupied Bandwidth, High Channel, 802.11g, 2.4 GHz

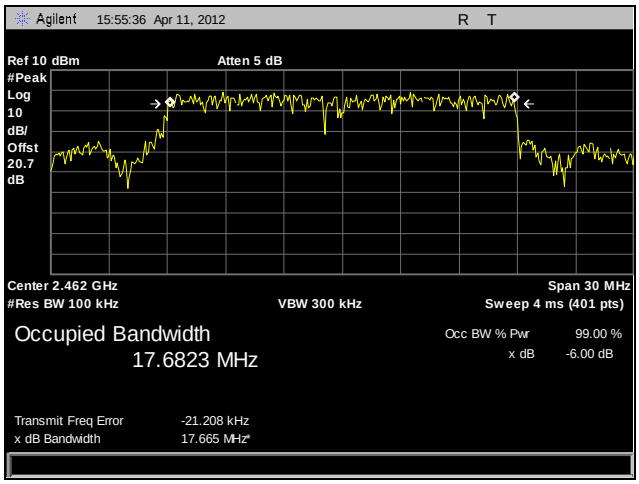
6 dB Occupied Bandwidth Test Results, 802.11n HT20, Port 1, 2.4 GHz



Plot 18. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT20, Port 1, 2.4 GHz

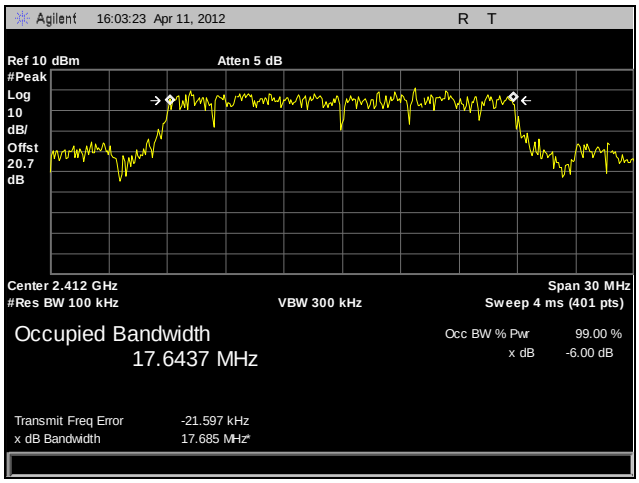


Plot 19. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 1, 2.4 GHz

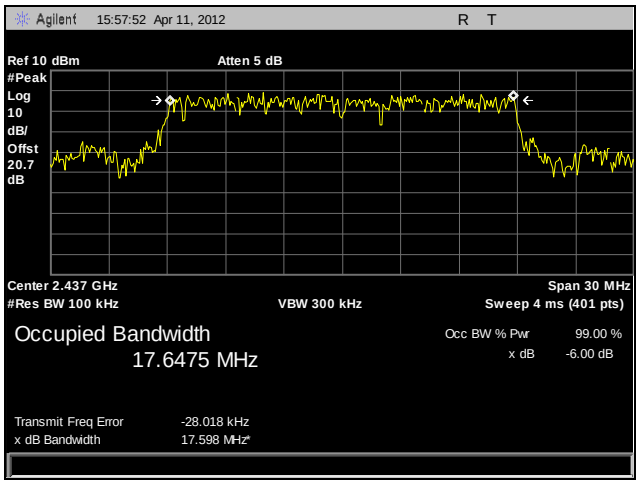


Plot 20. 6 dB Occupied Bandwidth, High Channel, 802.11n HT20, Port 1, 2.4 GHz

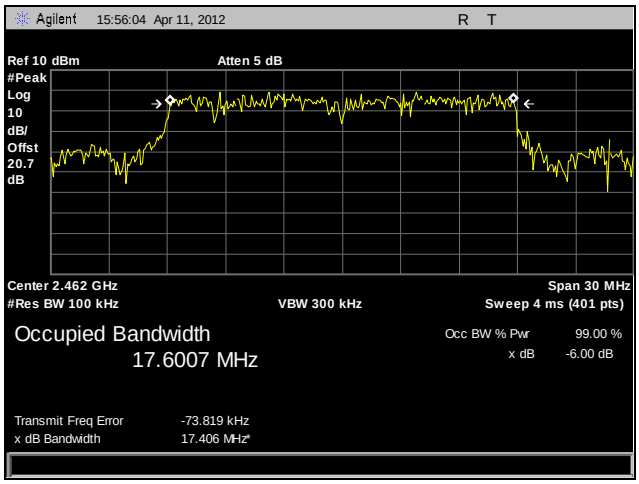
6 dB Occupied Bandwidth Test Results, 802.11n HT20, Port 2, 2.4 GHz



Plot 21. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT20, Port 2, 2.4 GHz

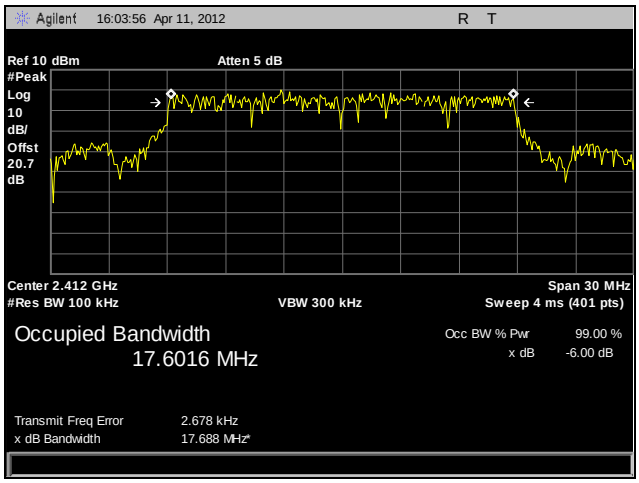


Plot 22. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 2, 2.4 GHz

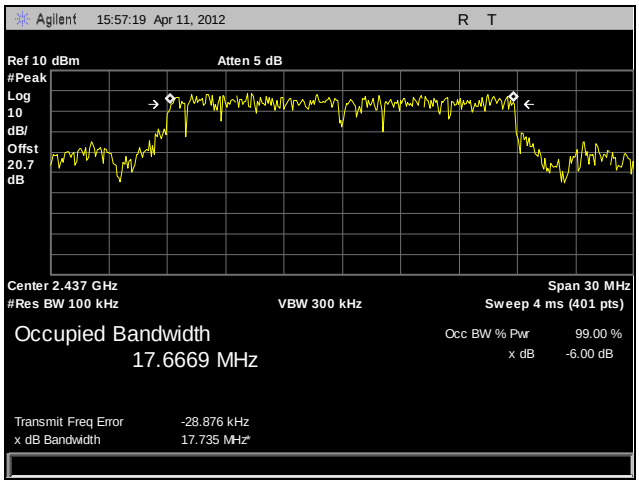


Plot 23. 6 dB Occupied Bandwidth, High Channel, 802.11n HT20, Port 2, 2.4 GHz

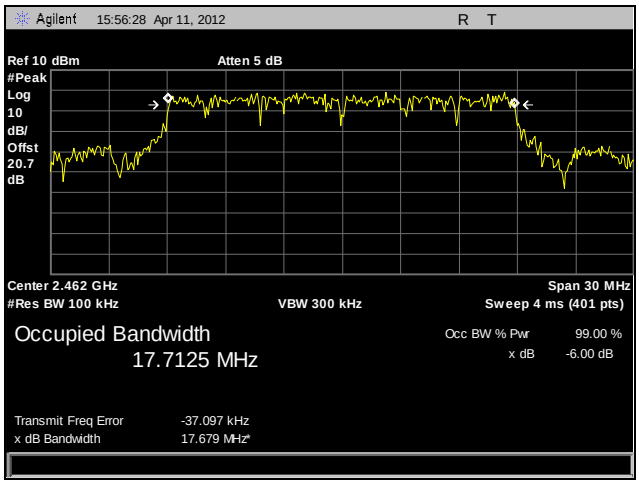
6 dB Occupied Bandwidth Test Results, 802.11n HT20, Port 3, 2.4 GHz



Plot 24. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT20, Port 3, 2.4 GHz

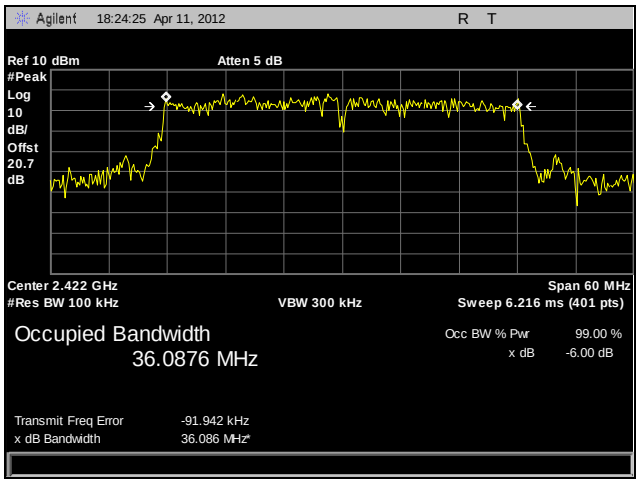


Plot 25. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 3, 2.4 GHz

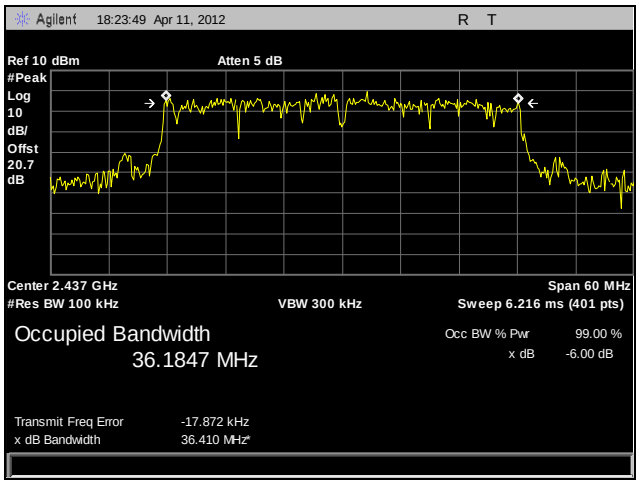


Plot 26. 6 dB Occupied Bandwidth, High Channel, 802.11n HT20, Port 3, 2.4 GHz

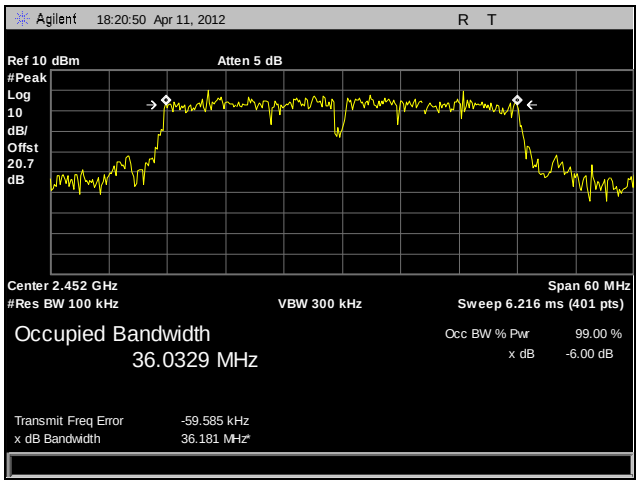
6 dB Occupied Bandwidth Test Results, 802.11n HT40, Port 1, 2.4 GHz



Plot 27. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT40, Port 1, 2.4 GHz

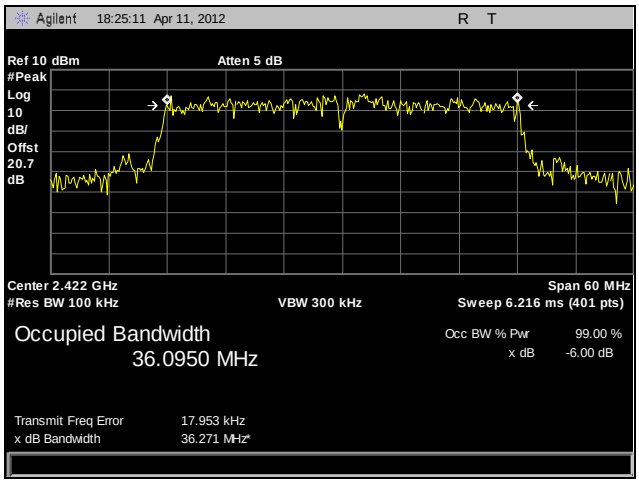


Plot 28. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT40, Port 1, 2.4 GHz

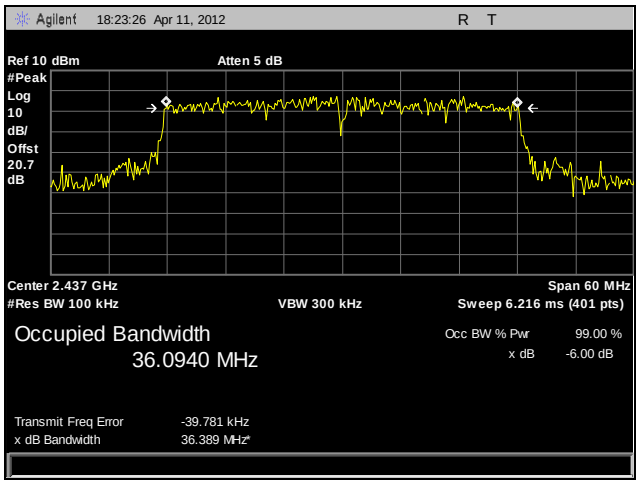


Plot 29. 6 dB Occupied Bandwidth, High Channel, 802.11n HT40, Port 1, 2.4 GHz

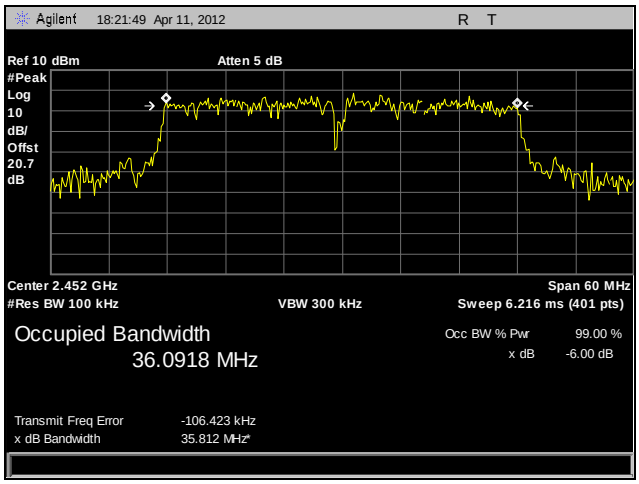
6 dB Occupied Bandwidth Test Results, 802.11n HT40, Port 2, 2.4 GHz



Plot 30. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT40, Port 2, 2.4 GHz

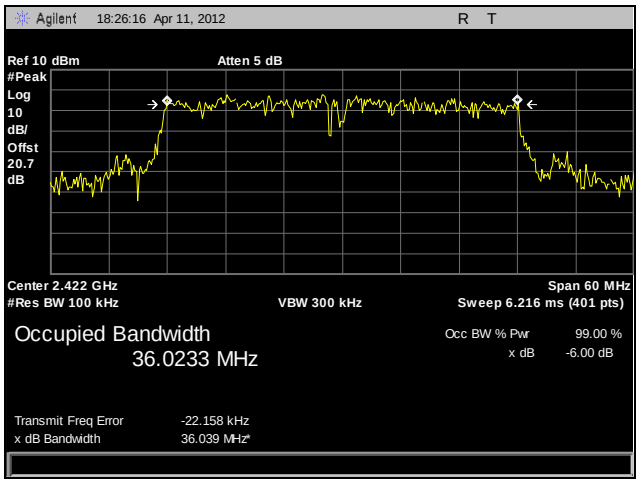


Plot 31. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT40, Port 2, 2.4 GHz

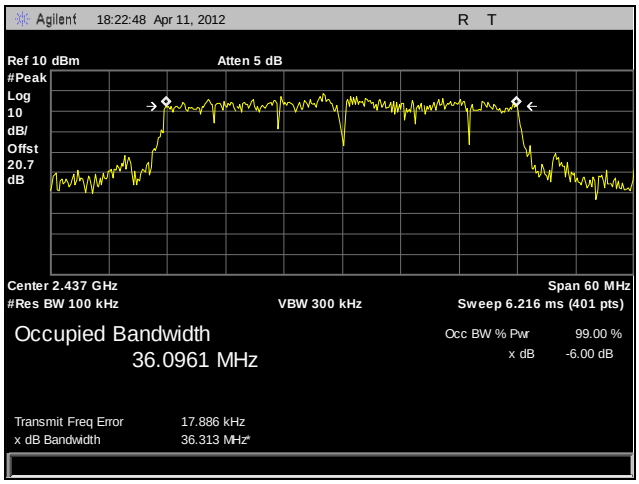


Plot 32. 6 dB Occupied Bandwidth, High Channel, 802.11n HT40, Port 2, 2.4 GHz

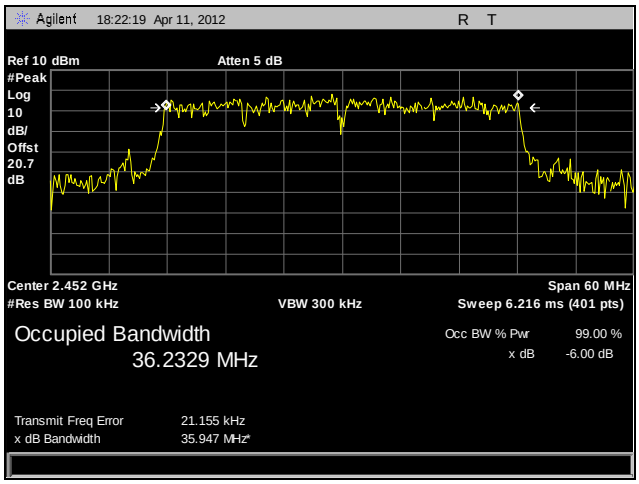
6 dB Occupied Bandwidth Test Results, 802.11n HT40, Port 3, 2.4 GHz



Plot 33. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT40, Port 3, 2.4 GHz

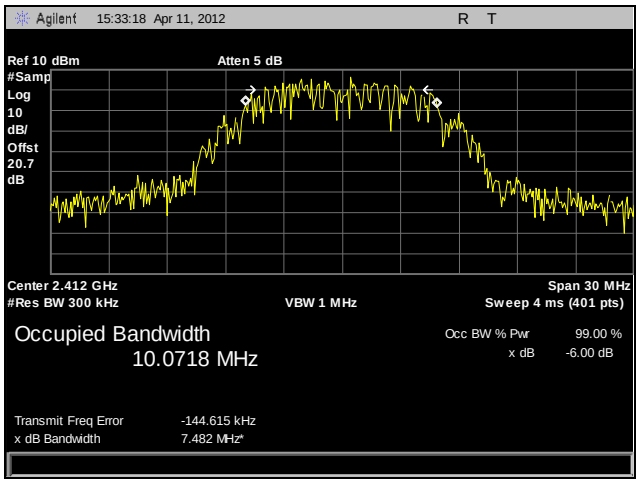


Plot 34. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT40, Port 3, 2.4 GHz

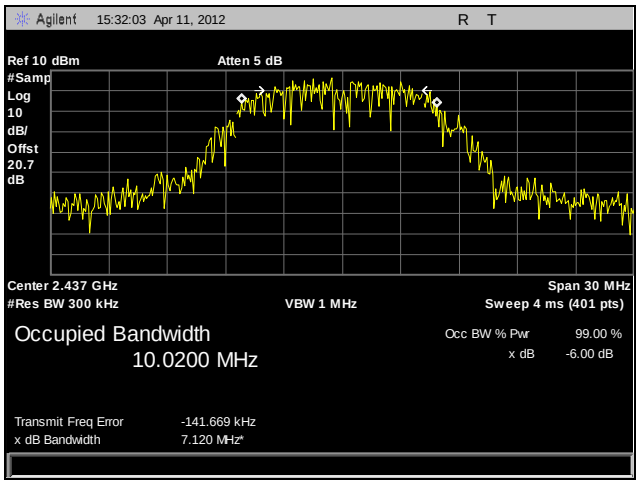


Plot 35. 6 dB Occupied Bandwidth, High Channel, 802.11n HT40, Port 3, 2.4 GHz

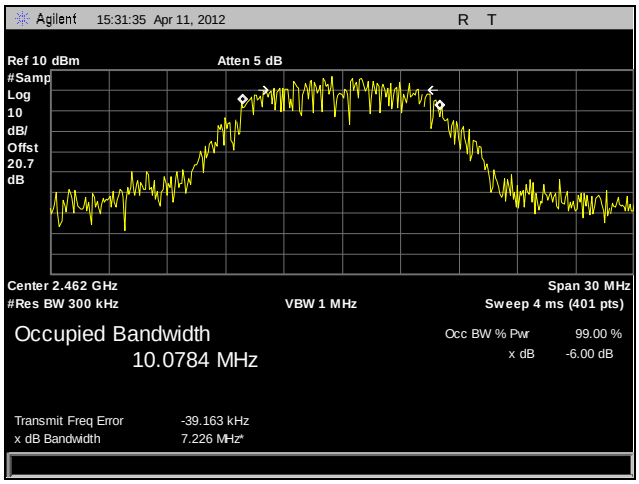
99% Occupied Bandwidth Test Results, 802.11b, 2.4 GHz



Plot 36. 99% Occupied Bandwidth, Low Channel, 802.11b, 2.4 GHz

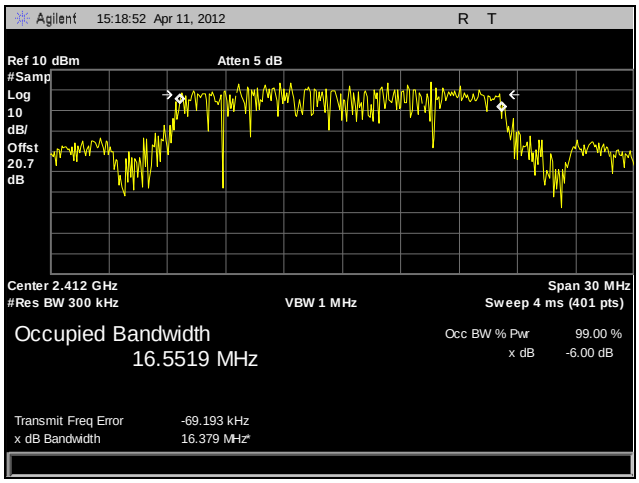


Plot 37. 99% Occupied Bandwidth, Mid Channel, 802.11b, 2.4 GHz

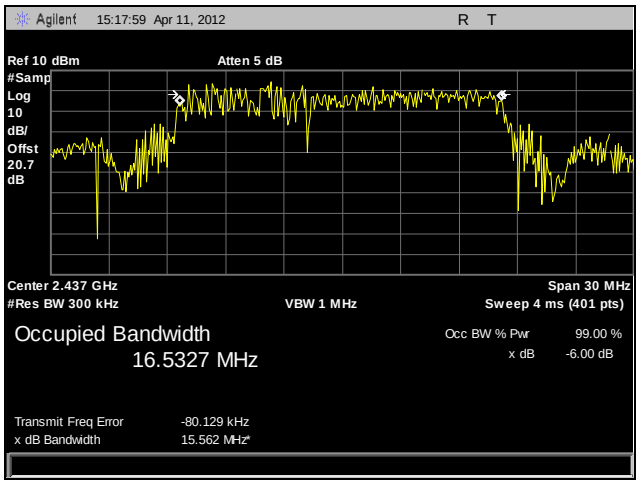


Plot 38. 99% Occupied Bandwidth, High Channel, 802.11b, 2.4 GHz

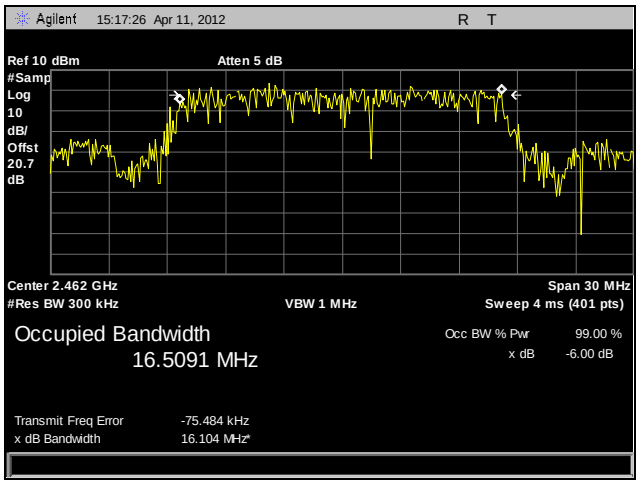
99% Occupied Bandwidth Test Results, 802.11g, 2.4 GHz



Plot 39. 99% Occupied Bandwidth, Low Channel, 802.11g, 2.4 GHz

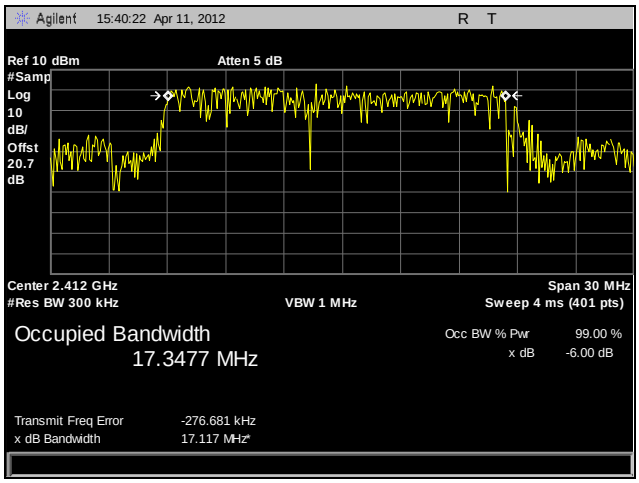


Plot 40. 99% Occupied Bandwidth, Mid Channel, 802.11g, 2.4 GHz

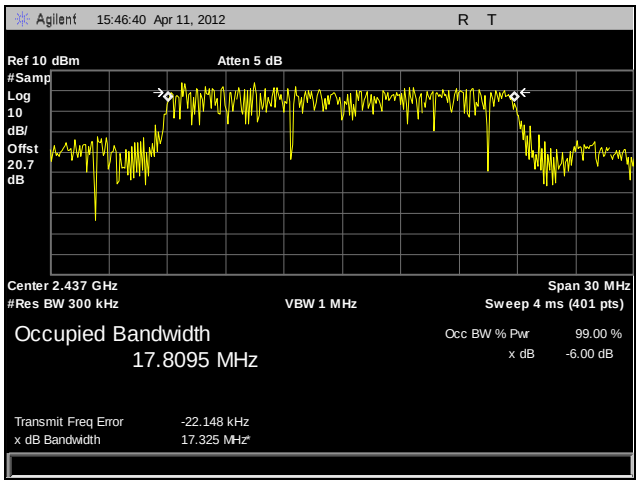


Plot 41. 99% Occupied Bandwidth, High Channel, 802.11g, 2.4 GHz

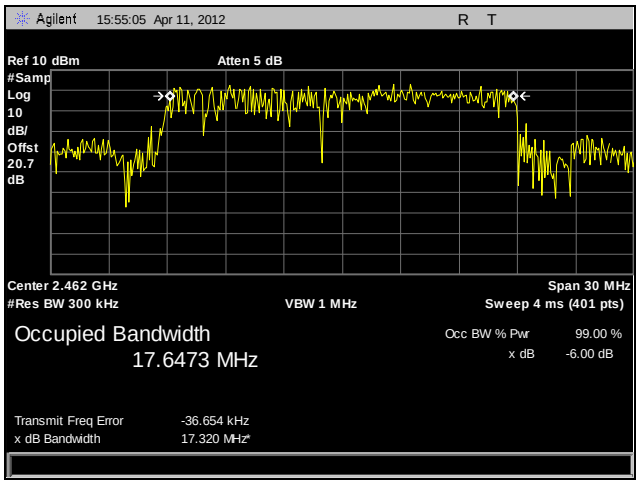
99% Occupied Bandwidth Test Results, 802.11n HT20, Port 1, 2.4 GHz



Plot 42. 99% Occupied Bandwidth, Low Channel, 802.11n HT20, Port 1, 2.4 GHz

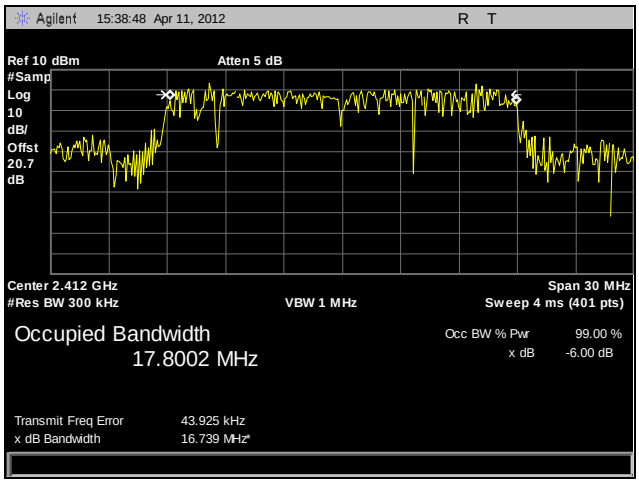


Plot 43. 99% Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 1, 2.4 GHz

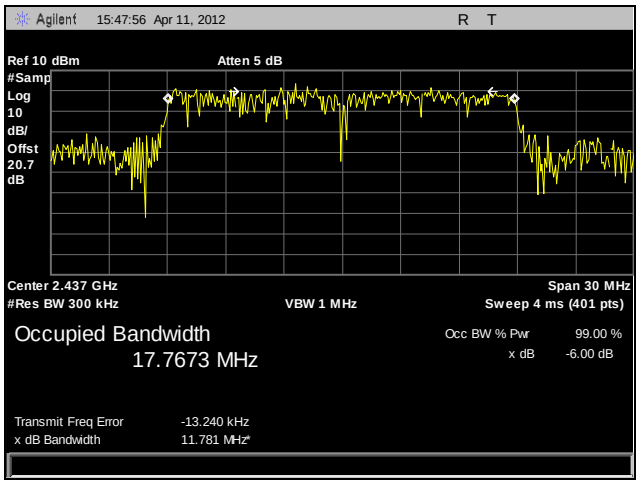


Plot 44. 99% Occupied Bandwidth, High Channel, 802.11n HT20, Port 1, 2.4 GHz

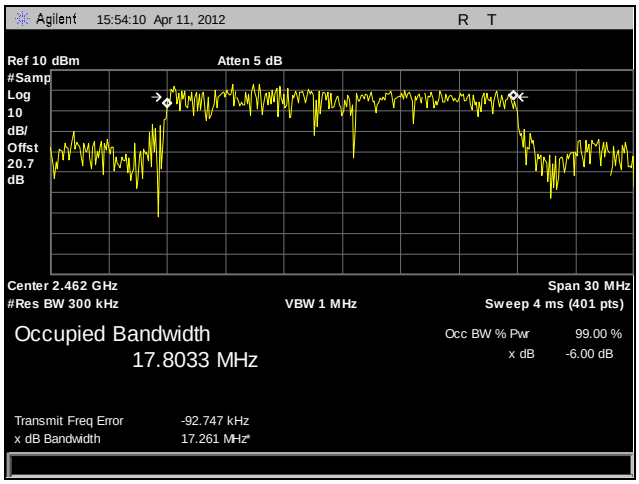
99% Occupied Bandwidth Test Results, 802.11n HT20, Port 2, 2.4 GHz



Plot 45. 99% Occupied Bandwidth, Low Channel, 802.11n HT20, Port 2, 2.4 GHz

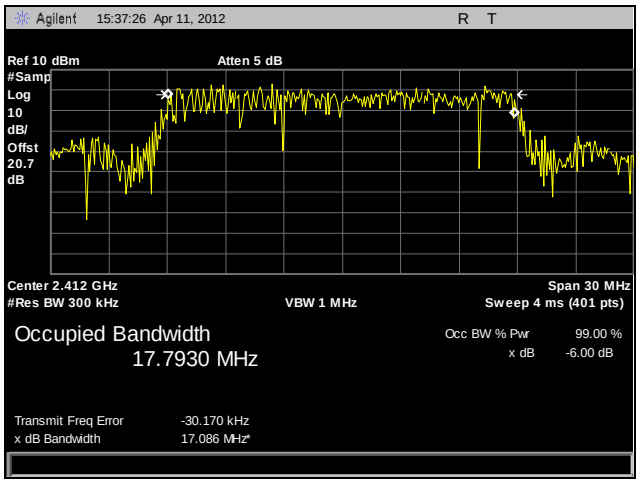


Plot 46. 99% Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 2, 2.4 GHz

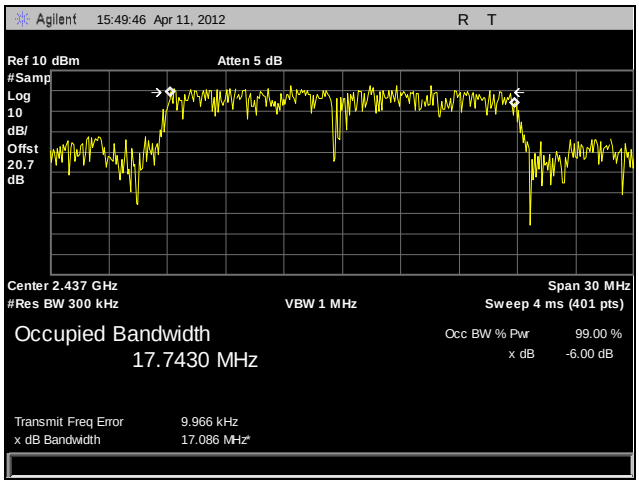


Plot 47. 99% Occupied Bandwidth, High Channel, 802.11n HT20, Port 2, 2.4 GHz

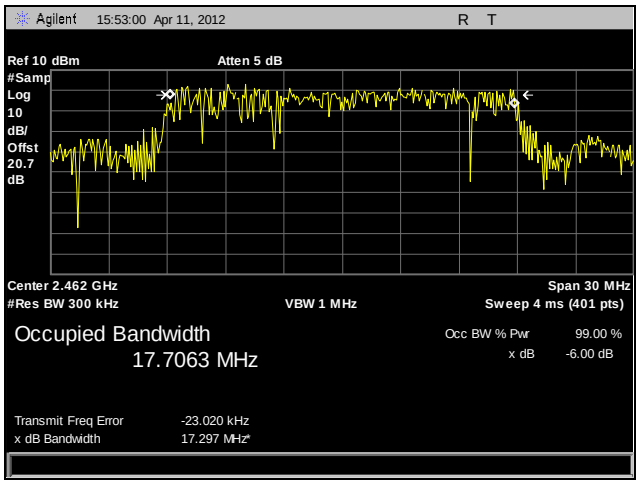
99% Occupied Bandwidth Test Results, 802.11n HT20, Port 3, 2.4 GHz



Plot 48. 99% Occupied Bandwidth, Low Channel, 802.11n HT20, Port 3, 2.4 GHz

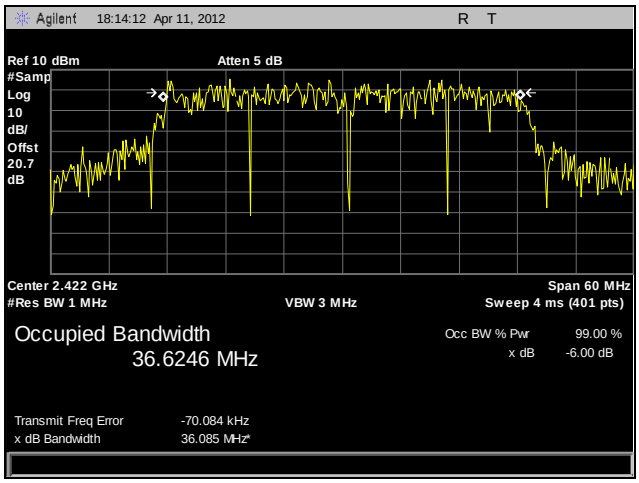


Plot 49. 99% Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 3, 2.4 GHz

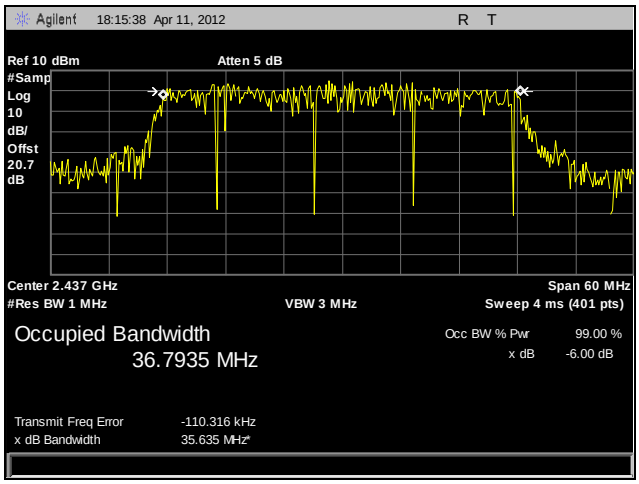


Plot 50. 99% Occupied Bandwidth, High Channel, 802.11n HT20, Port 3, 2.4 GHz

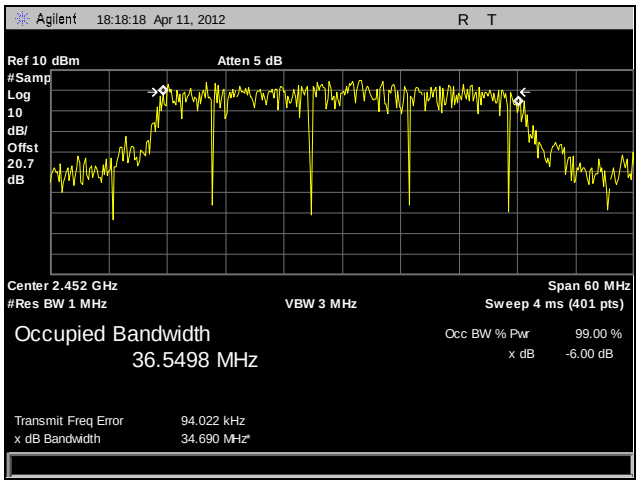
99% Occupied Bandwidth Test Results, 802.11n HT40, Port 1, 2.4 GHz



Plot 51. 99% Occupied Bandwidth, Low Channel, 802.11n HT40, Port 1, 2.4 GHz

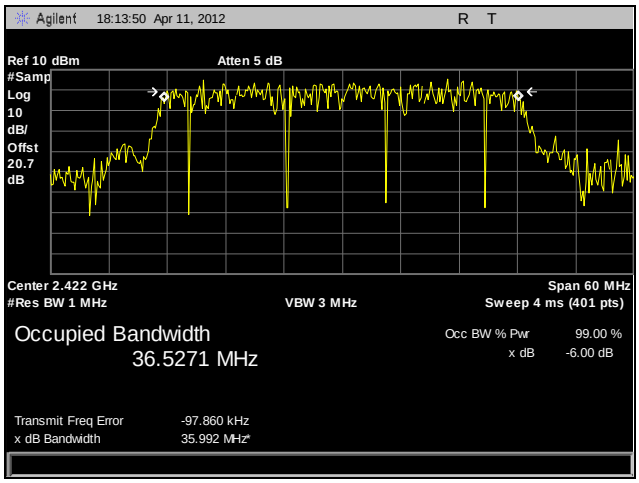


Plot 52. 99% Occupied Bandwidth, Mid Channel, 802.11n HT40, Port 1, 2.4 GHz

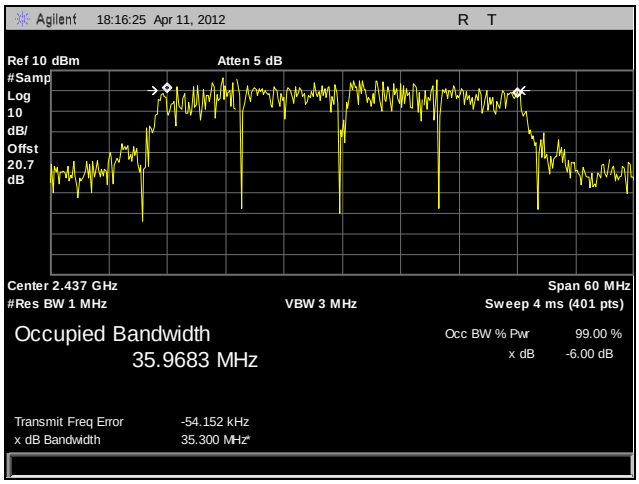


Plot 53. 99% Occupied Bandwidth, High Channel, 802.11n HT40, Port 1, 2.4 GHz

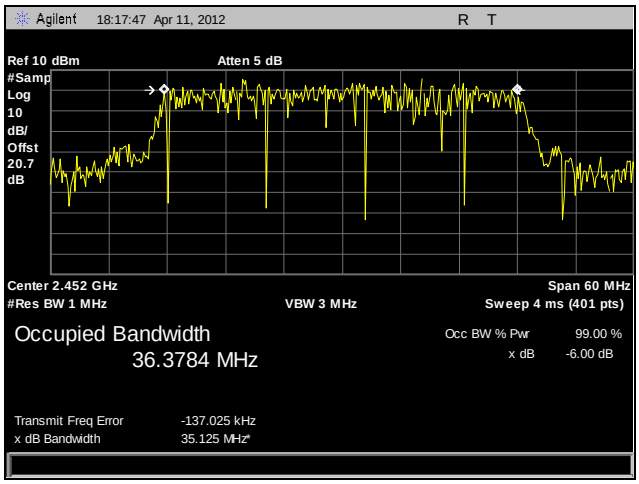
99% Occupied Bandwidth Test Results, 802.11n HT40, Port 2, 2.4 GHz



Plot 54. 99% Occupied Bandwidth, Low Channel, 802.11n HT40, Port 2, 2.4 GHz

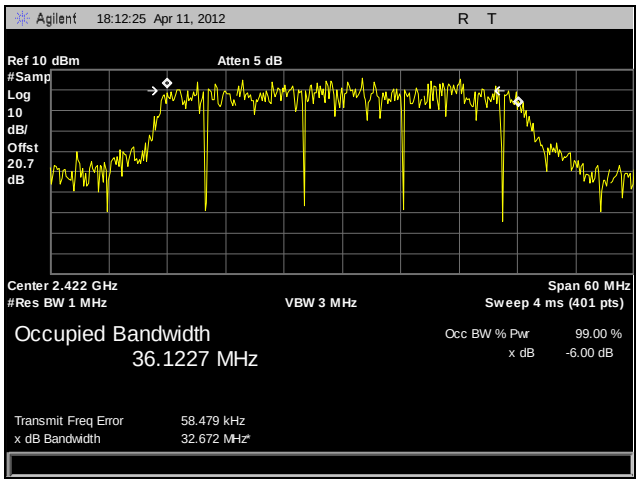


Plot 55. 99% Occupied Bandwidth, Mid Channel, 802.11n HT40, Port 2, 2.4 GHz

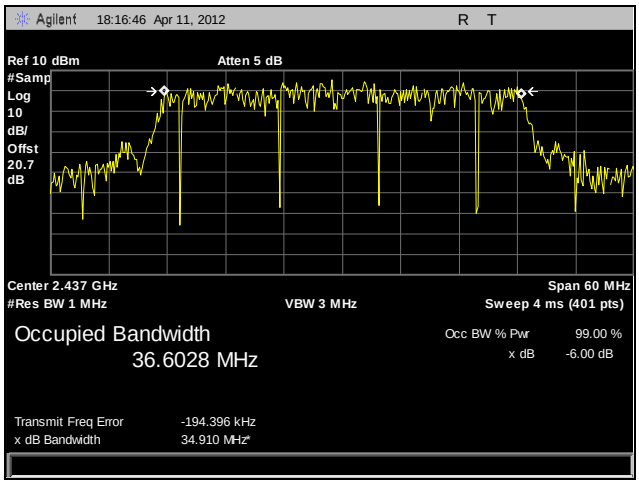


Plot 56. 99% Occupied Bandwidth, High Channel, 802.11n HT40, Port 2, 2.4 GHz

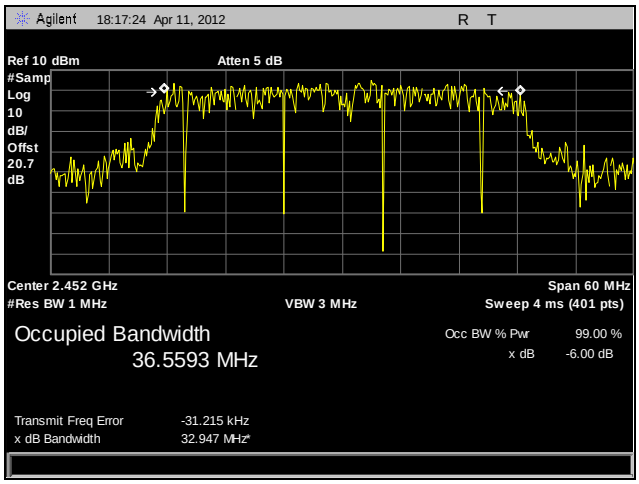
99% Occupied Bandwidth Test Results, 802.11n HT40, Port 3, 2.4 GHz



Plot 57. 99% Occupied Bandwidth, Low Channel, 802.11n HT40, Port 3, 2.4 GHz



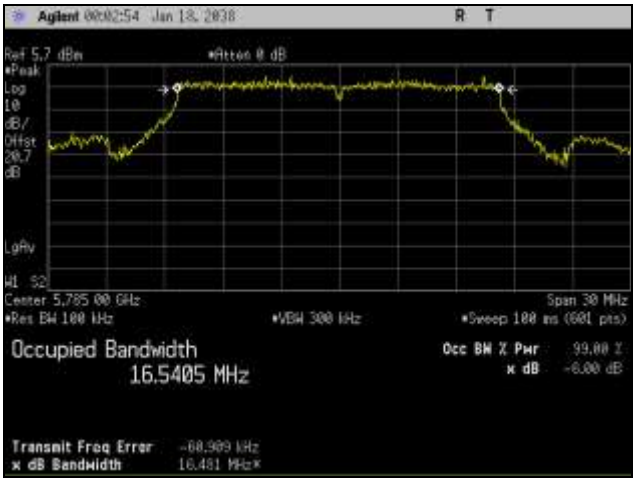
Plot 58. 99% Occupied Bandwidth, Mid Channel, 802.11n HT40, Port 3, 2.4 GHz



Plot 59. 99% Occupied Bandwidth, High Channel, 802.11n HT40, Port 3, 2.4 GHz

6 dB Occupied Bandwidth Test Results, 802.11a, 5 GHz

Plot 60. 6 dB Occupied Bandwidth, Low Channel, 802.11a, 5 GHz



Plot 61. 6 dB Occupied Bandwidth, Mid Channel, 802.11a, 5 GHz

Plot 62. 6 dB Occupied Bandwidth, High Channel, 802.11a, 5 GHz

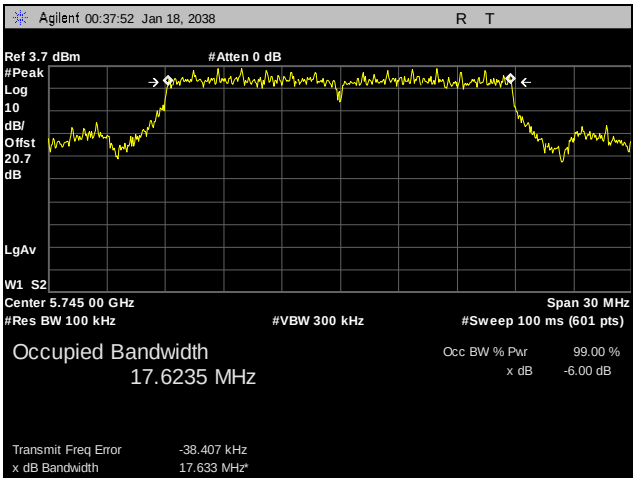
6 dB Occupied Bandwidth Test Results, 802.11n HT20, Port 1, 5 GHz

Plot 63. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT20, Port 1, 5 GHz

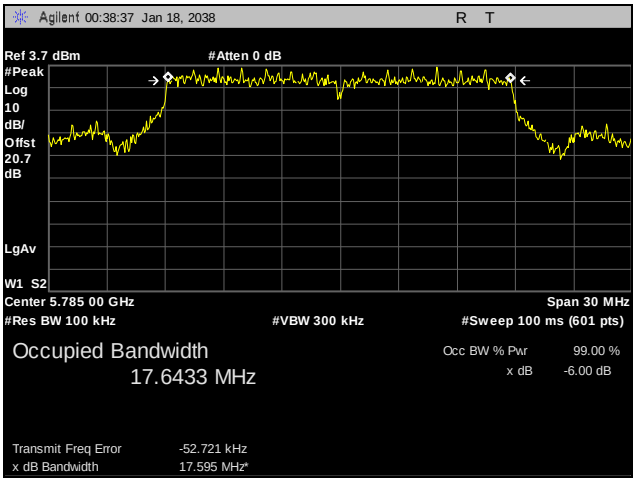
Plot 64. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 1, 5 GHz

Plot 65. 6 dB Occupied Bandwidth, High Channel, 802.11n HT20, Port 1, 5 GHz

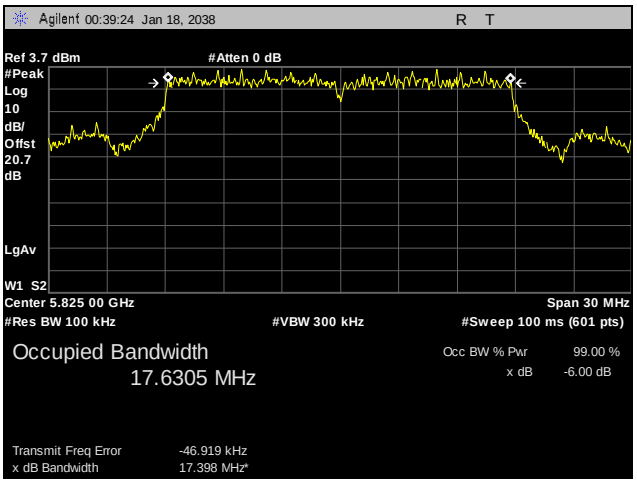
6 dB Occupied Bandwidth Test Results, 802.11n HT20, Port 2, 5 GHz



Plot 66. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT20, Port 2, 5 GHz

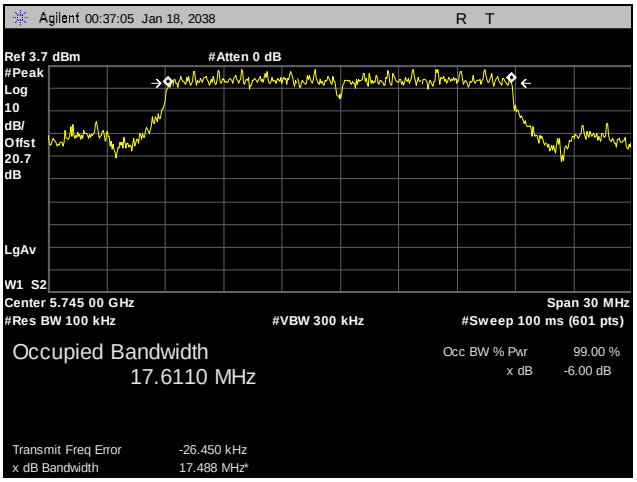


Plot 67. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 2, 5 GHz

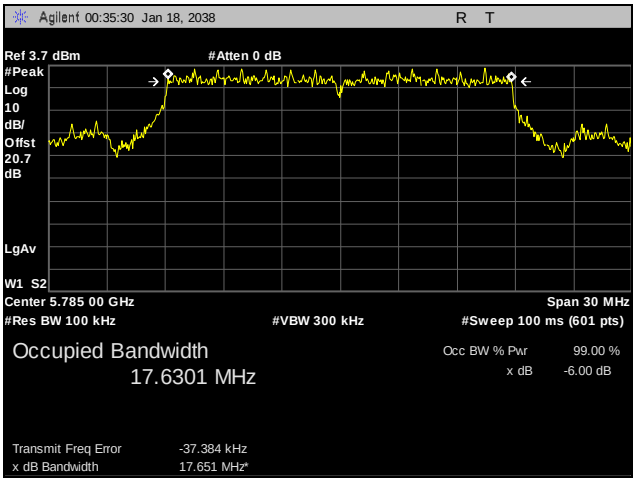


Plot 68. 6 dB Occupied Bandwidth, High Channel, 802.11n HT20, Port 2, 5 GHz

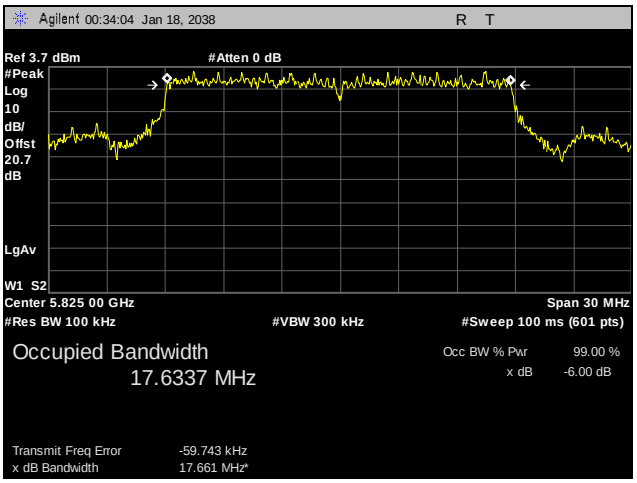
6 dB Occupied Bandwidth Test Results, 802.11n HT20, Port 3, 5 GHz



Plot 69. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT20, Port 3, 5 GHz

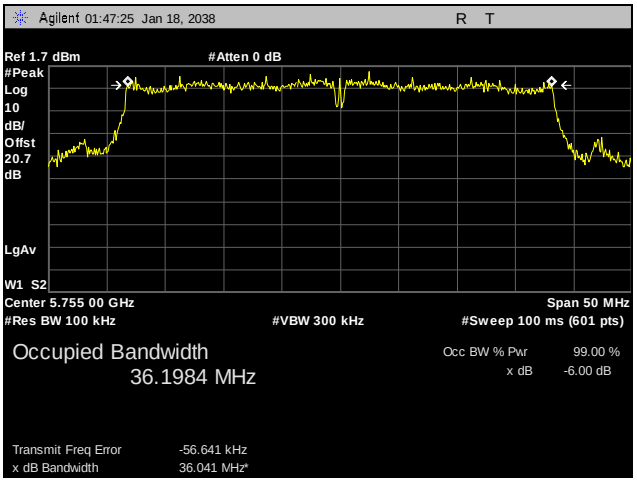


Plot 70. 6 dB Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 3, 5 GHz

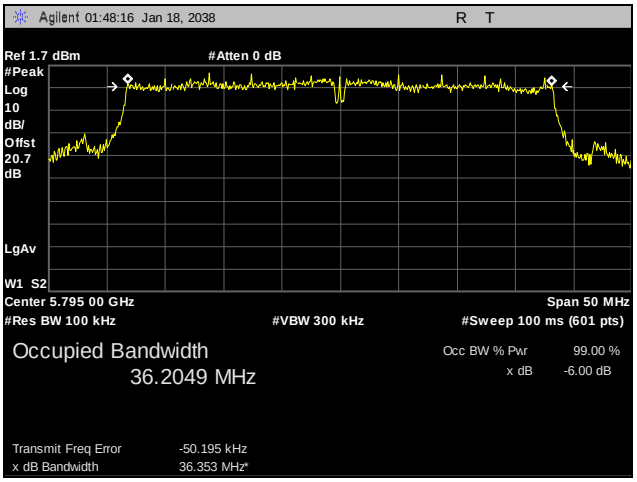


Plot 71. 6 dB Occupied Bandwidth, High Channel, 802.11n HT20, Port 3, 5 GHz

6 dB Occupied Bandwidth Test Results, 802.11n HT40, Port 1, 5 GHz

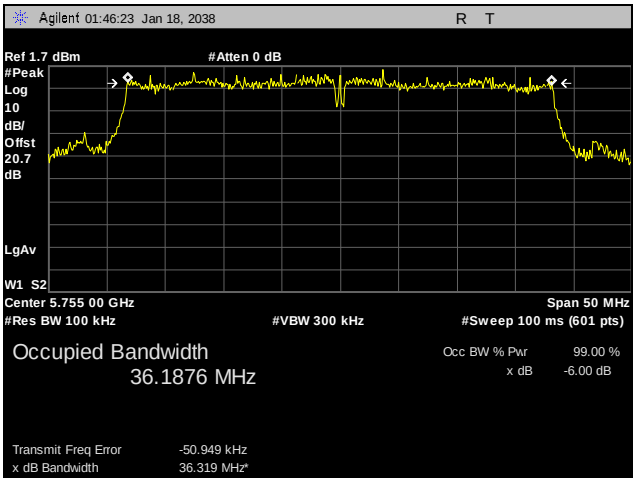


Plot 72. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT40, Port 1, 5 GHz

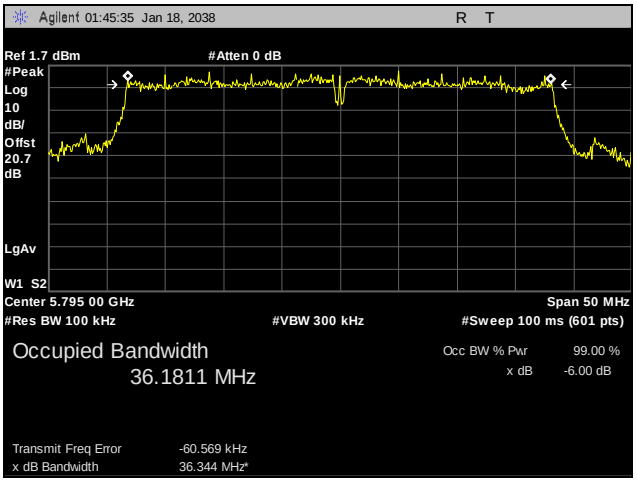


Plot 73. 6 dB Occupied Bandwidth, High Channel, 802.11n HT40, Port 1, 5 GHz

6 dB Occupied Bandwidth Test Results, 802.11n HT40, Port 2, 5 GHz

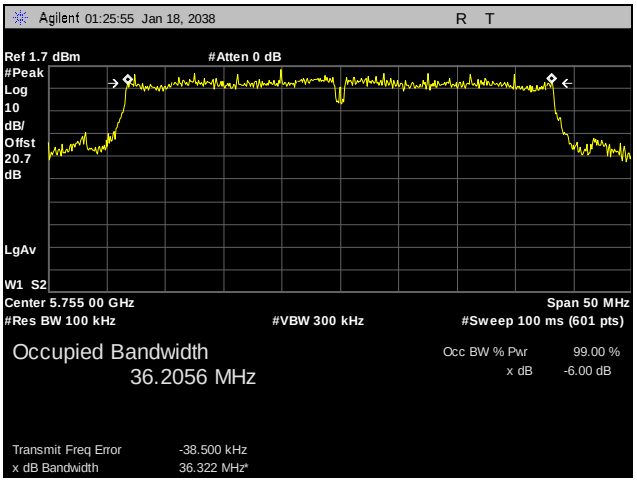


Plot 74. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT40, Port 2, 5 GHz

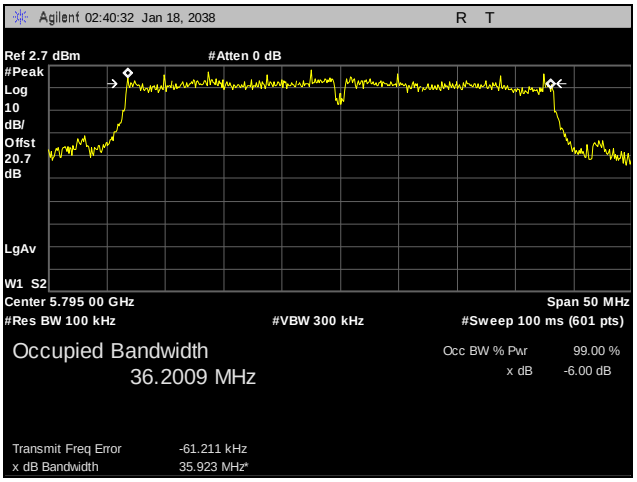


Plot 75. 6 dB Occupied Bandwidth, High Channel, 802.11n HT40, Port 2, 5 GHz

6 dB Occupied Bandwidth Test Results, 802.11n HT40, Port 3, 5 GHz

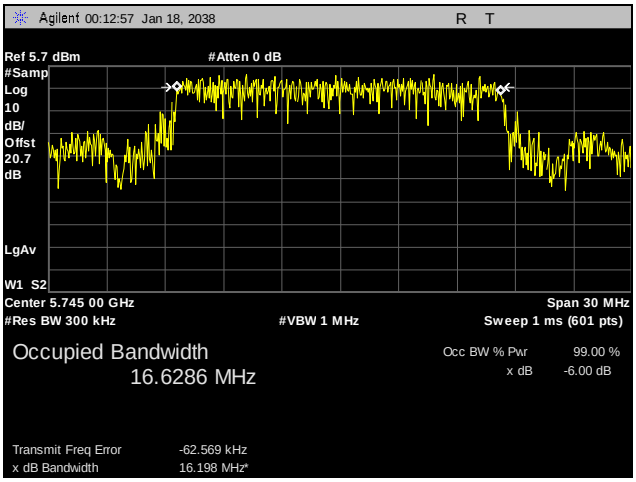


Plot 76. 6 dB Occupied Bandwidth, Low Channel, 802.11n HT40, Port 3, 5 GHz

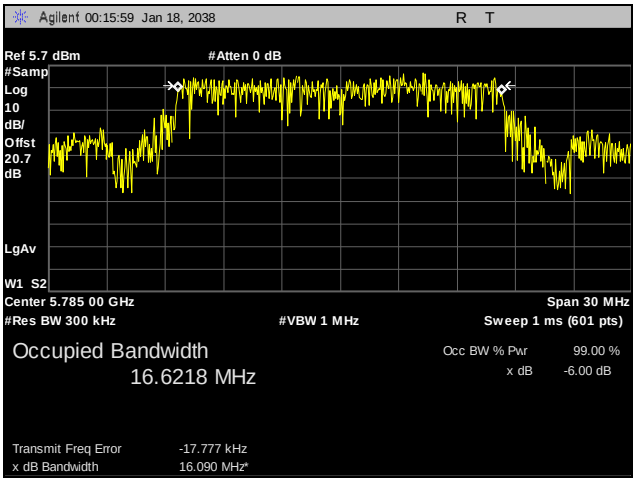


Plot 77. 6 dB Occupied Bandwidth, High Channel, 802.11n HT40, Port 3, 5 GHz

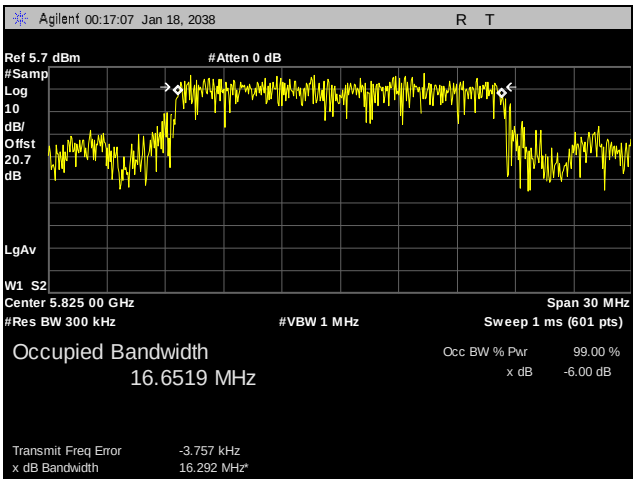
99% Occupied Bandwidth Test Results, 802.11a, 5 GHz



Plot 78. 99% Occupied Bandwidth, Low Channel, 802.11a, 5 GHz

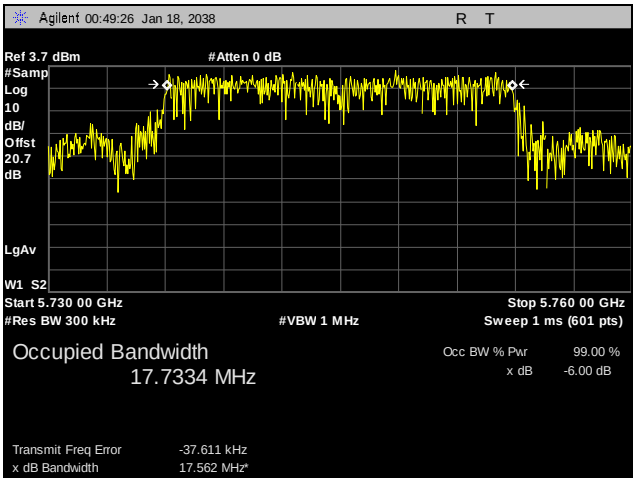


Plot 79. 99% Occupied Bandwidth, Mid Channel, 802.11a, 5 GHz

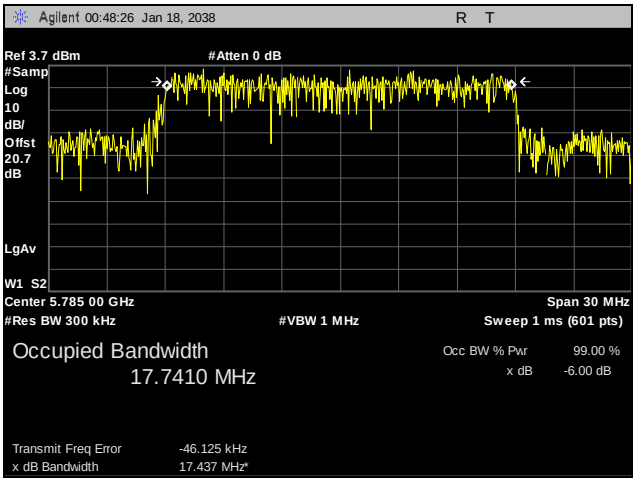


Plot 80. 99% Occupied Bandwidth, High Channel, 802.11a, 5 GHz

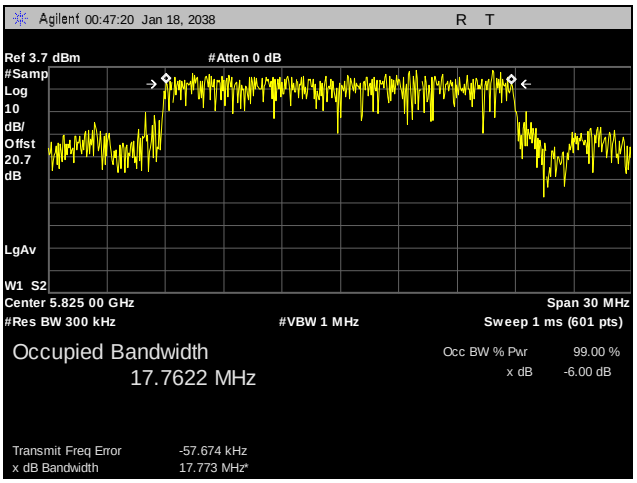
99% Occupied Bandwidth Test Results, 802.11n HT20, Port 1, 5 GHz



Plot 81. 99% Occupied Bandwidth, Low Channel, 802.11n HT20, Port 1, 5 GHz

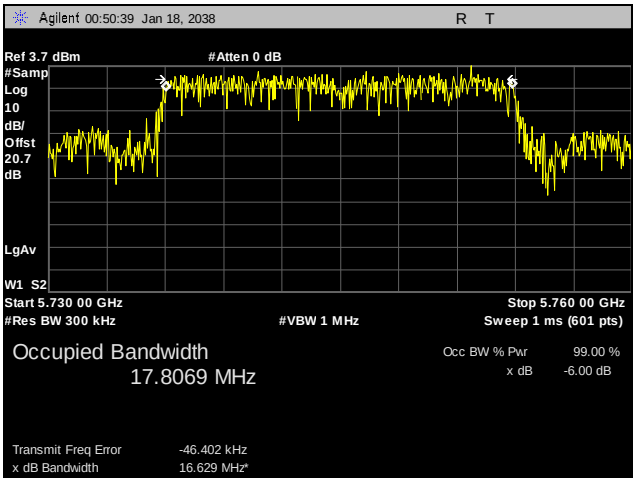


Plot 82. 99% Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 1, 5 GHz

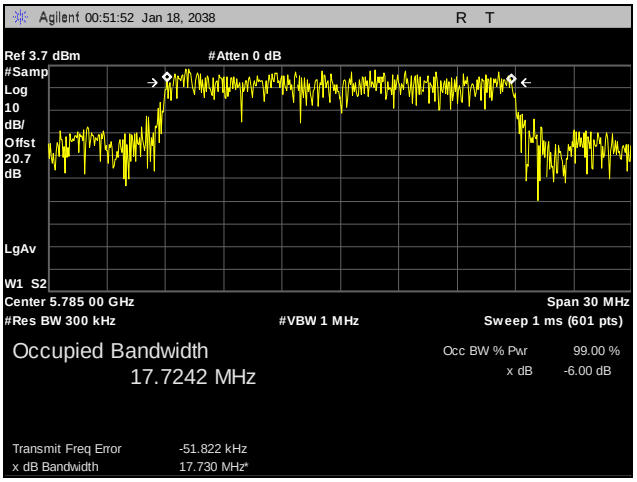


Plot 83. 99% Occupied Bandwidth, High Channel, 802.11n HT20, Port 1, 5 GHz

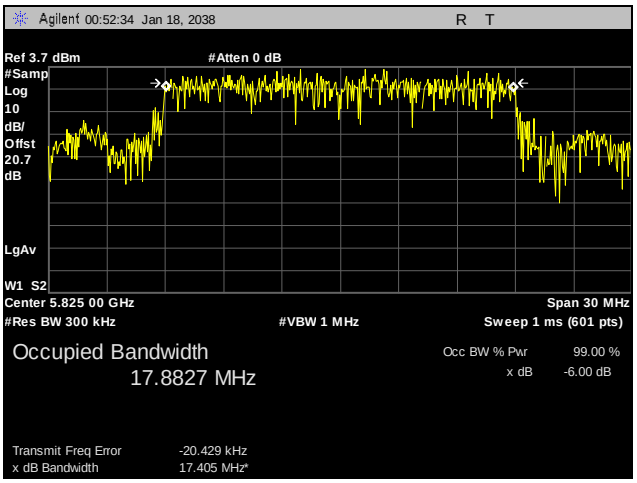
99% Occupied Bandwidth Test Results, 802.11n HT20, Port 2, 5 GHz



Plot 84. 99% Occupied Bandwidth, Low Channel, 802.11n HT20, Port 2, 5 GHz

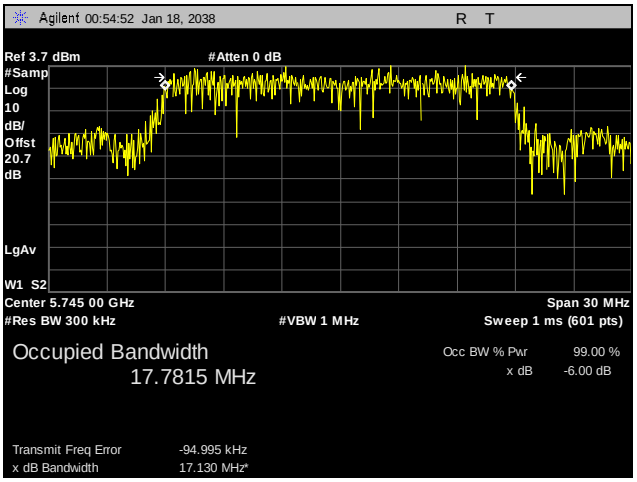


Plot 85. 99% Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 2, 5 GHz

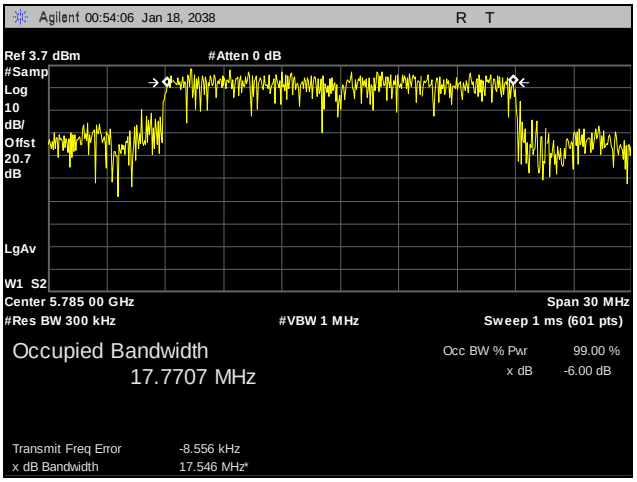


Plot 86. 99% Occupied Bandwidth, High Channel, 802.11n HT20, Port 2, 5 GHz

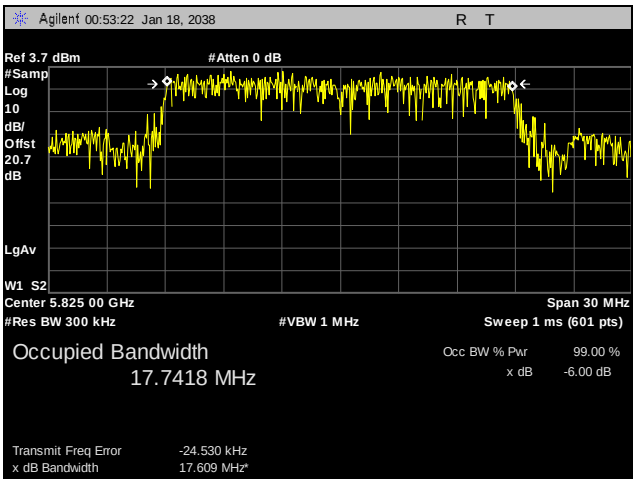
99% Occupied Bandwidth Test Results, 802.11n HT20, Port 3, 5 GHz



Plot 87. 99% Occupied Bandwidth, Low Channel, 802.11n HT20, Port 3, 5 GHz

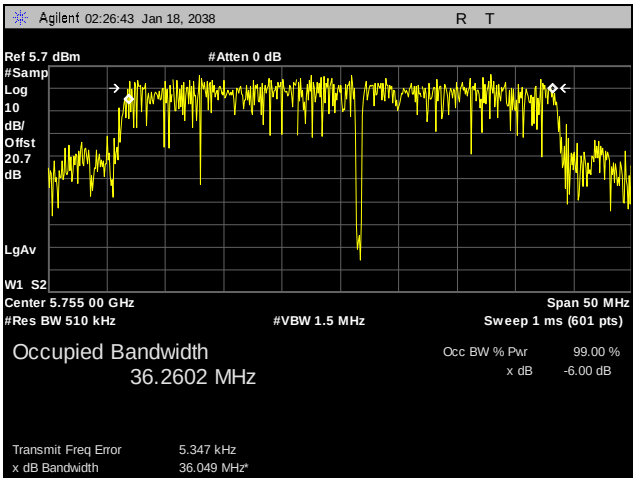


Plot 88. 99% Occupied Bandwidth, Mid Channel, 802.11n HT20, Port 3, 5 GHz

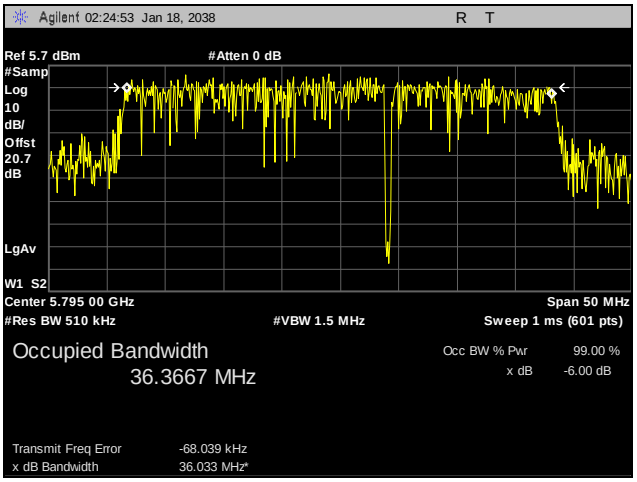


Plot 89. 99% Occupied Bandwidth, High Channel, 802.11n HT20, Port 3, 5 GHz

99% Occupied Bandwidth Test Results, 802.11n HT40, Port 1, 5 GHz

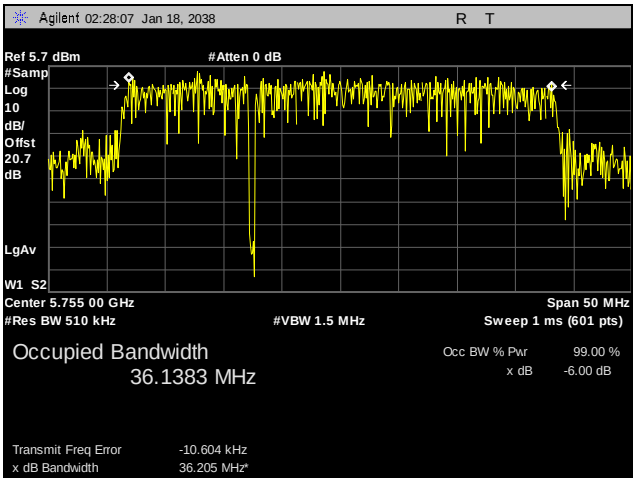


Plot 90. 99% Occupied Bandwidth, Low Channel, 802.11n HT40, Port 1, 5 GHz

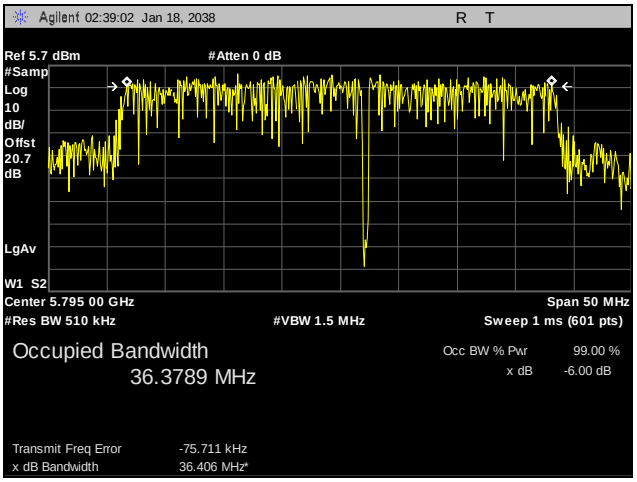


Plot 91. 99% Occupied Bandwidth, High Channel, 802.11n HT40, Port 1, 5 GHz

99% Occupied Bandwidth Test Results, 802.11n HT40, Port 2, 5 GHz

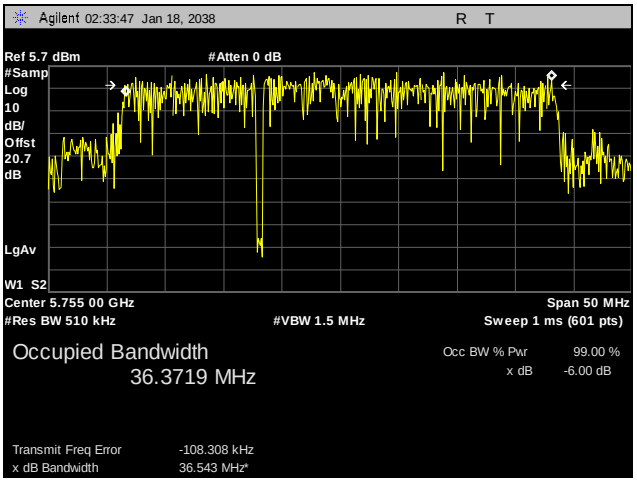


Plot 92. 99% Occupied Bandwidth, Low Channel, 802.11n HT40, Port 2, 5 GHz

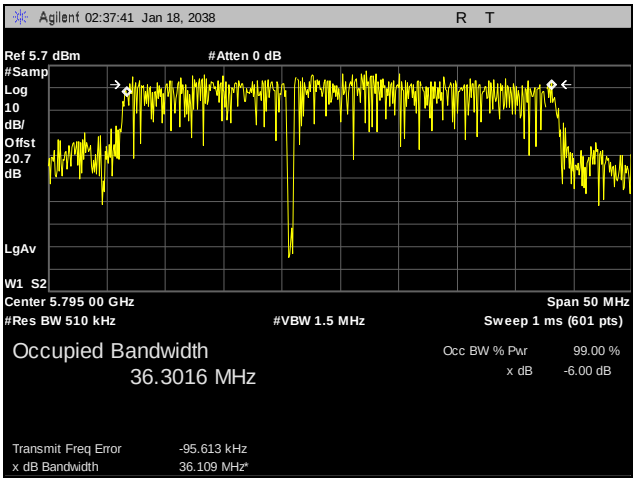


Plot 93. 99% Occupied Bandwidth, High Channel, 802.11n HT40, Port 2, 5 GHz

99% Occupied Bandwidth Test Results, 802.11n HT40, Port 3, 5 GHz



Plot 94. 99% Occupied Bandwidth, Low Channel, 802.11n HT40, Port 3, 5 GHz



Plot 95. 99% Occupied Bandwidth, High Channel, 802.11n HT40, Port 3, 5 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output

Test Requirements: **§15.247(b):** The maximum peak output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit (Watts)
902-928	1.000
2400–2483.5	1.000
5725– 5850	1.000

Table 25. Output Power Requirements from §15.247(b)

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in the Table 25, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band and using a point to point application may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Fixed, point-to-point operation excludes the use of point-to-multipoint systems, Omni-directional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

Test Procedure: The transmitter was connected to a calibrated spectrum analyzer. The EUT was measured at the low, mid and high channels of each band at the maximum power level.

Test Results: The EUT was compliant with the Peak Power Output limits of **§15.247(b)**.

Test Engineer(s): Lionel Gabrillo

Test Date(s): 05/04/12

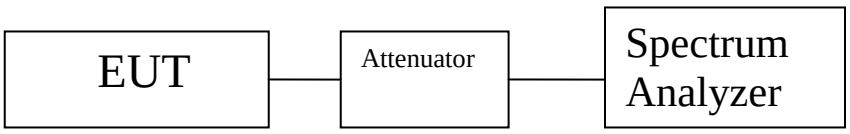


Figure 3. Peak Power Output Test Setup

Peak Power Output Test Results, 2.4 GHz

Peak Conducted Output Power			
	Carrier Channel	**Frequency (MHz)**	**Measured Peak Output Power dBm**
802.11b	Low Channel	2412	17.31
	Mid Channel	2437	17.68
	High Channel	2462	17.72
802.11g	Low Channel	2412	22.16
	Mid Channel	2437	22.16
	High Channel	2462	21.35
802.11n 20 MHz Port 1	Low Channel	2412	21.74
	Mid Channel	2437	22.05
	High Channel	2462	21.49
802.11n 20 MHz Port 2	Low Channel	2412	21.57
	Mid Channel	2437	21.97
	High Channel	2462	21.34
802.11n 20 MHz Port 3	Low Channel	2412	21.86
	Mid Channel	2437	22.06
	High Channel	2462	21.64
802.11n 20 MHz Sum Ports 1 – 3	Low Channel	2412	26.50
	Mid Channel	2437	26.80
	High Channel	2462	26.26

Table 26. Peak Power Output, Test Results, 2.4 GHz 20 MHz Bandwidth

Peak Conducted Output Power			
	Carrier Channel	**Frequency (MHz)**	**Measured Peak Output Power dBm**
802.11n 40 MHz Port 1	Channel 3	2422	20.93
	Channel 4	2427	21.87
	Channel 5	2432	22.24
	Channel 6	2437	22.29
	Channel 7	2442	21.18
	Channel 8	2447	20.13
	Channel 9	2452	19.62
802.11n 40 MHz Port 2	Channel 3	2422	21.03
	Channel 4	2427	21.76
	Channel 5	2432	22.15
	Channel 6	2437	22.09
	Channel 7	2442	21.32
	Channel 8	2447	20.37
	Channel 9	2452	19.53
802.11n 40 MHz Port 3	Channel 3	2422	21.22
	Channel 4	2427	22.14
	Channel 5	2432	22.34
	Channel 6	2437	22.74
	Channel 7	2442	21.54
	Channel 8	2447	20.43
	Channel 9	2452	19.95
802.11n 40 MHz Sum Ports 1-3	Channel 3	2422	25.83
	Channel 4	2427	26.70
	Channel 5	2432	27.02
	Channel 6	2437	27.15
	Channel 7	2442	26.12
	Channel 8	2447	25.08
	Channel 9	2452	24.47

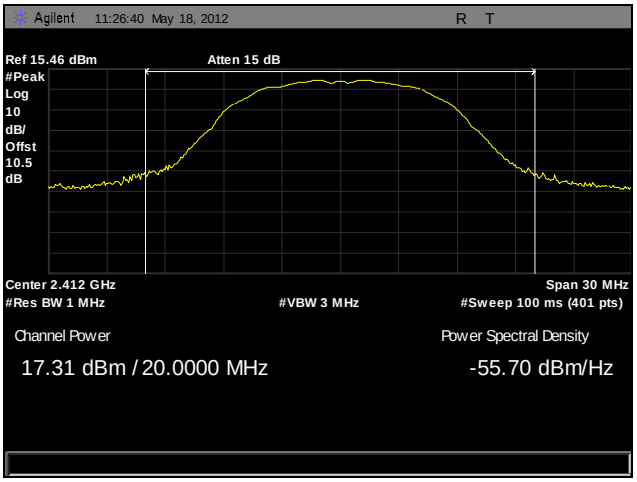
Table 27. Peak Power Output, Test Results, 2.4 GHz 40 MHz Bandwidth

Peak Power Output Test Results, 5 GHz

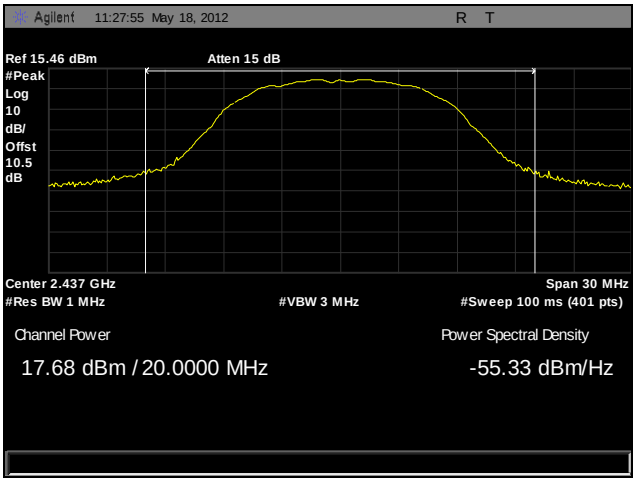
Peak Conducted Output Power			
	Carrier Channel	**Frequency (MHz)**	**Measured Peak Output Power dBm**
802.11a	Low Channel	5745	20.11
	Mid Channel	5785	20.39
	High Channel	5825	20.39
802.11n 20 MHz Port 1	Low Channel	5745	19.75
	Mid Channel	5785	20.16
	High Channel	5825	20.30
802.11n 20 MHz Port 2	Low Channel	5745	20.81
	Mid Channel	5785	20.78
	High Channel	5825	20.71
802.11n 20 MHz Port 3	Low Channel	5745	20.42
	Mid Channel	5785	20.38
	High Channel	5825	20.50
802.11n 20 MHz Sum Ports 1-3	Low Channel	5745	25.12
	Mid Channel	5785	25.22
	High Channel	5825	25.28
'802.11n 40 MHz Port 1	Low Channel	5755	19.81
	High Channel	5795	19.88
802.11n 40 MHz Port 2	Low Channel	5755	21.08
	High Channel	5795	20.81
802.11n 40 MHz Port 3	Low Channel	5755	20.96
	High Channel	5795	20.95
802.11n 40 MHz Sum Ports 1-3	Low Channel	5755	25.42
	High Channel	5795	25.34

Table 28. Peak Power Output, Test Results, 5 GHz

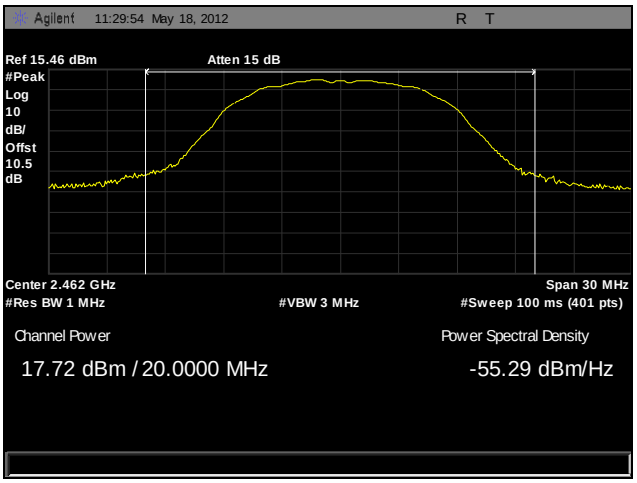
Peak Power Output Test Results, 802.11b, 2.4 GHz



Plot 96. Peak Power Output, Channel 1, 802.11b, 2.4 GHz

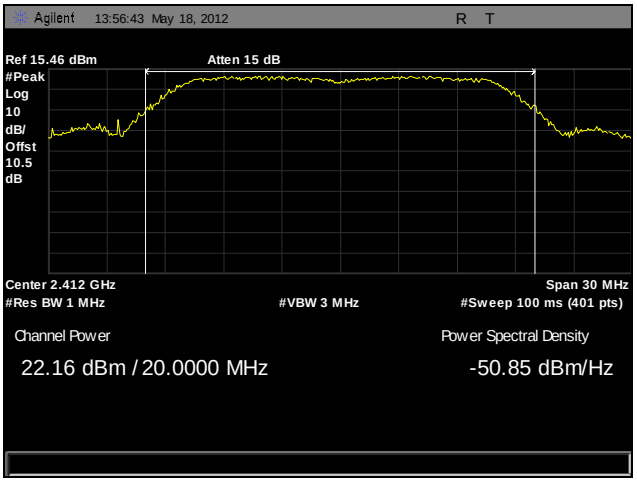


Plot 97. Peak Power Output, Channel 6, 802.11b, 2.4 GHz

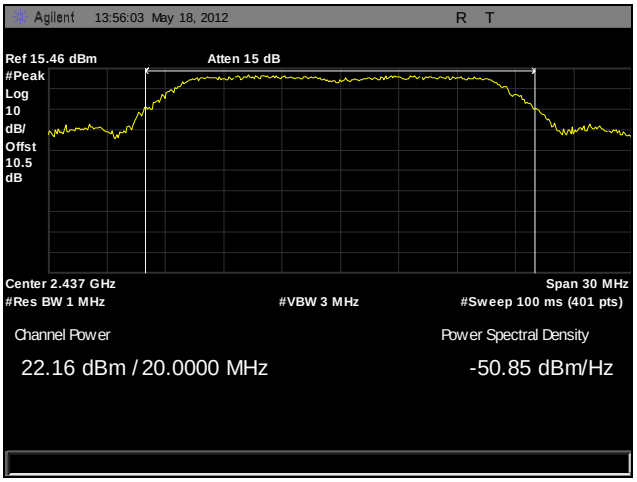


Plot 98. Peak Power Output, Channel 11, 802.11b, 2.4 GHz

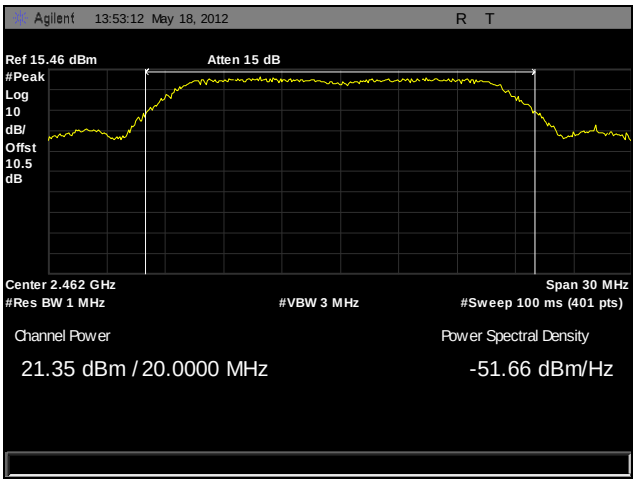
Peak Power Output Test Results, 802.11g, 2.4 GHz



Plot 99. Peak Power Output, Low Channel, 802.11g, 2.4 GHz

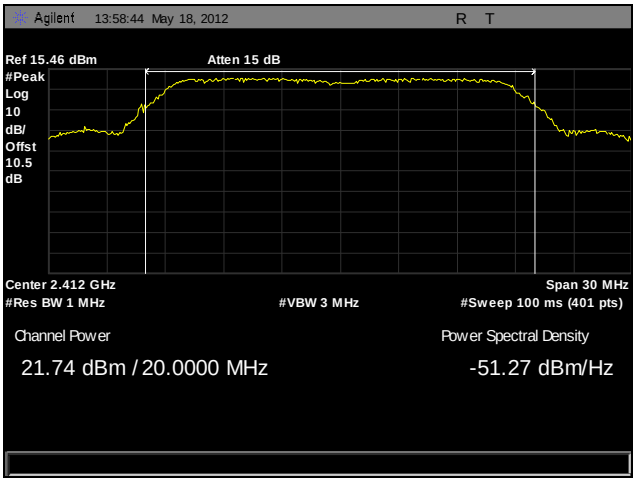


Plot 100. Peak Power Output, Mid Channel, 802.11g, 2.4 GHz

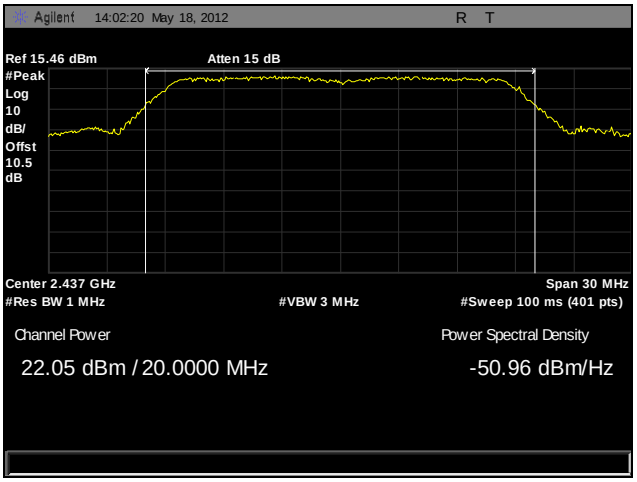


Plot 101. Peak Power Output, High Channel, 802.11g, 2.4 GHz

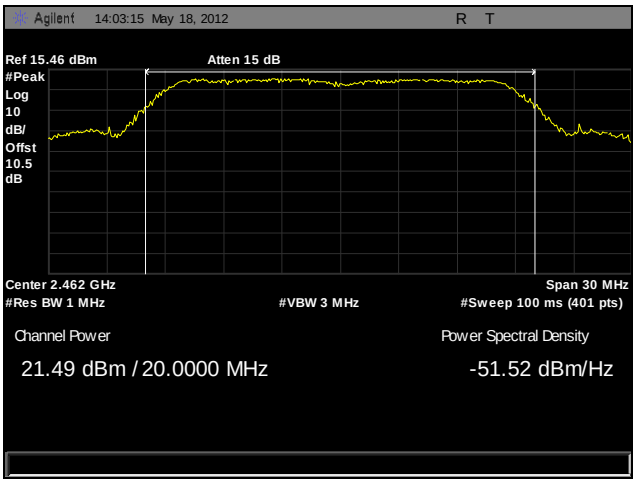
Peak Power Output Test Results, 802.11n HT20, Port 1, 2.4 GHz



Plot 102. Peak Power Output, Low Channel, 802.11n HT20, Port 1, 2.4 GHz

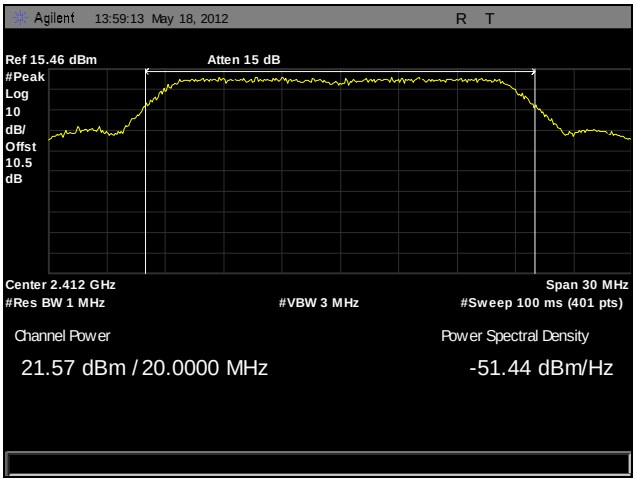


Plot 103. Peak Power Output, Mid Channel, 802.11n HT20, Port 1, 2.4 GHz

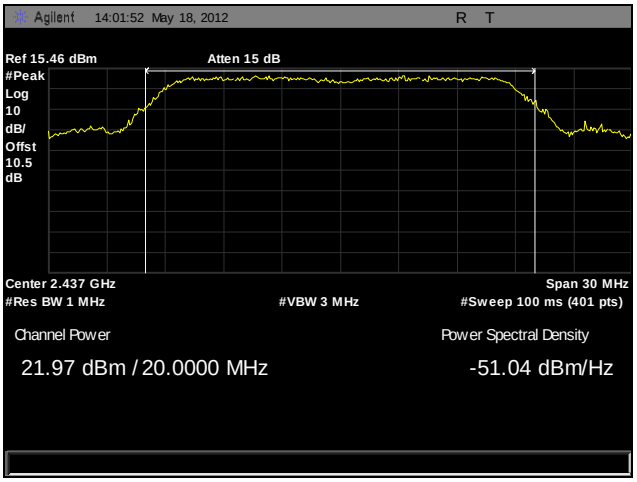


Plot 104. Peak Power Output, High Channel, 802.11n HT20, Port 1, 2.4 GHz

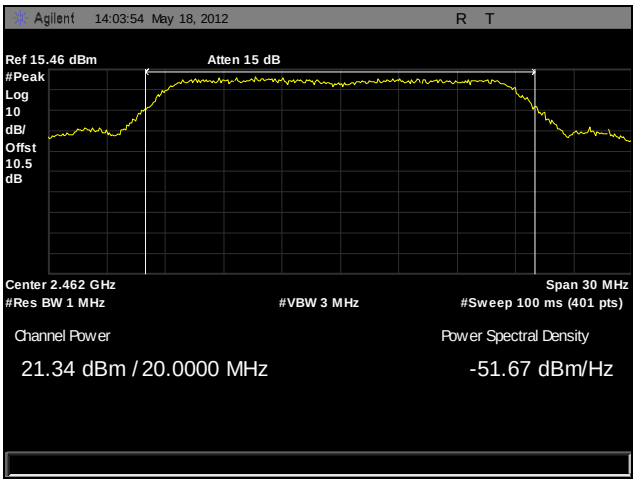
Peak Power Output Test Results, 802.11n HT20, Port 2, 2.4 GHz



Plot 105. Peak Power Output, Low Channel, 802.11n HT20, Port 2, 2.4 GHz

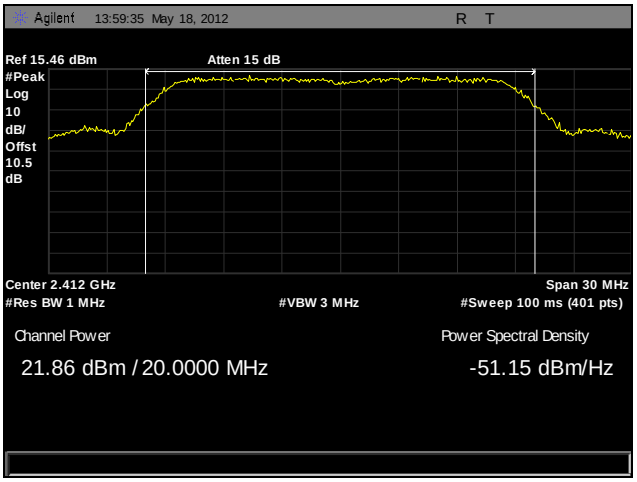


Plot 106. Peak Power Output, Mid Channel, 802.11n HT20, Port 2, 2.4 GHz

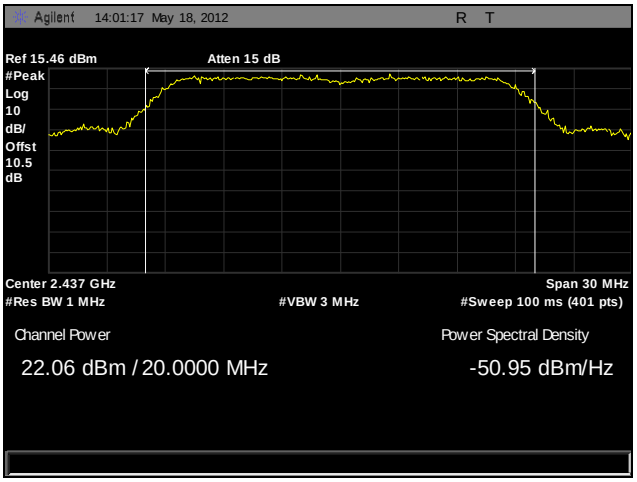


Plot 107. Peak Power Output, High Channel, 802.11n HT20, Port 2, 2.4 GHz

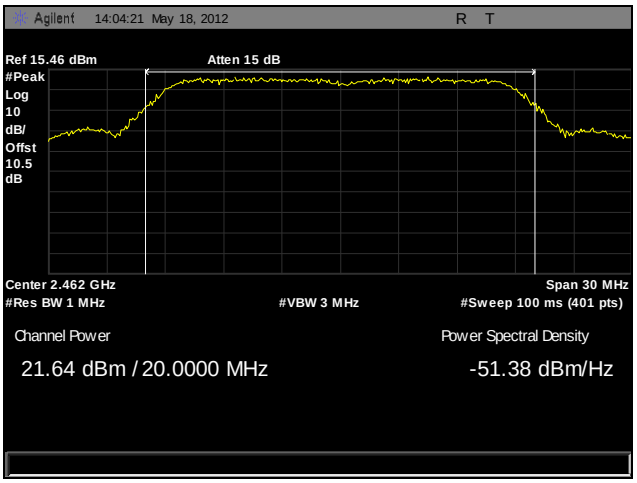
Peak Power Output Test Results, 802.11n HT20, Port 3, 2.4 GHz



Plot 108. Peak Power Output, Low Channel, 802.11n HT20, Port 3, 2.4 GHz

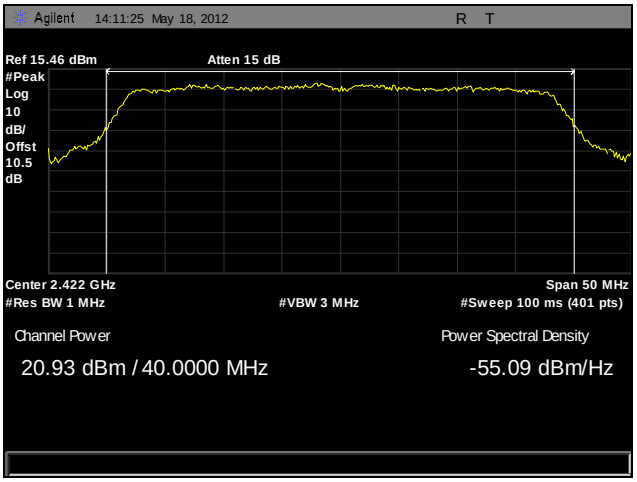


Plot 109. Peak Power Output, Mid Channel, 802.11n HT20, Port 3, 2.4 GHz

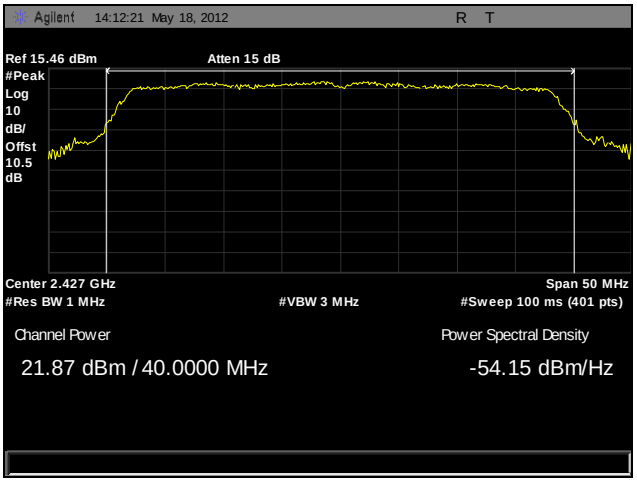


Plot 110. Peak Power Output, High Channel, 802.11n HT20, Port 3, 2.4 GHz

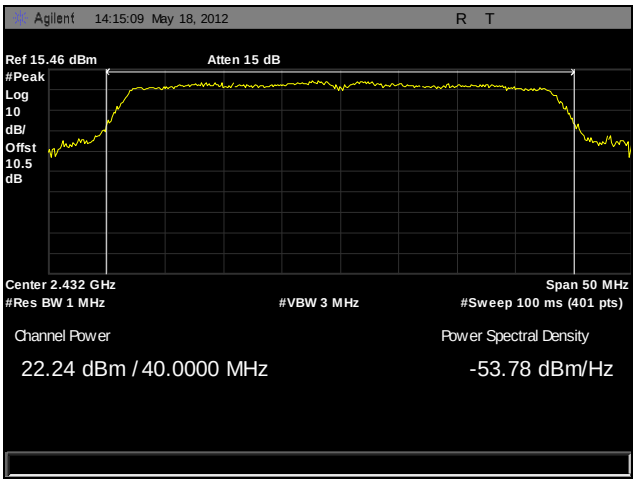
Peak Power Output Test Results, 802.11n HT40, Port 1, 2.4 GHz



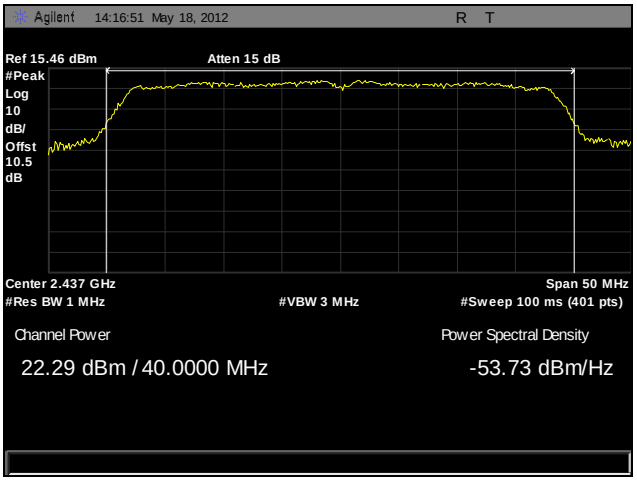
Plot 111. Peak Power Output, Low Channel, 802.11n HT40, Port 1, 2.4 GHz



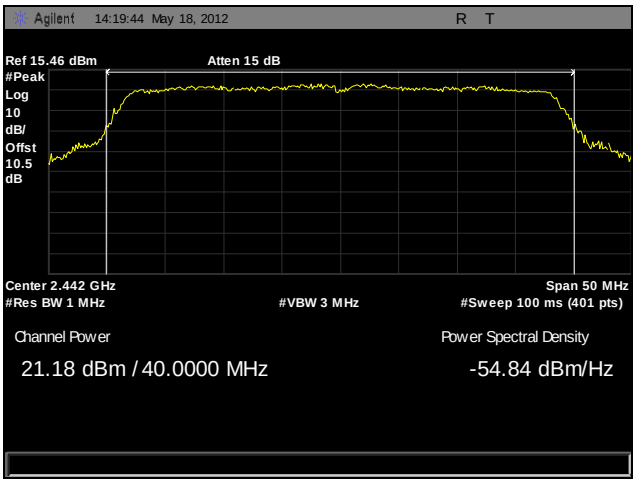
Plot 112. Peak Power Output, Channel 4, 802.11n HT40, Port 1, 2.4 GHz



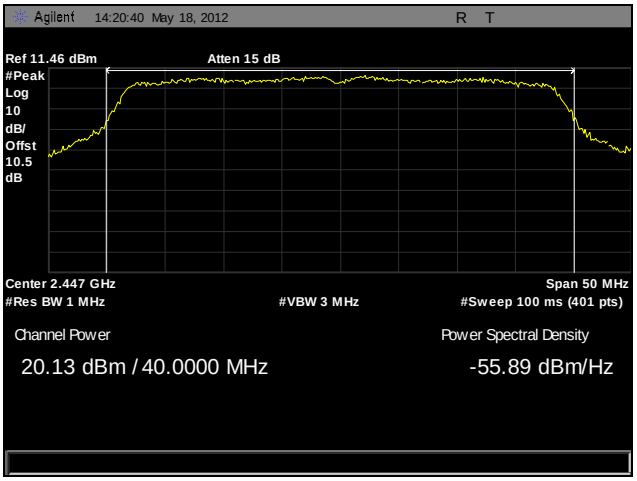
Plot 113. Peak Power Output, Channel 5, 802.11n HT40, Port 1, 2.4 GHz



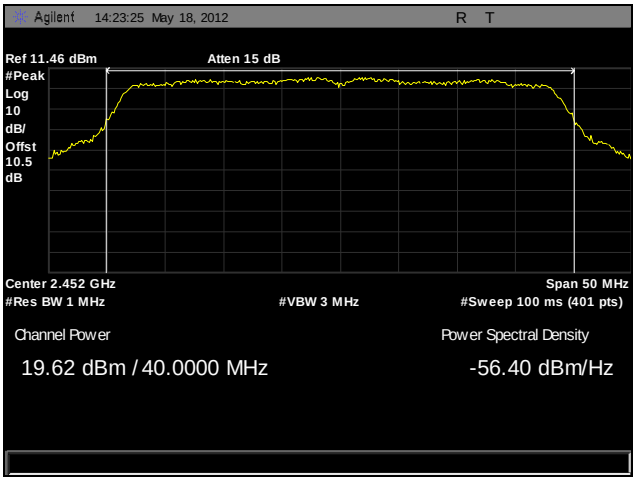
Plot 114. Peak Power Output, Channel 6, 802.11n HT40, Port 1, 2.4 GHz



Plot 115. Peak Power Output, Channel 7, 802.11n HT40, Port 1, 2.4 GHz

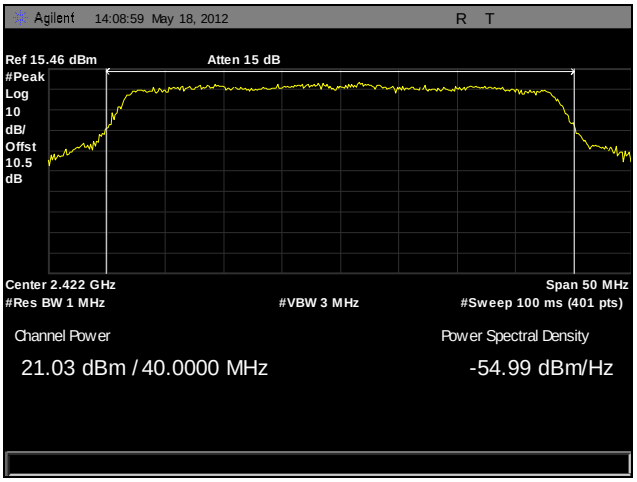


Plot 116. Peak Power Output, Channel 8, 802.11n HT40, Port 1, 2.4 GHz

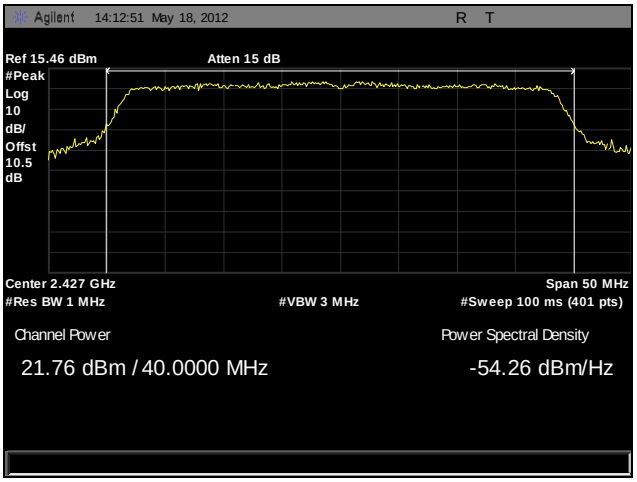


Plot 117. Peak Power Output, High Channel, 802.11n HT40, Port 1, 2.4 GHz

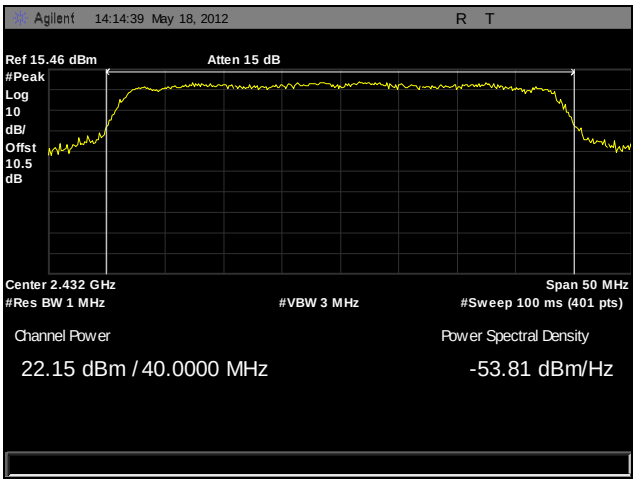
Peak Power Output Test Results, 802.11n HT40, Port 2, 2.4 GHz



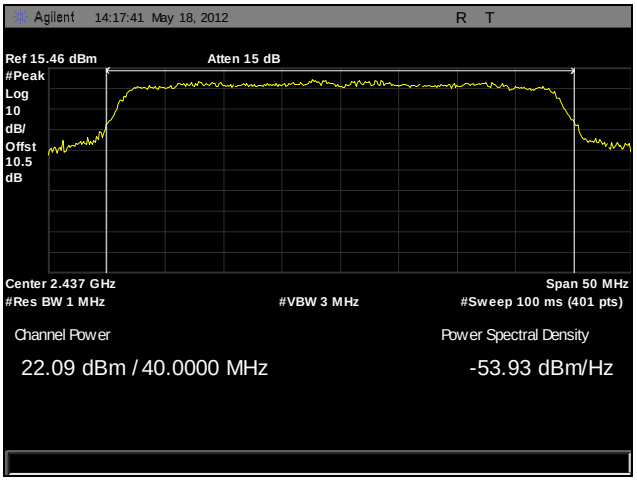
Plot 118. Peak Power Output, Low Channel, 802.11n HT40, Port 2, 2.4 GHz



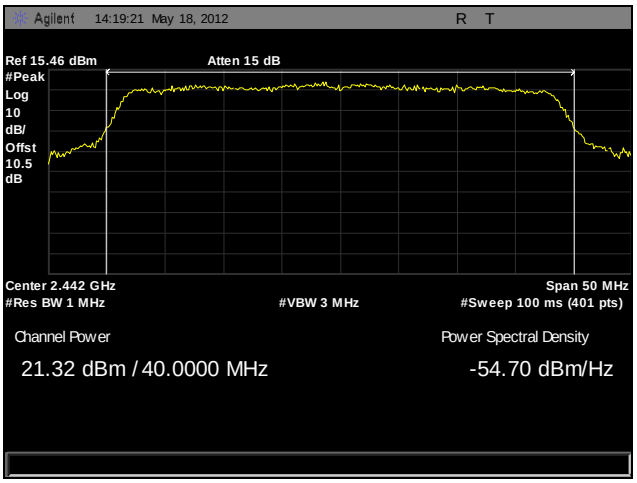
Plot 119. Peak Power Output, Channel 4, 802.11n HT40, Port 2, 2.4 GHz



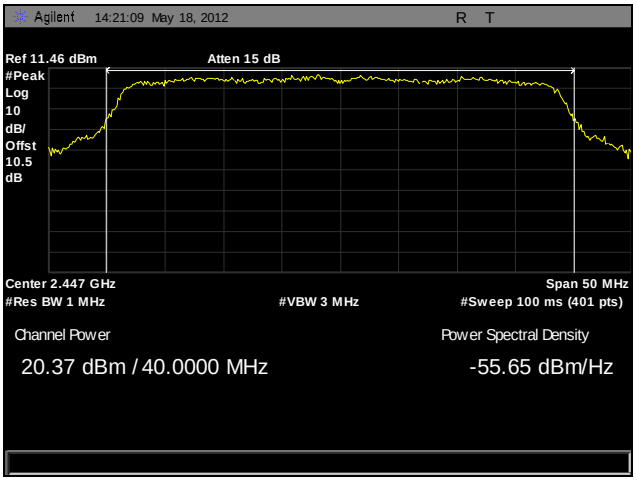
Plot 120. Peak Power Output, Channel 5, 802.11n HT40, Port 2, 2.4 GHz



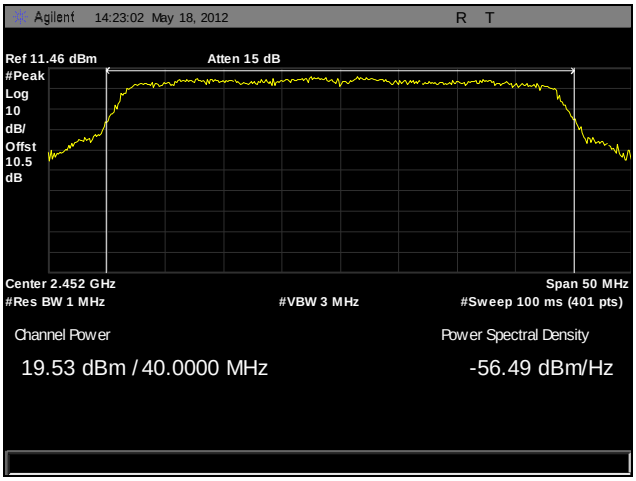
Plot 121. Peak Power Output, Channel 6, 802.11n HT40, Port 2, 2.4 GHz



Plot 122. Peak Power Output, Channel 7, 802.11n HT40, Port 2, 2.4 GHz

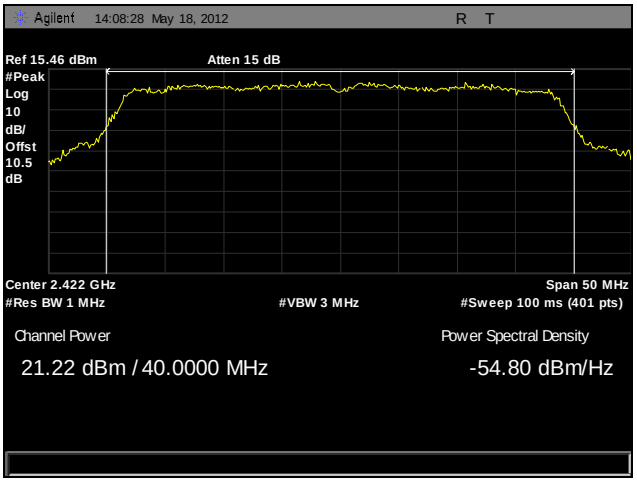


Plot 123. Peak Power Output, Channel 8, 802.11n HT40, Port 2, 2.4 GHz

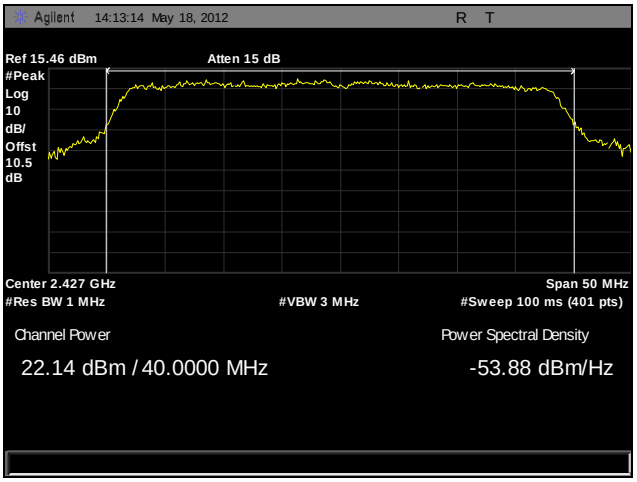


Plot 124. Peak Power Output, High Channel, 802.11n HT40, Port 2, 2.4 GHz

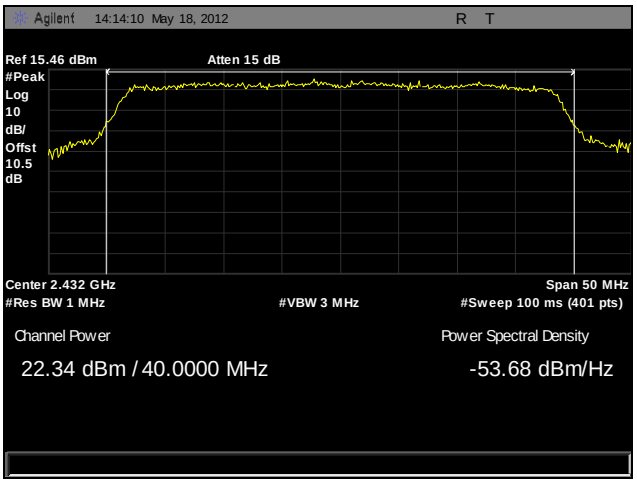
Peak Power Output Test Results, 802.11n HT40, Port 3, 2.4 GHz



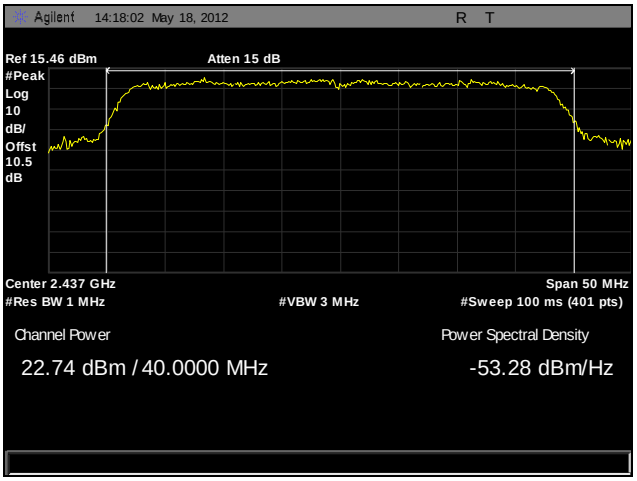
Plot 125. Peak Power Output, Low Channel, 802.11n HT40, Port 3, 2.4 GHz



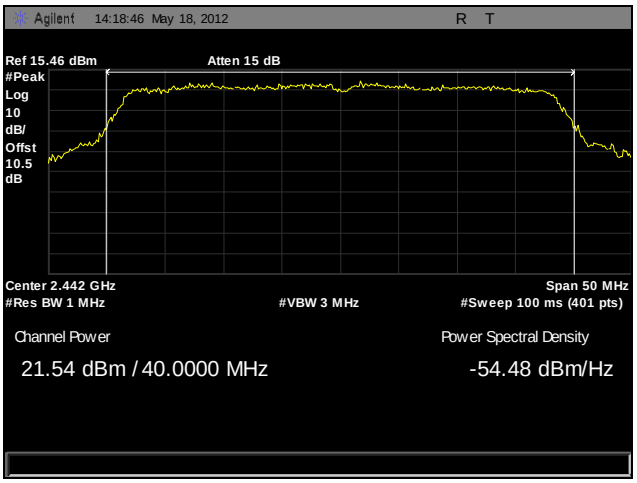
Plot 126. Peak Power Output, Channel 4, 802.11n HT40, Port 3, 2.4 GHz



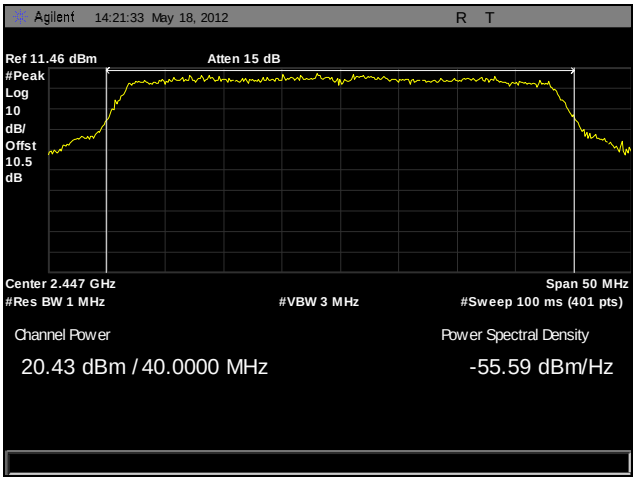
Plot 127. Peak Power Output, Channel 5, 802.11n HT40, Port 3, 2.4 GHz



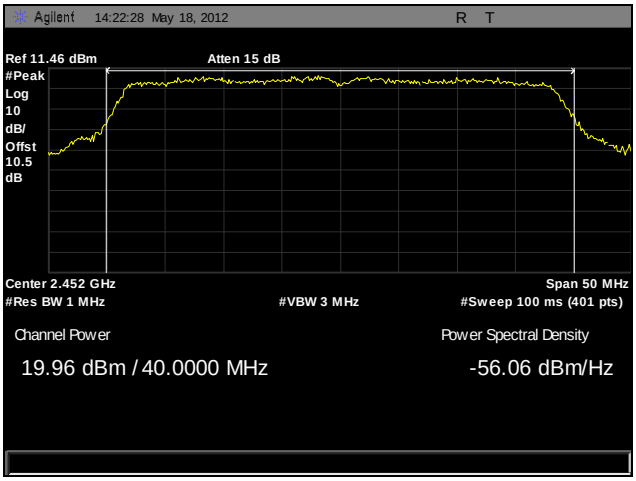
Plot 128. Peak Power Output, Channel 6, 802.11n HT40, Port 3, 2.4 GHz



Plot 129. Peak Power Output, Channel 7, 802.11n HT40, Port 3, 2.4 GHz

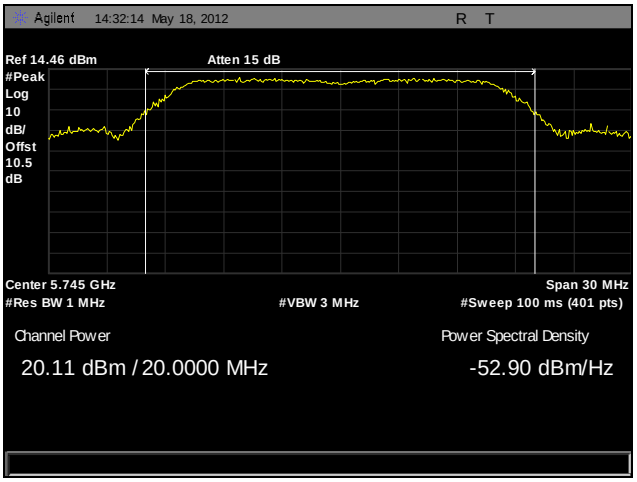


Plot 130. Peak Power Output, Channel 8, 802.11n HT40, Port 3, 2.4 GHz

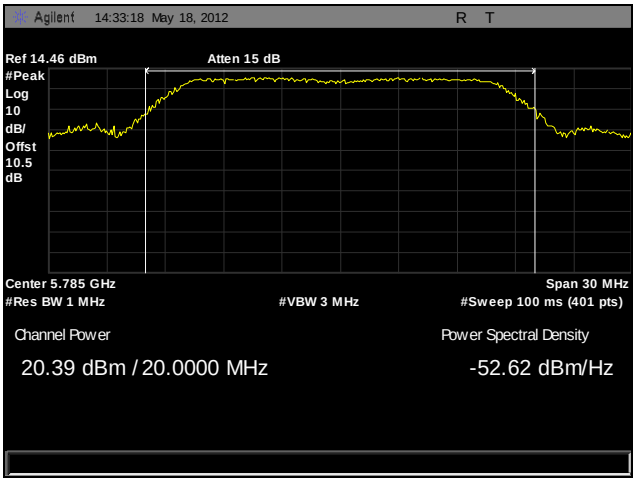


Plot 131. Peak Power Output, High Channel, 802.11n HT40, Port 3, 2.4 GHz

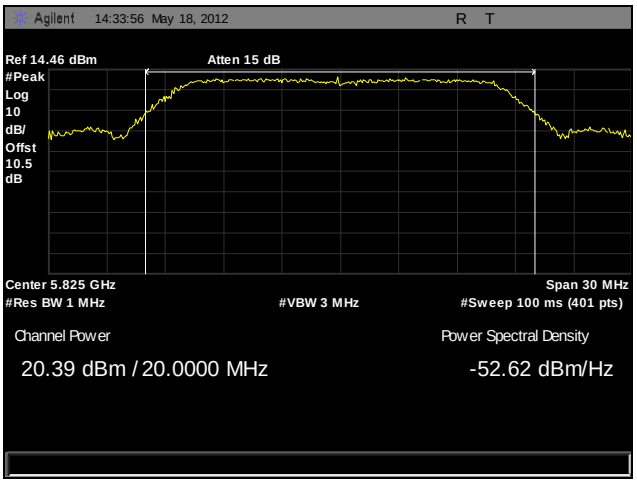
Peak Power Output Test Results, 802.11a, 5 GHz



Plot 132. Peak Power Output, Low Channel, 802.11a, 5 GHz

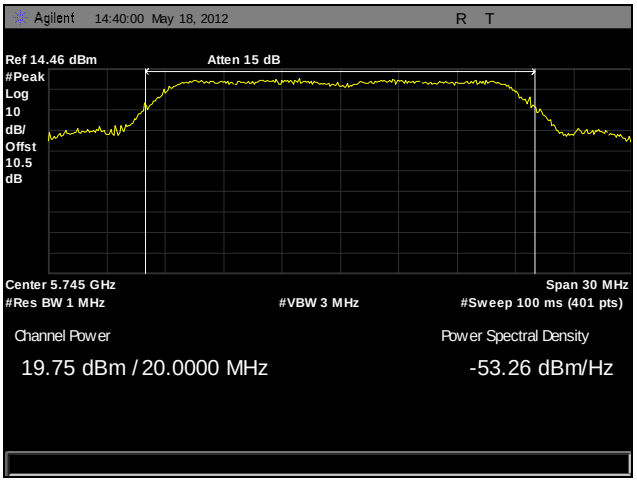


Plot 133. Peak Power Output, Mid Channel, 802.11a, 5 GHz

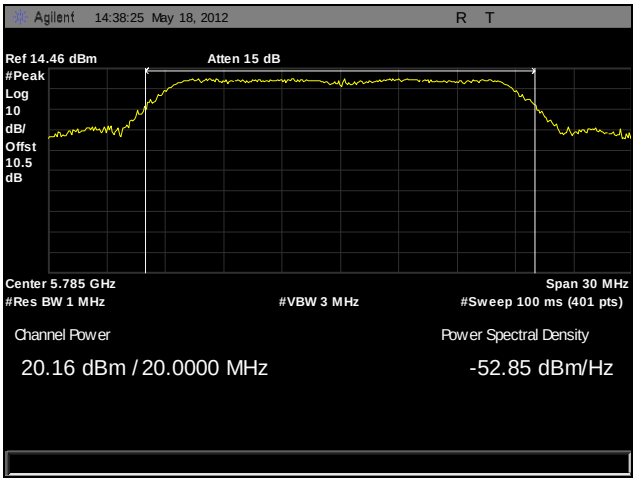


Plot 134. Peak Power Output, High Channel, 802.11a, 5 GHz

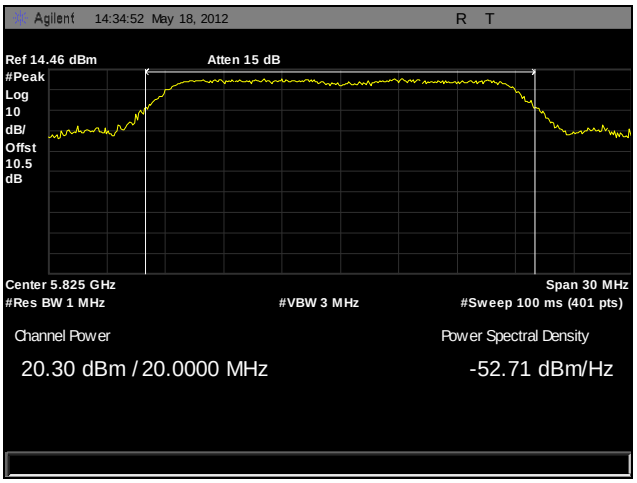
Peak Power Output Test Results, 802.11n HT20, Port 1, 5 GHz



Plot 135. Peak Power Output, Low Channel, 802.11n HT20, Port 1, 5 GHz

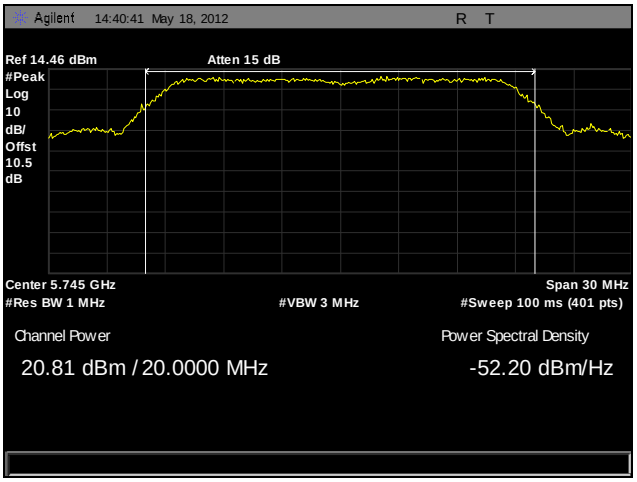


Plot 136. Peak Power Output, Mid Channel, 802.11n HT20, Port 1, 5 GHz

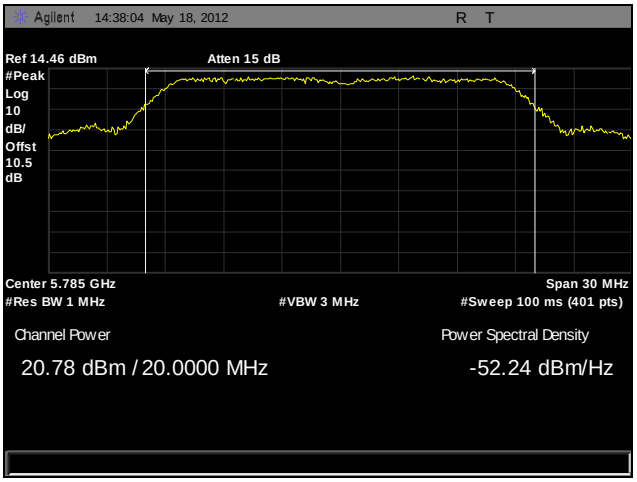


Plot 137. Peak Power Output, High Channel, 802.11n HT20, Port 1, 5 GHz

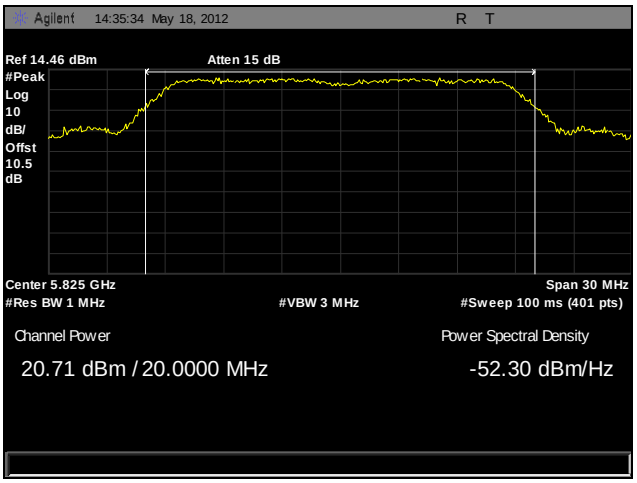
Peak Power Output Test Results, 802.11n HT20, Port 2, 5 GHz



Plot 138. Peak Power Output, Low Channel, 802.11n HT20, Port 2, 5 GHz

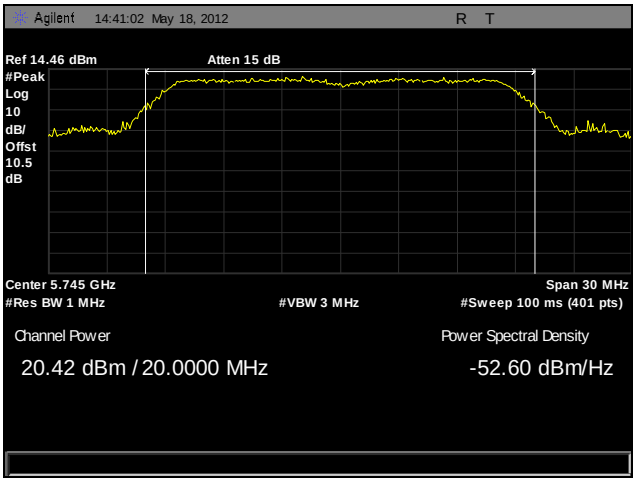


Plot 139. Peak Power Output, Mid Channel, 802.11n HT20, Port 2, 5 GHz

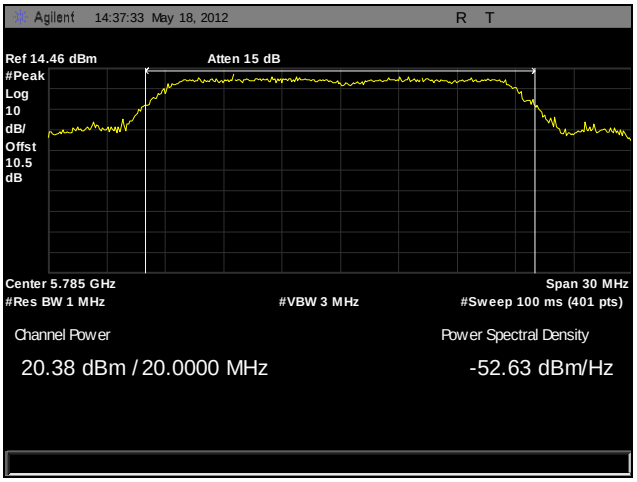


Plot 140. Peak Power Output, High Channel, 802.11n HT20, Port 2, 5 GHz

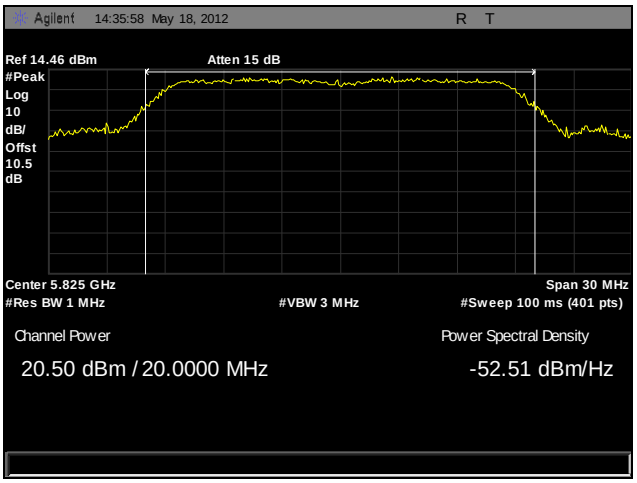
Peak Power Output Test Results, 802.11n HT20, Port 3, 5 GHz



Plot 141. Peak Power Output, Low Channel, 802.11n HT20, Port 3, 5 GHz

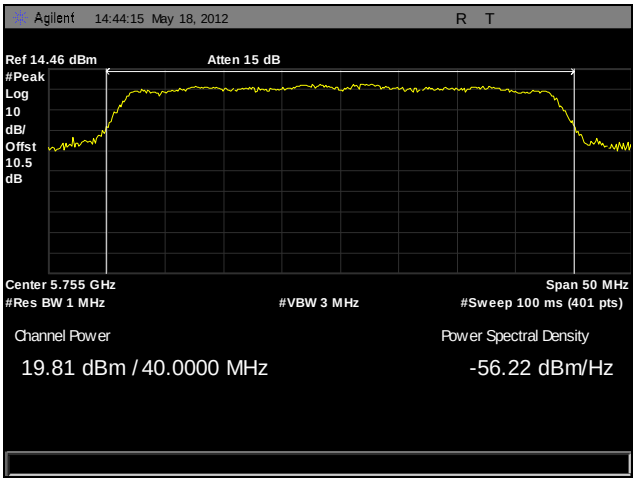


Plot 142. Peak Power Output, Mid Channel, 802.11n HT20, Port 3, 5 GHz

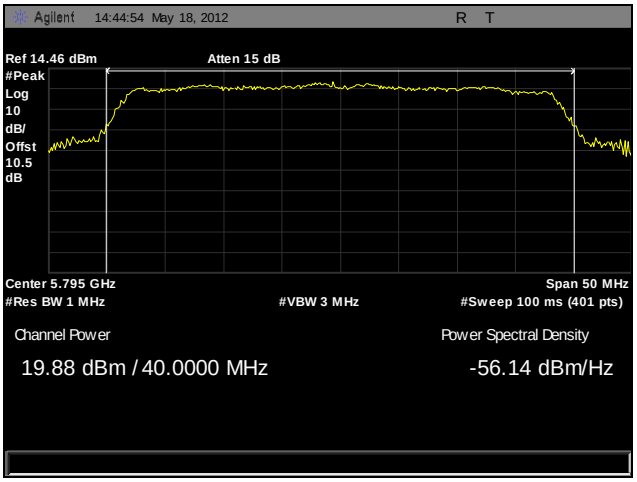


Plot 143. Peak Power Output, High Channel, 802.11n HT20, Port 3, 5 GHz

Peak Power Output Test Results, 802.11n HT40, Port 1, 5 GHz

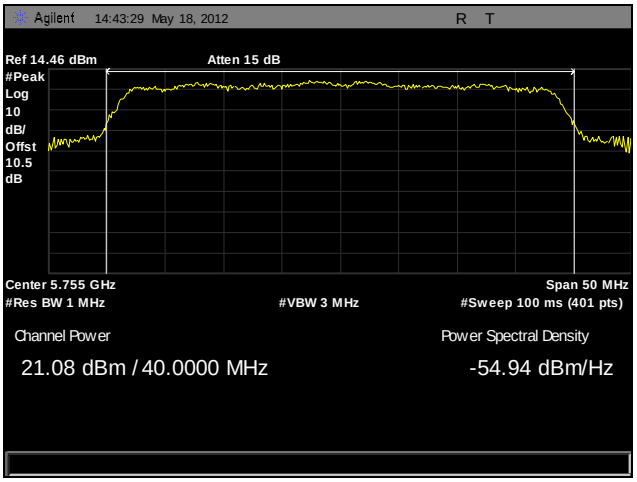


Plot 144. Peak Power Output, Low Channel, 802.11n HT40, Port 1, 5 GHz

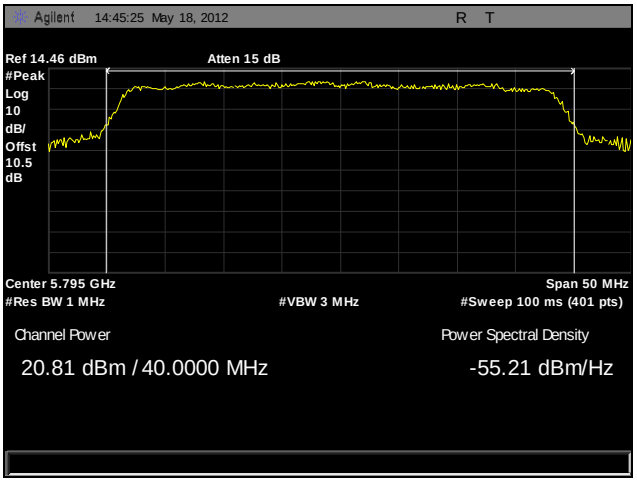


Plot 145. Peak Power Output, High Channel, 802.11n HT40, Port 1, 5 GHz

Peak Power Output Test Results, 802.11n HT40, Port 2, 5 GHz

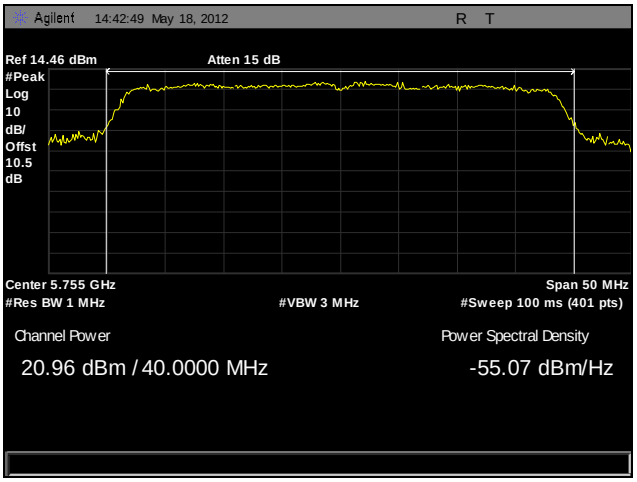


Plot 146. Peak Power Output, Low Channel, 802.11n HT40, Port 2, 5 GHz

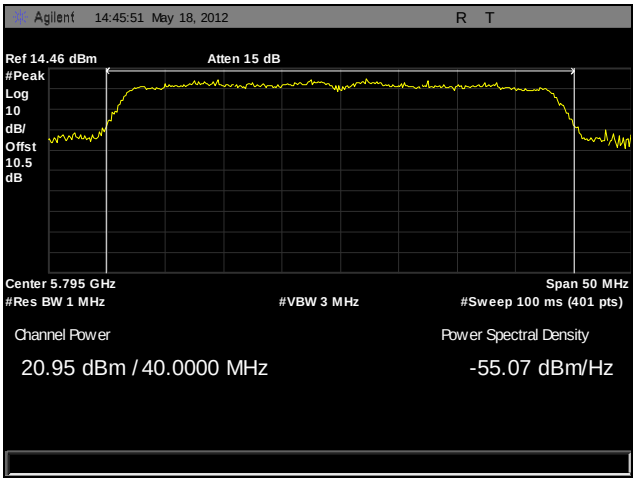


Plot 147. Peak Power Output, High Channel, 802.11n HT40, Port 2, 5 GHz

Peak Power Output Test Results, 802.11n HT40, Port 3, 5 GHz



Plot 148. Peak Power Output, Low Channel, 802.11n HT40, Port 3, 5 GHz



Plot 149. Peak Power Output, High Channel, 802.11n HT40, Port 3, 5 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Radiated Spurious Emissions Requirements and Band Edge

Test Requirements: **§15.247(d); §15.205:** Emissions outside the frequency band.

§15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

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

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

Table 29. Restricted Bands of Operation

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

Test Requirement(s): **§ 15.209 (a):** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 30.

Frequency (MHz)	§ 15.209(a),Radiated Emission Limits (dBµV) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 30. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedures: The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for antenna correction factor, preamp, cable loss and distance and compared to a 3 m limit line.

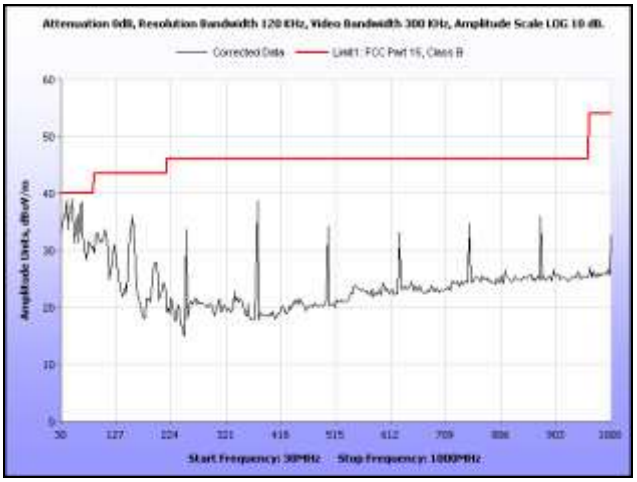
Note: Only noise floor was measured above 18 GHz.

Test Results: The EUT was compliant with the Radiated Spurious Emission limits of **§ 15.247(d)**.

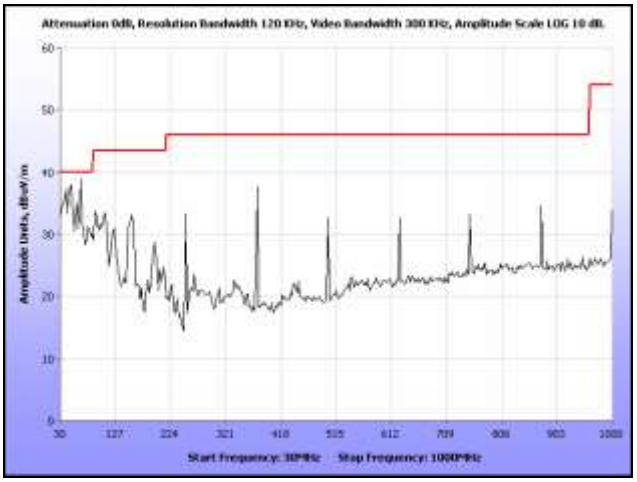
Test Engineer(s): Lionel Gabrillo

Test Date(s): 05/18/12

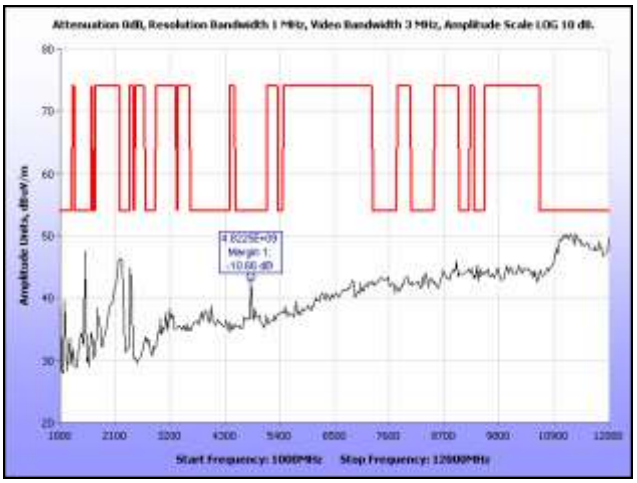
Radiated Spurious Emissions Test Results, 802.11b, 2.4 GHz



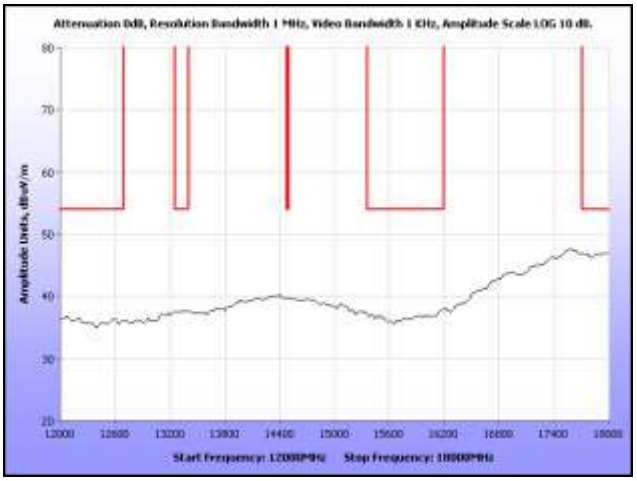
Plot 150. Radiated Spurious Emissions, Ambient (Radio Off), 30 MHz – 1 GHz, 2.4 GHz



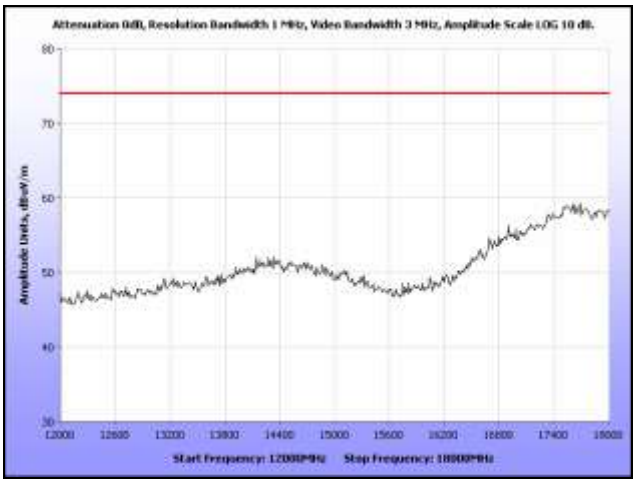
Plot 151. Radiated Spurious Emissions, Low Channel, 802.11b, 30 MHz – 1 GHz, 2.4 GHz



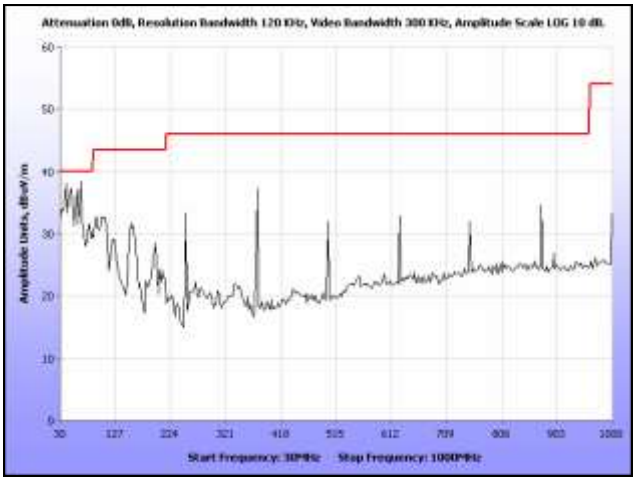
Plot 152. Radiated Spurious Emissions, Low Channel, 802.11b, 1 – 12 GHz, 2.4 GHz



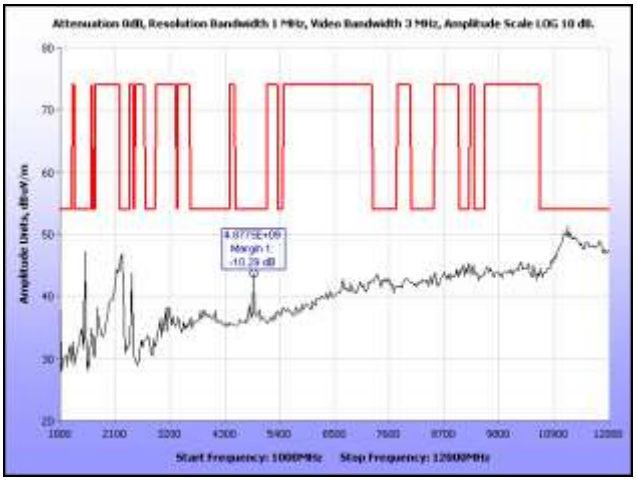
Plot 153. Radiated Spurious Emissions, Low Channel, 802.11b, 12 – 18 GHz, Avg., 2.4 GHz



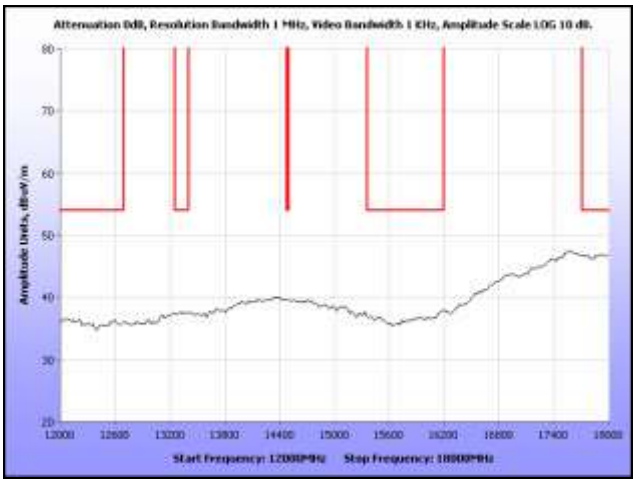
Plot 154. Radiated Spurious Emissions, Low Channel, 802.11b, 12 – 18 GHz, Peak, 2.4 GHz



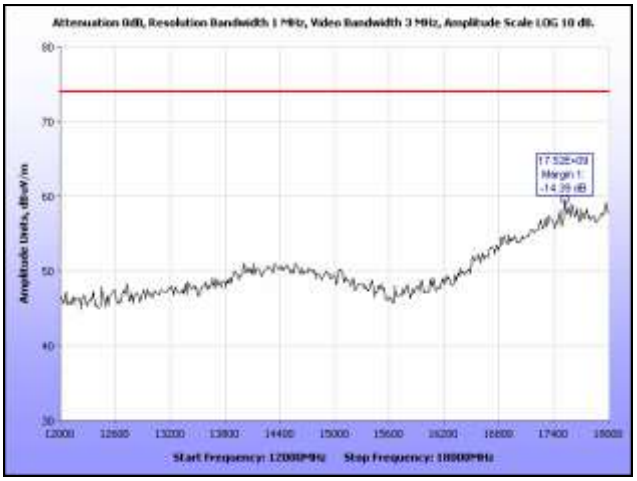
Plot 155. Radiated Spurious Emissions, Mid Channel, 802.11b, 30 MHz – 1 GHz, 2.4 GHz



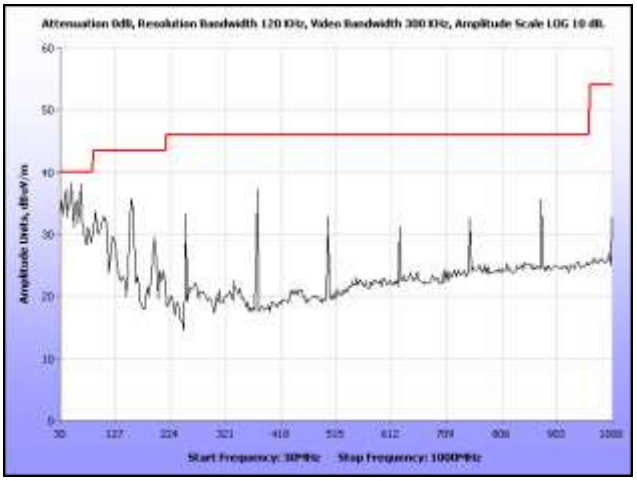
Plot 156. Radiated Spurious Emissions, Mid Channel, 802.11b, 1 – 12 GHz, Avg., 2.4 GHz



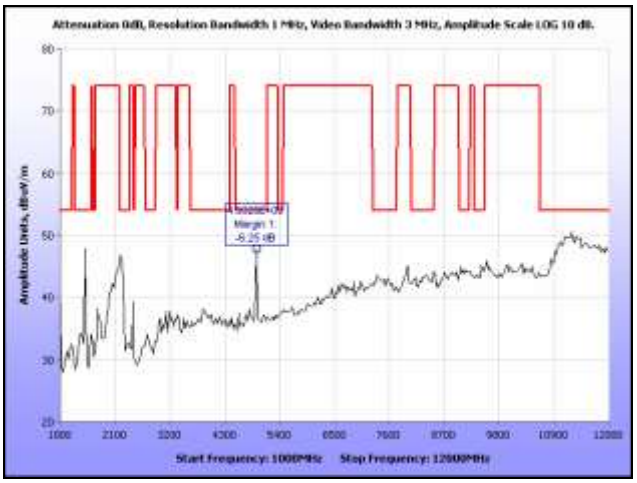
Plot 157. Radiated Spurious Emissions, Mid Channel, 802.11b, 12 – 18 GHz, Avg., 2.4 GHz



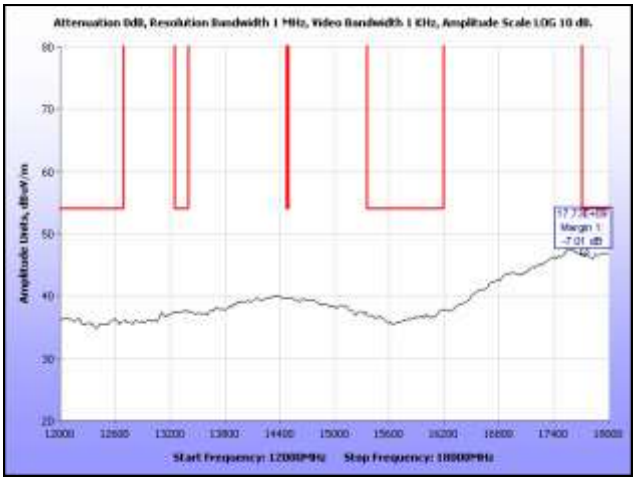
Plot 158. Radiated Spurious Emissions, Mid Channel, 802.11b, 12 – 18 GHz, Peak, 2.4 GHz



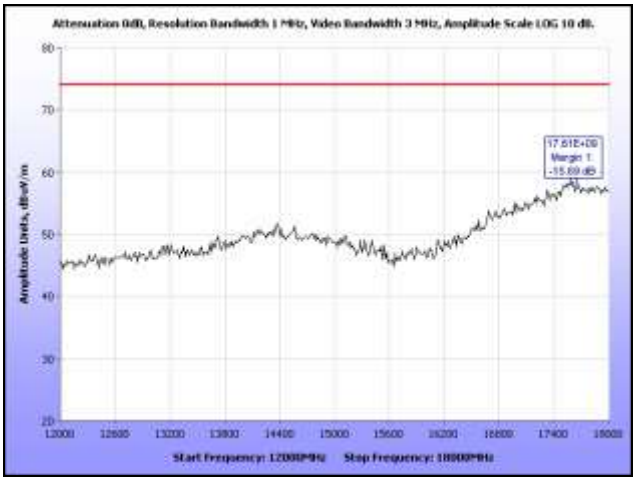
Plot 159. Radiated Spurious Emissions, High Channel, 802.11b, 30 MHz – 1 GHz, 2.4 GHz



Plot 160. Radiated Spurious Emissions, High Channel, 802.11b, 1 – 12 GHz, 2.4 GHz

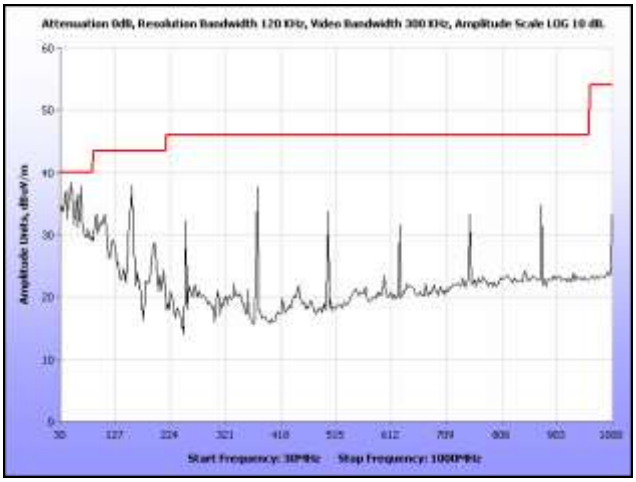


Plot 161. Radiated Spurious Emissions, High Channel, 802.11b, 12 – 18 GHz, Avg., 2.4 GHz

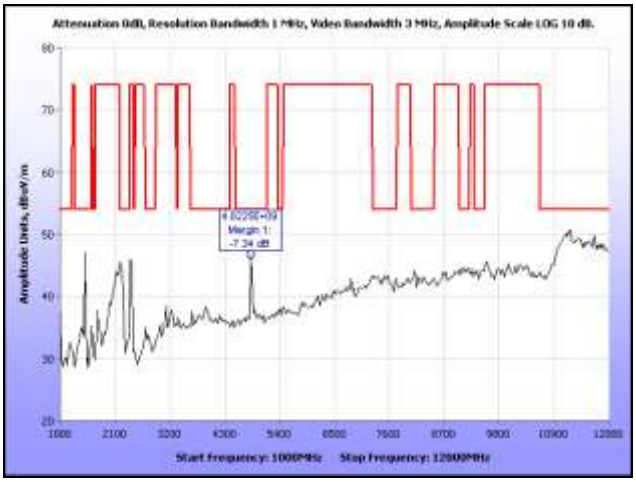


Plot 162. Radiated Spurious Emissions, High Channel, 802.11b, 12 – 18 GHz, Peak, 2.4 GHz

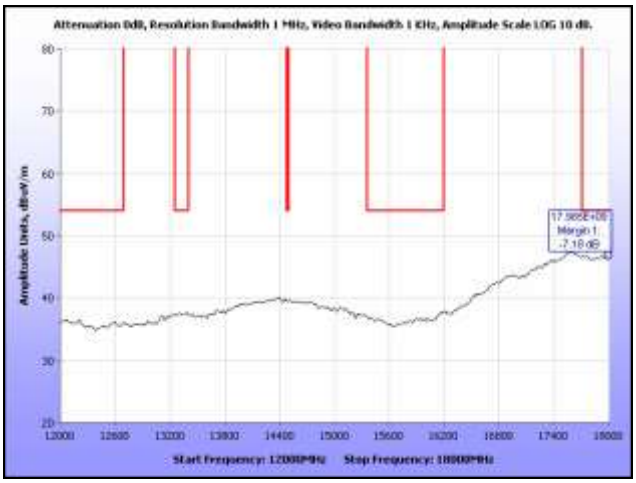
Radiated Spurious Emissions Test Results, 802.11g, 2.4 GHz



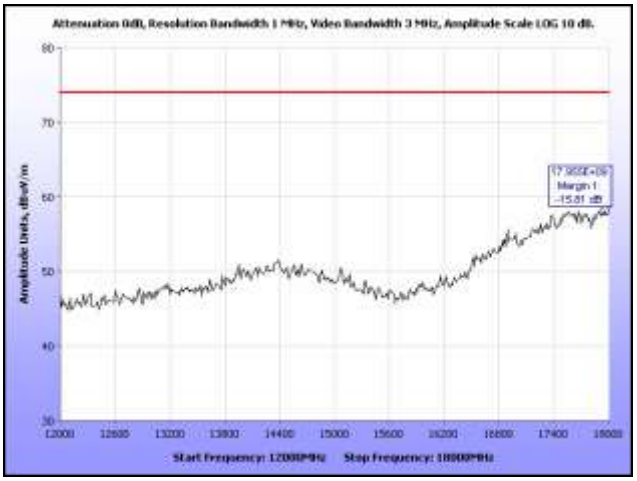
Plot 163. Radiated Spurious Emissions, Low Channel, 802.11g, 30 MHz – 1 GHz, 2.4 GHz



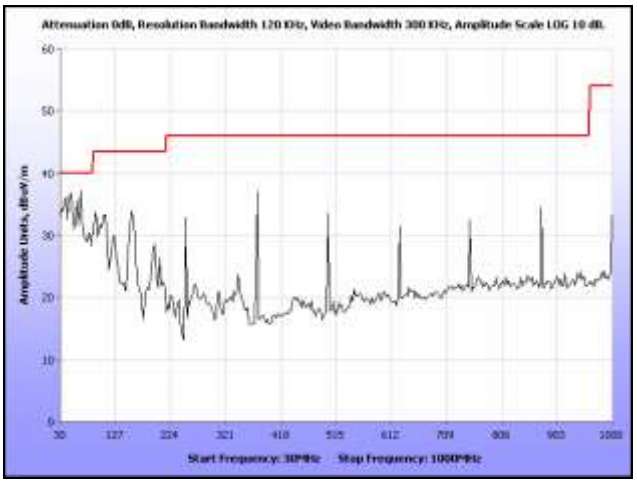
Plot 164. Radiated Spurious Emissions, Low Channel, 802.11g, 1 – 12 GHz, 2.4 GHz



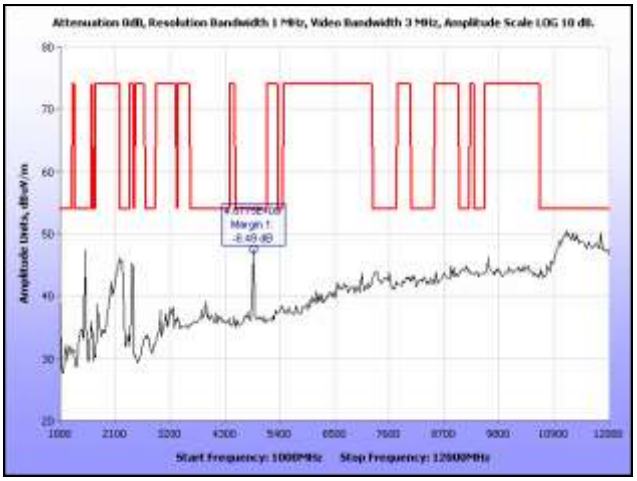
Plot 165. Radiated Spurious Emissions, Low Channel, 802.11g, 12 – 18 GHz, Avg., 2.4 GHz



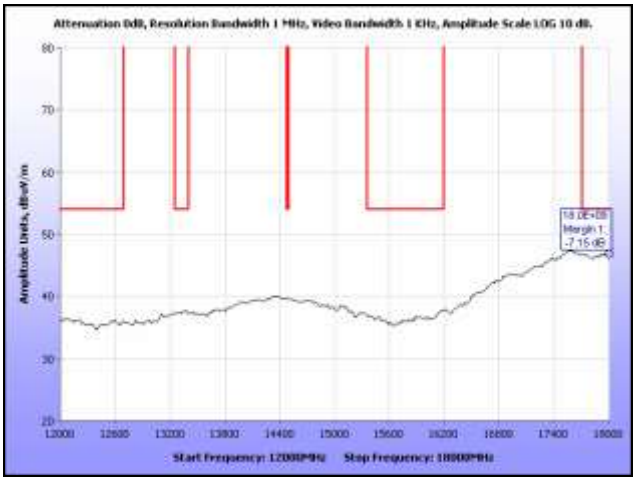
Plot 166. Radiated Spurious Emissions, Low Channel, 802.11g, 12 – 18 GHz, Peak, 2.4 GHz



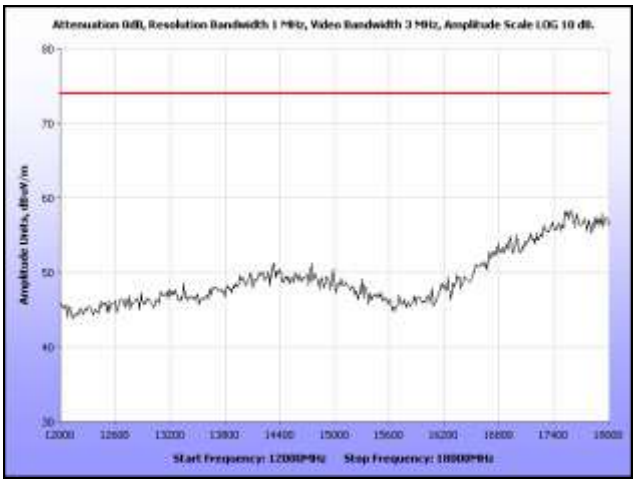
Plot 167. Radiated Spurious Emissions, Mid Channel, 802.11g, 30 MHz – 1 GHz, 2.4 GHz



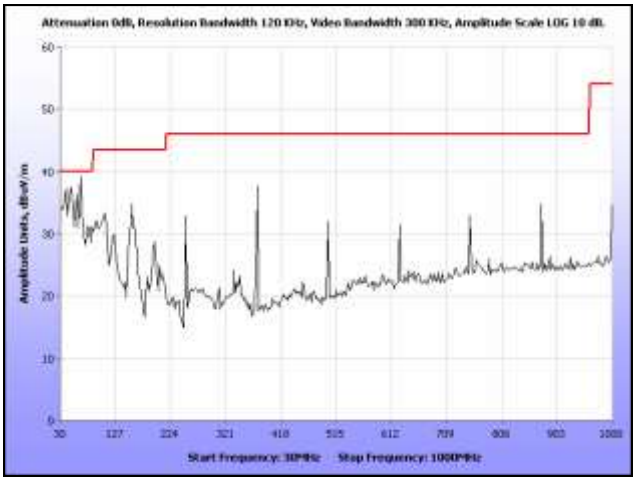
Plot 168. Radiated Spurious Emissions, Mid Channel, 802.11g, 1 – 12 GHz, 2.4 GHz



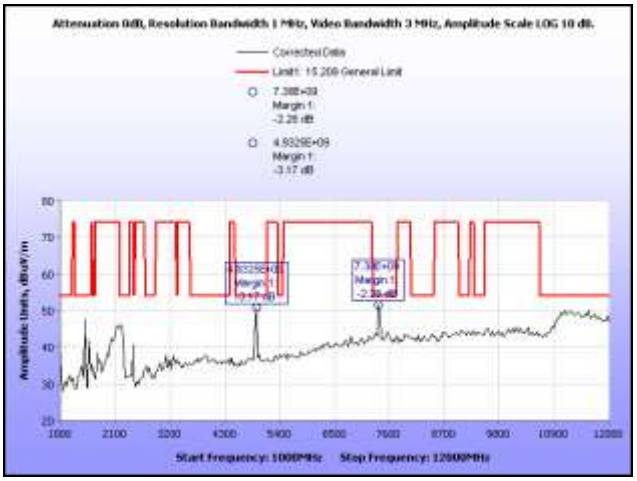
Plot 169. Radiated Spurious Emissions, Mid Channel, 802.11g, 12 – 18 GHz, Avg., 2.4 GHz



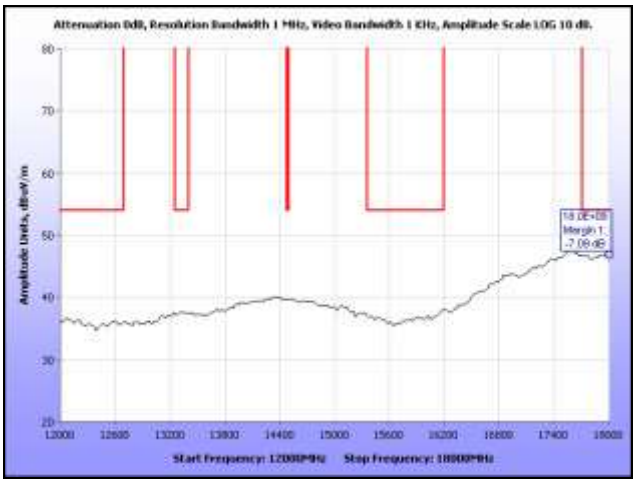
Plot 170. Radiated Spurious Emissions, Mid Channel, 802.11g, 12 – 18 GHz, Peak, 2.4 GHz



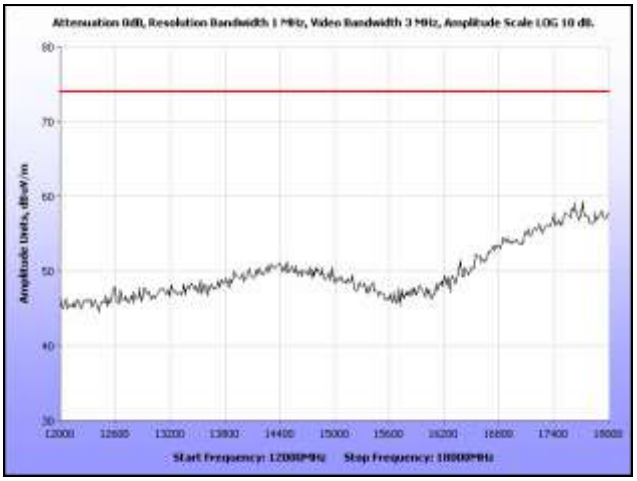
Plot 171. Radiated Spurious Emissions, High Channel, 802.11g, 30 MHz – 1 GHz, 2.4 GHz



Plot 172. Radiated Spurious Emissions, High Channel, 802.11g, 1 – 12 GHz, 2.4 GHz

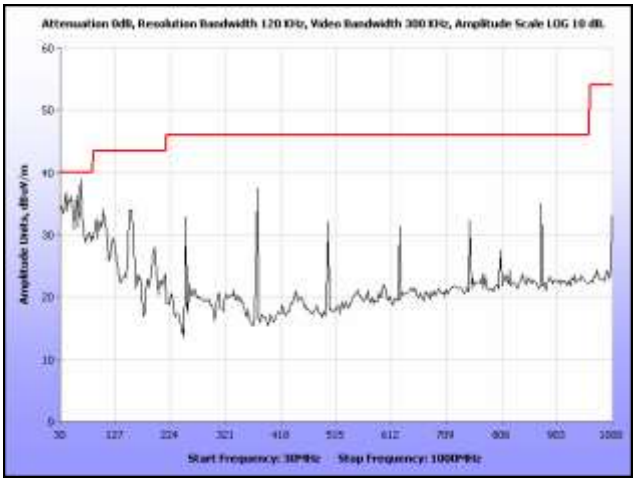


Plot 173. Radiated Spurious Emissions, High Channel, 802.11g, 12 – 18 GHz, Avg., 2.4 GHz

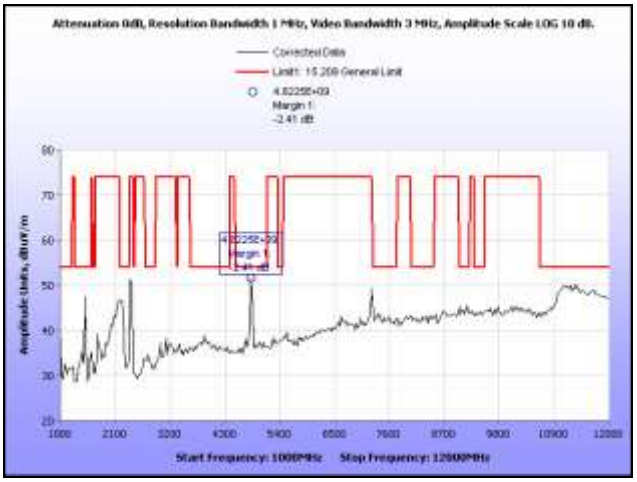


Plot 174. Radiated Spurious Emissions, High Channel, 802.11g, 12 – 18 GHz, Peak, 2.4 GHz

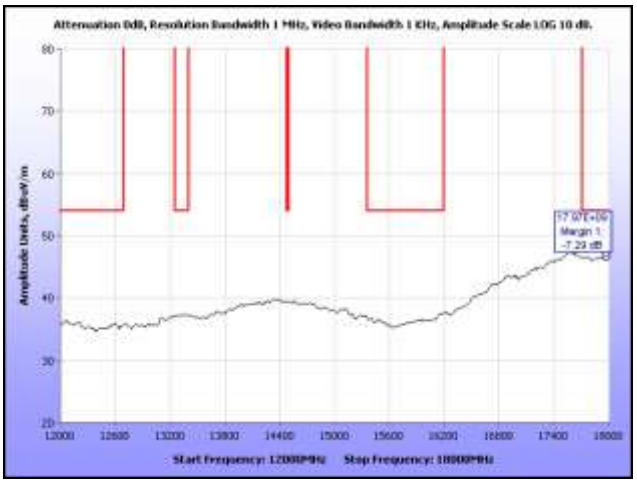
Radiated Spurious Emissions Test Results, 802.11n HT20, 2.4 GHz



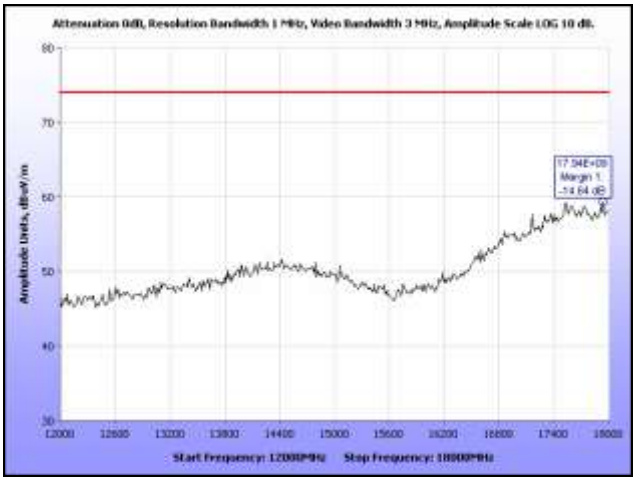
Plot 175. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 30 MHz – 1 GHz, 2.4 GHz



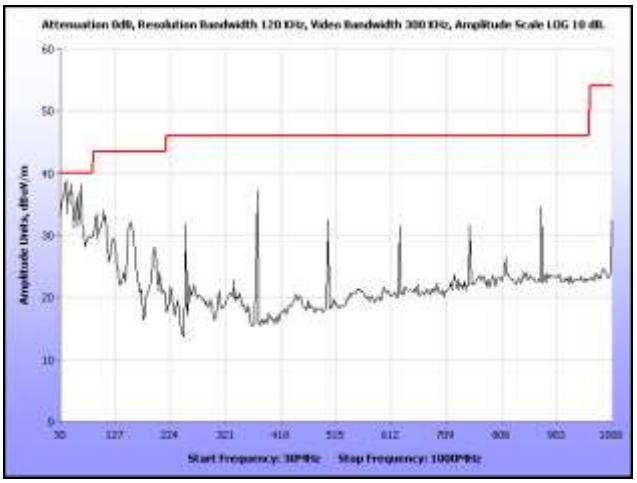
Plot 176. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 1 – 12 GHz, 2.4 GHz



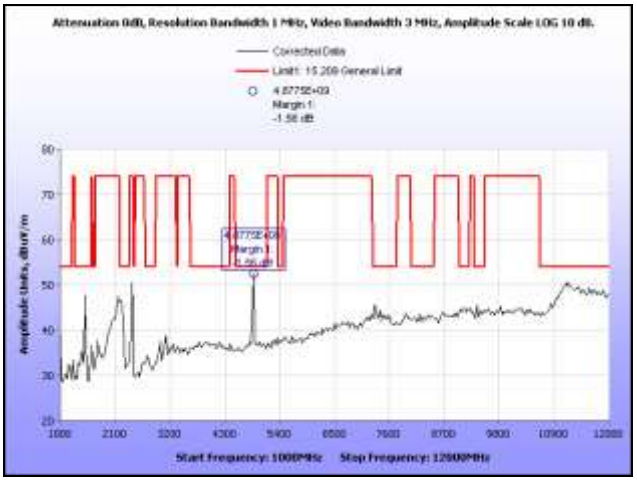
Plot 177. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 12 – 18 GHz, Avg., 2.4 GHz



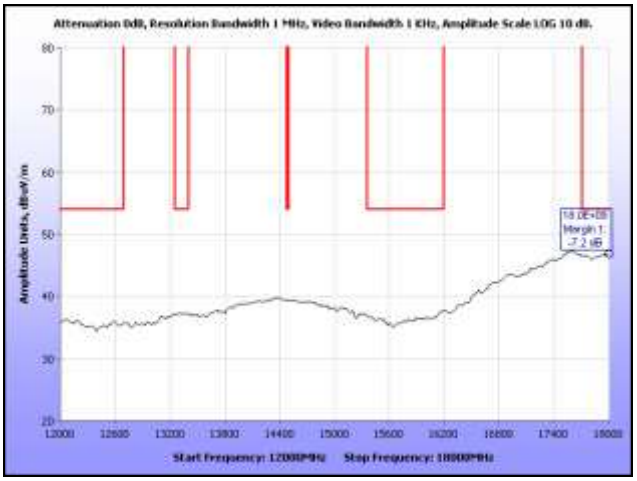
Plot 178. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 12 – 18 GHz, Peak, 2.4 GHz



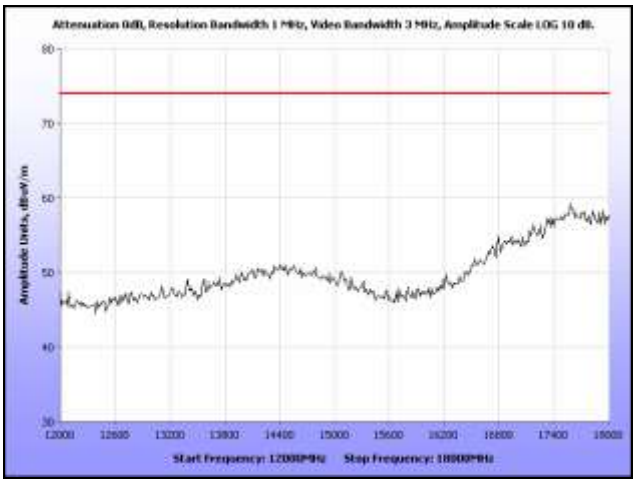
Plot 179. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 30 MHz – 1 GHz, 2.4 GHz



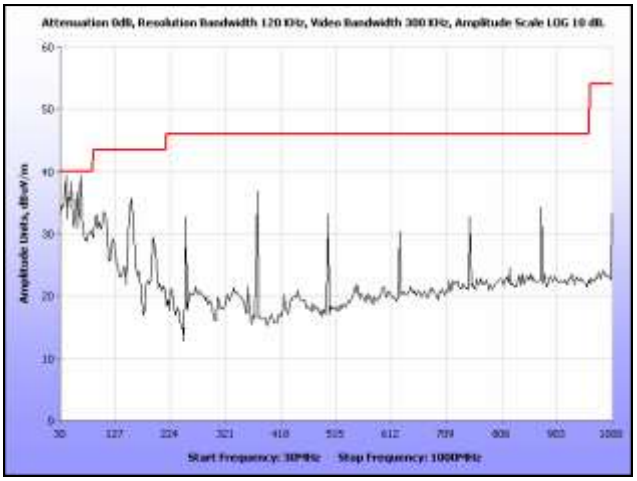
Plot 180. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 1 – 12 GHz, 2.4 GHz



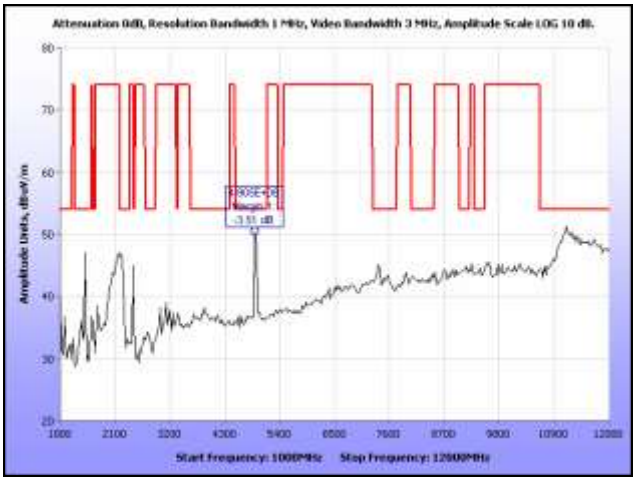
Plot 181. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 12 – 18 GHz, Avg., 2.4 GHz



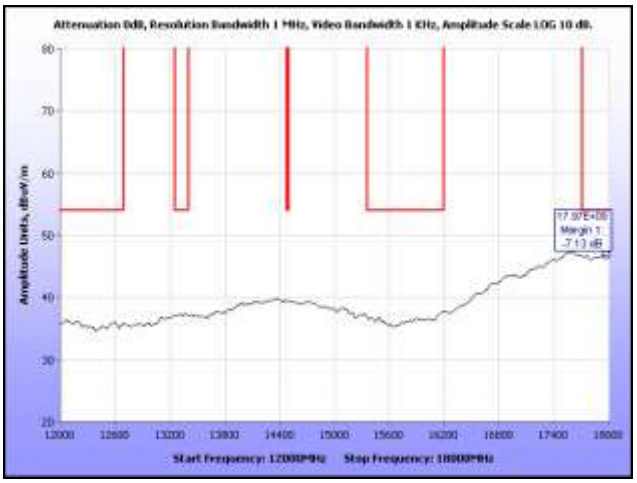
Plot 182. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 12 – 18 GHz, Peak, 2.4 GHz



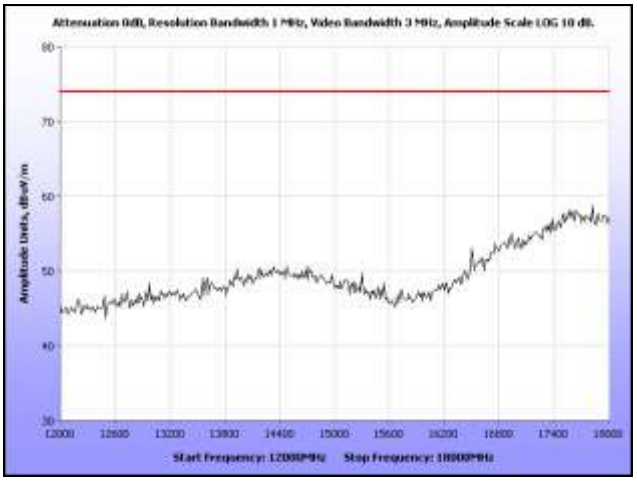
Plot 183. Radiated Spurious Emissions, High Channel, 802.11n HT20, 30 MHz – 1 GHz, 2.4 GHz



Plot 184. Radiated Spurious Emissions, High Channel, 802.11n HT20, 1 – 12 GHz, 2.4 GHz

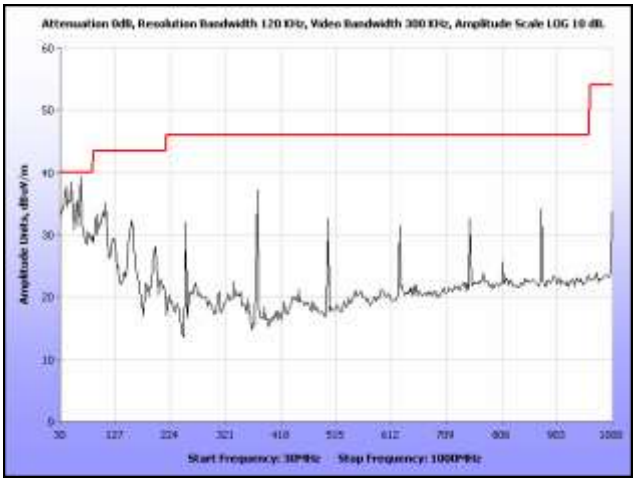


Plot 185. Radiated Spurious Emissions, High Channel, 802.11n HT20, 12 – 18 GHz, Avg., 2.4 GHz

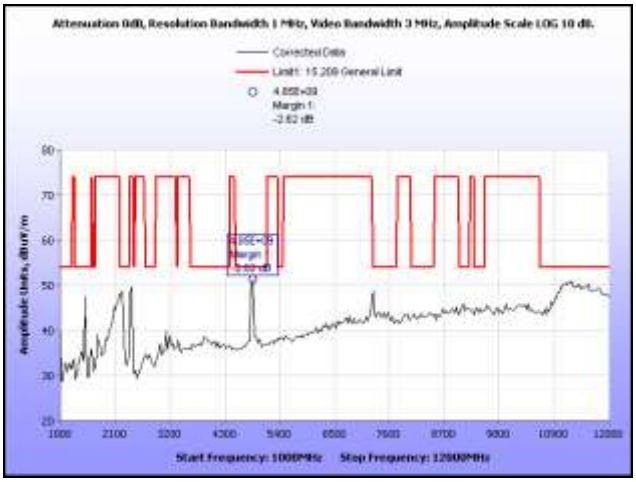


Plot 186. Radiated Spurious Emissions, High Channel, 802.11n HT20, 12 – 18 GHz, Peak, 2.4 GHz

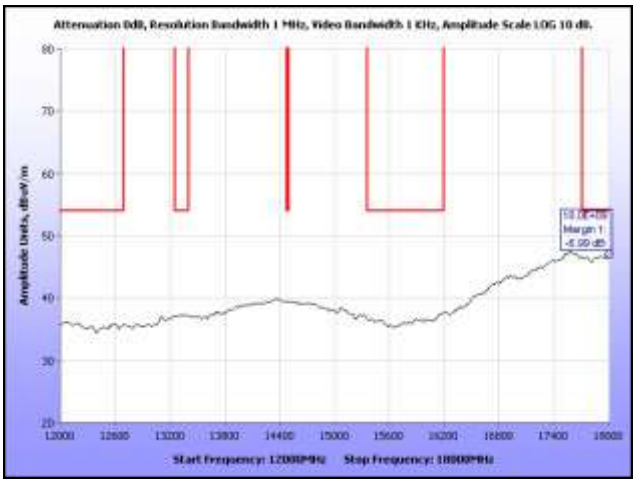
Radiated Spurious Emissions Test Results, 802.11n HT40, 2.4 GHz



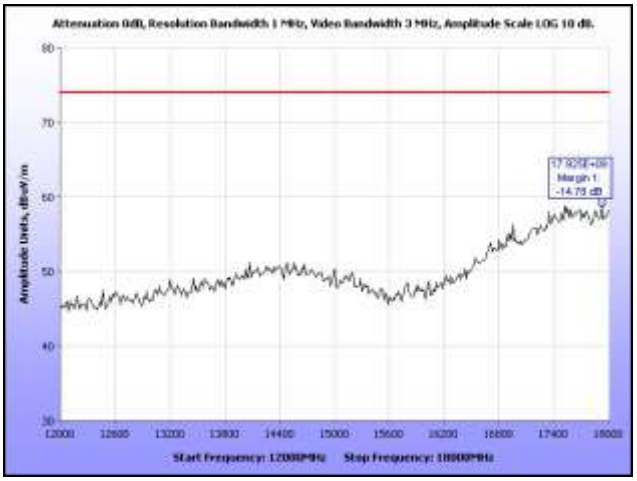
Plot 187. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 30 MHz – 1 GHz, 2.4 GHz



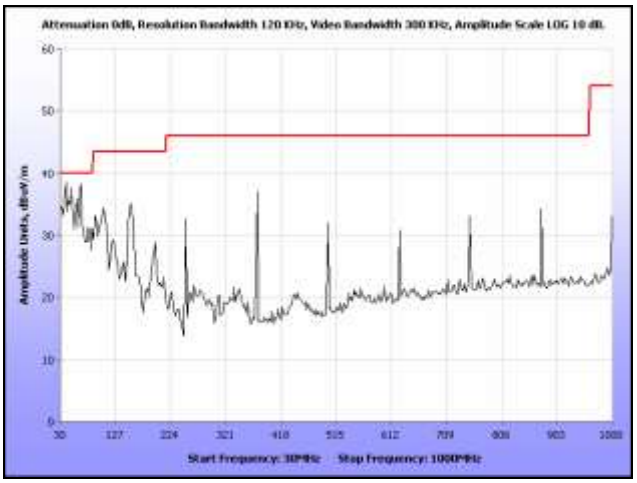
Plot 188. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 1 – 12 GHz, 2.4 GHz



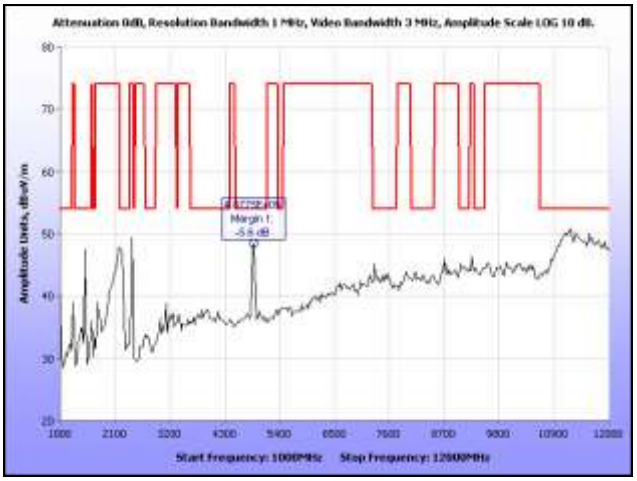
Plot 189. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 12 – 18 GHz, Avg., 2.4 GHz



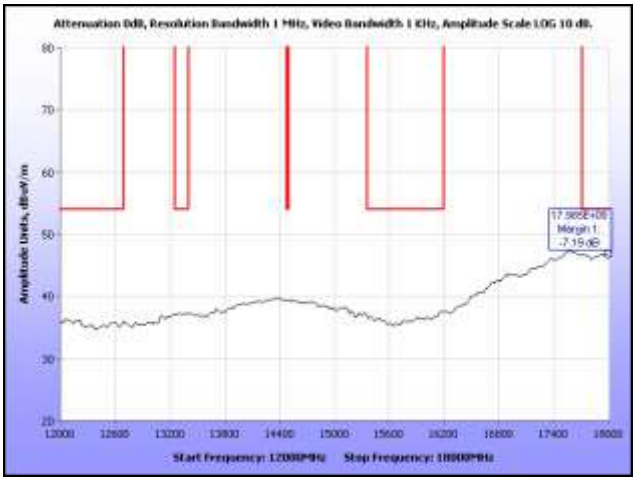
Plot 190. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 12 – 18 GHz, Peak, 2.4 GHz



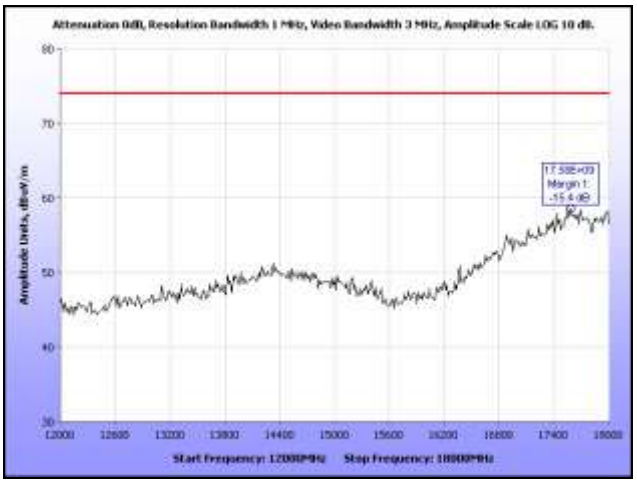
Plot 191. Radiated Spurious Emissions, Mid Channel, 802.11n HT40, 30 MHz – 1 GHz, 2.4 GHz



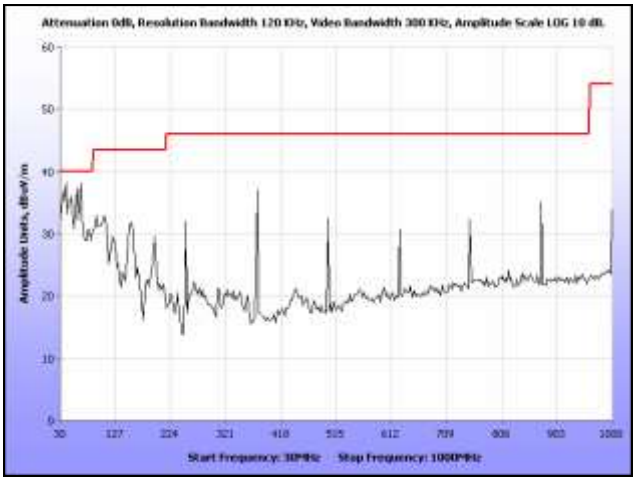
Plot 192. Radiated Spurious Emissions, Mid Channel, 802.11n HT40, 1 – 12 GHz, 2.4 GHz



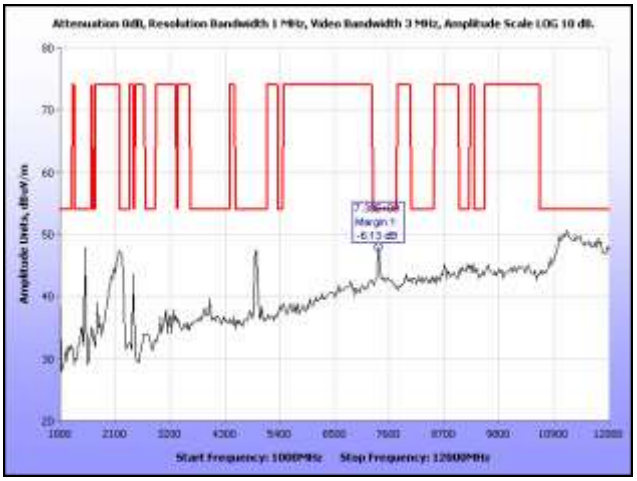
Plot 193. Radiated Spurious Emissions, Mid Channel, 802.11n HT40, 12 – 18 GHz, Avg., 2.4 GHz



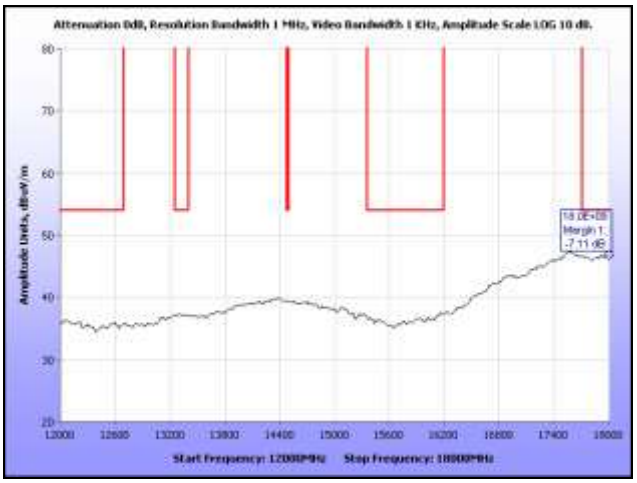
Plot 194. Radiated Spurious Emissions, Mid Channel, 802.11n HT40, 12 – 18 GHz, Peak, 2.4 GHz



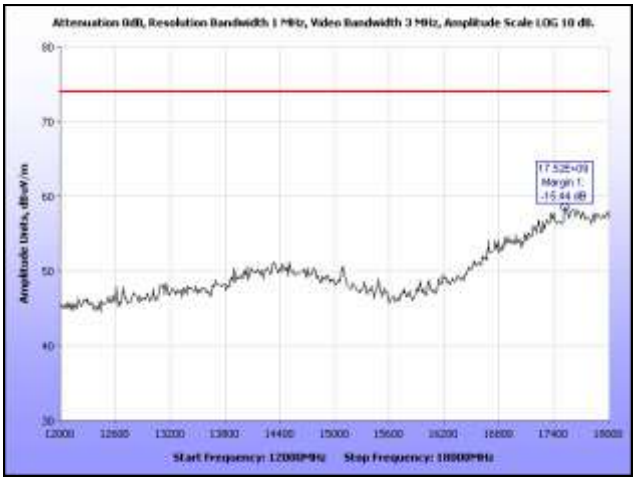
Plot 195. Radiated Spurious Emissions, High Channel, 802.11n HT40, 30 MHz – 1 GHz, 2.4 GHz



Plot 196. Radiated Spurious Emissions, High Channel, 802.11n HT40, 1 – 12 GHz, 2.4 GHz

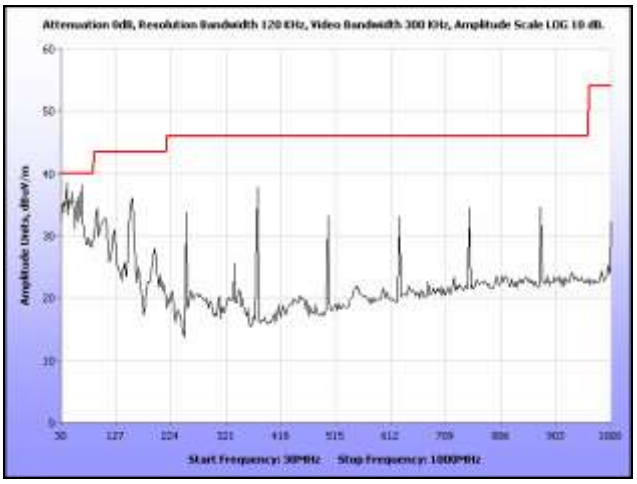


Plot 197. Radiated Spurious Emissions, High Channel, 802.11n HT40, 12 – 18 GHz, Avg., 2.4 GHz

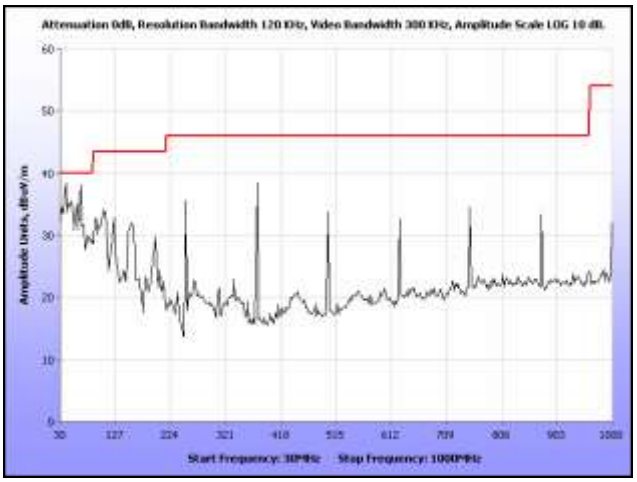


Plot 198. Radiated Spurious Emissions, High Channel, 802.11n HT40, 12 – 18 GHz, Peak, 2.4 GHz

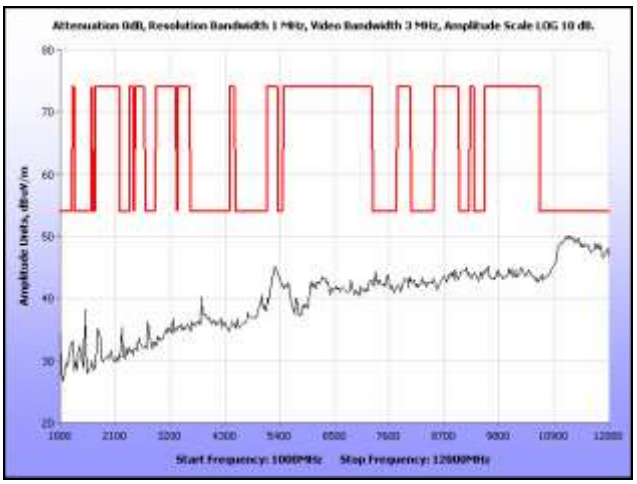
Radiated Spurious Emissions Test Results, 802.11a, 5 GHz



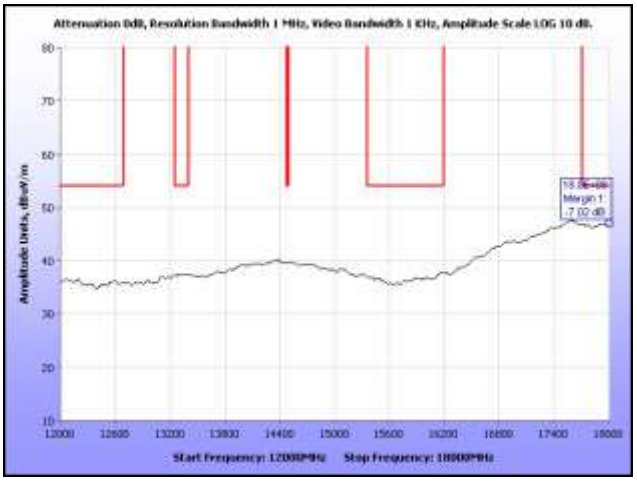
Plot 199. Radiated Spurious Emissions, Ambient (Radio Off), 30 MHz – 1 GHz, 5 GHz



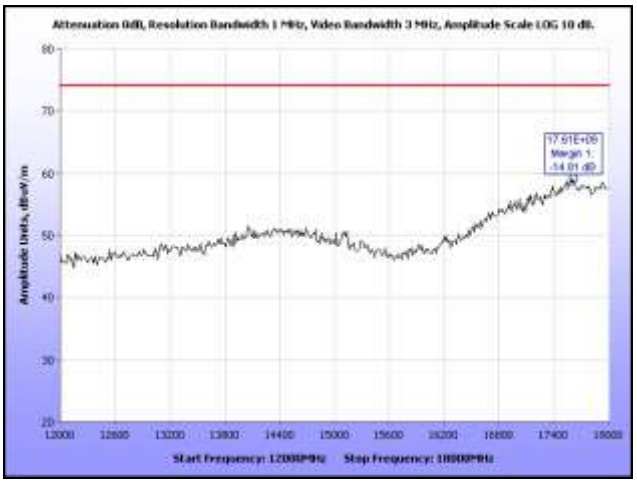
Plot 200. Radiated Spurious Emissions, Low Channel, 802.11a, 30 MHz – 1 GHz, 5 GHz



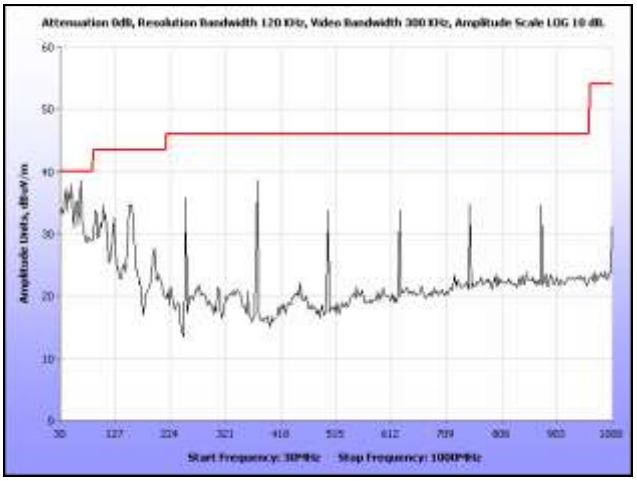
Plot 201. Radiated Spurious Emissions, Low Channel, 802.11a, 1 – 12 GHz, 5 GHz



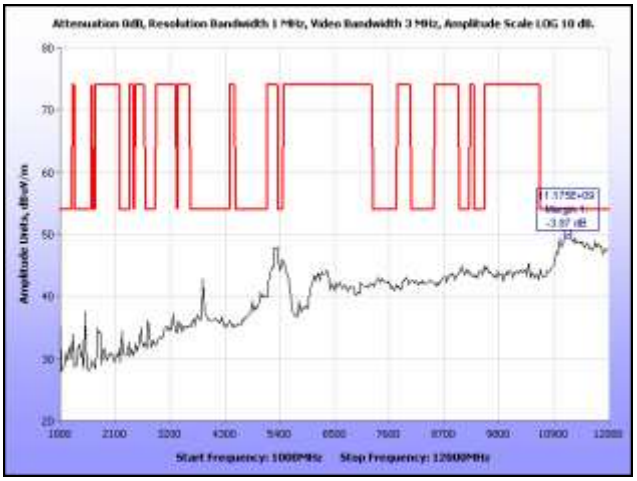
Plot 202. Radiated Spurious Emissions, Low Channel, 802.11a, 12 – 18 GHz, Avg., 5 GHz



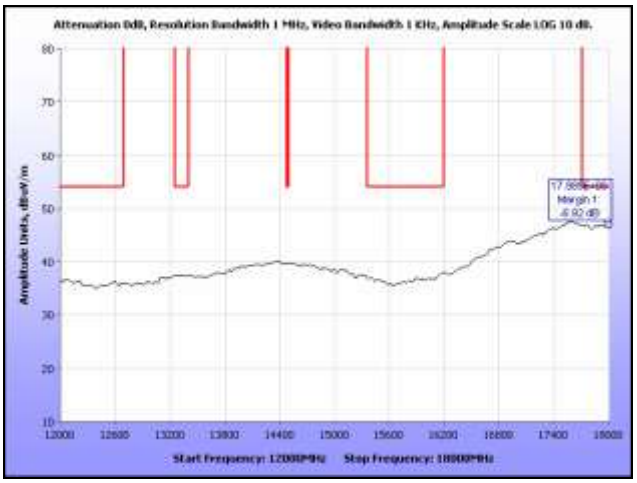
Plot 203. Radiated Spurious Emissions, Low Channel, 802.11a, 12 – 18 GHz, Peak, 5 GHz



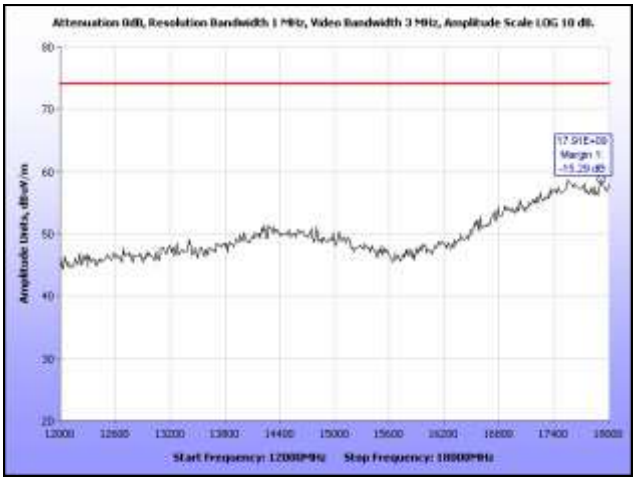
Plot 204. Radiated Spurious Emissions, Mid Channel, 802.11a, 30 MHz – 1 GHz, 5 GHz



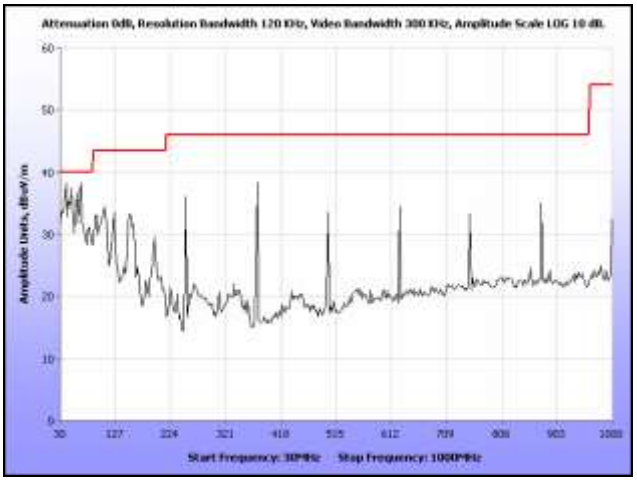
Plot 205. Radiated Spurious Emissions, Mid Channel, 802.11a, 1 – 12 GHz, 5 GHz



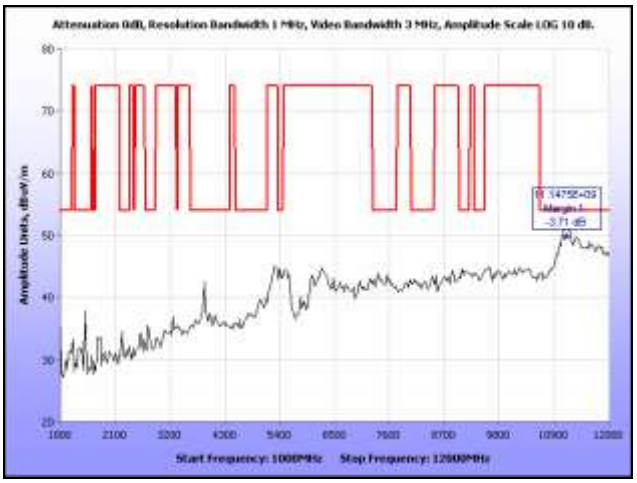
Plot 206. Radiated Spurious Emissions, Mid Channel, 802.11a, 12 – 18 GHz, Avg., 5 GHz



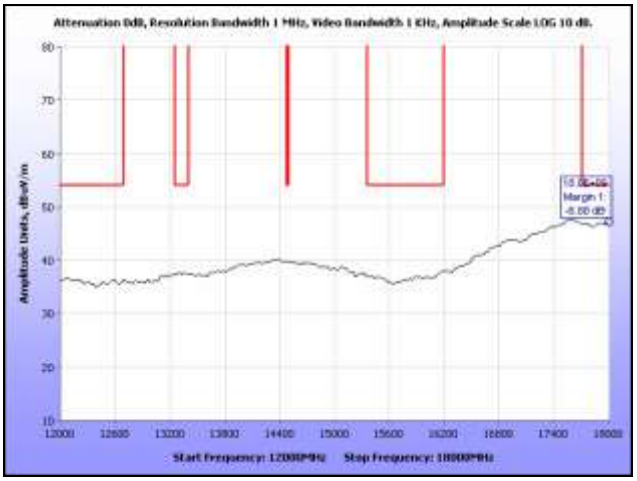
Plot 207. Radiated Spurious Emissions, Mid Channel, 802.11a, 12 – 18 GHz, Peak, 5 GHz



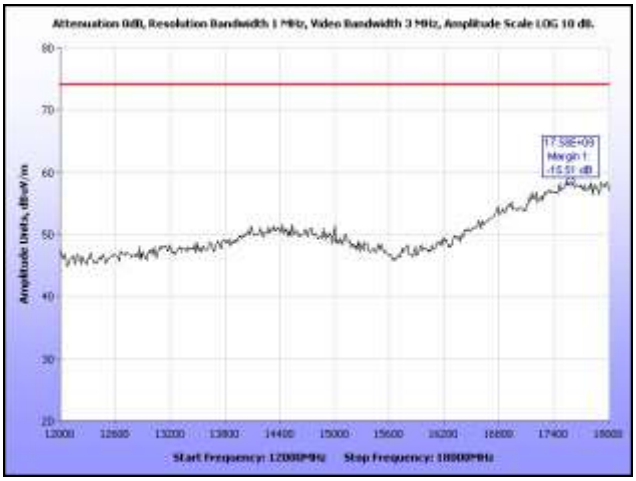
Plot 208. Radiated Spurious Emissions, High Channel, 802.11a, 30 MHz – 1 GHz, 5 GHz



Plot 209. Radiated Spurious Emissions, High Channel, 802.11a, 1 – 12 GHz, 5 GHz

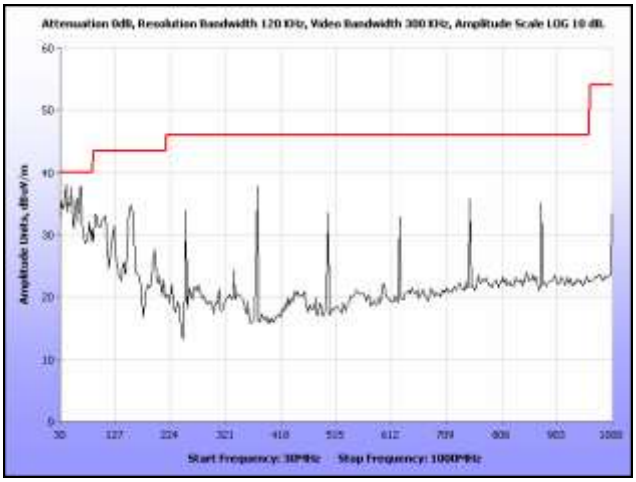


Plot 210. Radiated Spurious Emissions, High Channel, 802.11a, 12 – 18 GHz, Avg., 5 GHz

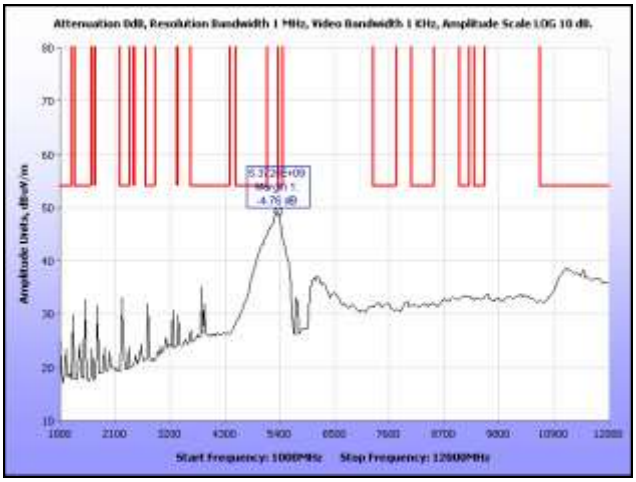


Plot 211. Radiated Spurious Emissions, High Channel, 802.11a, 12 – 18 GHz, Peak, 5 GHz

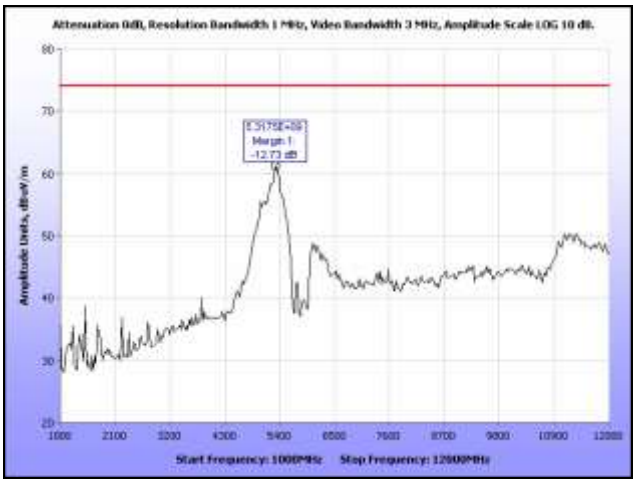
Radiated Spurious Emissions Test Results, 802.11n HT20, 5 GHz



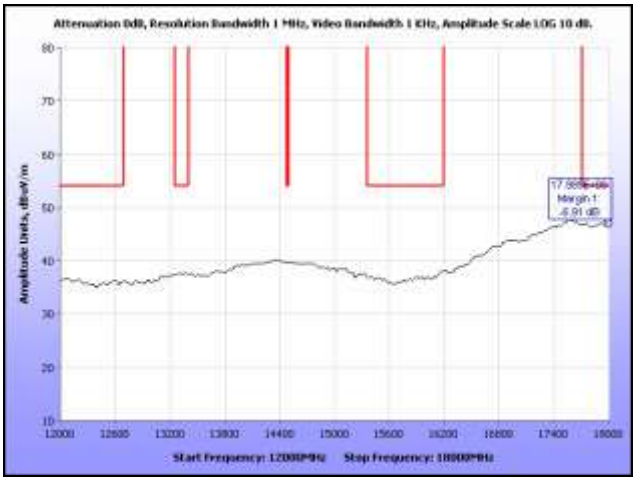
Plot 212. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 30 MHz – 1 GHz, 5 GHz



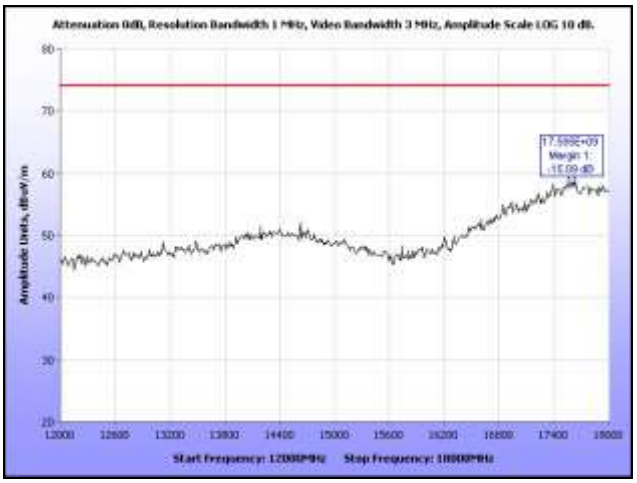
Plot 213. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 1 – 12 GHz, Avg., 5 GHz



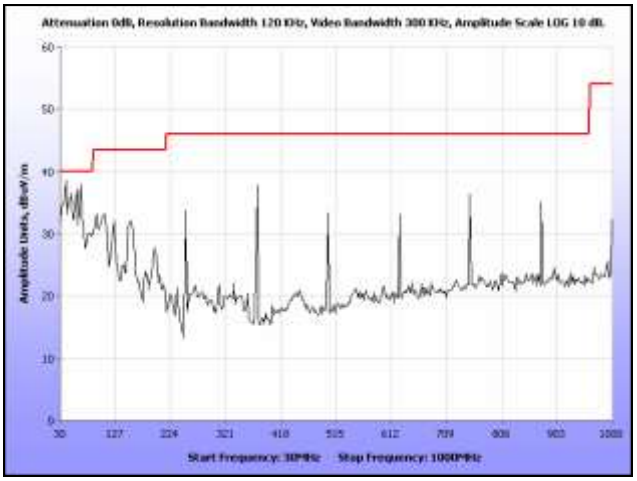
Plot 214. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 7 dBi Omni, 1 – 12 GHz, Peak, 5 GHz



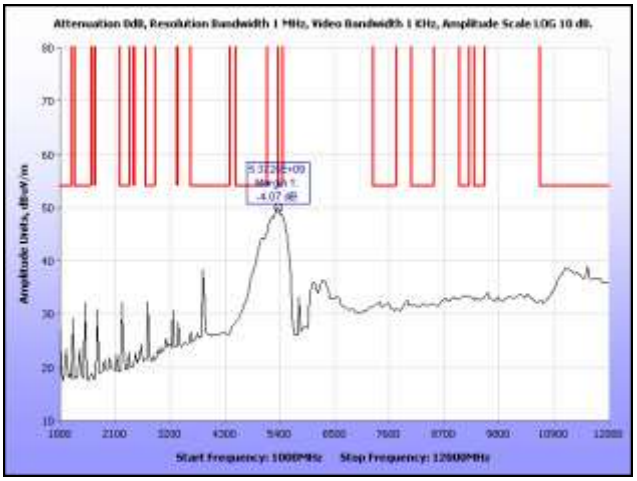
Plot 215. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 12 – 18 GHz, Avg., 5 GHz



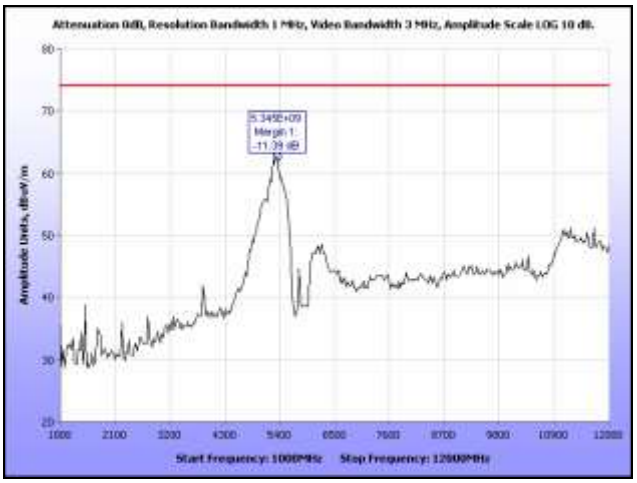
Plot 216. Radiated Spurious Emissions, Low Channel, 802.11n HT20, 12 – 18 GHz, Peak, 5 GHz



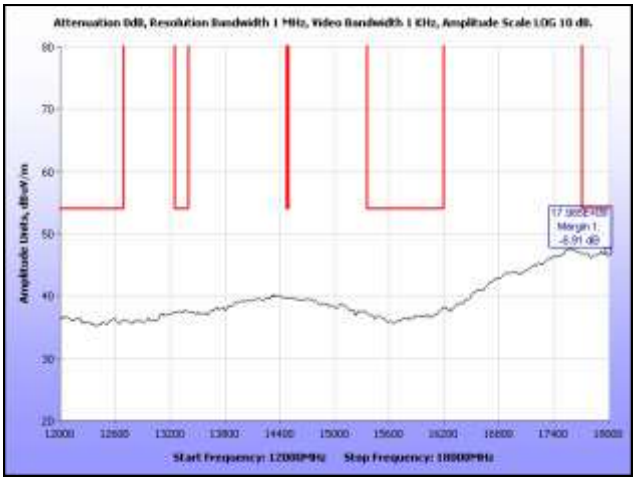
Plot 217. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 30 MHz – 1 GHz, 5 GHz



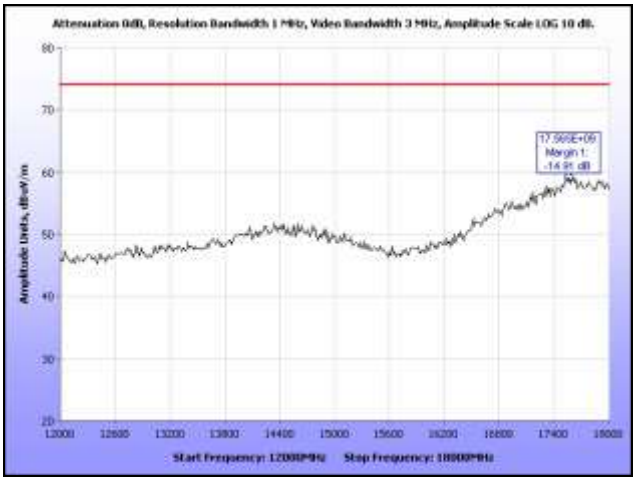
Plot 218. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 1 – 12 GHz, Avg., 5 GHz



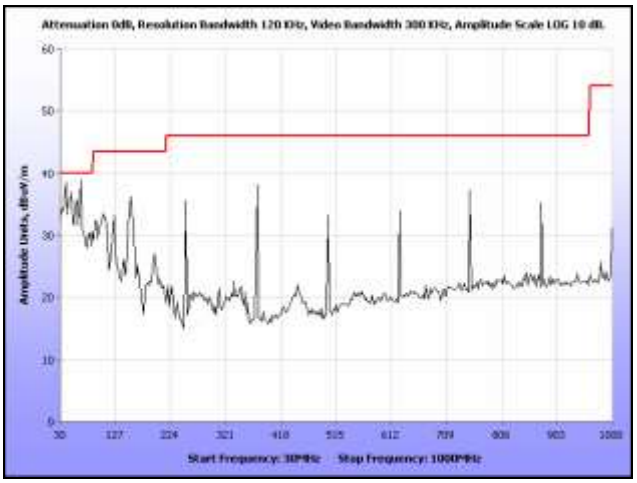
Plot 219. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 1 – 12 GHz, Peak, 5 GHz



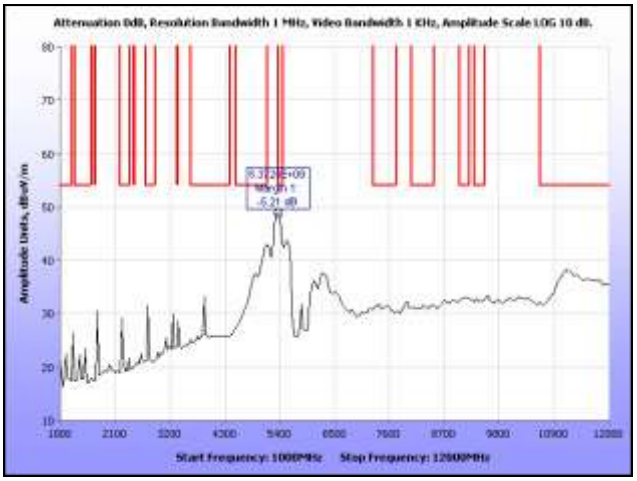
Plot 220. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 12 – 18 GHz, Avg., 5 GHz



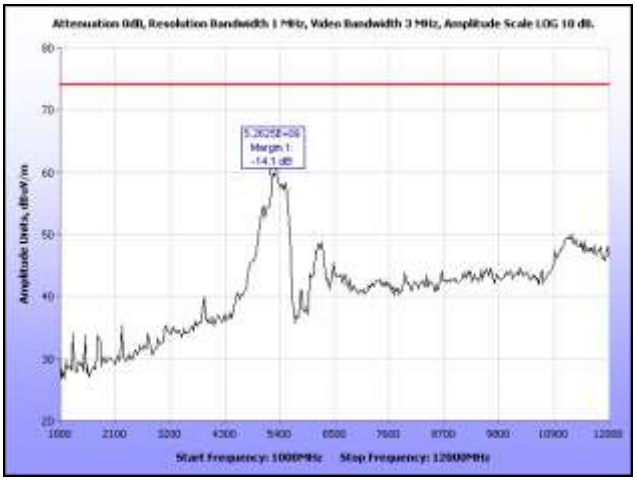
Plot 221. Radiated Spurious Emissions, Mid Channel, 802.11n HT20, 12 – 18 GHz, Peak, 5 GHz



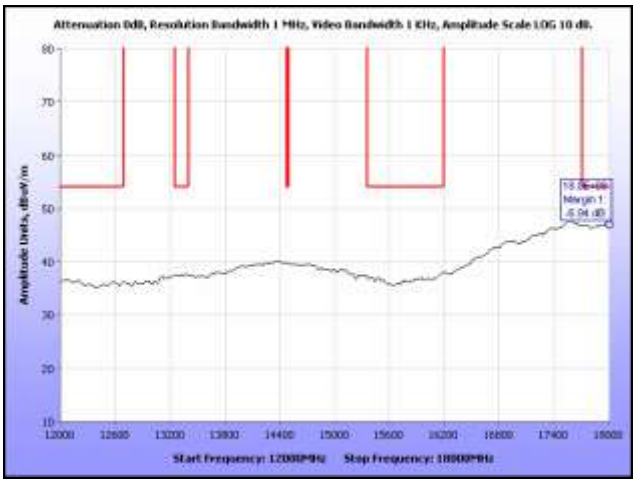
Plot 222. Radiated Spurious Emissions, High Channel, 802.11n HT20, 30 MHz – 1 GHz, 5 GHz



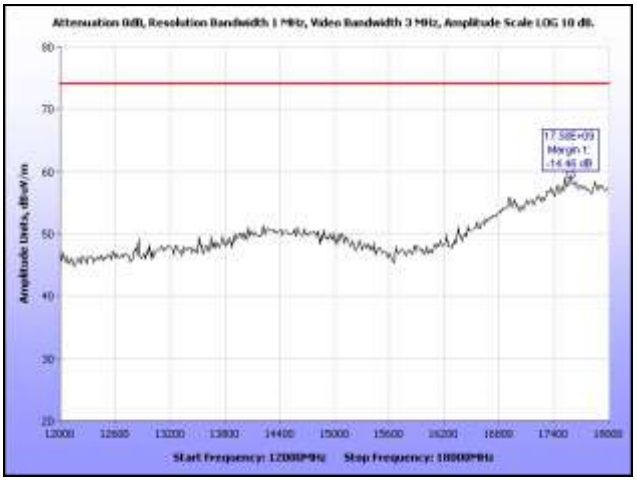
Plot 223. Radiated Spurious Emissions, High Channel, 802.11n HT20, 1 – 12 GHz, Avg., 5 GHz



Plot 224. Radiated Spurious Emissions, High Channel, 802.11n HT20, 1 – 12 GHz, Peak, 5 GHz

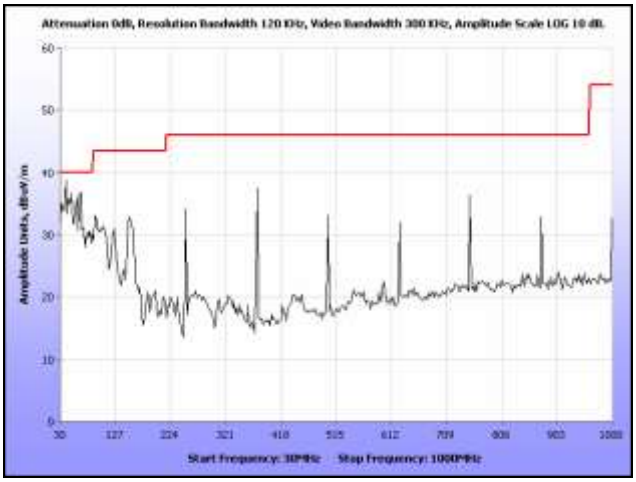


Plot 225. Radiated Spurious Emissions, High Channel, 802.11n HT20, 12 – 18 GHz, Avg., 5 GHz

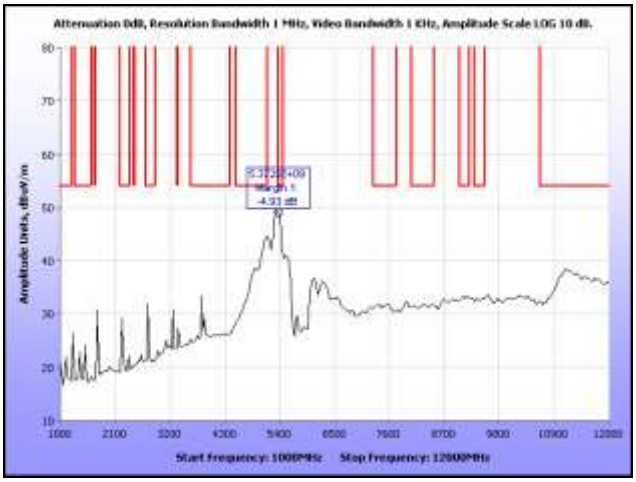


Plot 226. Radiated Spurious Emissions, High Channel, 802.11n HT20, 12 – 18 GHz, Peak, 5 GHz

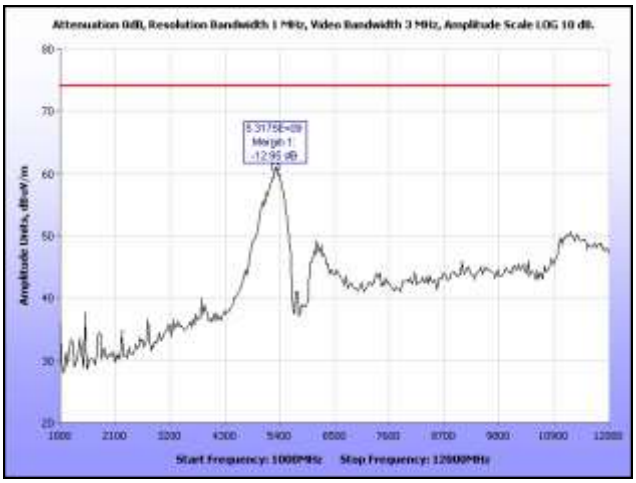
Radiated Spurious Emissions Test Results, 802.11n HT40, 5 GHz



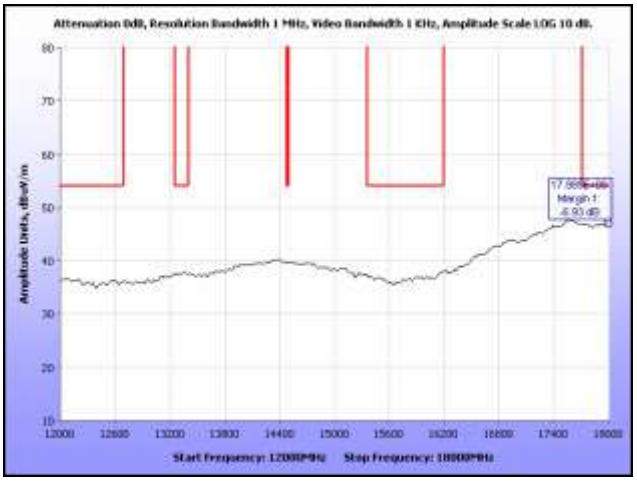
Plot 227. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 30 MHz – 1 GHz, 5 GHz



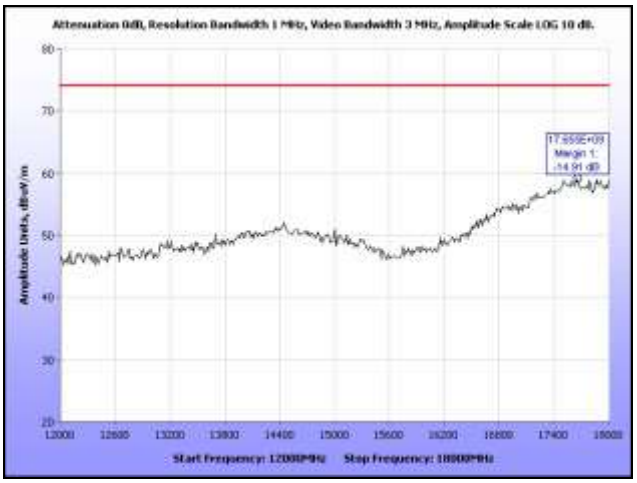
Plot 228. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 1 – 12 GHz, Avg., 5 GHz



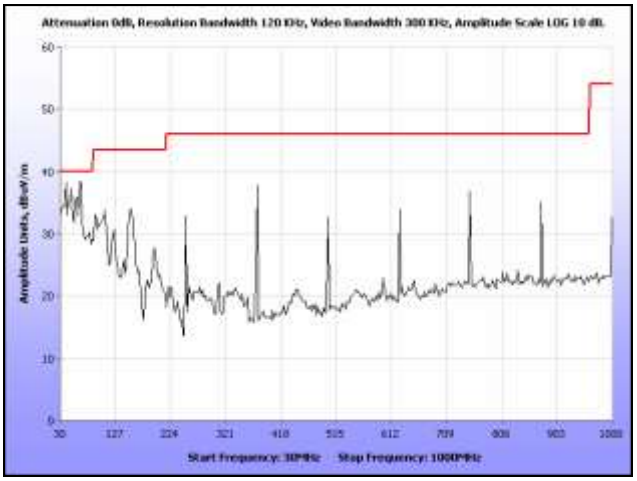
Plot 229. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 1 – 12 GHz, Peak, 5 GHz



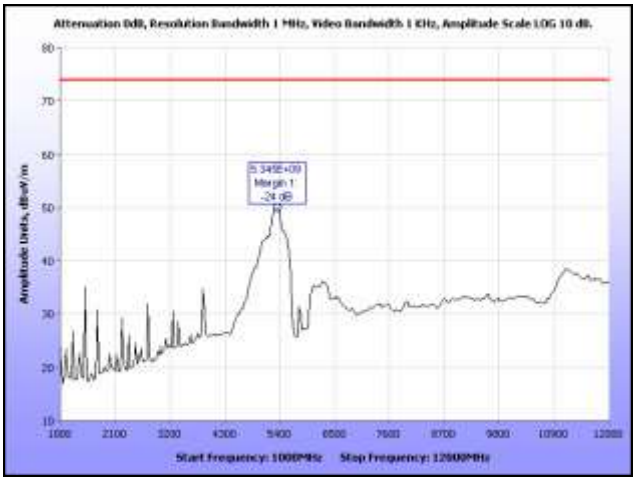
Plot 230. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 12 – 18 GHz, Avg., 5 GHz



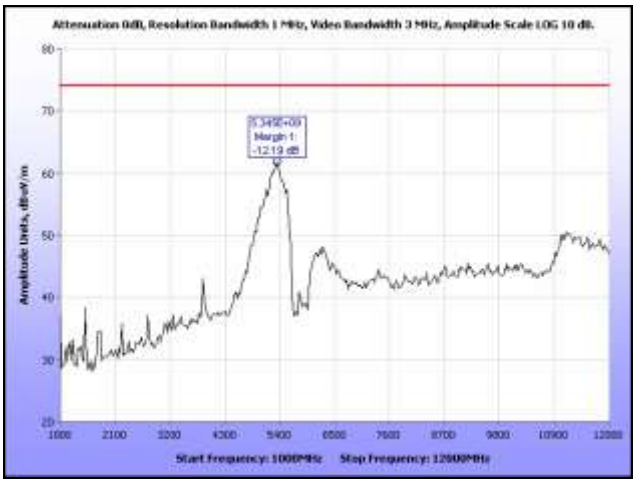
Plot 231. Radiated Spurious Emissions, Low Channel, 802.11n HT40, 12 – 18 GHz, Peak, 5 GHz



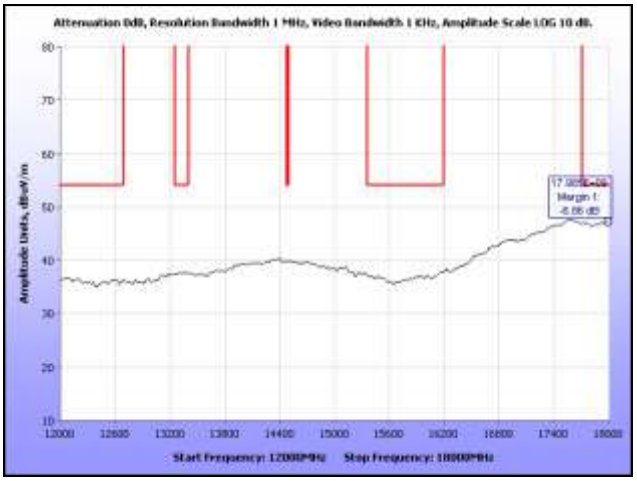
Plot 232. Radiated Spurious Emissions, High Channel, 802.11n HT40, 30 MHz – 1 GHz, 5 GHz



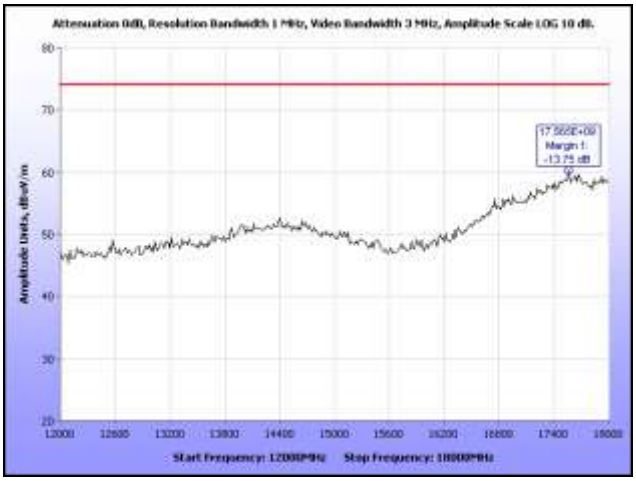
Plot 233. Radiated Spurious Emissions, High Channel, 802.11n HT40, 1 – 12 GHz, Avg., 5 GHz



Plot 234. Radiated Spurious Emissions, High Channel, 802.11n HT40, 1 – 12 GHz, Peak, 5 GHz



Plot 235. Radiated Spurious Emissions, High Channel, 802.11n HT40, 12 – 18 GHz, Avg., 5 GHz



Plot 236. Radiated Spurious Emissions, High Channel, 802.11n HT40, 12 – 18 GHz, Peak, 5 GHz

Radiated Band Edge Measurements

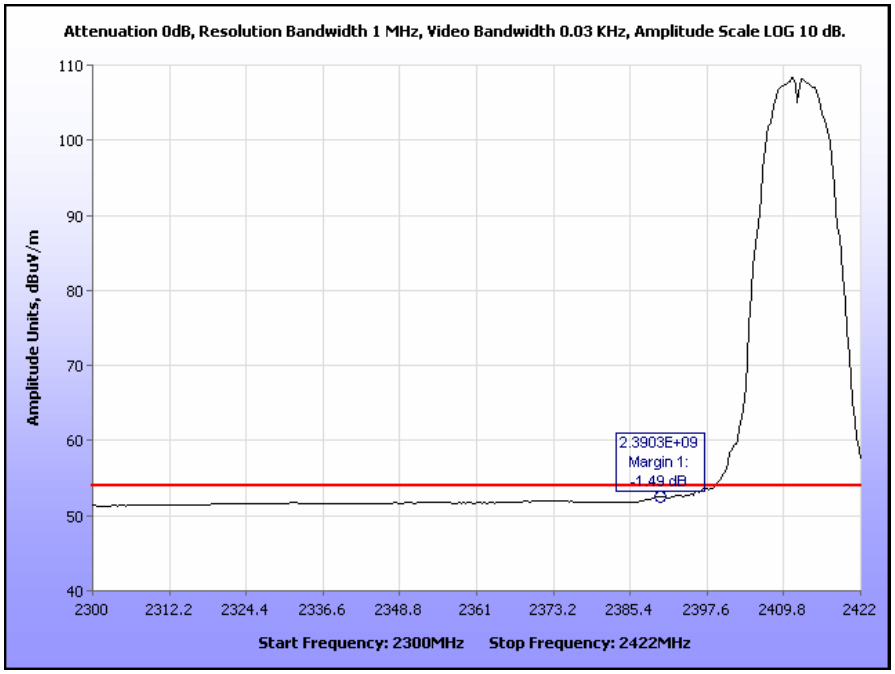
Test Procedures: The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line.

Test Results: The EUT was compliant with the Radiated Band Edge limits of **§15.247(d)**.

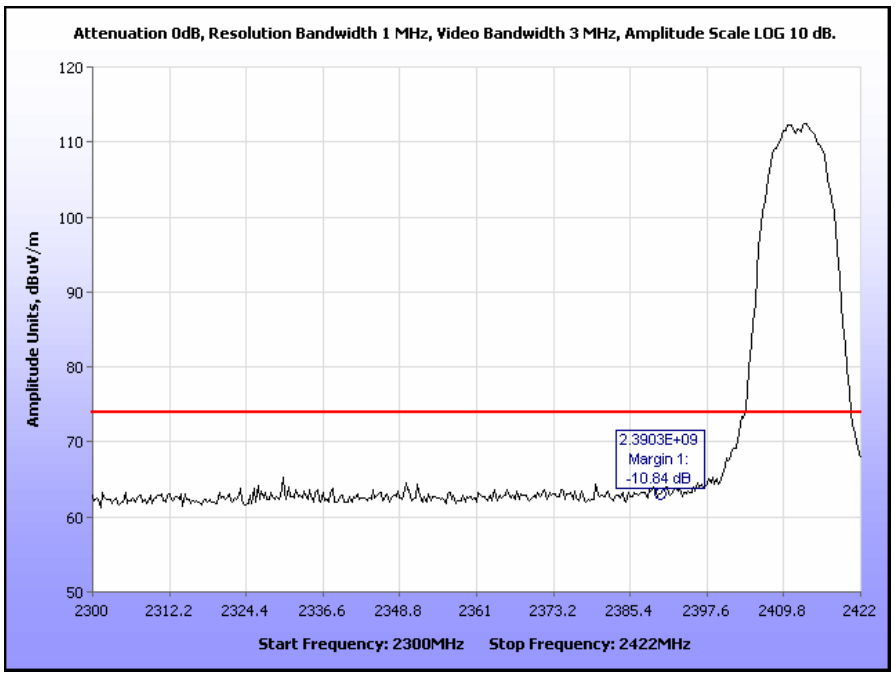
Test Engineer(s): Lionel Gabrillo

Test Date(s): 05/18/12

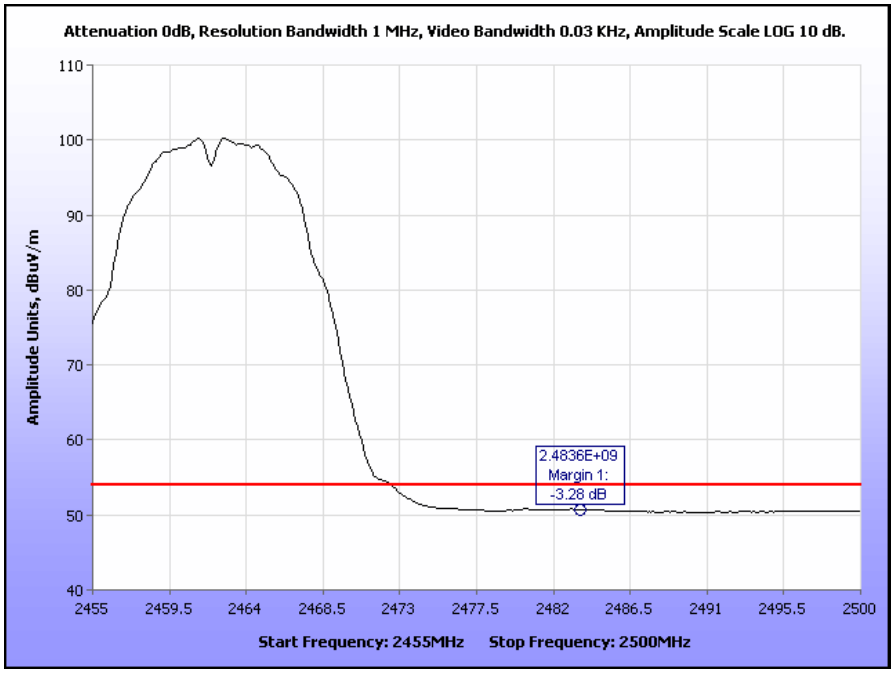
Radiated Band Edge Measurements, 802.11b, 2.4 GHz



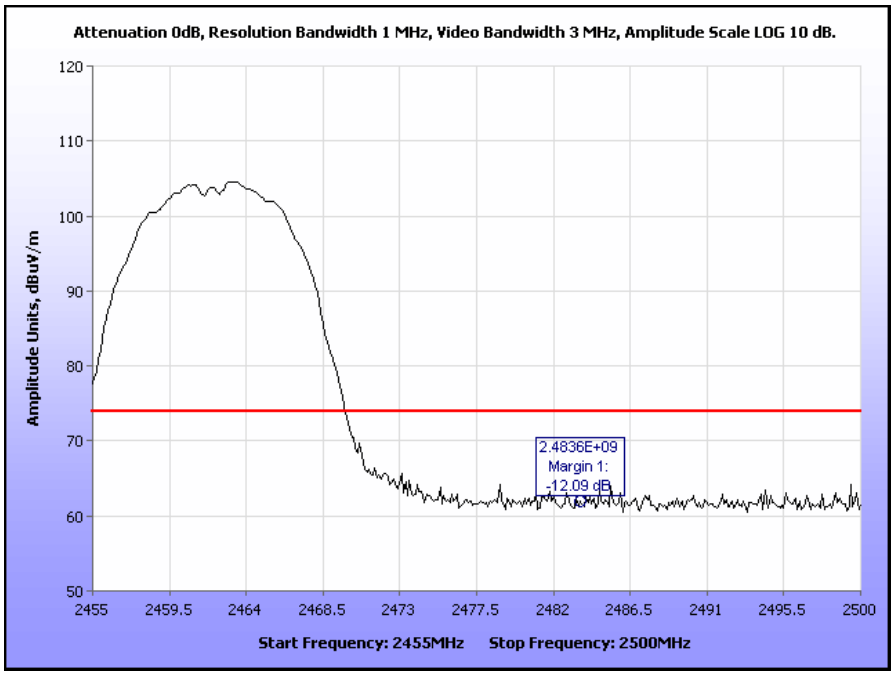
Plot 237. Radiated Band Edge, 802.11b, Low Channel, Avg., 2.4 GHz



Plot 238. Radiated Band Edge, 802.11b, Low Channel, Peak, 2.4 GHz

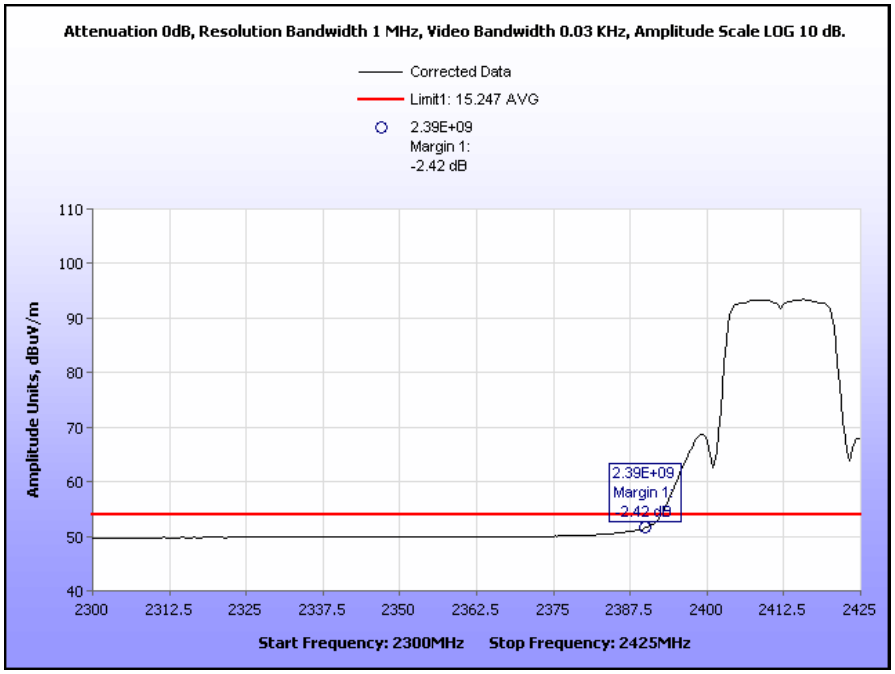


Plot 239. Radiated Band Edge, 802.11b, High Channel, Avg., 2.4 GHz

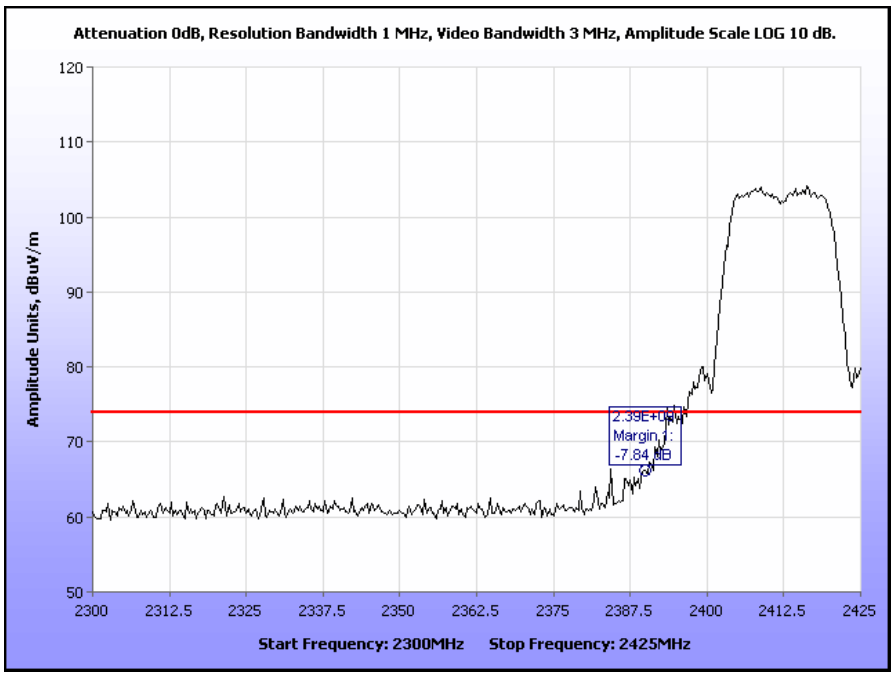


Plot 240. Radiated Band Edge, 802.11b, High Channel, Peak, 2.4 GHz

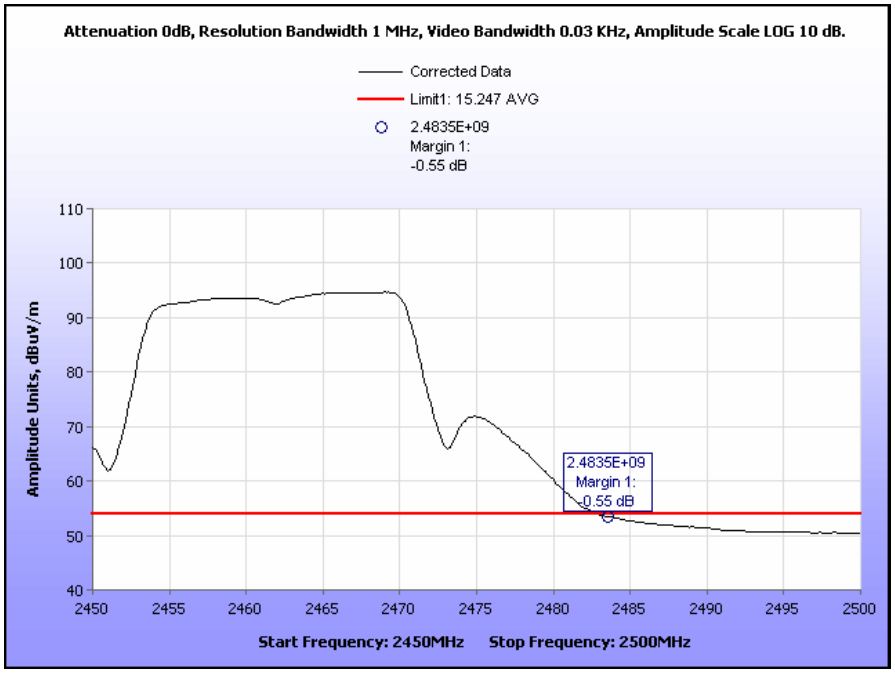
Radiated Band Edge Measurements, 802.11g, 2.4 GHz



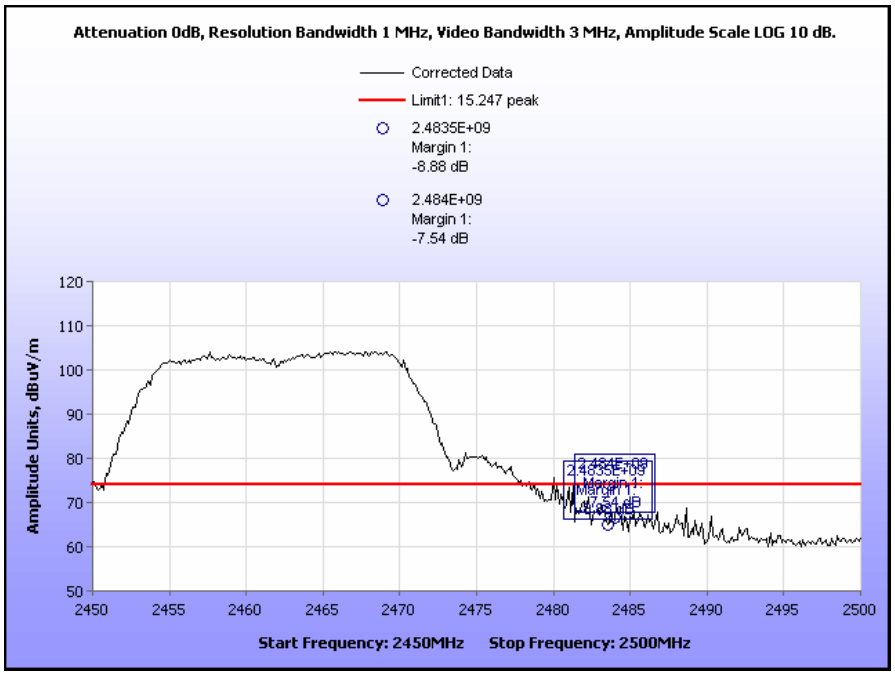
Plot 241. Radiated Band Edge, 802.11g, Low Channel, Avg., 2.4 GHz



Plot 242. Radiated Band Edge, 802.11g Low Channel, Peak, 2.4 GHz

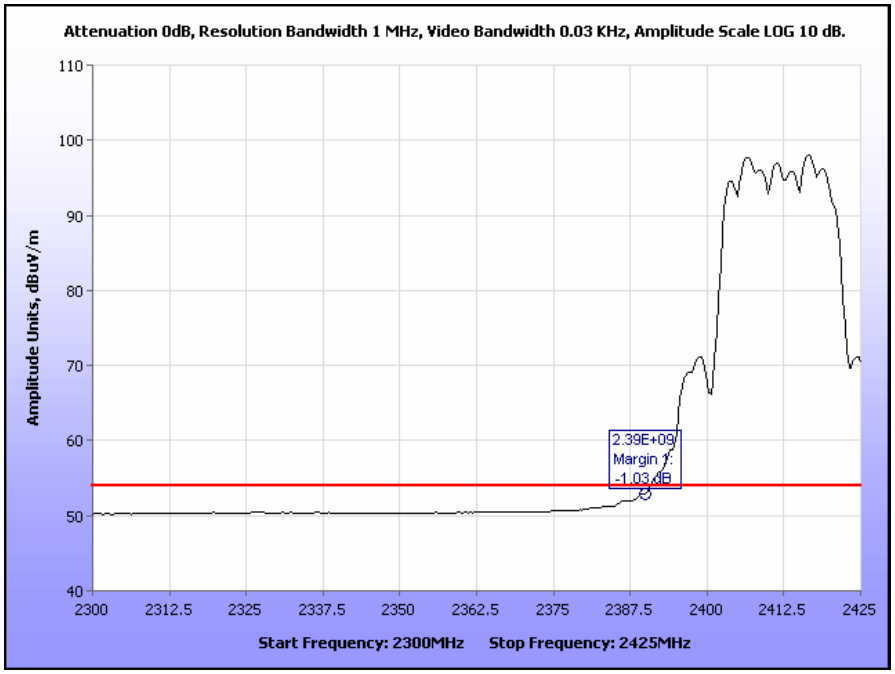


Plot 243. Radiated Band Edge, 802.11g, High Channel, Avg., 2.4 GHz

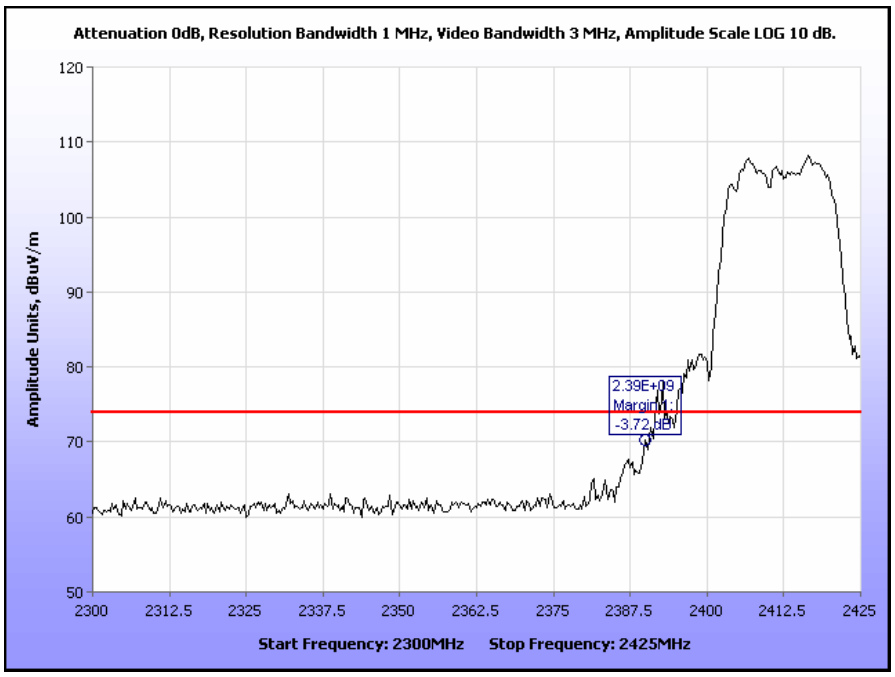


Plot 244. Radiated Band Edge, 802.11g, High Channel, Peak, 2.4 GHz

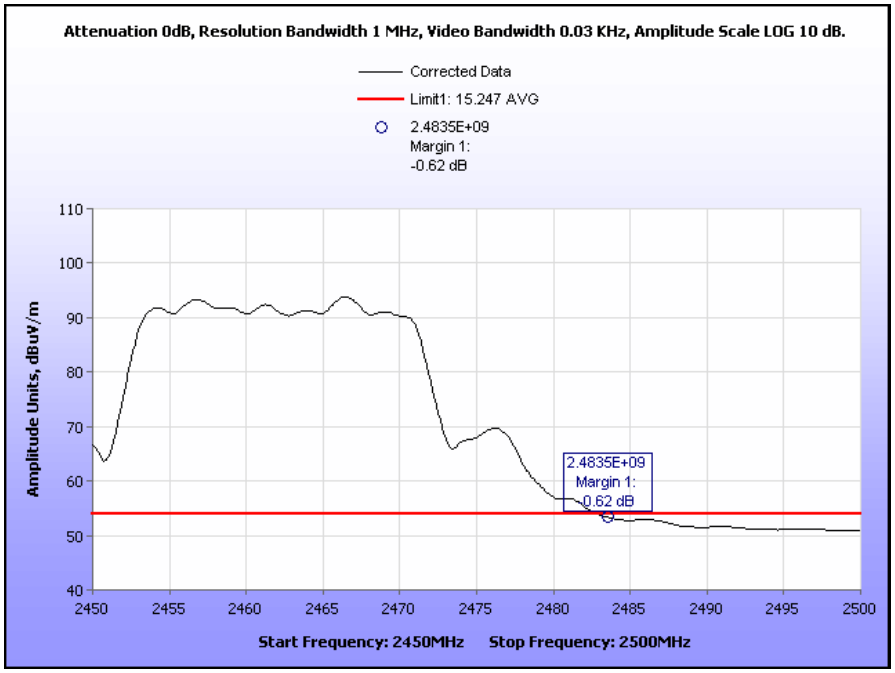
Radiated Band Edge Measurements, 802.11n HT20, 2.4 GHz



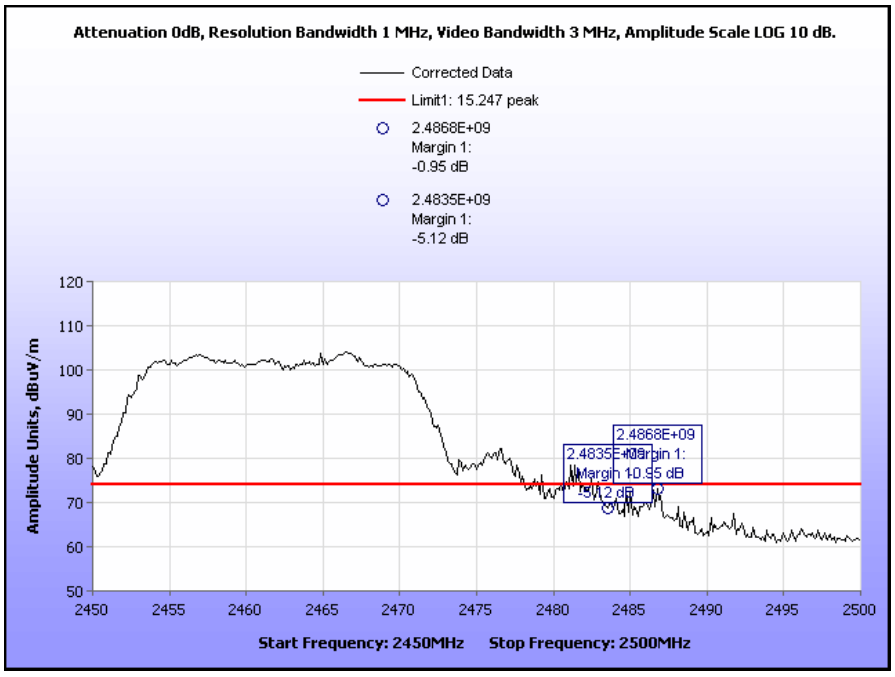
Plot 245. Radiated Band Edge, 802.11n HT20, Low Channel, Avg., 2.4 GHz



Plot 246. Radiated Band Edge, 802.11n HT20 Low Channel, Peak, 2.4 GHz

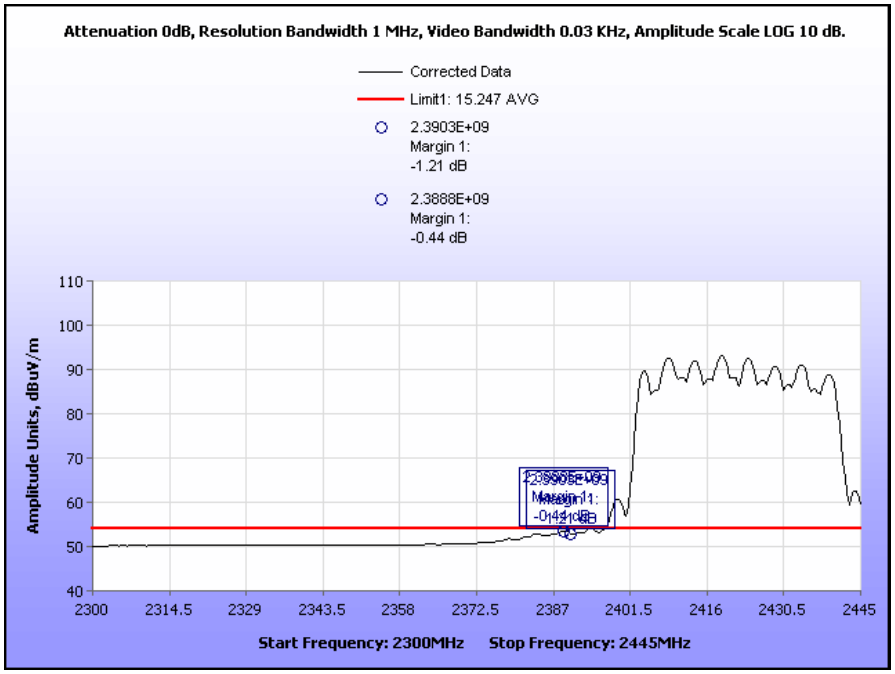


Plot 247. Radiated Band Edge, 802.11n HT20, High Channel, Avg., 2.4 GHz

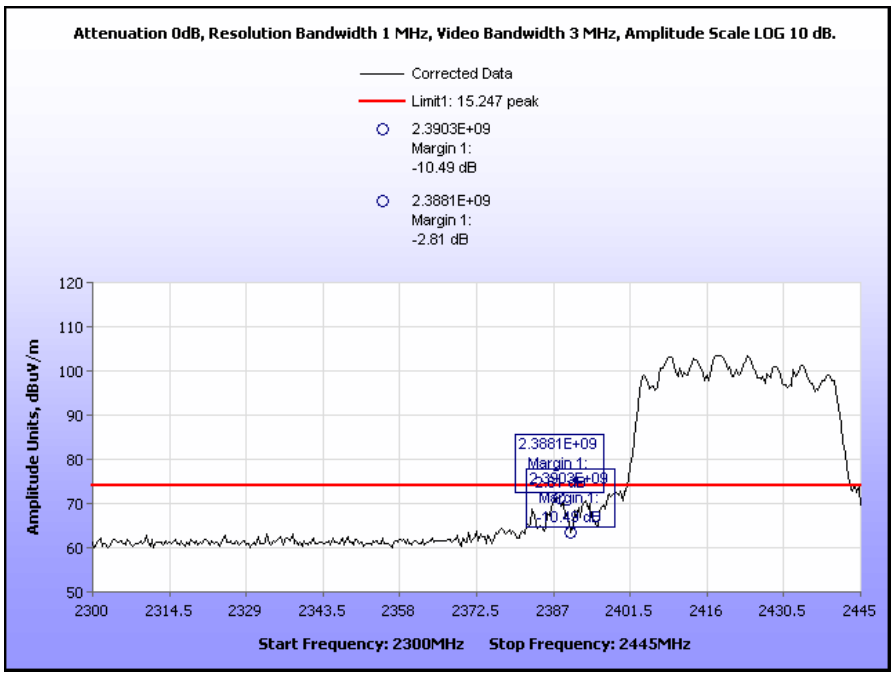


Plot 248. Radiated Band Edge, 802.11n HT20, High Channel, Peak, 2.4 GHz

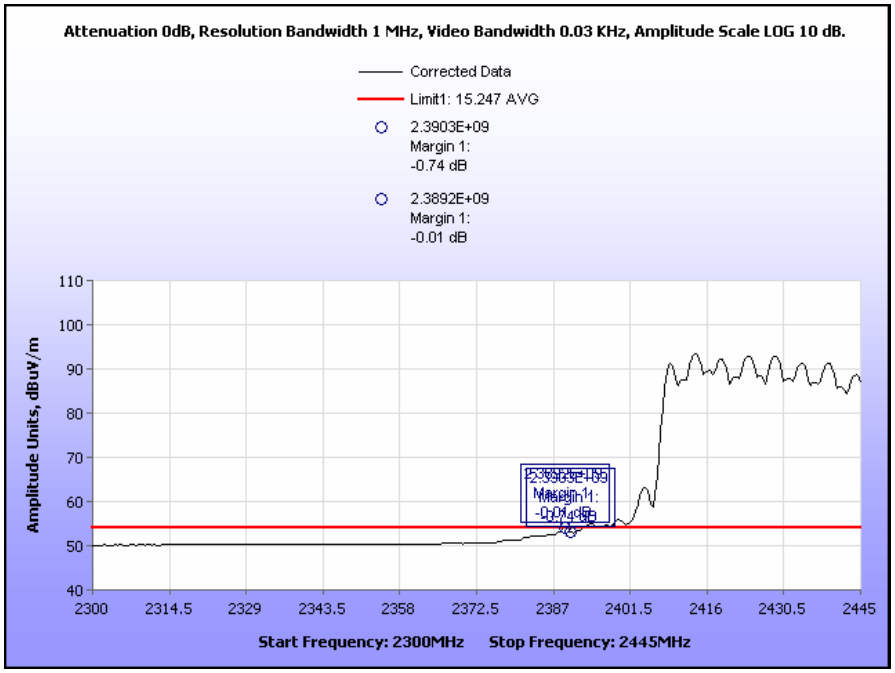
Radiated Band Edge Measurements, 802.11n HT40, 2.4 GHz



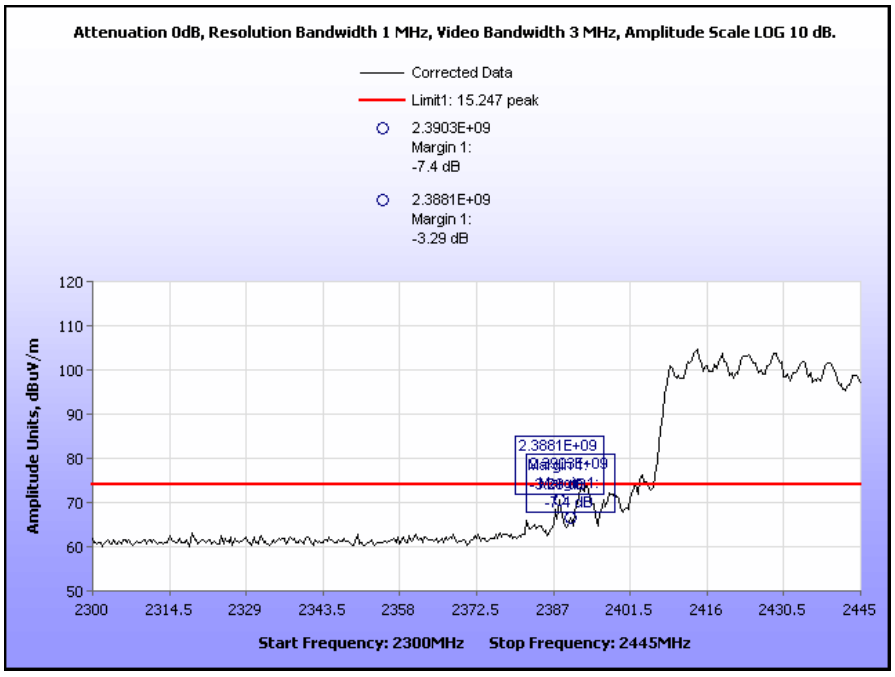
Plot 249. Radiated Band Edge, 802.11n HT40, Low Channel, Avg., 2.4 GHz



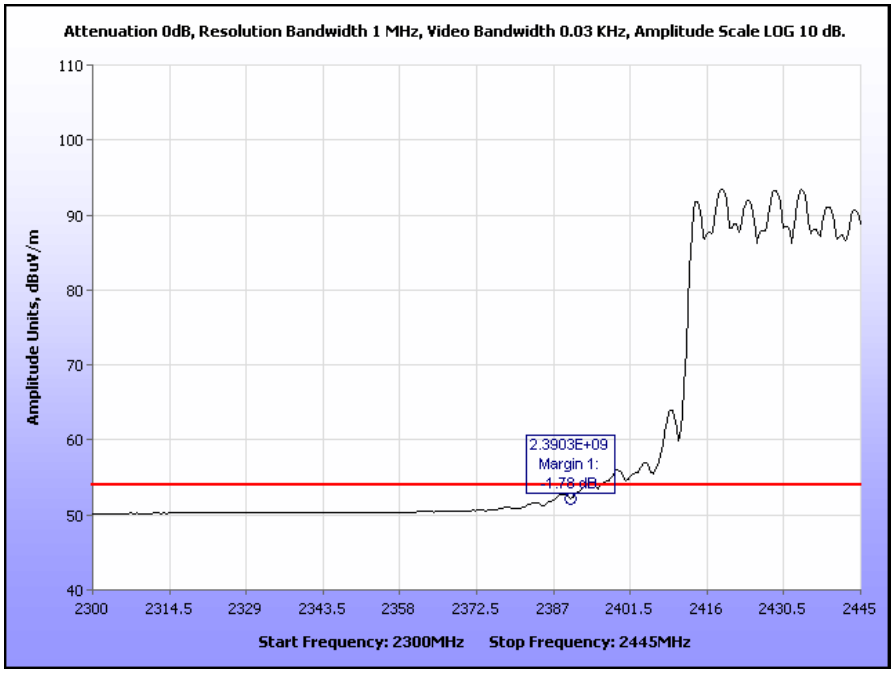
Plot 250. Radiated Band Edge, 802.11n HT40 Low Channel, Peak, 2.4 GHz



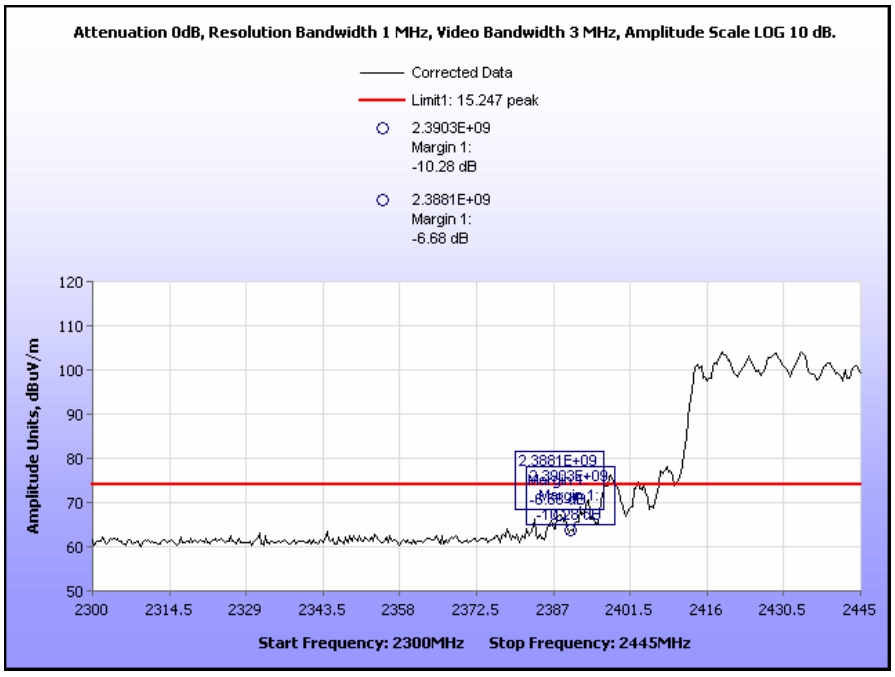
Plot 251. Radiated Band Edge, 802.11n HT40, Channel 4, Avg., 2.4 GHz



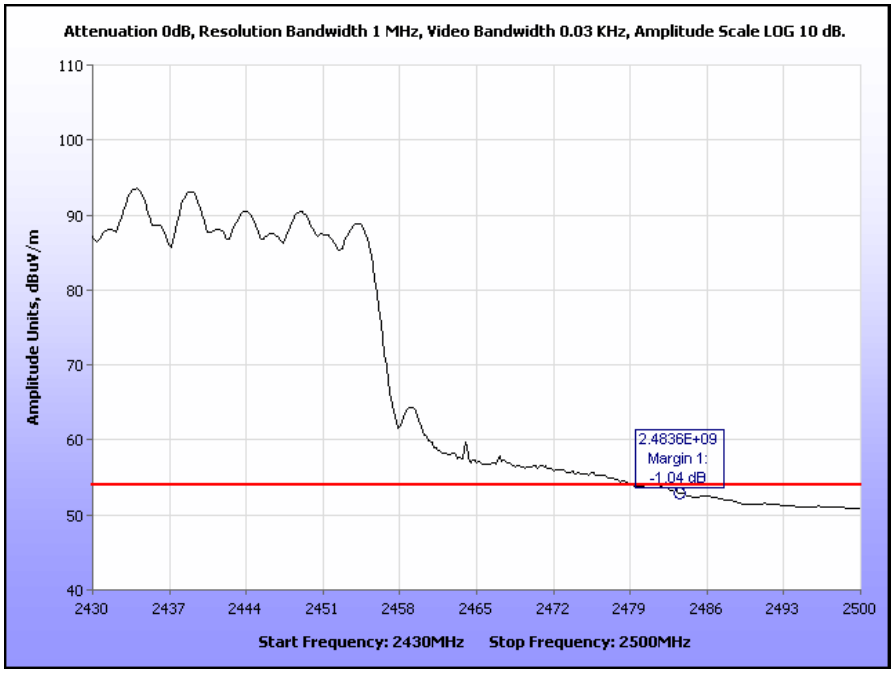
Plot 252. Radiated Band Edge, 802.11n HT40, Channel 4, Peak, 2.4 GHz



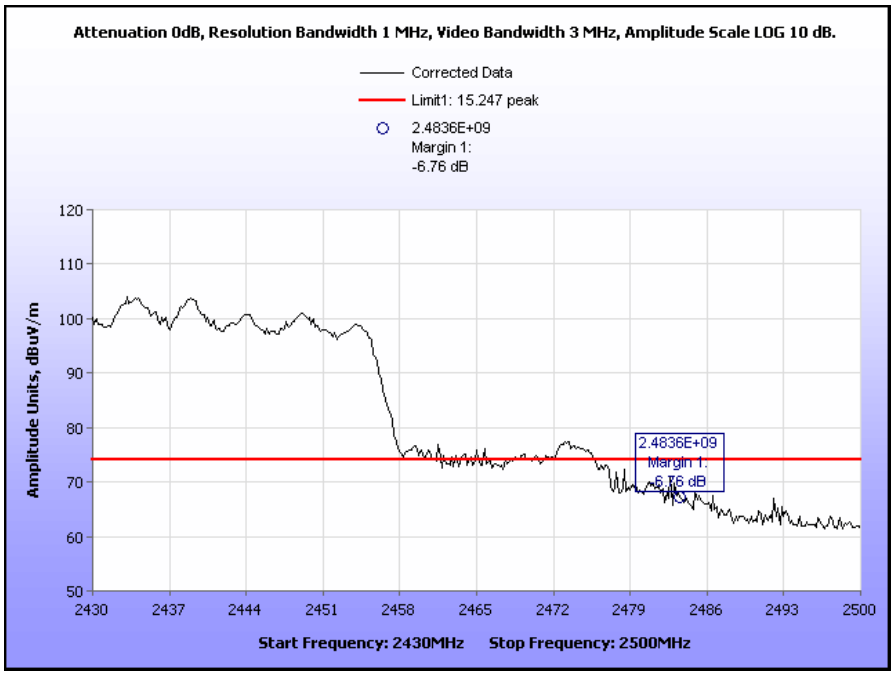
Plot 253. Radiated Band Edge, 802.11n HT40, Channel 5, Avg., 2.4 GHz



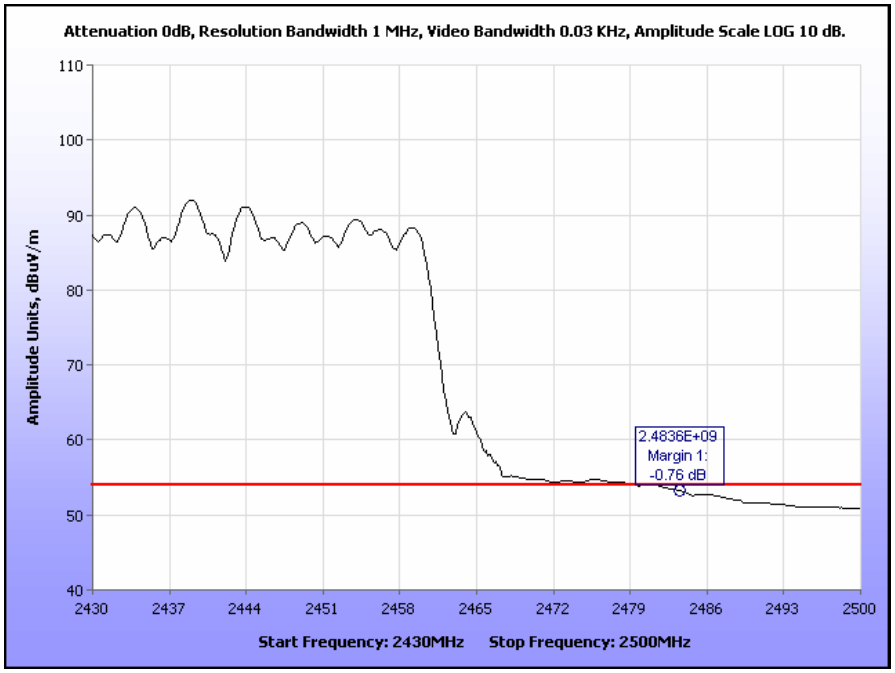
Plot 254. Radiated Band Edge, 802.11n HT40, Channel 5, Peak, 2.4 GHz



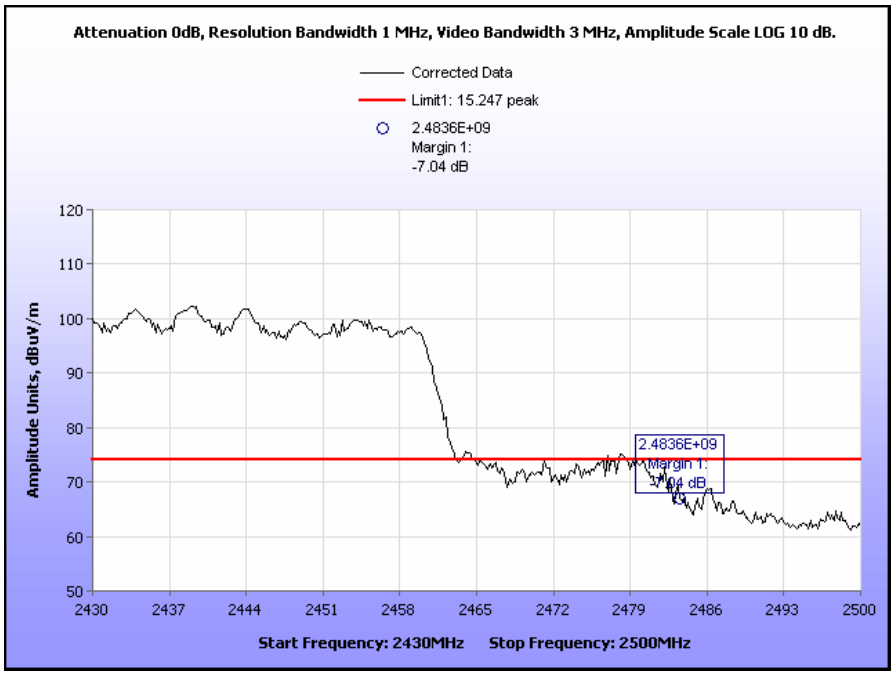
Plot 255. Radiated Band Edge, 802.11n HT40, Channel 6, Avg., 2.4 GHz



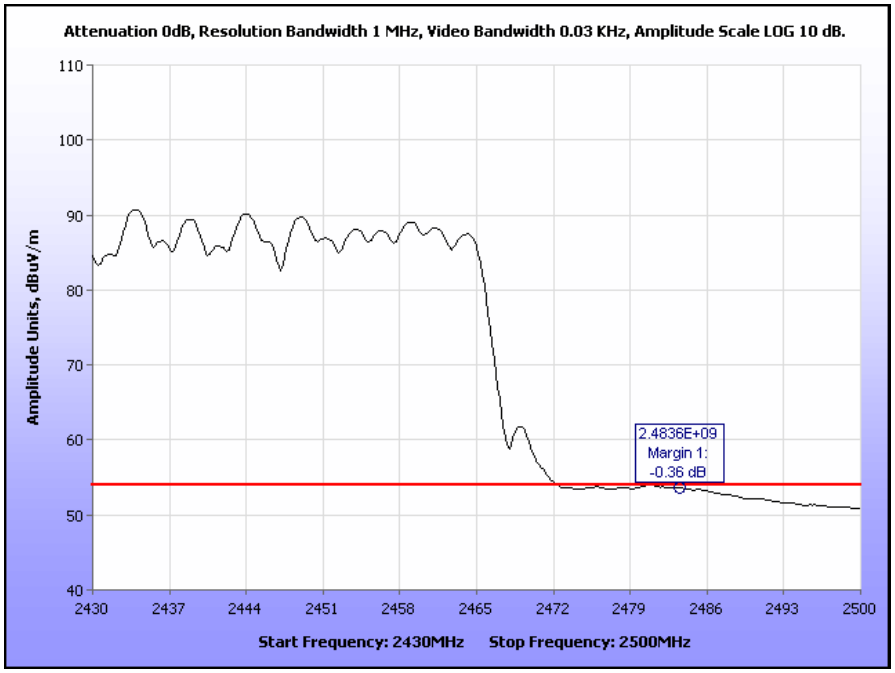
Plot 256. Radiated Band Edge, 802.11n HT40, Channel 6, 2.4 GHz



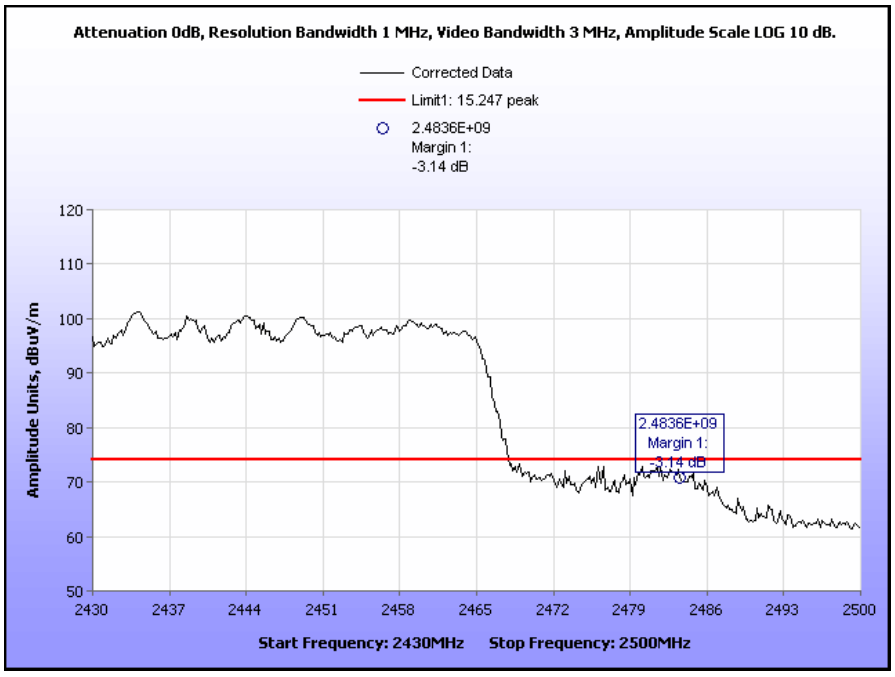
Plot 257. Radiated Band Edge, 802.11n HT40, Channel 7, Avg., 2.4 GHz



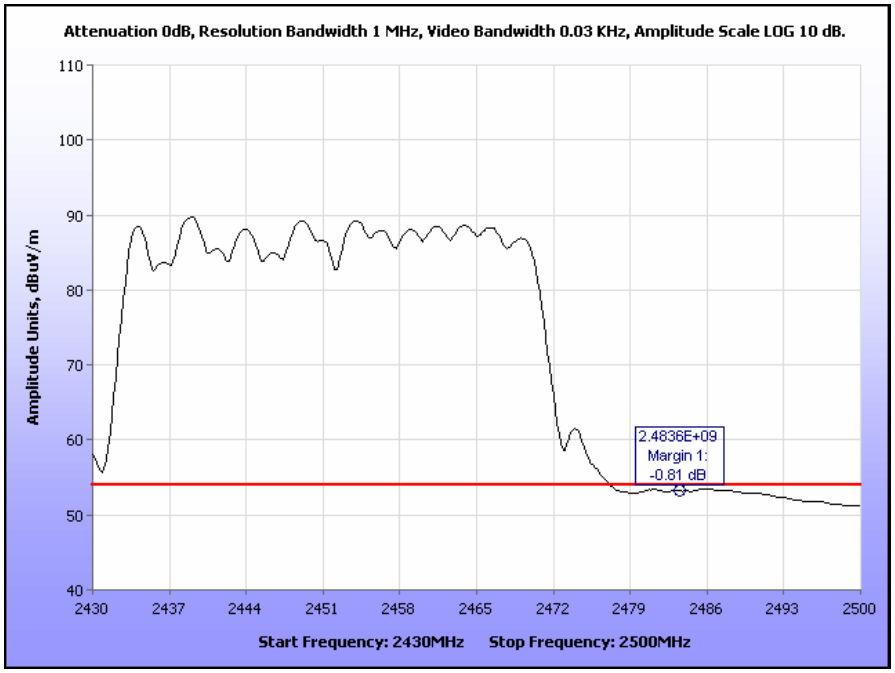
Plot 258. Radiated Band Edge, 802.11n HT40, Channel 7, 2.4 GHz



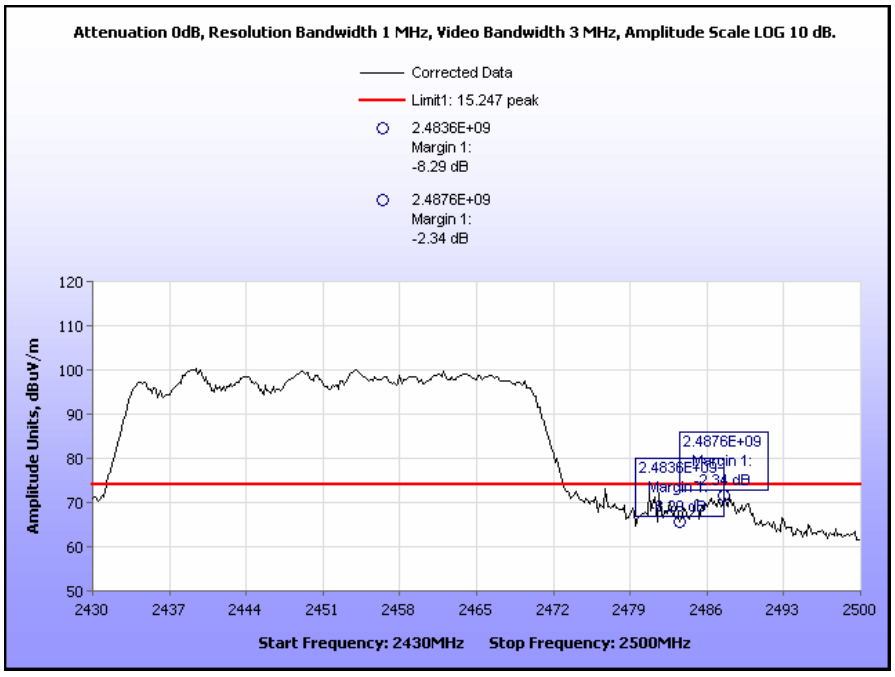
Plot 259. Radiated Band Edge, 802.11n HT40, Channel 8, Avg., 2.4 GHz



Plot 260. Radiated Band Edge, 802.11n HT40, Channel 8, Peak, 2.4 GHz



Plot 261. Radiated Band Edge, 802.11n HT40, High Channel, Avg., 2.4 GHz



Plot 262. Radiated Band Edge, 802.11n HT40, High Channel, Peak, 2.4 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge

Test Requirement: **15.247(d)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Since the EUT had an integral antenna, conducted measurements could not be performed. Measurements needed to be taken radiated. An antenna was located 3 m away from the EUT and plots were taken. The EUT was rotated through all three orthogonal axes. The plots were corrected for both antenna correction factor and cable lost.

See following pages for detailed test results with RF Conducted Spurious Emissions.

Test Results: The EUT was compliant with the Conducted Spurious Emission limits of **§15.247(d)**.

Test Engineer(s): Lionel Gabrillo

Test Date(s): 04/20/12 & 04/24/12

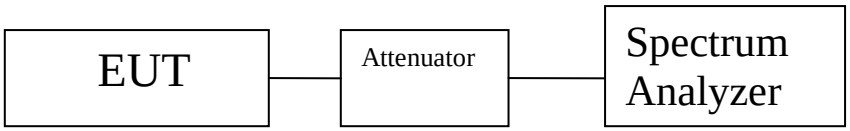
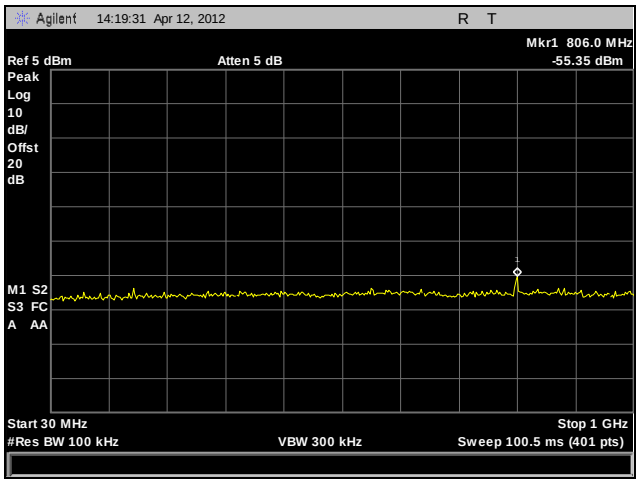
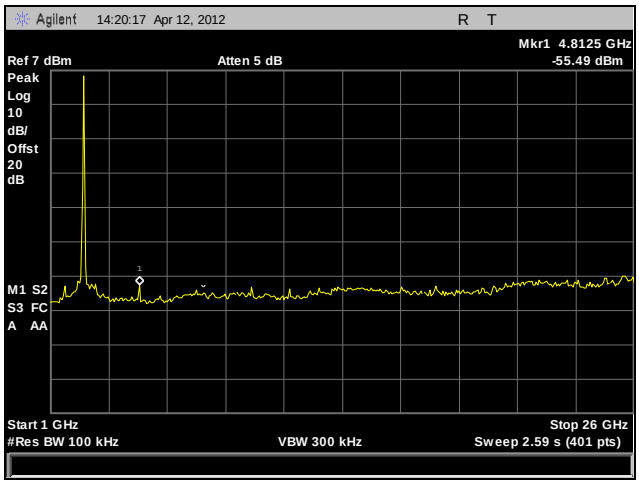


Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup

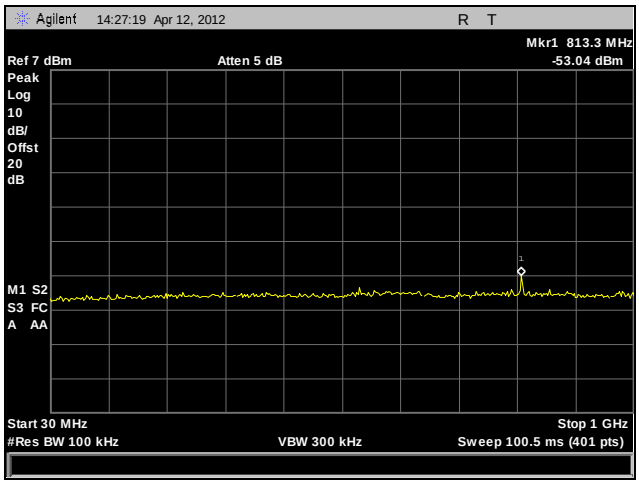
Conducted Spurious Emissions Test Results, 802.11b, 2.4 GHz



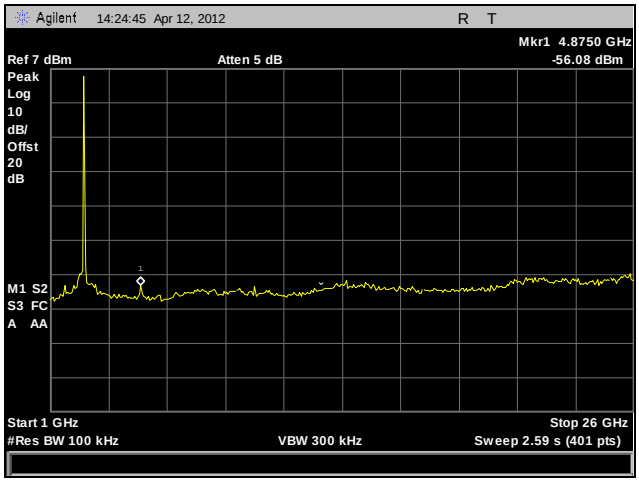
Plot 263. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11b, 2.4 GHz



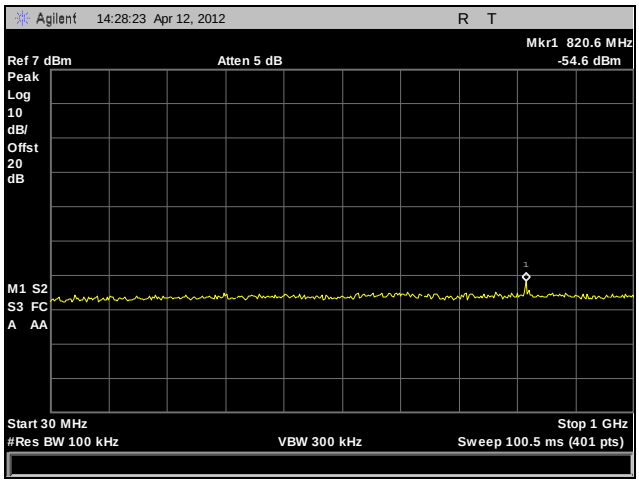
Plot 264. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11b, 2.4 GHz



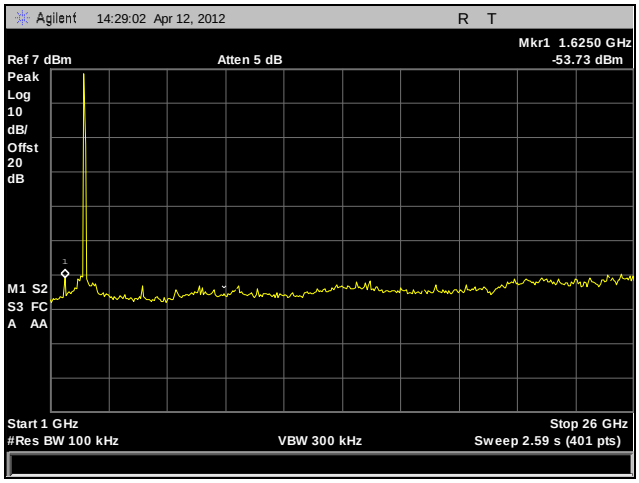
Plot 265. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11b, 2.4 GHz



Plot 266. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11b, 2.4 GHz

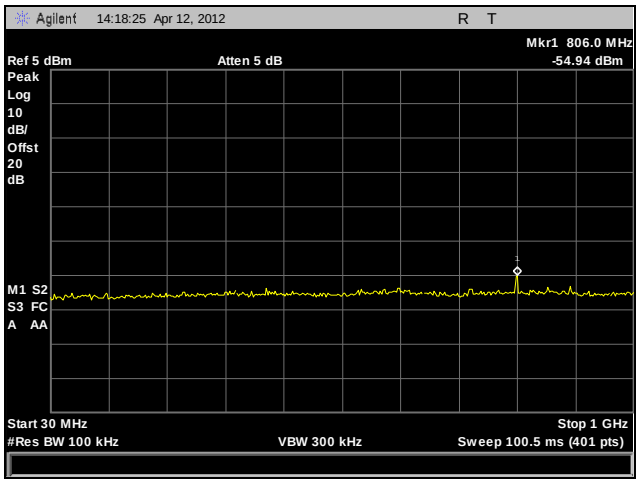


Plot 267. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11b, 2.4 GHz

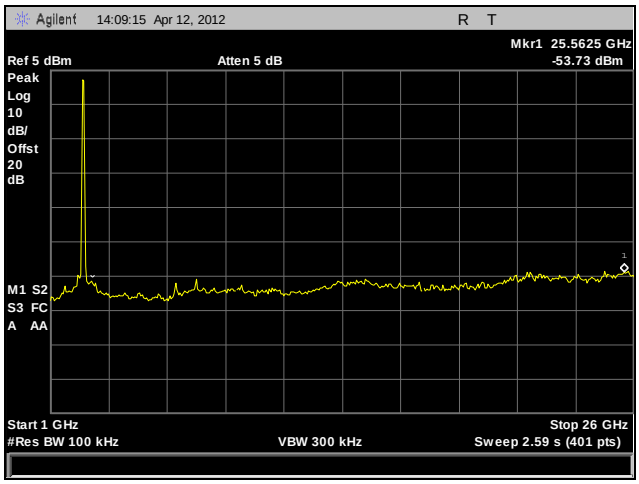


Plot 268. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11b, 2.4 GHz

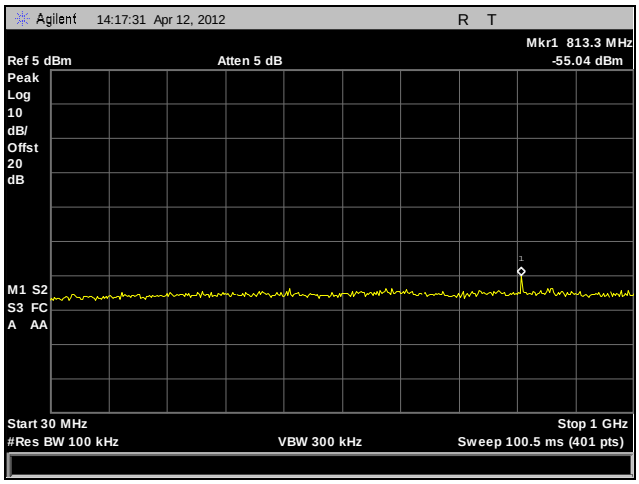
Conducted Spurious Emissions Test Results, 802.11g, 2.4 GHz



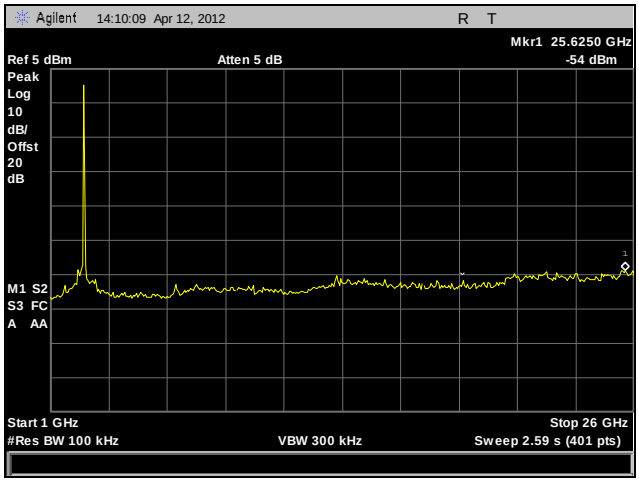
Plot 269. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11g, 2.4 GHz



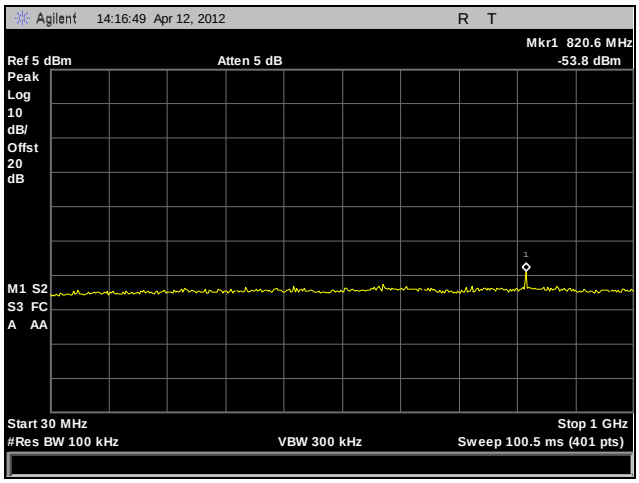
Plot 270. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11g, 2.4 GHz



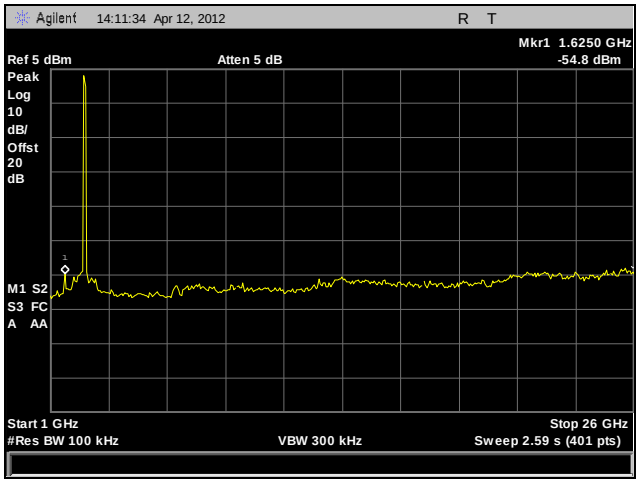
Plot 271. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11g, 2.4 GHz



Plot 272. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11g, 2.4 GHz

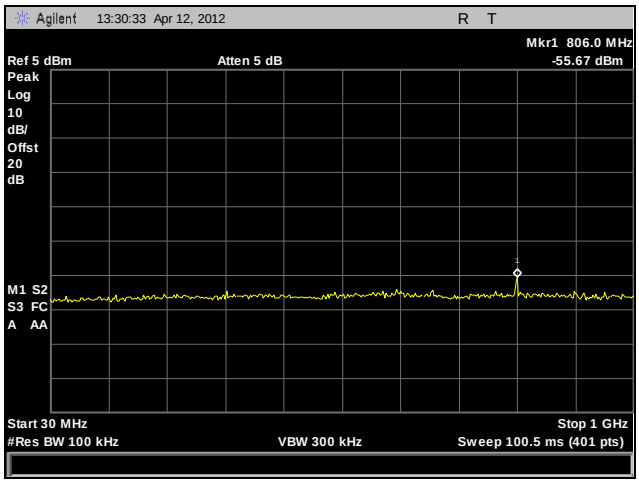


Plot 273. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11g, 2.4 GHz

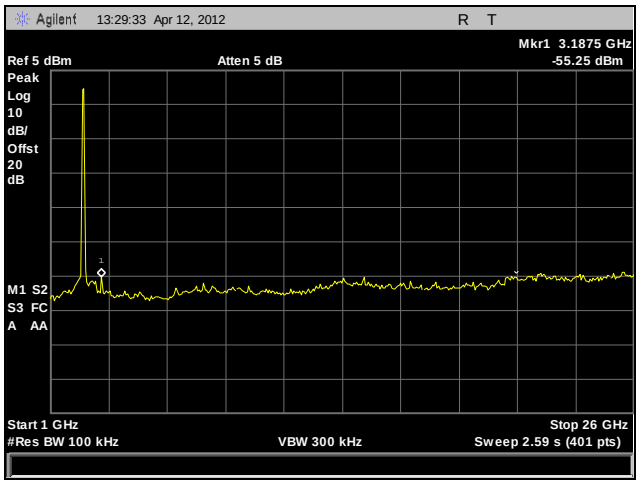


Plot 274. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11g, 2.4 GHz

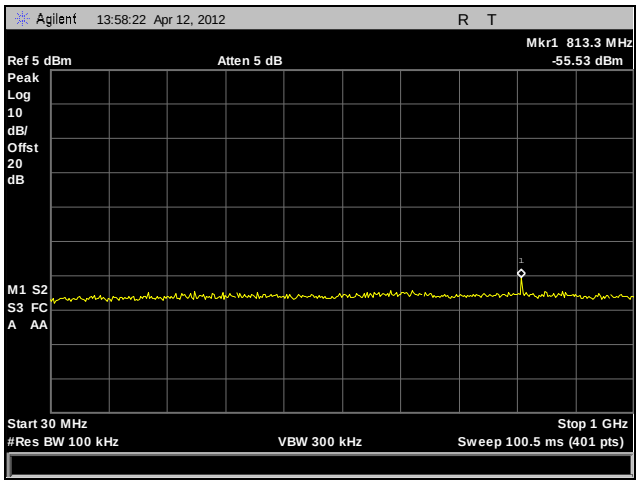
Conducted Spurious Emissions Test Results, 802.11n HT20, Port 1, 2.4 GHz



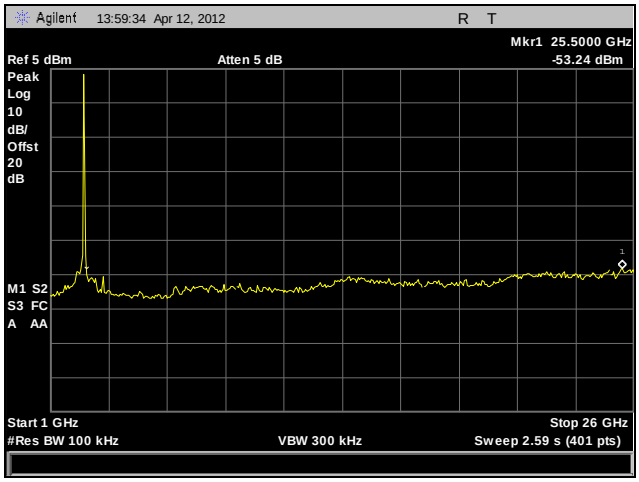
Plot 275. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 1, 2.4 GHz



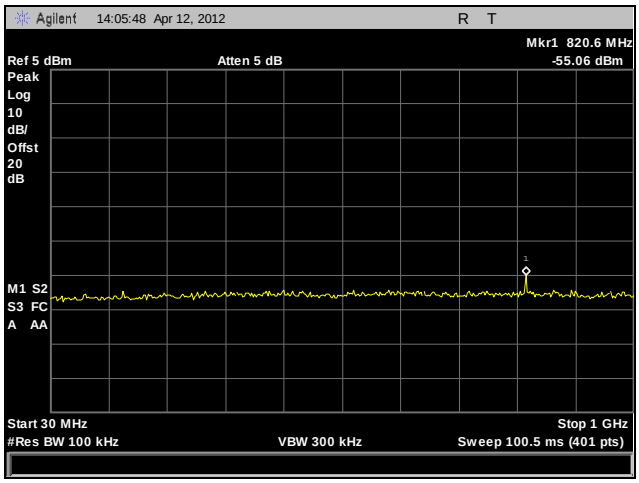
Plot 276. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 1, 2.4 GHz



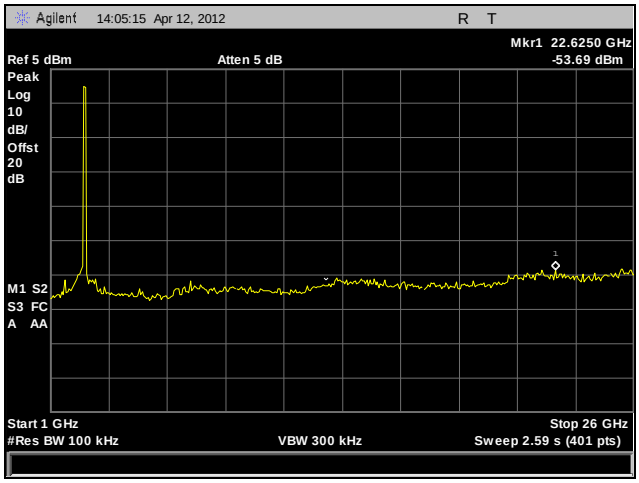
Plot 277. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 1, 2.4 GHz



Plot 278. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 1, 2.4 GHz

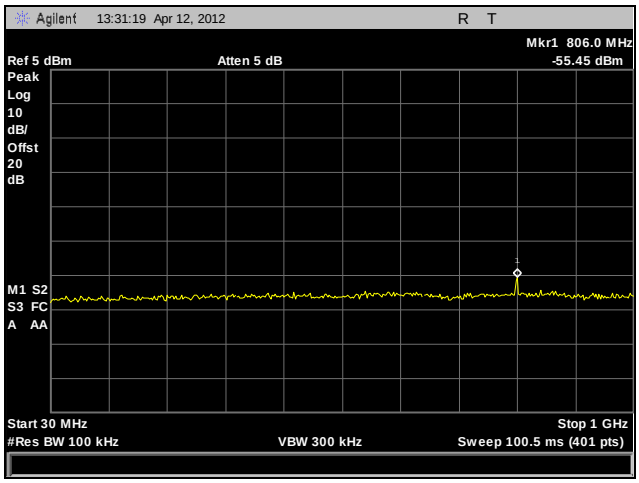


Plot 279. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 1, 2.4 GHz

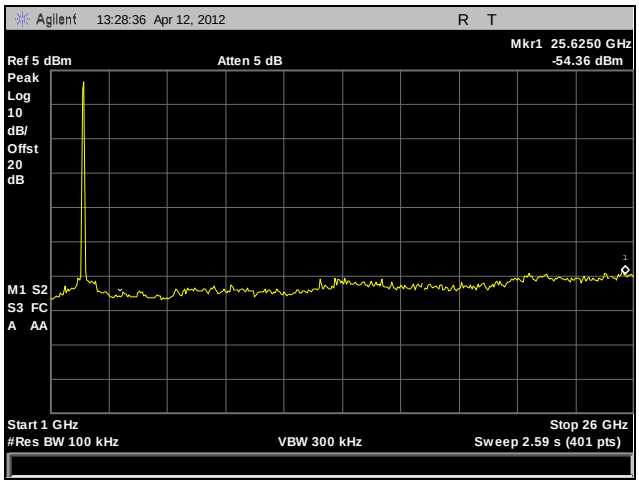


Plot 280. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 1, 2.4 GHz

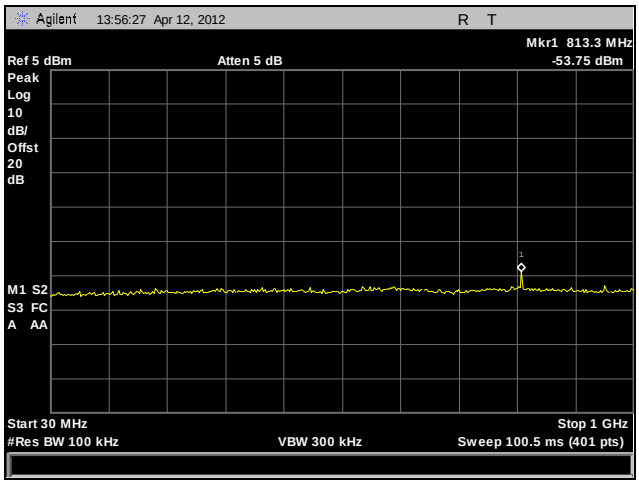
Conducted Spurious Emissions Test Results, 802.11n HT20, Port 2, 2.4 GHz



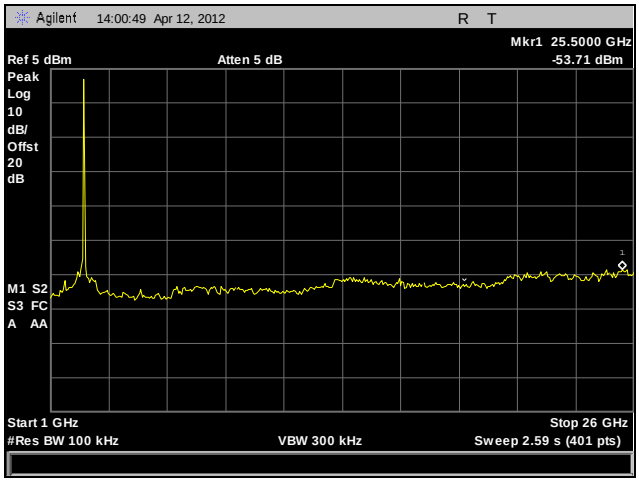
Plot 281. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 2, 2.4 GHz



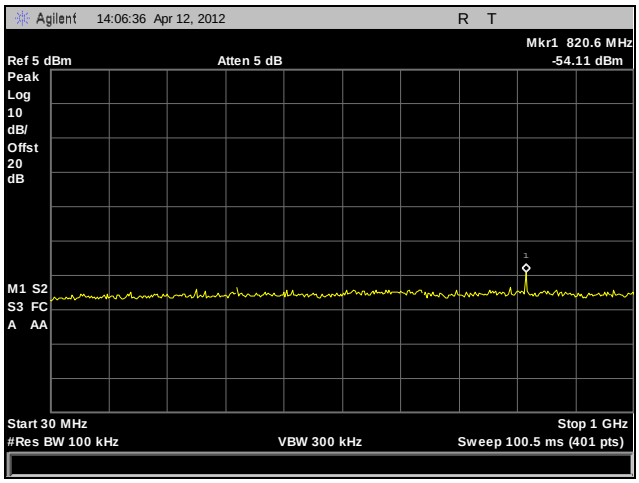
Plot 282. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 2, 2.4 GHz



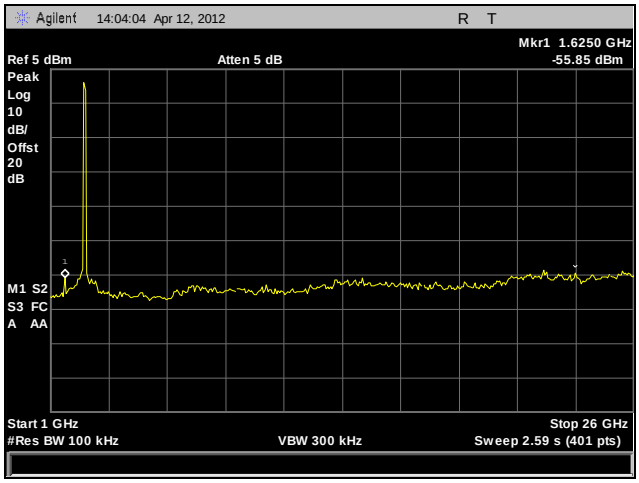
Plot 283. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 2, 2.4 GHz



Plot 284. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 2, 2.4 GHz

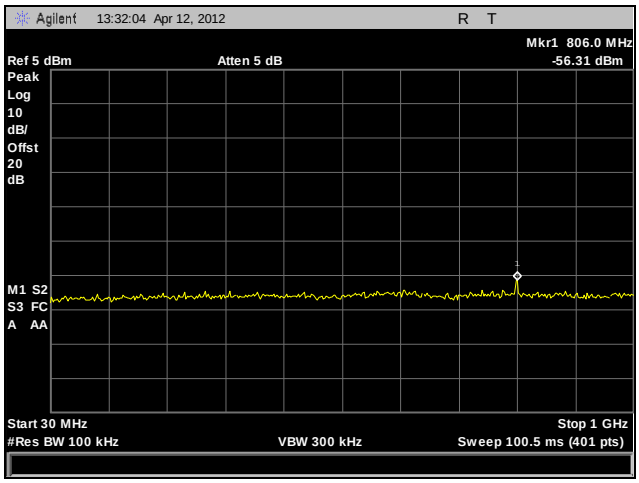


Plot 285. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 2, 2.4 GHz

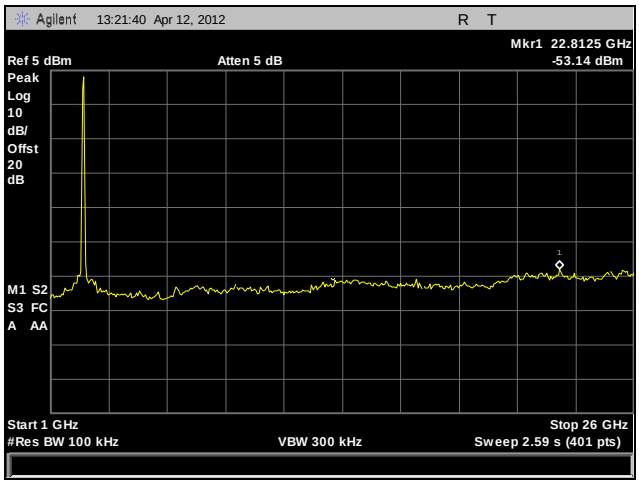


Plot 286. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 2, 2.4 GHz

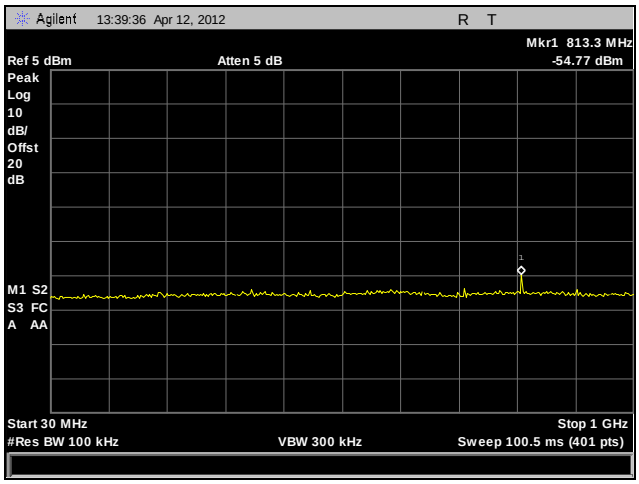
Conducted Spurious Emissions Test Results, 802.11n HT20, Port 3, 2.4 GHz



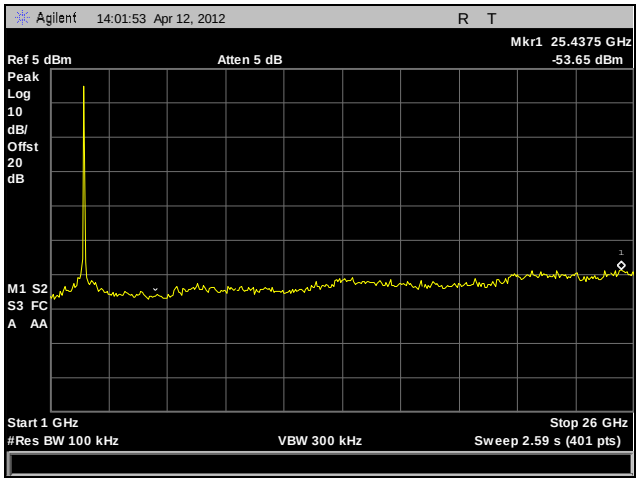
Plot 287. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 3, 2.4 GHz



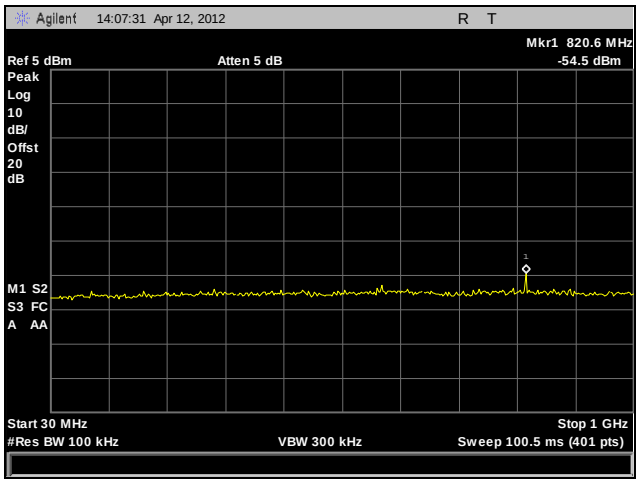
Plot 288. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 3, 2.4 GHz



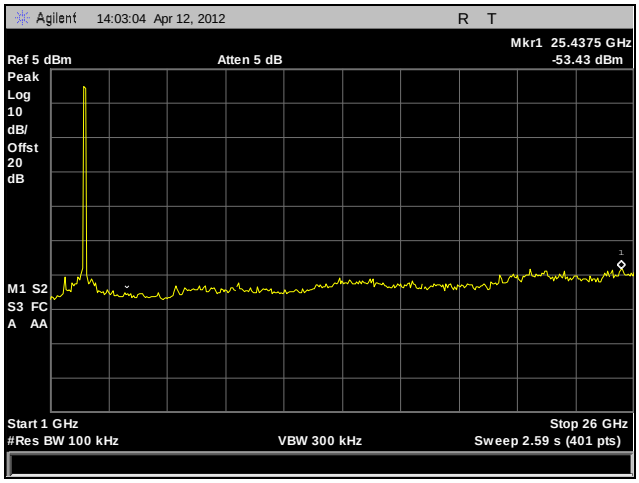
Plot 289. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 3, 2.4 GHz



Plot 290. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 3, 2.4 GHz

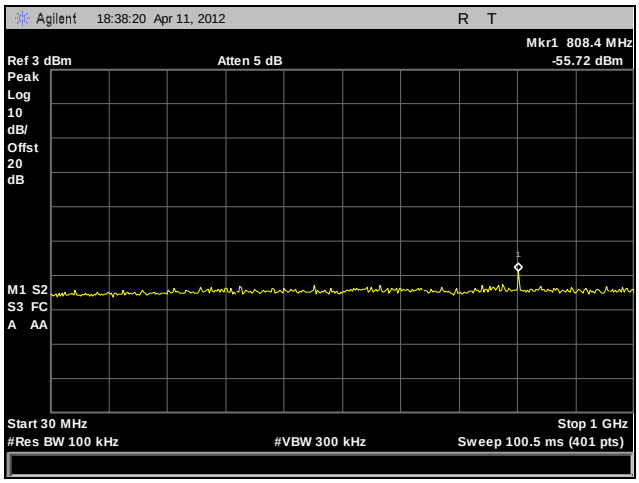


Plot 291. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 3, 2.4 GHz

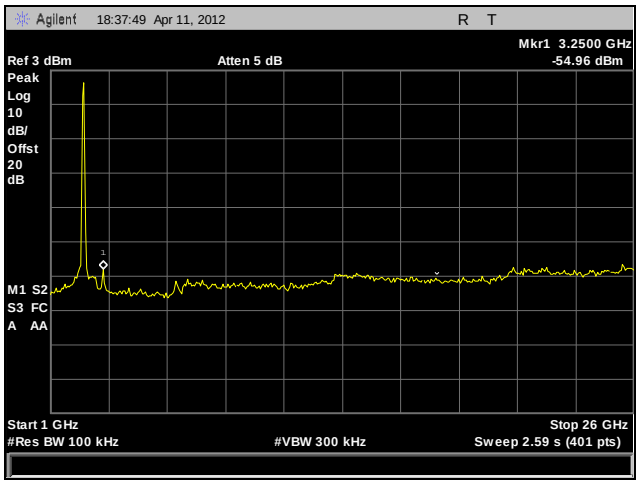


Plot 292. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11n HT20, Port 3, 2.4 GHz

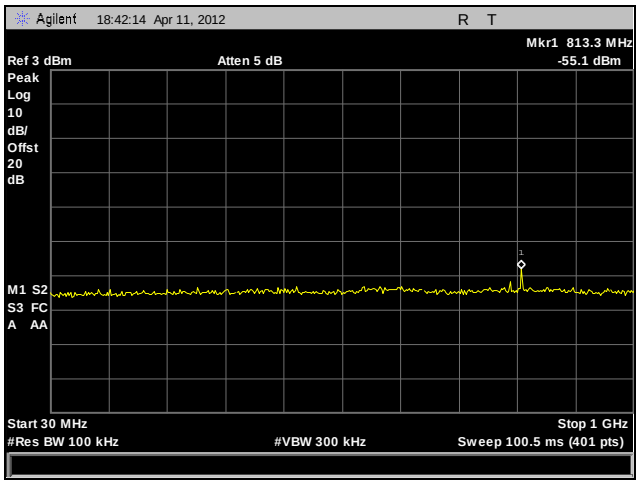
Conducted Spurious Emissions Test Results, 802.11n HT40, Port 1, 2.4 GHz



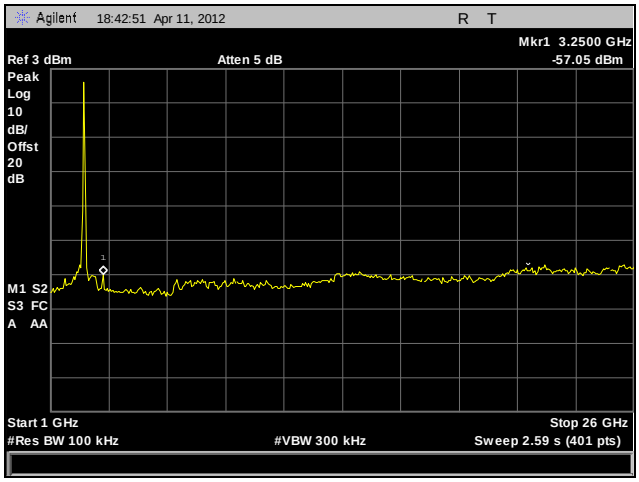
Plot 293. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 1, 2.4 GHz



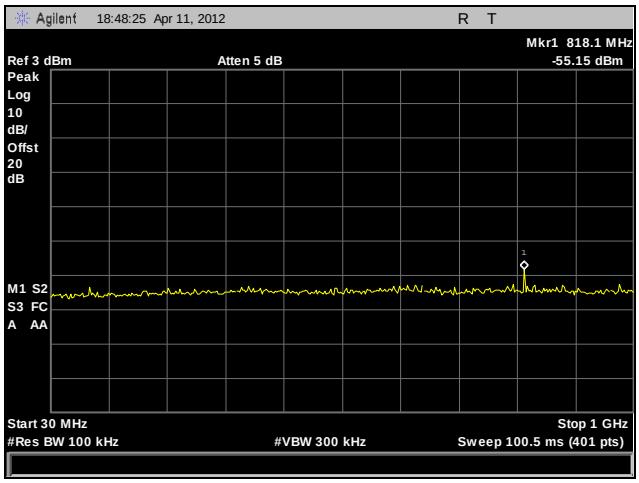
Plot 294. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 1, 2.4 GHz



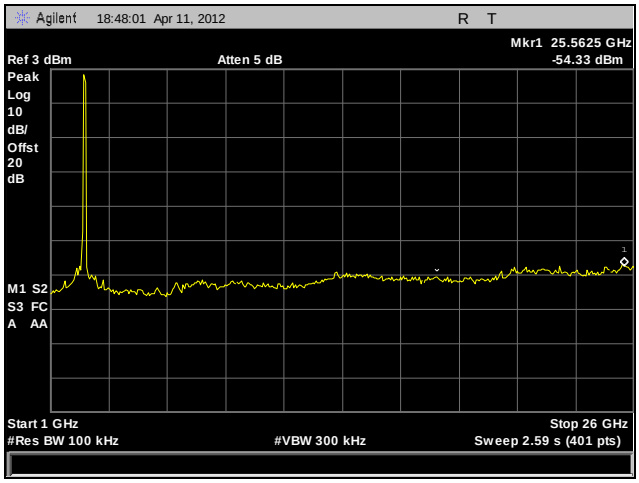
Plot 295. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 1, 2.4 GHz



Plot 296. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 1, 2.4 GHz

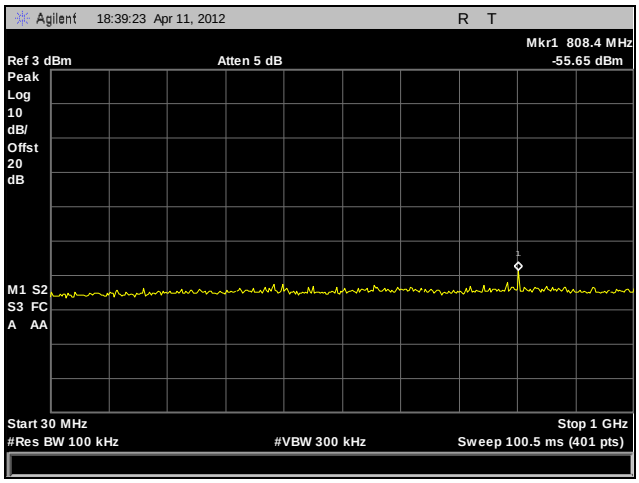


Plot 297. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 1, 2.4 GHz

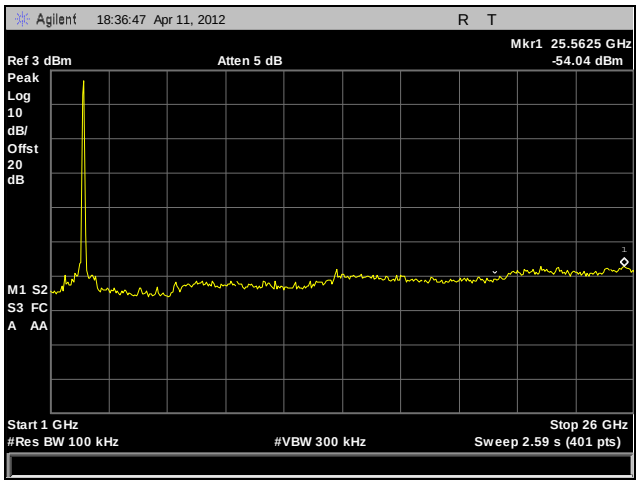


Plot 298. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 1, 2.4 GHz

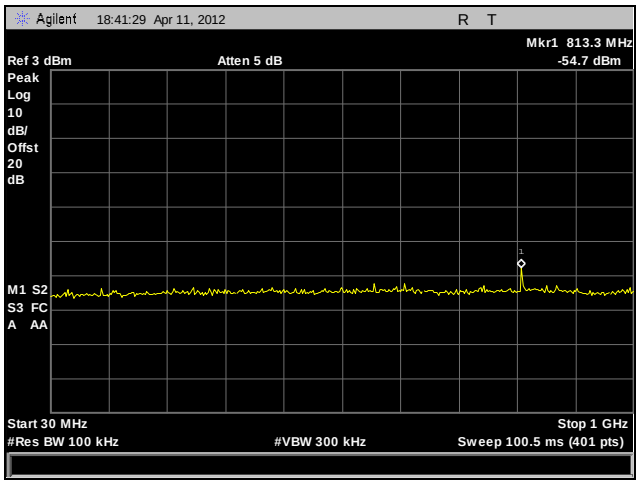
Conducted Spurious Emissions Test Results, 802.11n HT40, Port 2, 2.4 GHz



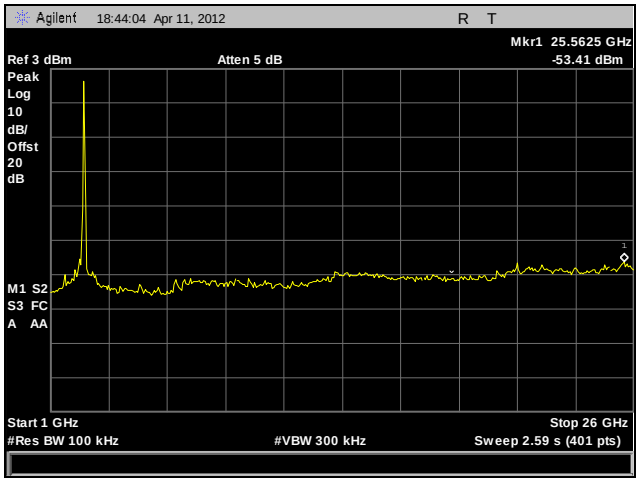
Plot 299. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 2, 2.4 GHz



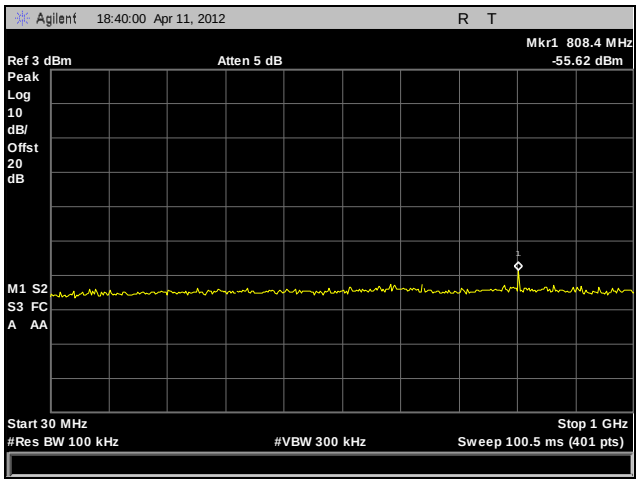
Plot 300. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 2, 2.4 GHz



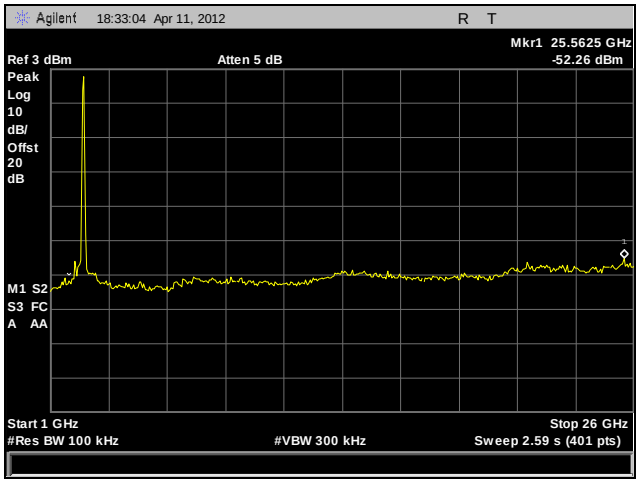
Plot 301. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 2, 2.4 GHz



Plot 302. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 2, 2.4 GHz

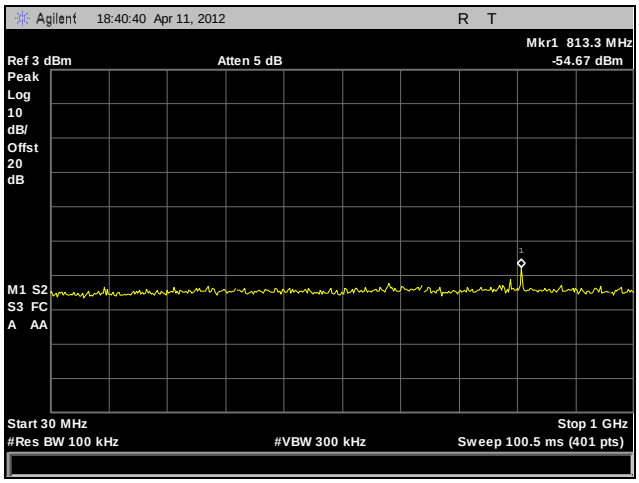


Plot 303. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 2, 2.4 GHz

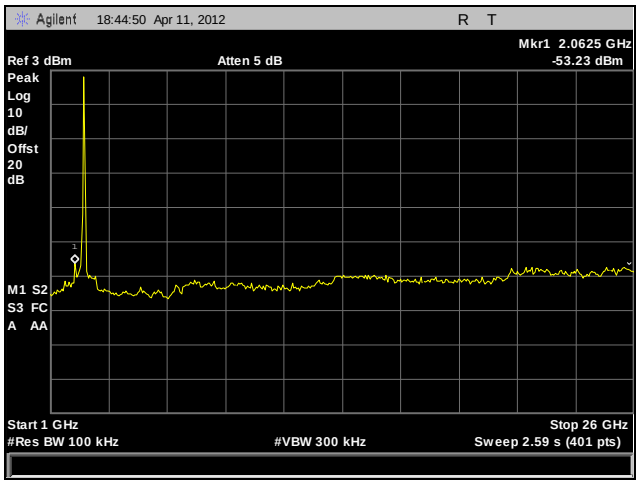


Plot 304. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 2, 2.4 GHz

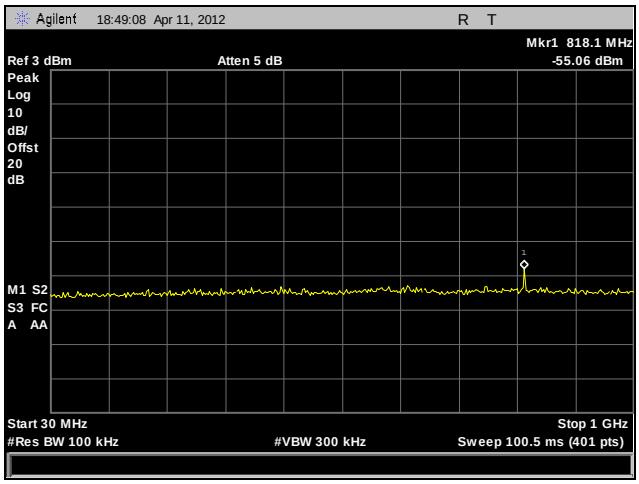
Conducted Spurious Emissions Test Results, 802.11n HT40, Port 3, 2.4 GHz



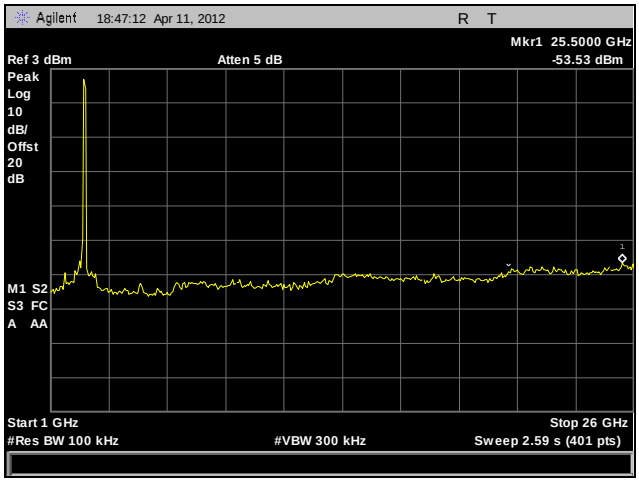
Plot 305. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 3, 2.4 GHz



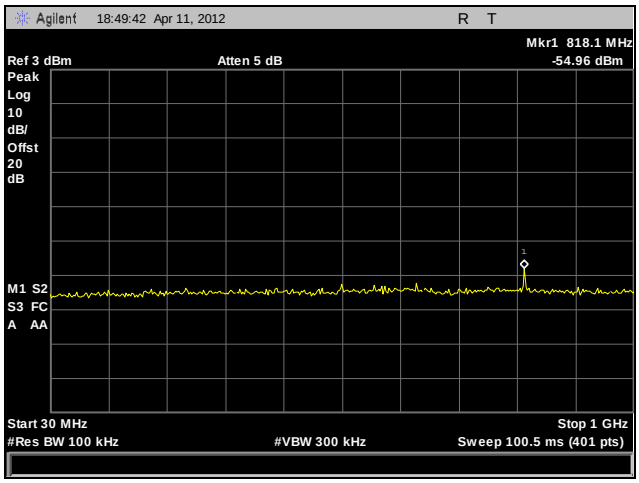
Plot 306. Conducted Spurious Emissions, Low Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 3, 2.4 GHz



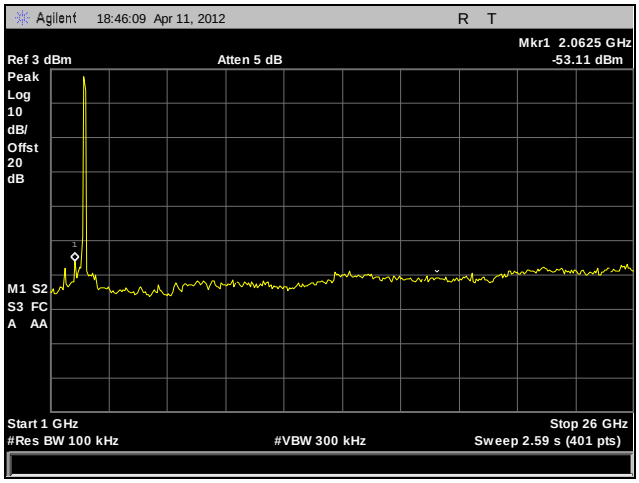
Plot 307. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 3, 2.4 GHz



Plot 308. Conducted Spurious Emissions, Mid Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 3, 2.4 GHz

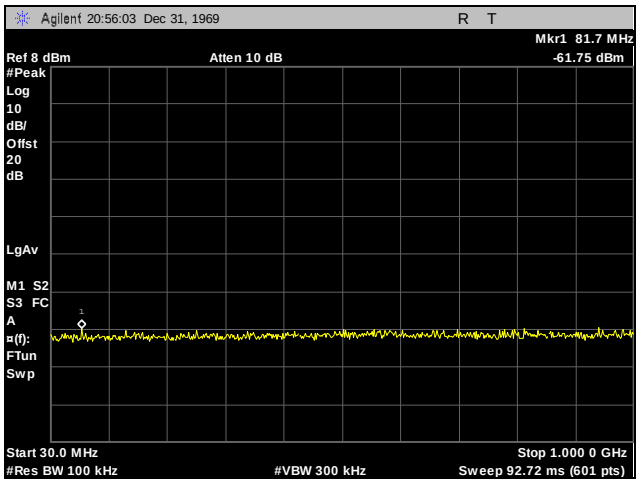


Plot 309. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 3, 2.4 GHz

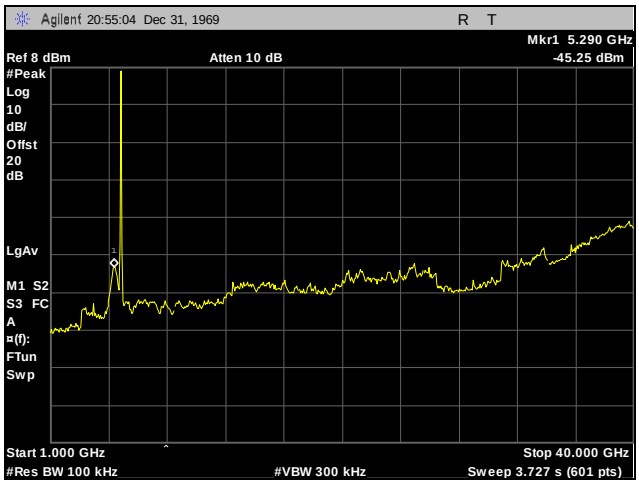


Plot 310. Conducted Spurious Emissions, High Channel, 1 GHz – 26 GHz, 802.11n HT40, Port 3, 2.4 GHz

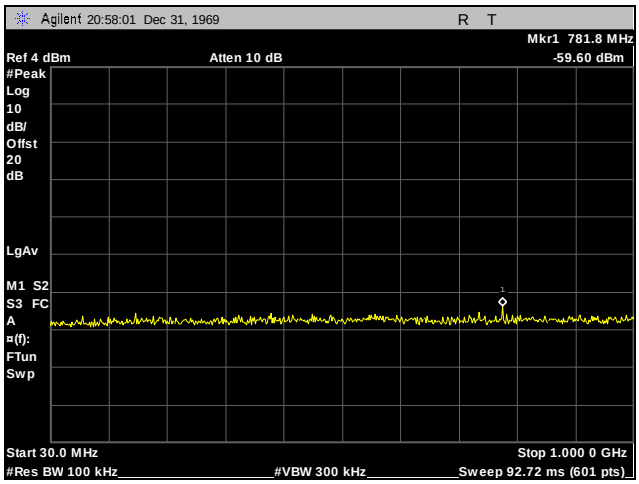
Conducted Spurious Emissions Test Results, 802.11a, 5 GHz



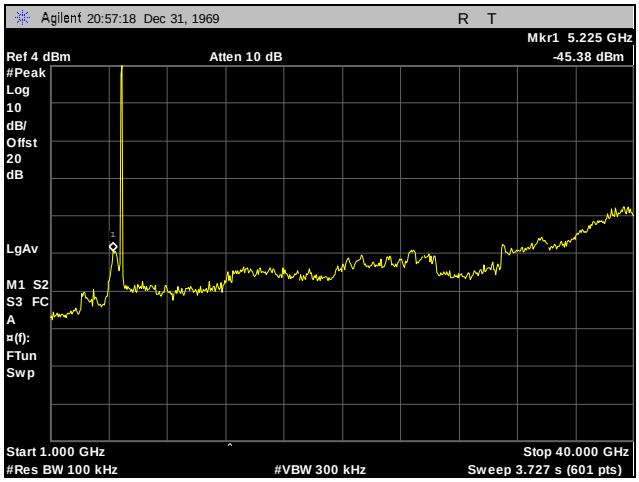
Plot 311. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11a, 5 GHz



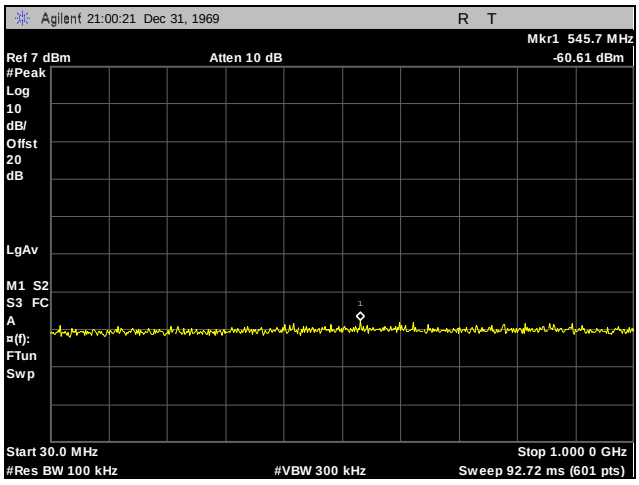
Plot 312. Conducted Spurious Emissions, Low Channel, 1 GHz – 40 GHz, 802.11a, 5 GHz



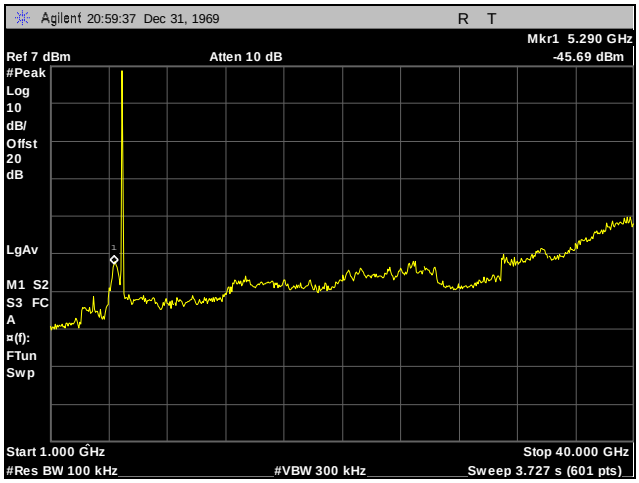
Plot 313. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11a, 5 GHz



Plot 314. Conducted Spurious Emissions, Mid Channel, 1 GHz – 40 GHz, 802.11a, 5 GHz

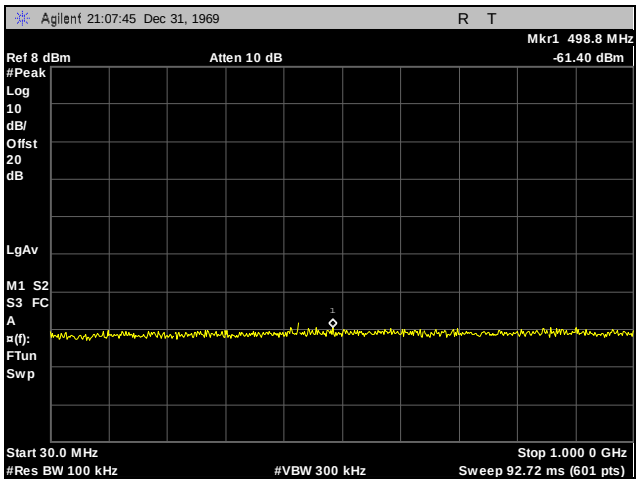


Plot 315. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11a, 5 GHz

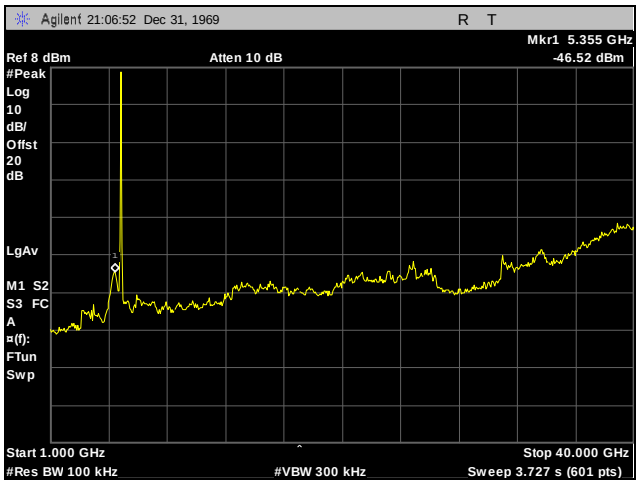


Plot 316. Conducted Spurious Emissions, High Channel, 1 GHz – 40 GHz, 802.11a, 5 GHz

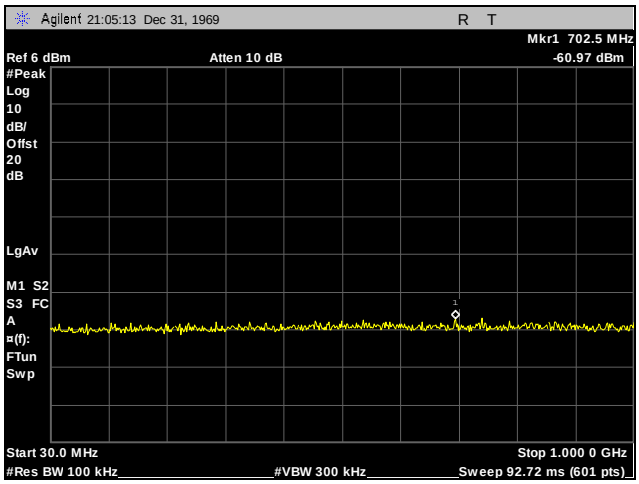
Conducted Spurious Emissions Test Results, 802.11n HT20, Port 1, 5 GHz



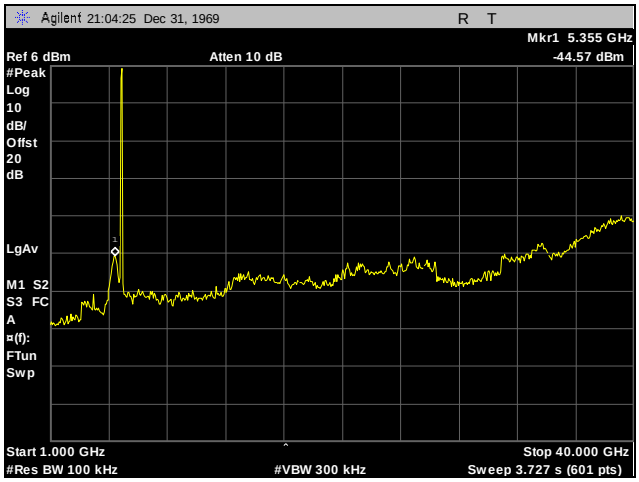
Plot 317. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 1, 5 GHz



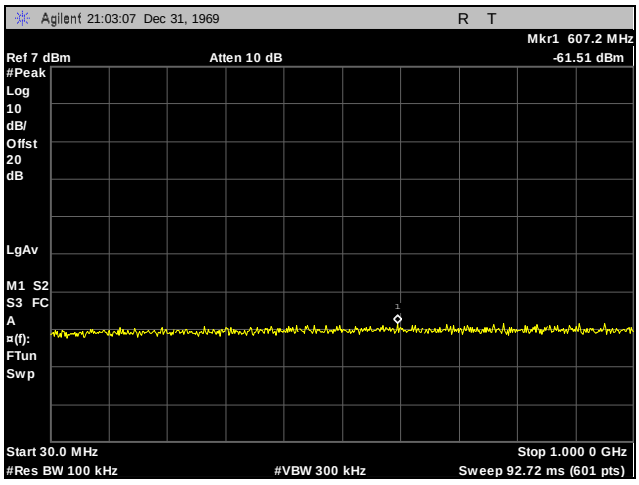
Plot 318. Conducted Spurious Emissions, Low Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 1, 5 GHz



Plot 319. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 1, 5 GHz



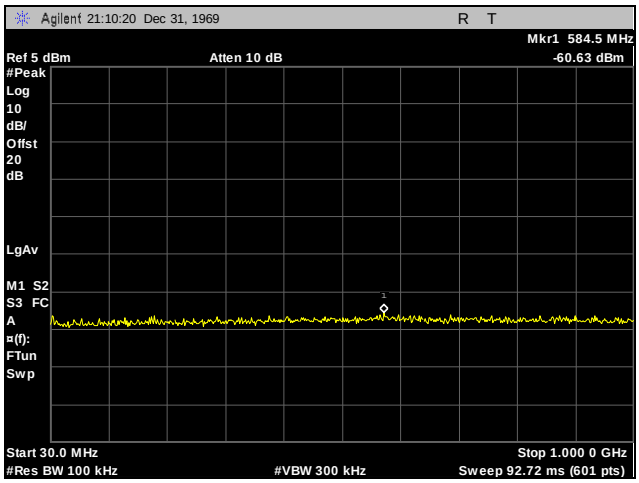
Plot 320. Conducted Spurious Emissions, Mid Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 1, 5 GHz



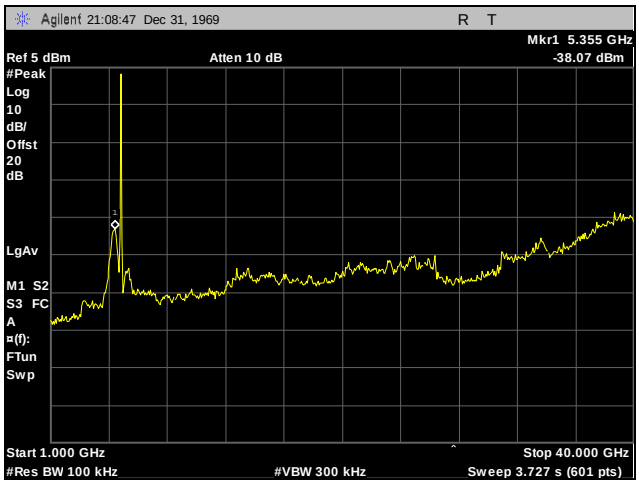
Plot 321. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 1, 5 GHz

Plot 322. Conducted Spurious Emissions, High Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 1, 5 GHz

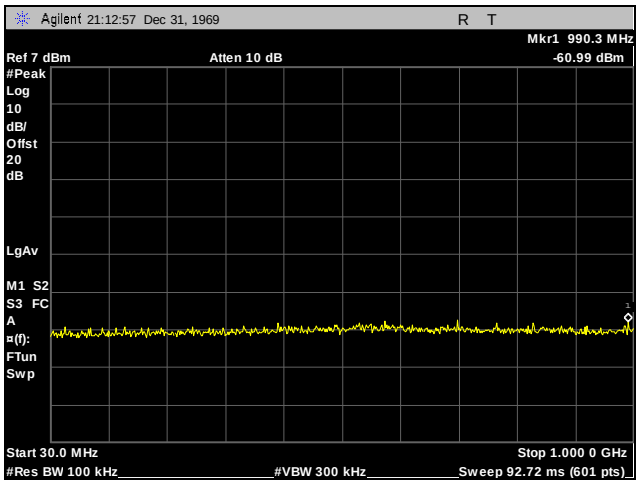
Conducted Spurious Emissions Test Results, 802.11n HT20, Port 2, 5 GHz



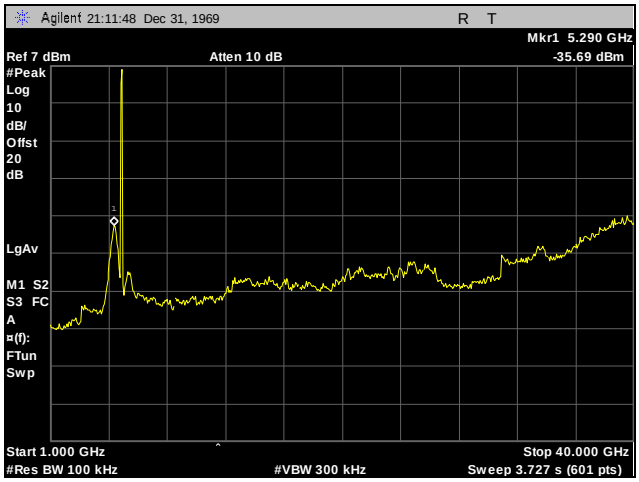
Plot 323. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 2, 5 GHz



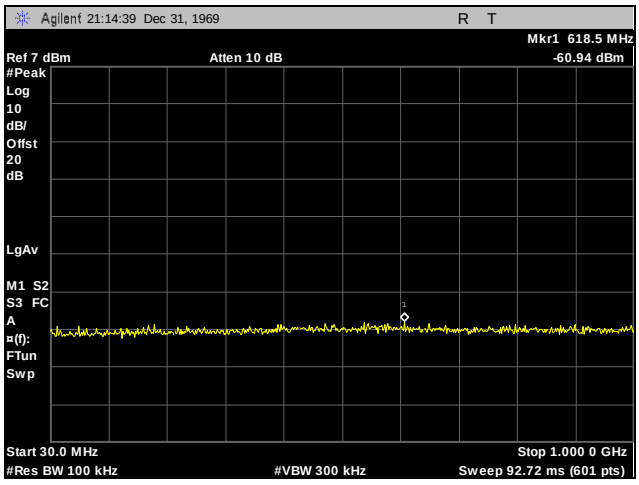
Plot 324. Conducted Spurious Emissions, Low Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 2, 5 GHz



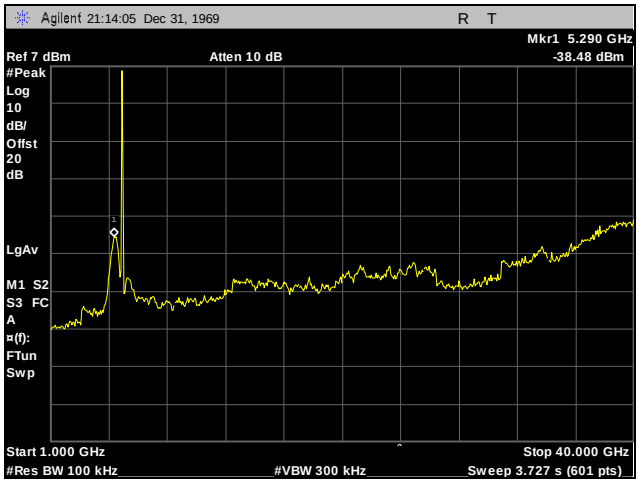
Plot 325. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 2, 5 GHz



Plot 326. Conducted Spurious Emissions, Mid Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 2, 5 GHz

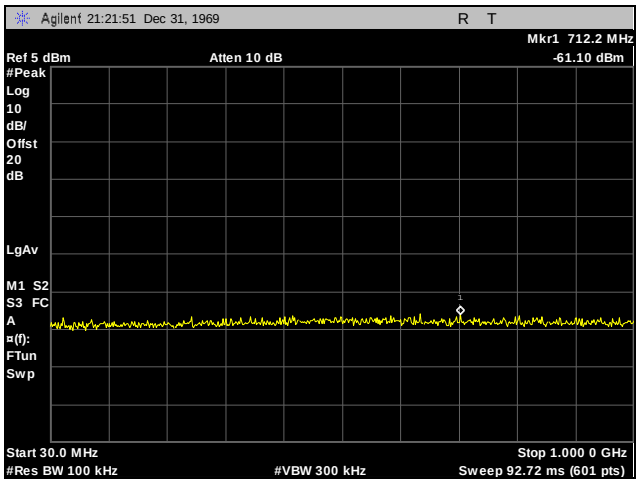


Plot 327. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 2, 5 GHz

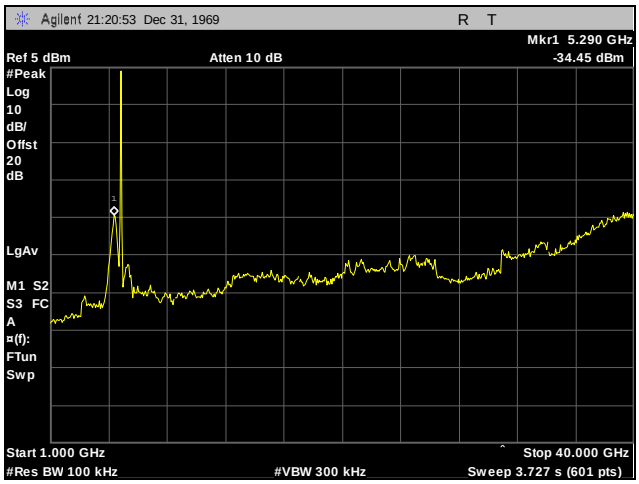


Plot 328. Conducted Spurious Emissions, High Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 2, 5 GHz

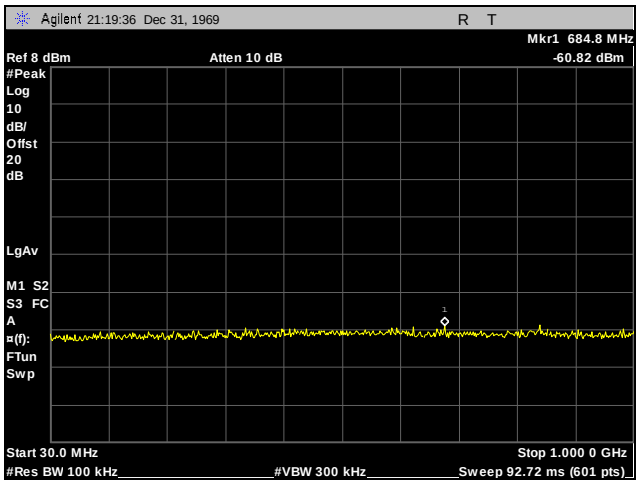
Conducted Spurious Emissions Test Results, 802.11n HT20, Port 3, 5 GHz



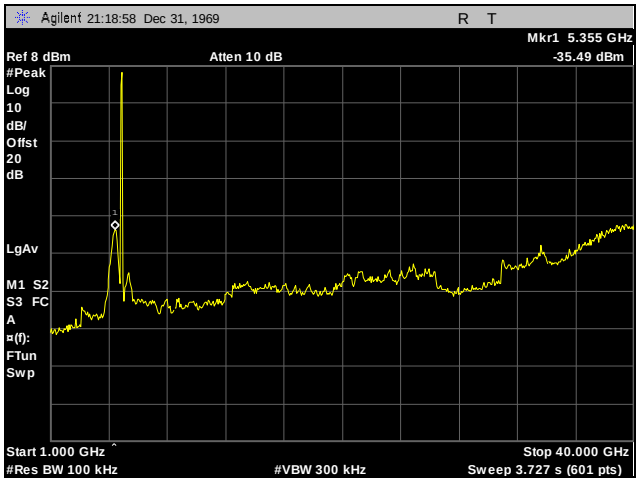
Plot 329. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 3, 5 GHz



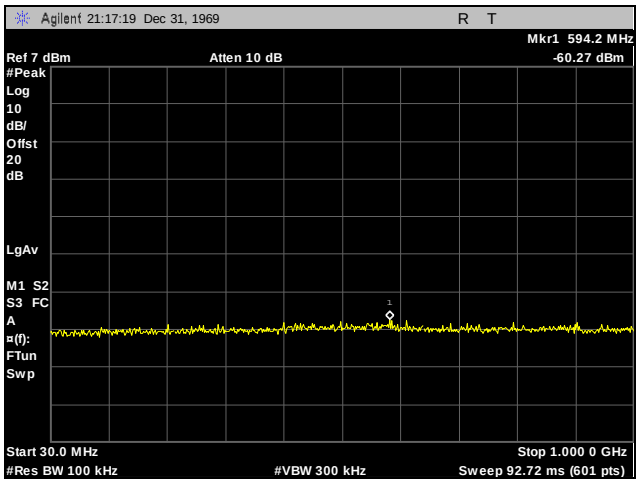
Plot 330. Conducted Spurious Emissions, Low Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 3, 5 GHz



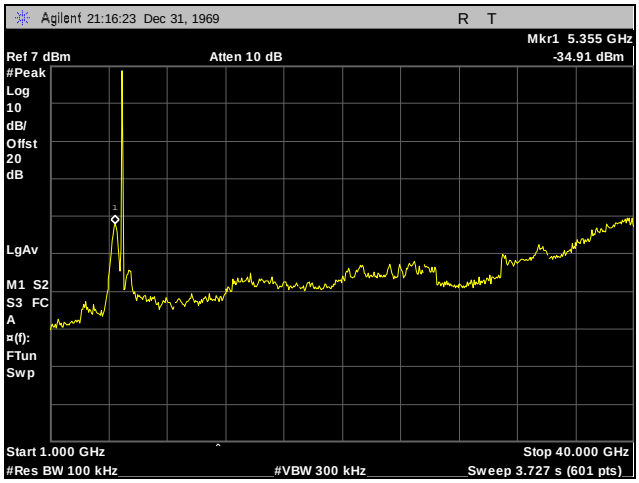
Plot 331. Conducted Spurious Emissions, Mid Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 3, 5 GHz



Plot 332. Conducted Spurious Emissions, Mid Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 3, 5 GHz

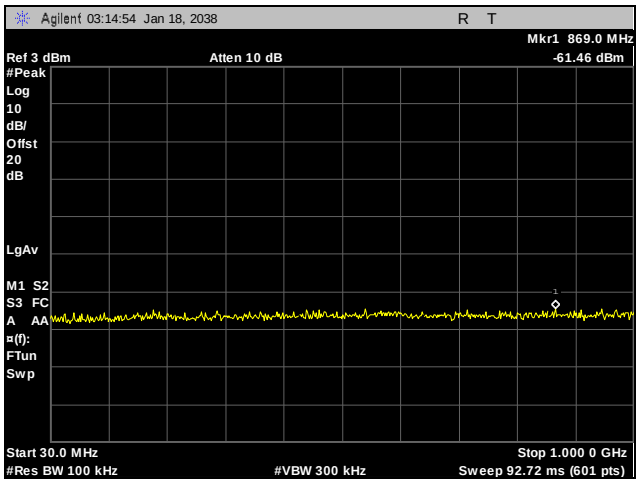


Plot 333. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT20, Port 3, 5 GHz

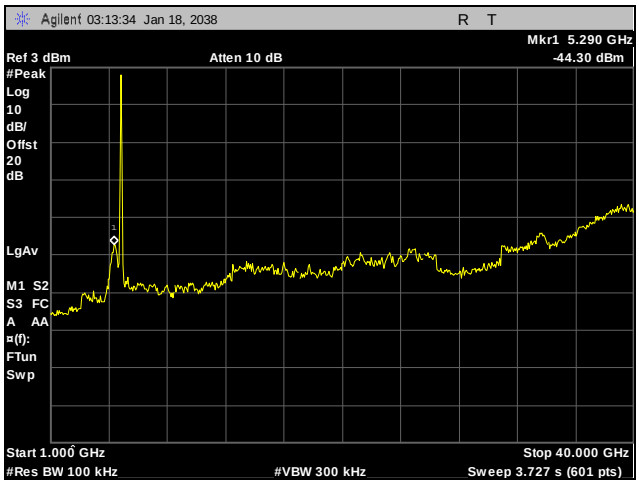


Plot 334. Conducted Spurious Emissions, High Channel, 1 GHz – 40 GHz, 802.11n HT20, Port 3, 5 GHz

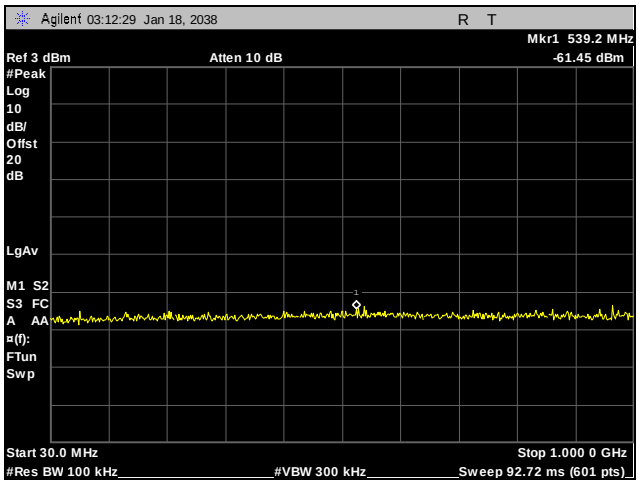
Conducted Spurious Emissions Test Results, 802.11n HT40, Port 1, 5 GHz



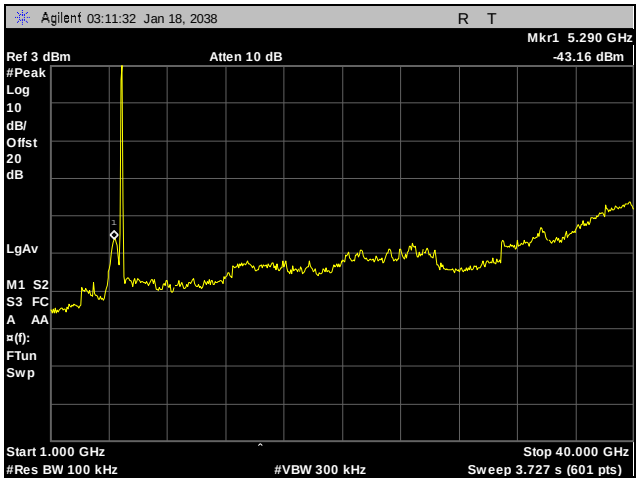
Plot 335. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 1, 5 GHz



Plot 336. Conducted Spurious Emissions, Low Channel, 1 GHz – 40 GHz, 802.11n HT40, Port 1, 5 GHz

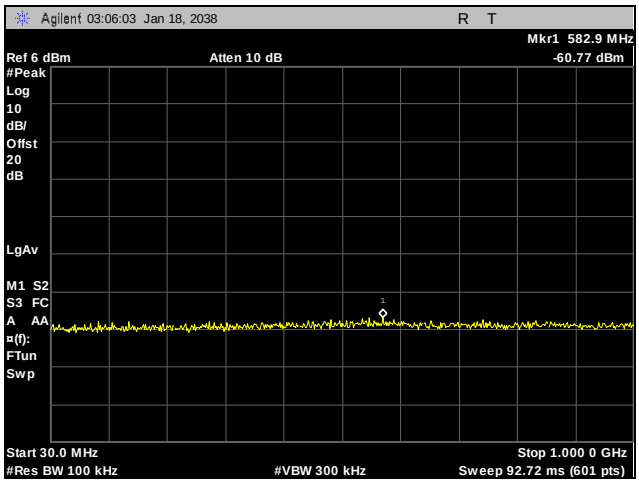


Plot 337. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 1, 5 GHz

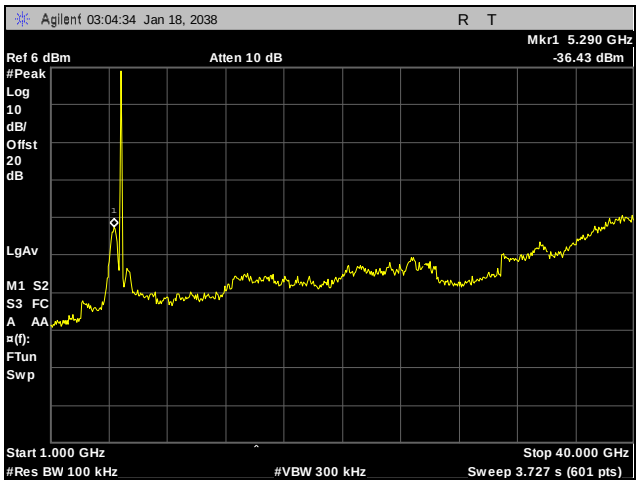


Plot 338. Conducted Spurious Emissions, High Channel, 1 GHz – 40 GHz, 802.11n HT40, Port 1, 5 GHz

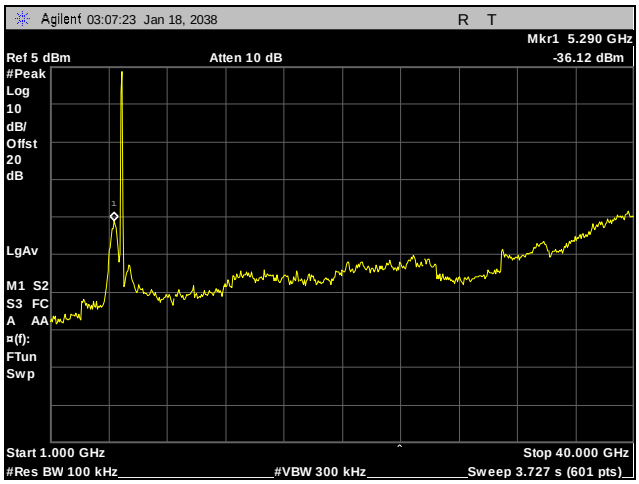
Conducted Spurious Emissions Test Results, 802.11n HT40, Port 2, 5 GHz



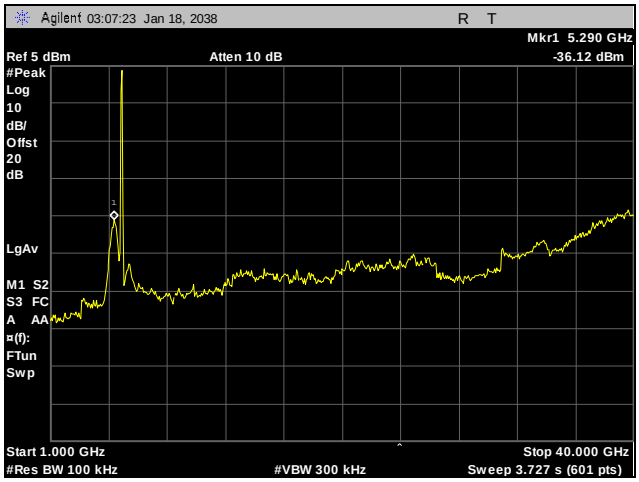
Plot 339. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 2, 5 GHz



Plot 340. Conducted Spurious Emissions, Low Channel, 1 GHz – 40 GHz, 802.11n HT40, Port 2, 5 GHz

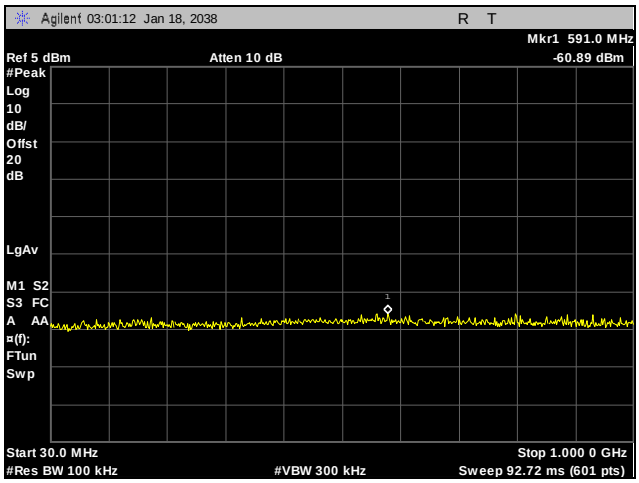


Plot 341. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 2, 5 GHz

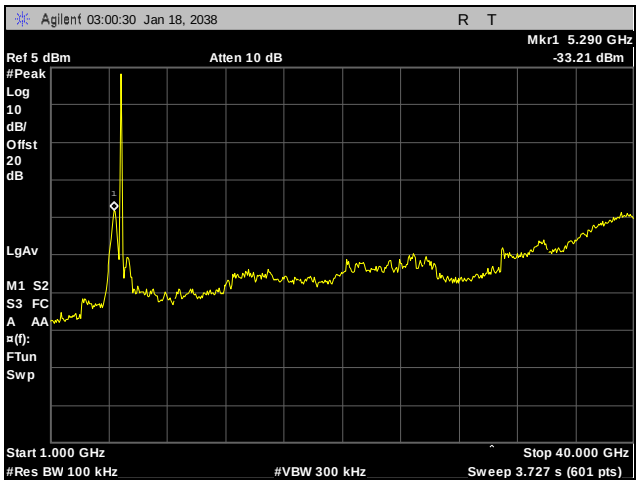


Plot 342. Conducted Spurious Emissions, High Channel, 1 GHz – 40 GHz, 802.11n HT40, Port 2, 5 GHz

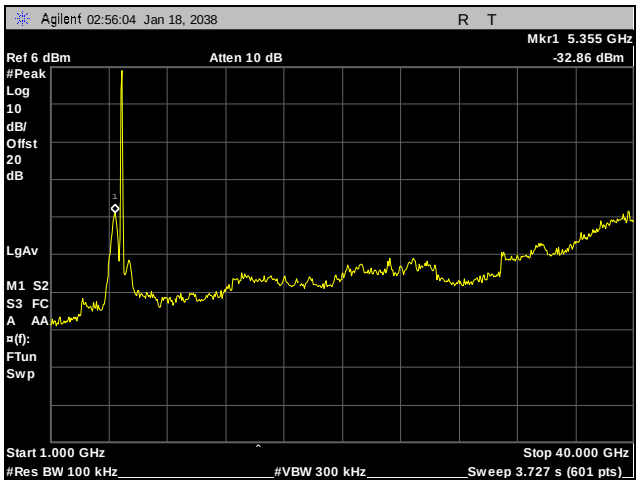
Conducted Spurious Emissions Test Results, 802.11n HT40, Port 3, 5 GHz



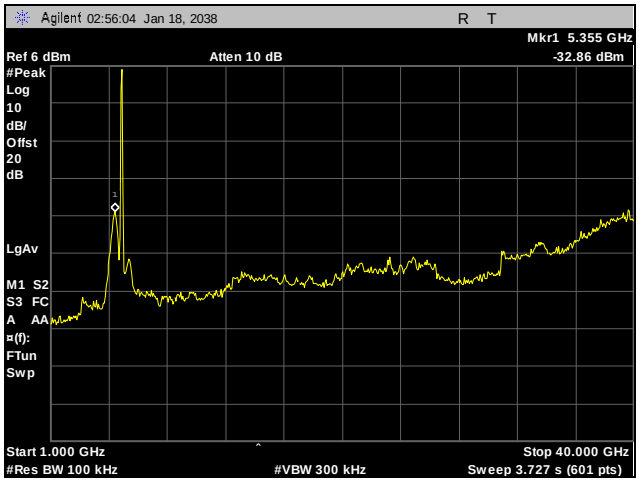
Plot 343. Conducted Spurious Emissions, Low Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 3, 5 GHz



Plot 344. Conducted Spurious Emissions, Low Channel, 1 GHz – 40 GHz, 802.11n HT40, Port 3, 5 GHz

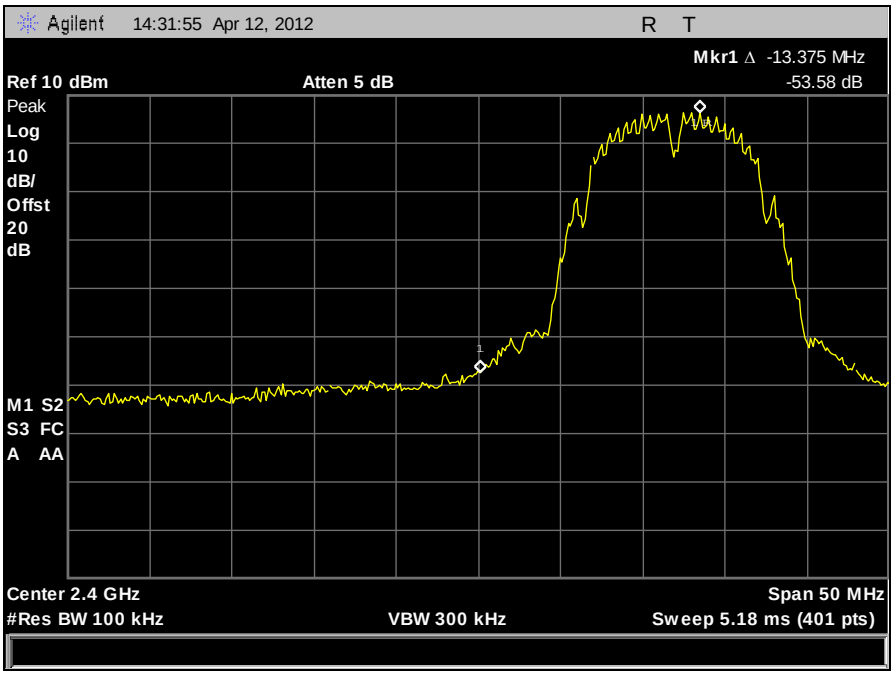


Plot 345. Conducted Spurious Emissions, High Channel, 30 MHz – 1 GHz, 802.11n HT40, Port 3, 5 GHz

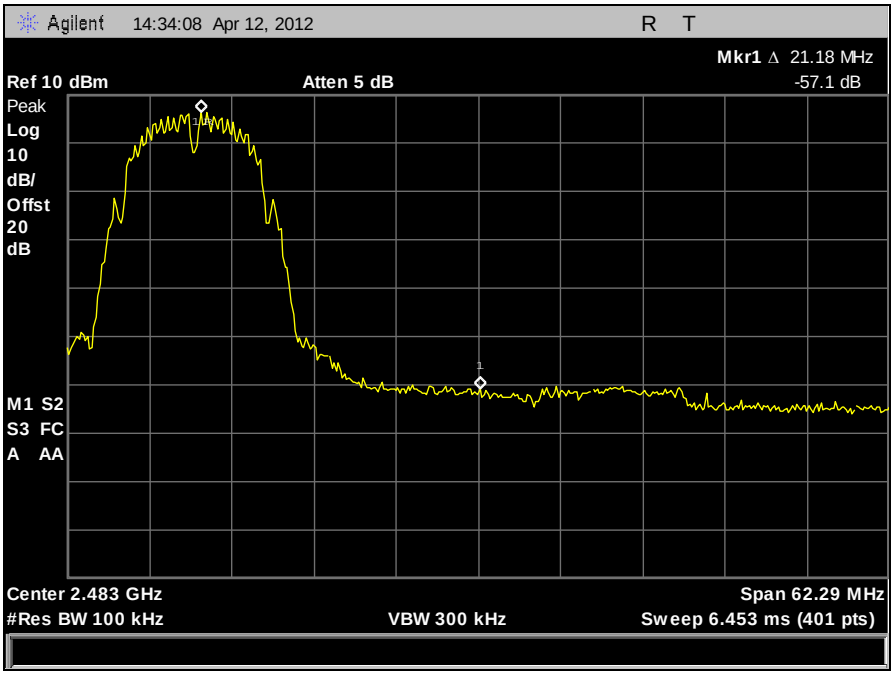


Plot 346. Conducted Spurious Emissions, High Channel, 1 GHz – 40 GHz, 802.11n HT40, Port 3, 5 GHz

Conducted Band Edge Test Results, 802.11b, 2.4 GHz

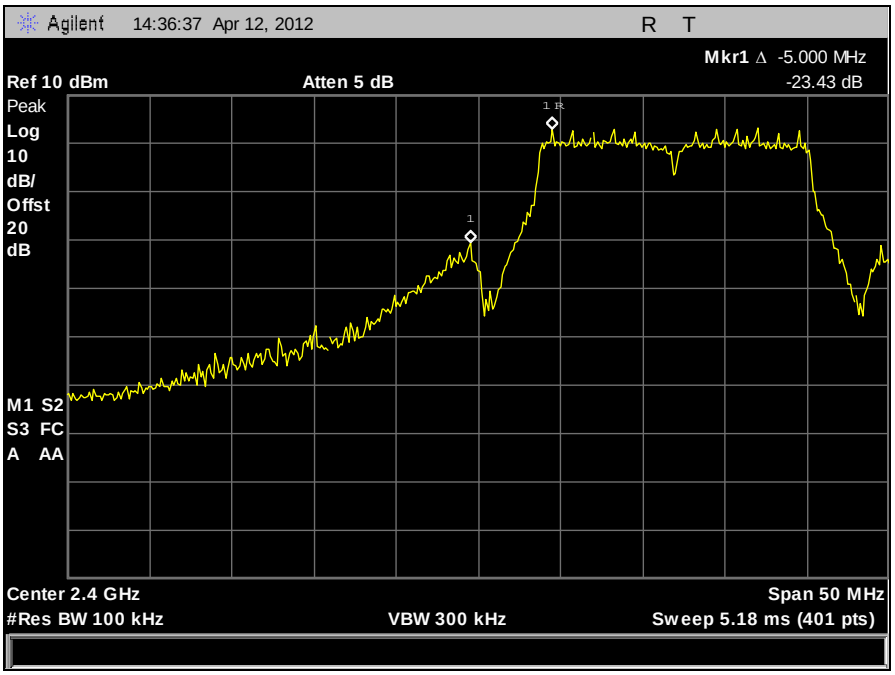


Plot 347. Conducted Band Edge, Low Channel, 802.11b, 2.4 GHz

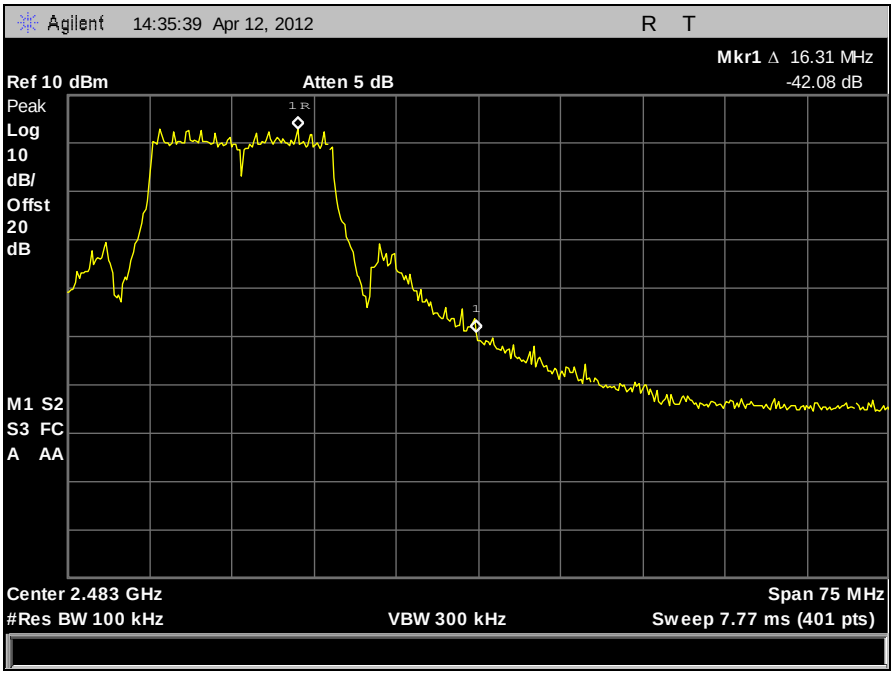


Plot 348. Conducted Band Edge, High Channel, 802.11b, 2.4 GHz

Conducted Band Edge Test Results, 802.11g, 2.4 GHz

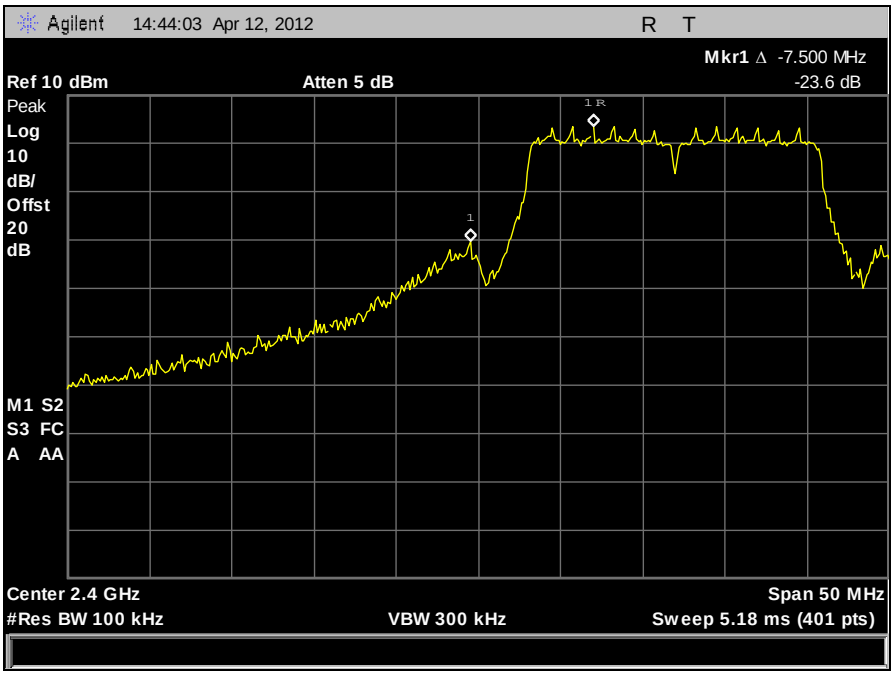


Plot 349. Conducted Band Edge, Low Channel, 802.11g, 2.4 GHz

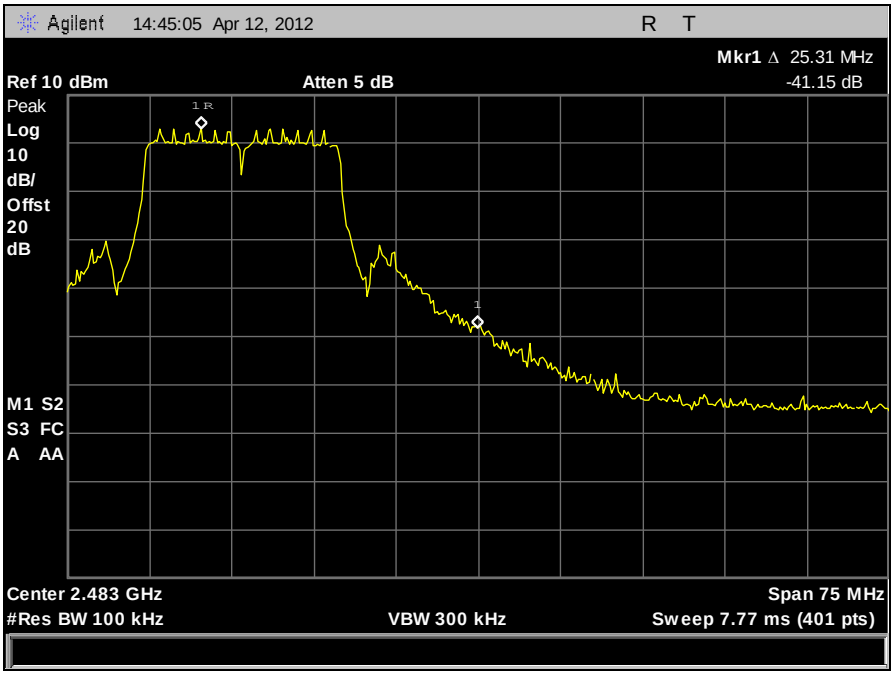


Plot 350. Conducted Band Edge, High Channel, 802.11g, 2.4 GHz

Conducted Band Edge Test Results, 802.11n HT20, Port 1, 2.4 GHz

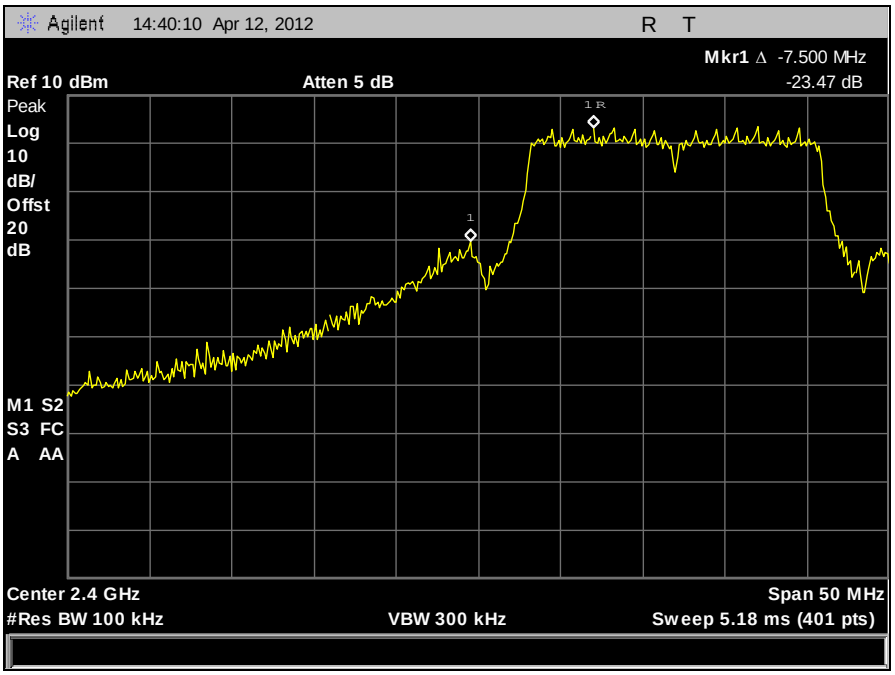


Plot 351. Conducted Band Edge, Low Channel, 802.11n HT20, Port 1, 2.4 GHz

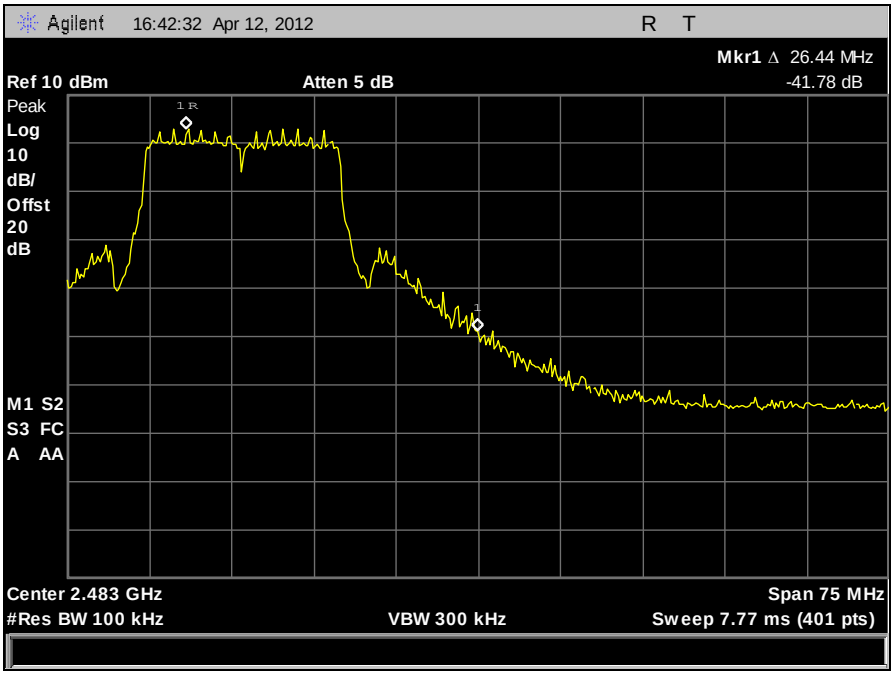


Plot 352. Conducted Band Edge, High Channel, 802.11n HT20, Port 1, 2.4 GHz

Conducted Band Edge Test Results, 802.11n HT20, Port 2, 2.4 GHz

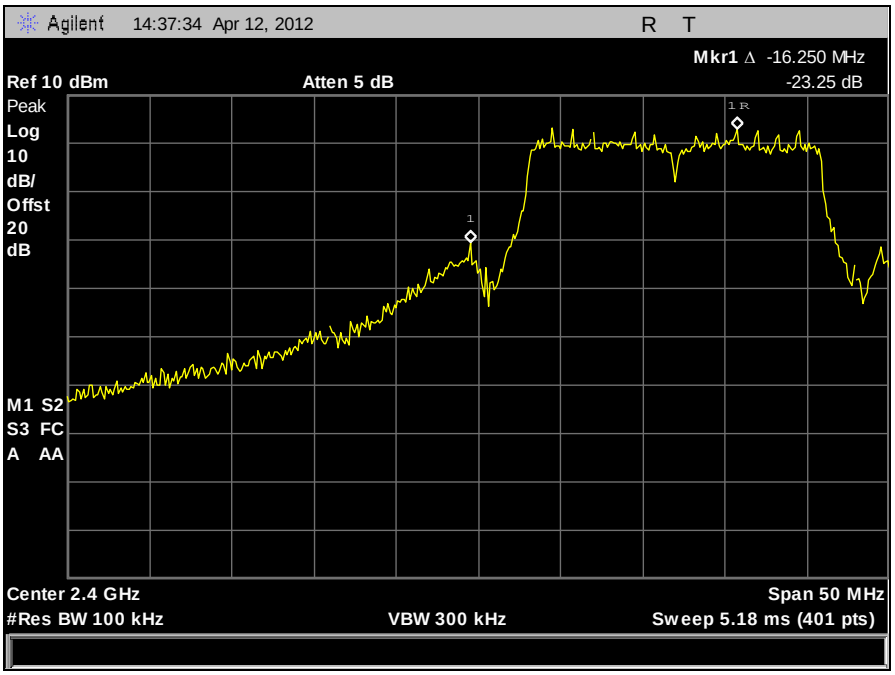


Plot 353. Conducted Band Edge, Low Channel, 802.11n HT20, Port 2, 2.4 GHz

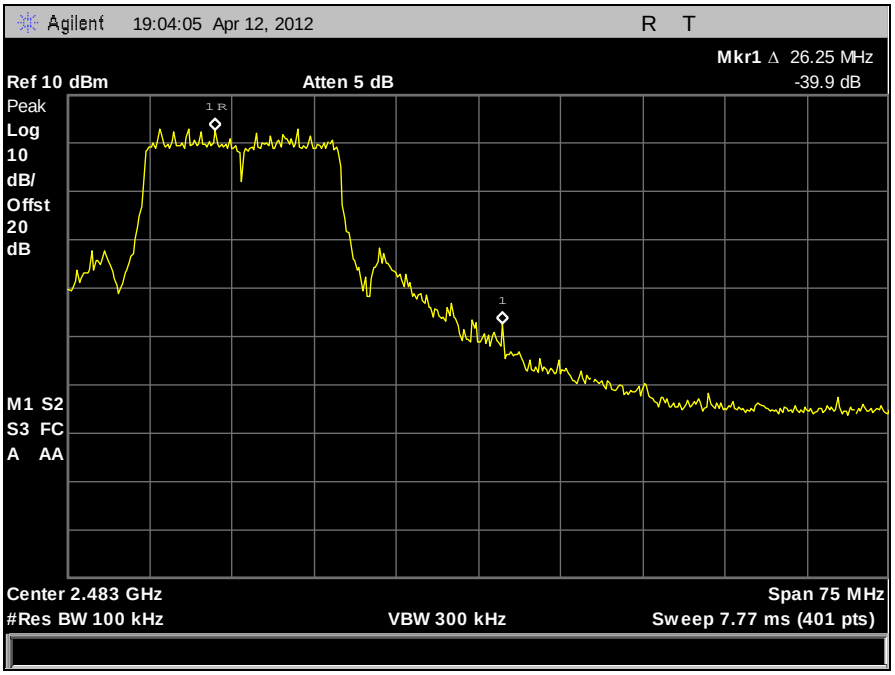


Plot 354. Conducted Band Edge, High Channel, 802.11n HT20, Port 2, 2.4 GHz

Conducted Band Edge Test Results, 802.11n HT20, Port 3, 2.4 GHz

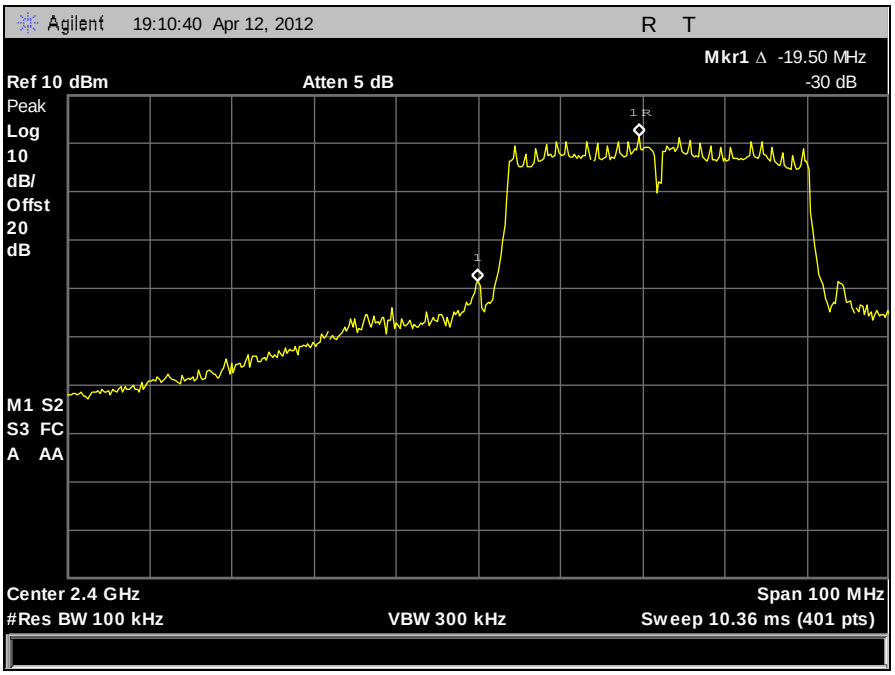


Plot 355. Conducted Band Edge, Low Channel, 802.11n HT20, Port 3, 2.4 GHz

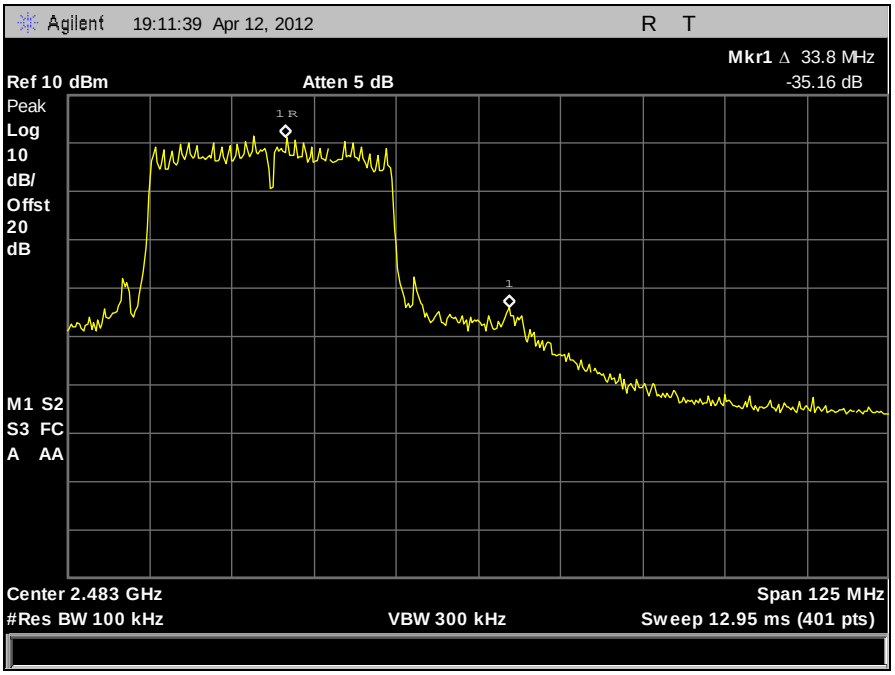


Plot 356. Conducted Band Edge, High Channel, 802.11n HT20, Port 3, 2.4 GHz

Conducted Band Edge Test Results, 802.11n HT40, Port 1, 2.4 GHz

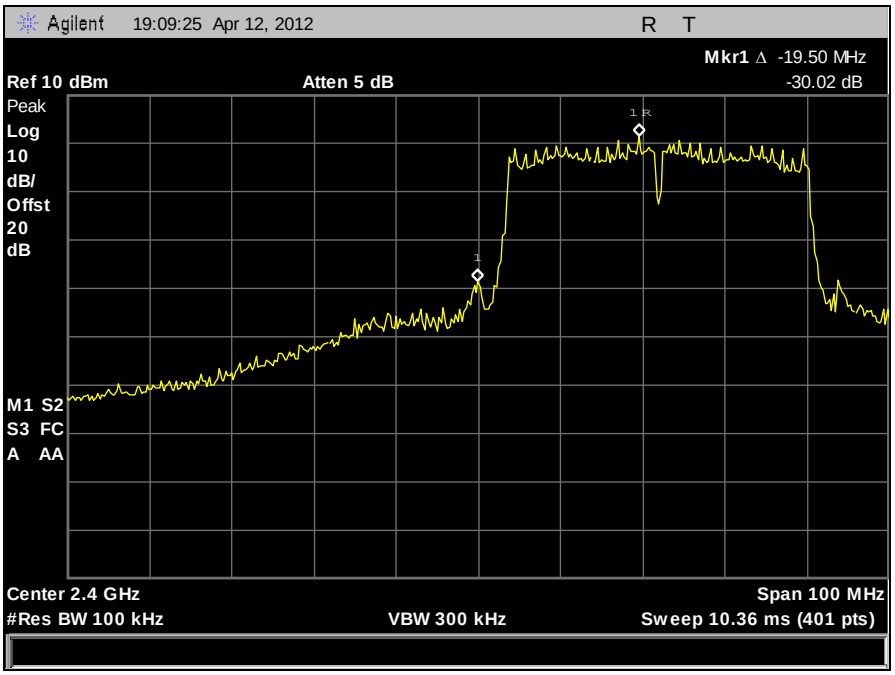


Plot 357. Conducted Band Edge, Low Channel, 802.11n HT40, Port 1, 2.4 GHz

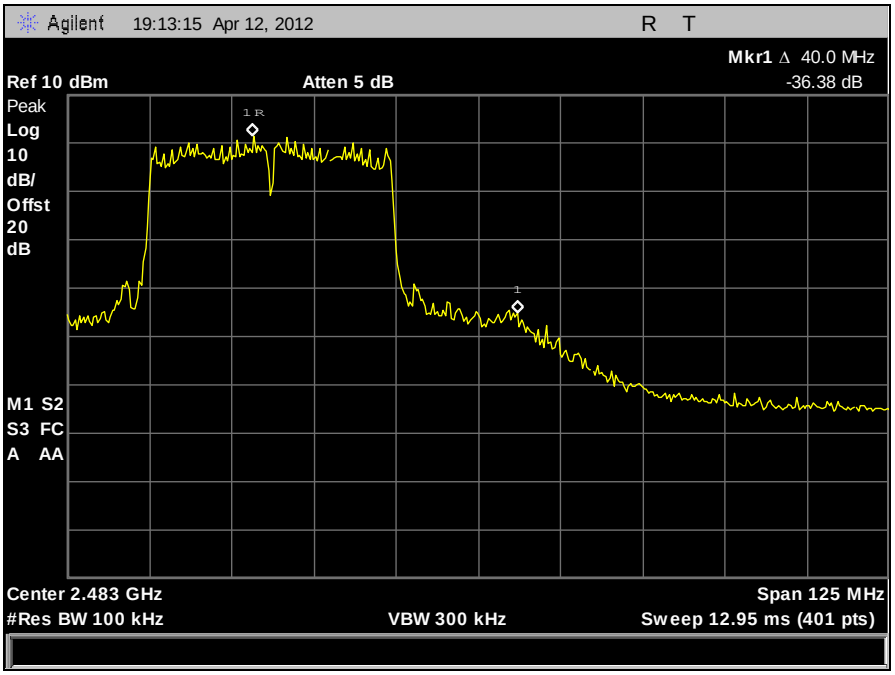


Plot 358. Conducted Band Edge, High Channel, 802.11n HT40, Port 1, 2.4 GHz

Conducted Band Edge Test Results, 802.11n HT40, Port 2, 2.4 GHz

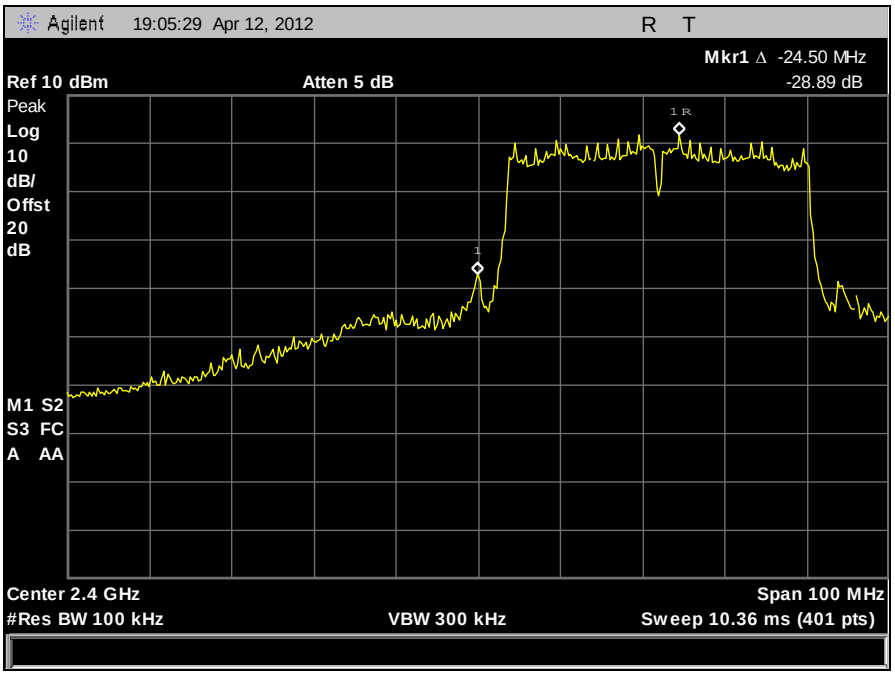


Plot 359. Conducted Band Edge, Low Channel, 802.11n HT40, Port 2, 2.4 GHz

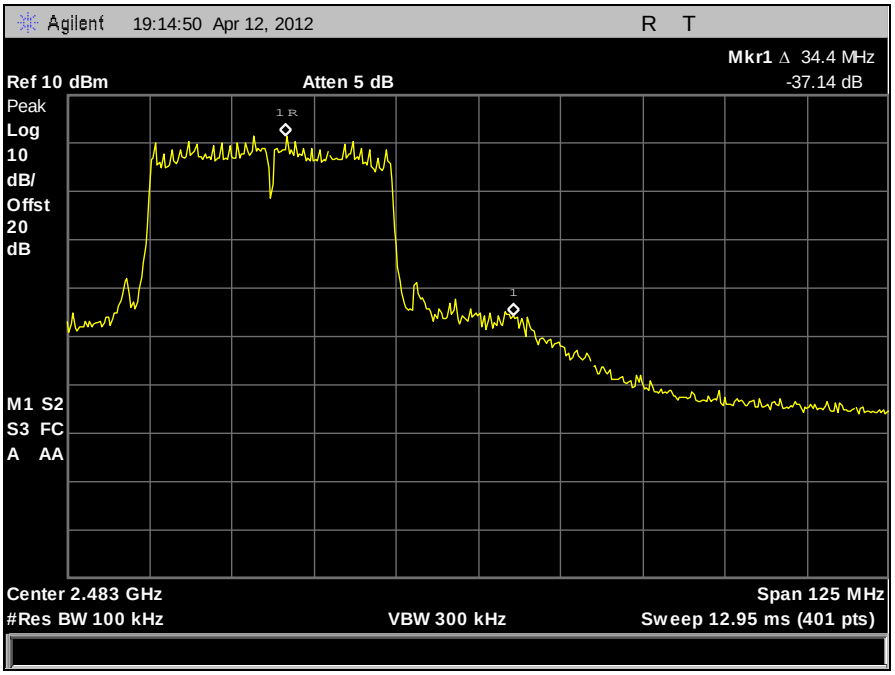


Plot 360. Conducted Band Edge, High Channel, 802.11n HT40, Port 2, 2.4 GHz

Conducted Band Edge Test Results, 802.11n HT40, Port 3, 2.4 GHz

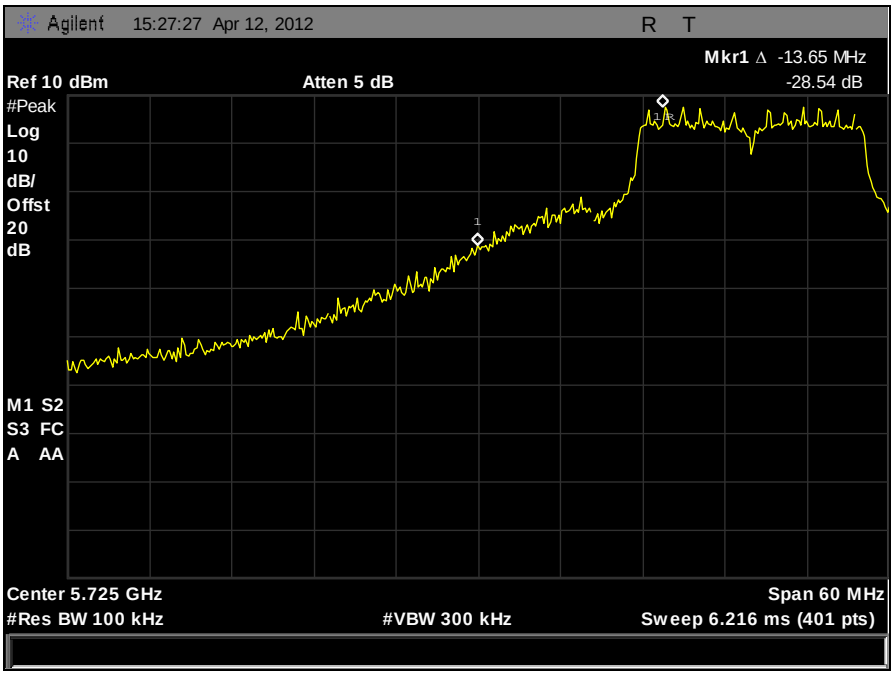


Plot 361. Conducted Band Edge, Low Channel, 802.11n HT40, Port 3, 2.4 GHz

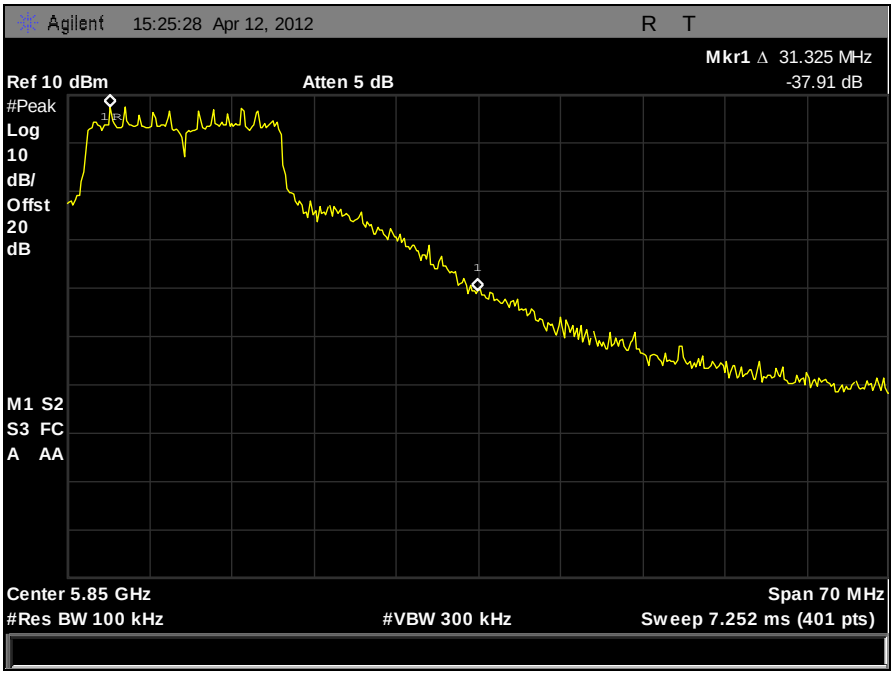


Plot 362. Conducted Band Edge, High Channel, 802.11n HT40, Port 3, 2.4 GHz

Conducted Band Edge Test Results, 802.11a, 5 GHz

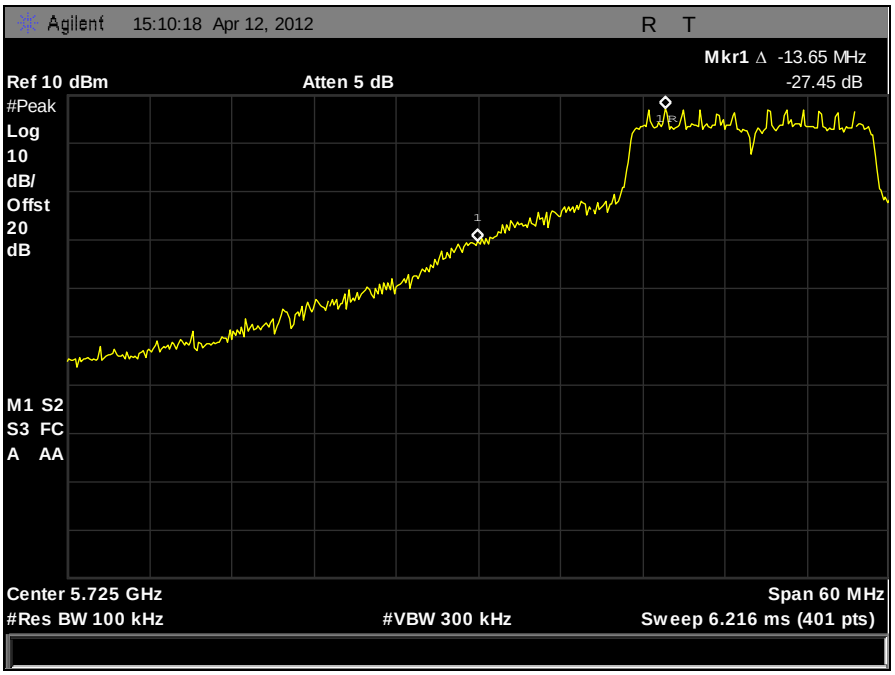


Plot 363. Conducted Band Edge, Low Channel, 802.11a, 5 GHz

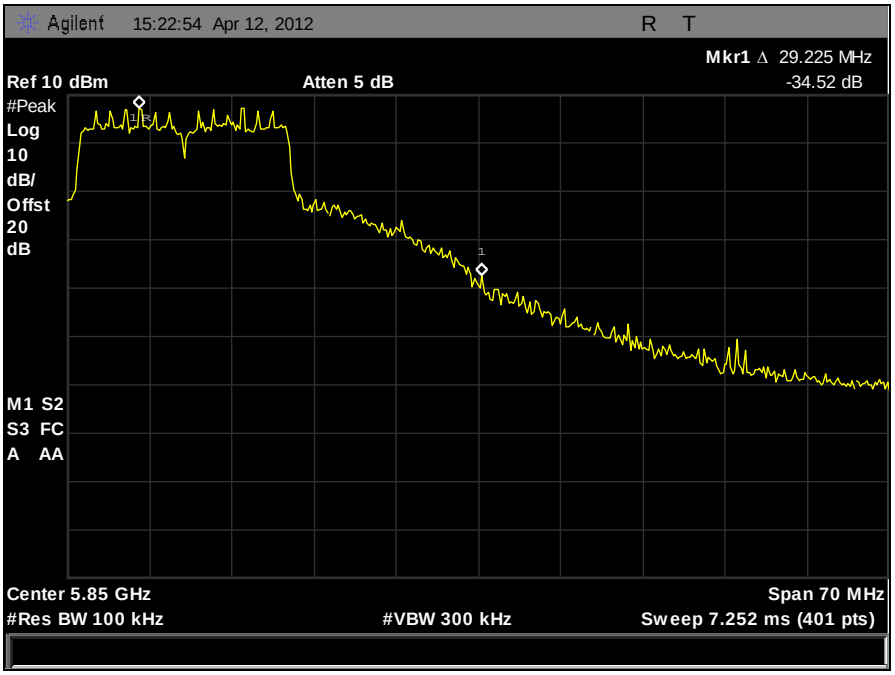


Plot 364. Conducted Band Edge, High Channel, 802.11a, 5 GHz

Conducted Band Edge Test Results, 802.11n HT20, Port 1, 5 GHz

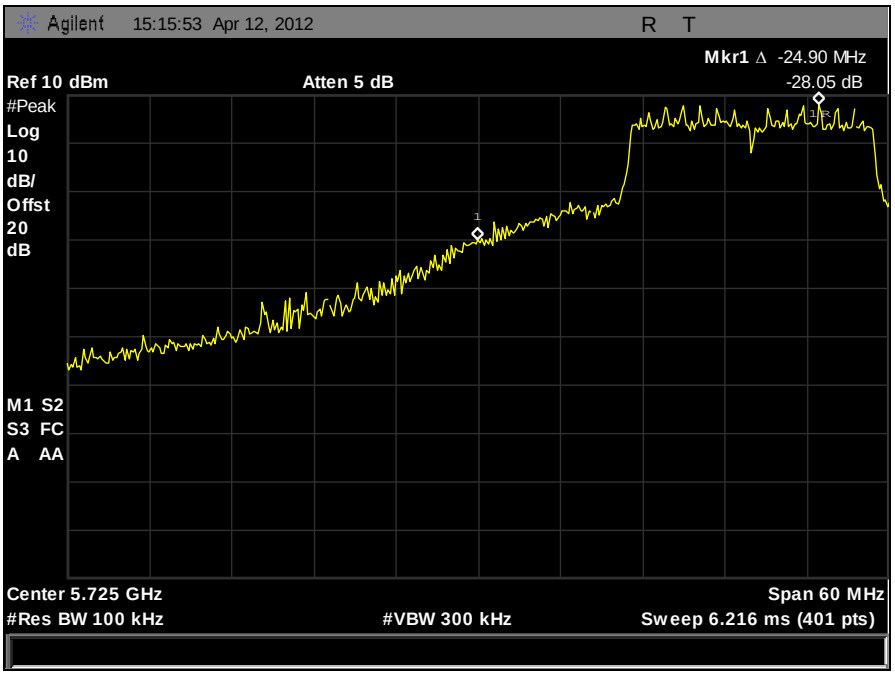


Plot 365. Conducted Band Edge, Low Channel, 802.11n HT20, Port 1, 5 GHz

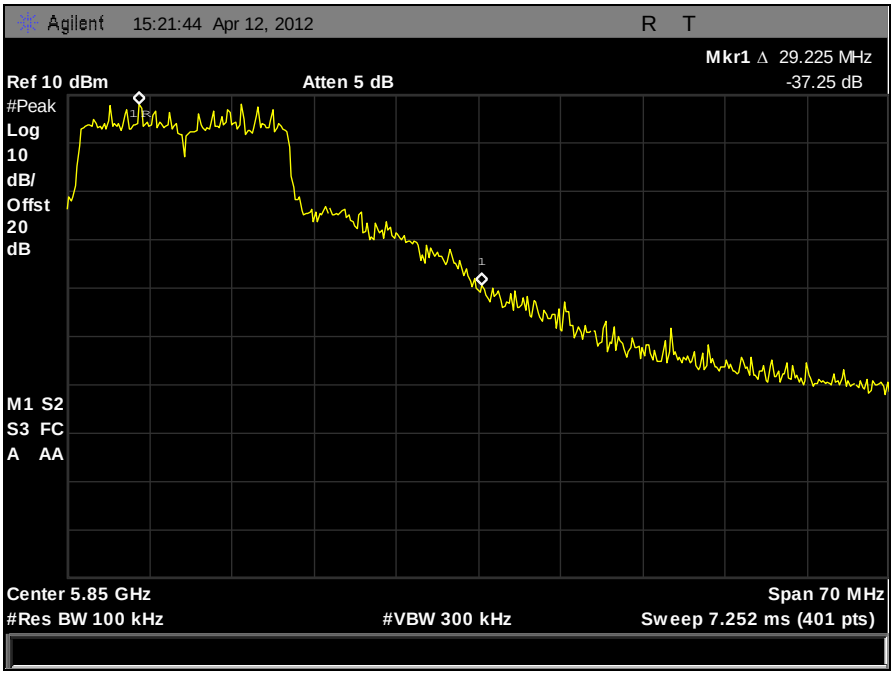


Plot 366. Conducted Band Edge, High Channel, 802.11n HT20, Port 1, 5 GHz

Conducted Band Edge Test Results, 802.11n HT20, Port 2, 5 GHz

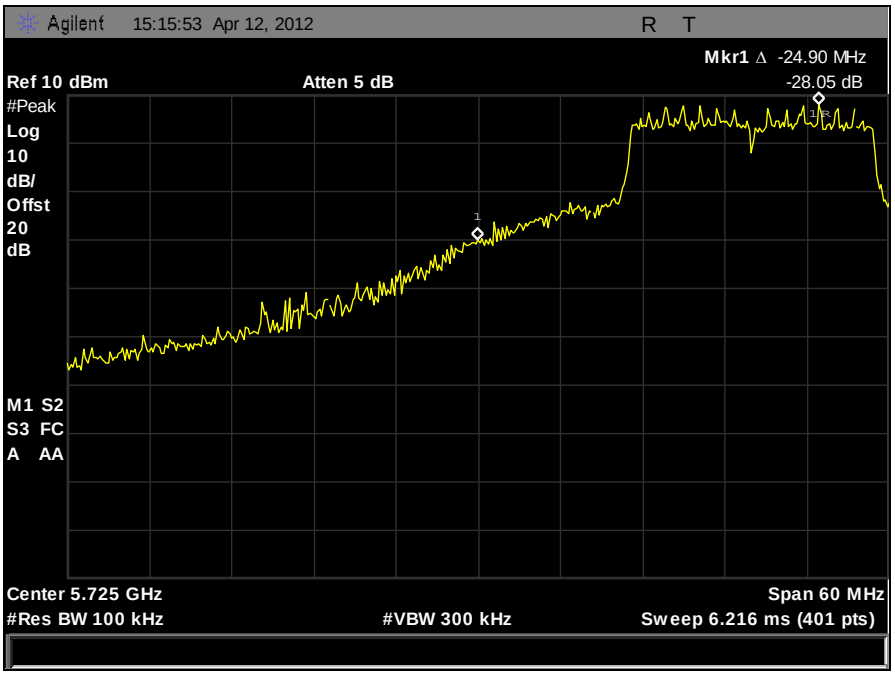


Plot 367. Conducted Band Edge, Low Channel, 802.11n HT20, Port 2, 5 GHz

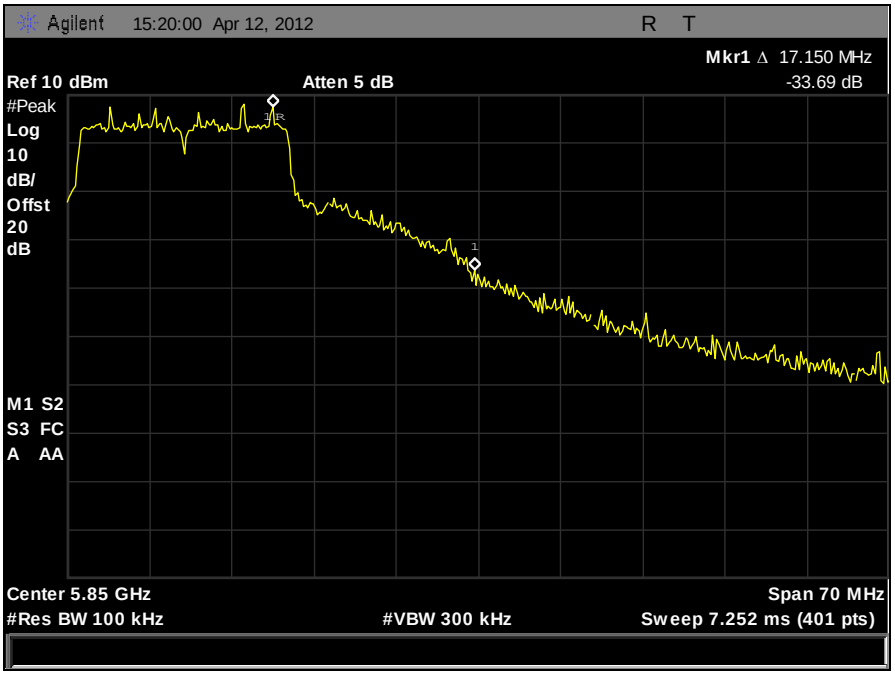


Plot 368. Conducted Band Edge, High Channel, 802.11n HT20, Port 2, 5 GHz

Conducted Band Edge Test Results, 802.11n HT20, Port 3, 5 GHz

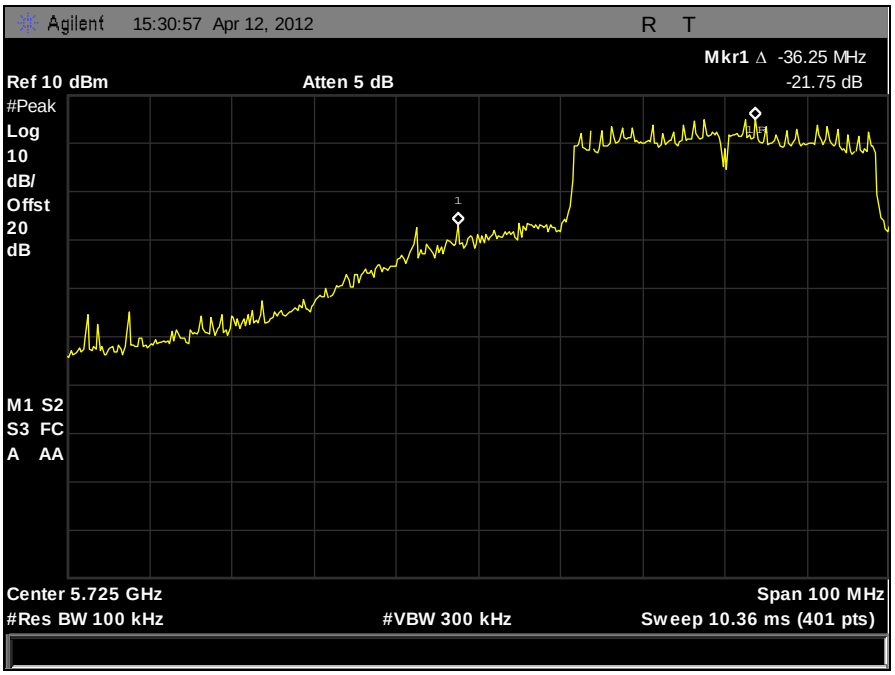


Plot 369. Conducted Band Edge, Low Channel, 802.11n HT20, Port 3, 5 GHz

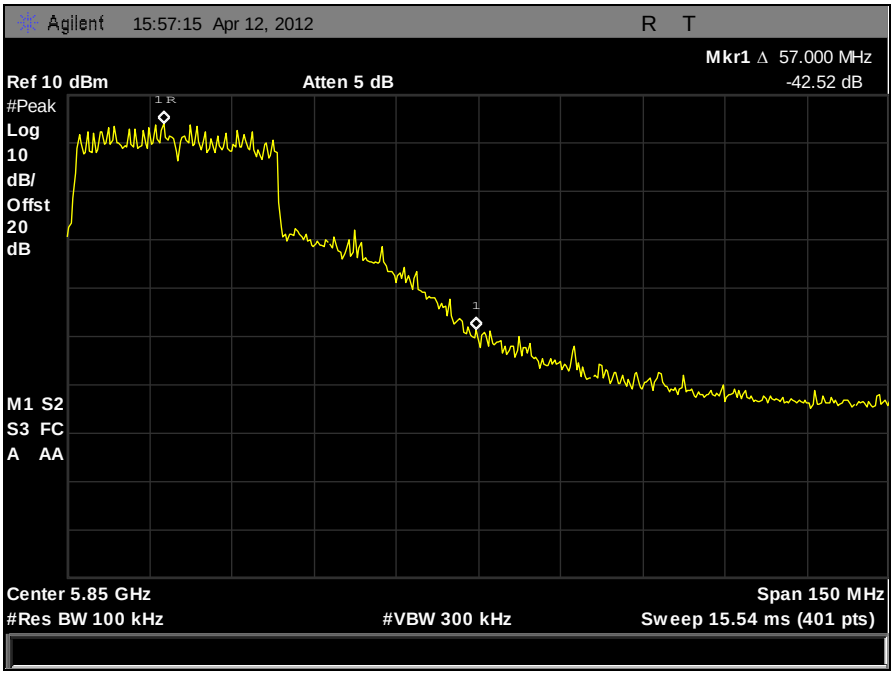


Plot 370. Conducted Band Edge, High Channel, 802.11n HT20, Port 3, 5 GHz

Conducted Band Edge Test Results, 802.11n HT40, Port 1, 5 GHz

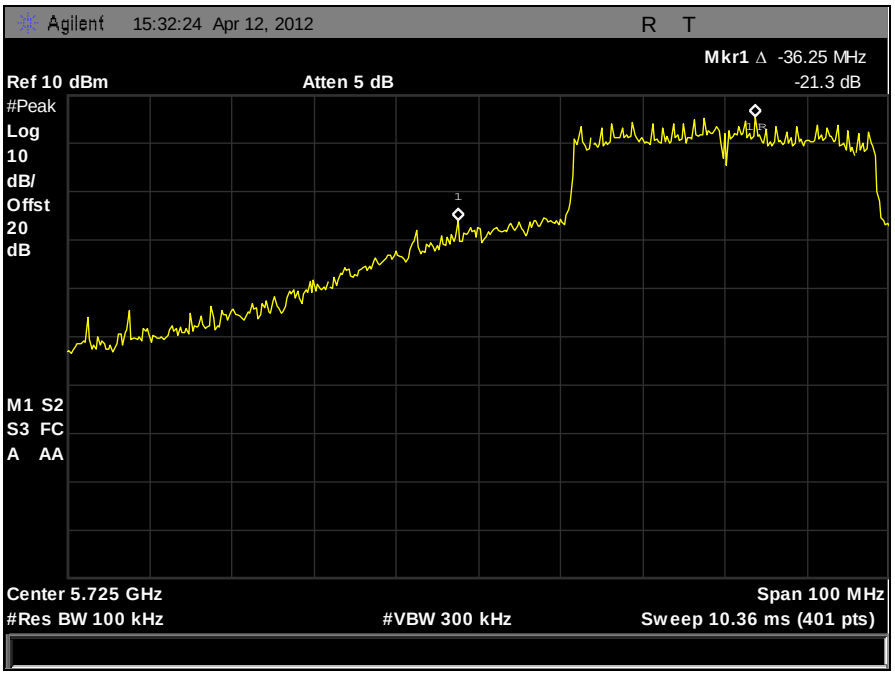


Plot 371. Conducted Band Edge, Low Channel, 802.11n HT40, Port 1, 5 GHz

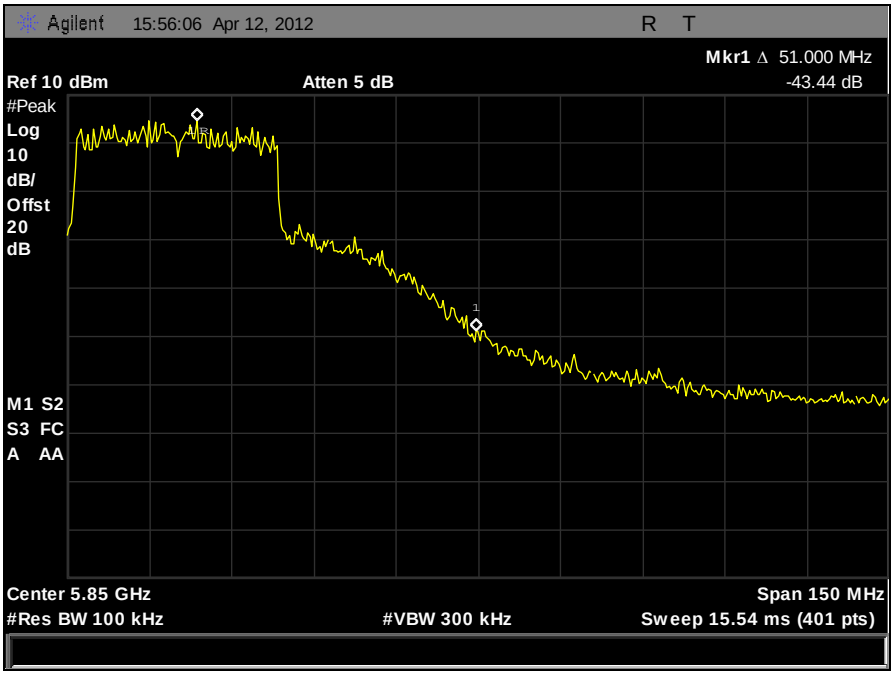


Plot 372. Conducted Band Edge, High Channel, 802.11n HT40, Port 1, 5 GHz

Conducted Band Edge Test Results, 802.11n HT40, Port 2, 5 GHz

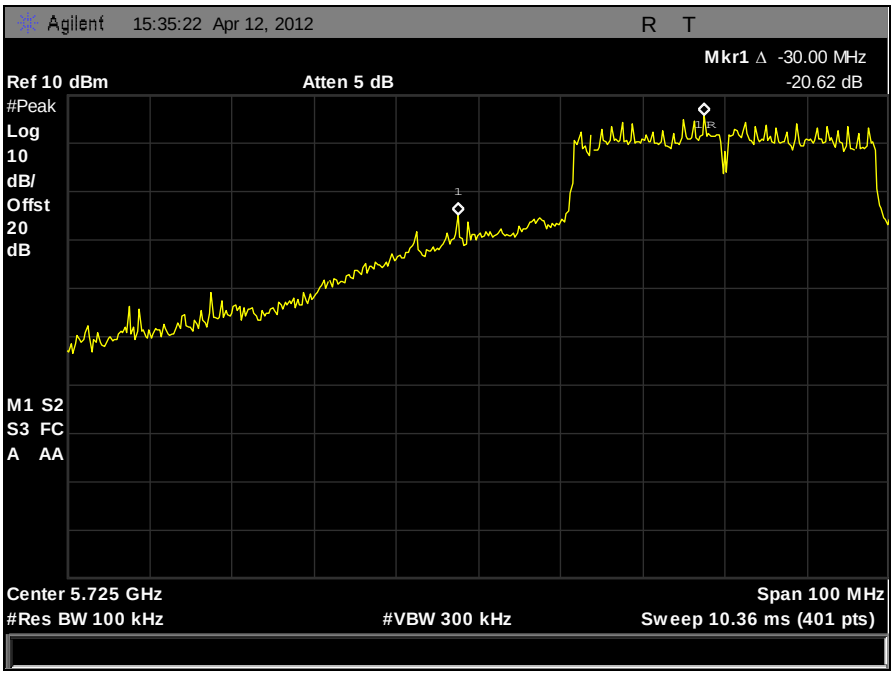


Plot 373. Conducted Band Edge, Low Channel, 802.11n HT40, Port 2, 5 GHz

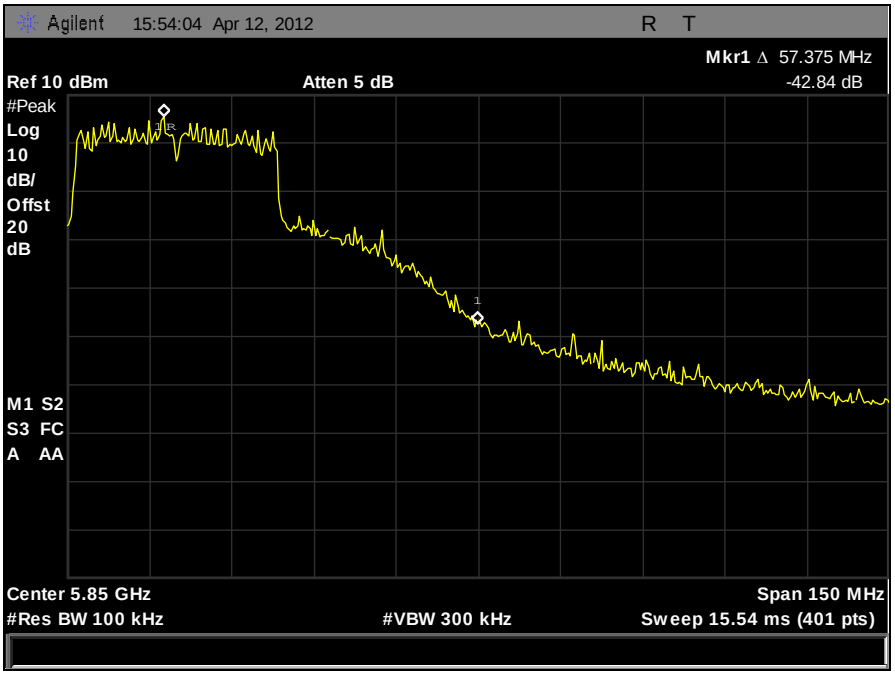


Plot 374. Conducted Band Edge, High Channel, 802.11n HT40, Port 2, 5 GHz

Conducted Band Edge Test Results, 802.11n HT40, Port 3, 5 GHz



Plot 375. Conducted Band Edge, Low Channel, 802.11n HT40, Port 3, 5 GHz



Plot 376. Conducted Band Edge, High Channel, 802.11n HT40, Port 3, 5 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(e) Peak Power Spectral Density

Test Requirements: **§15.247(e):** For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer through an attenuator. The power level was set to the maximum level. A RBW of 1 MHz and VBW of 3 MHz were used to determine the peak emissions within the band. The Spectrum analyzer was then set to a RBW of 3 kHz and VBW was set to 10 kHz. The SPAN of the analyzer was set to 1 MHz with a 333.3 second sweep. Measurements were carried out at the low, mid and high channels.

Test Results: The EUT was compliant with the peak power spectral density limits of **§ 15.247 (e)**.

The peak power spectral density was determined from plots on the following page(s).

Test Engineer: Anderson Soungpanya

Test Date: 05/03/12 & 05/04/12

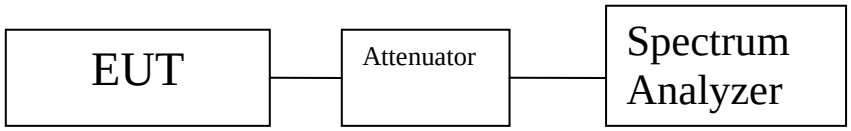


Figure 5. Block Diagram, Peak Power Spectral Density Test Setup

Peak Power Spectral Density Test Results, 2.4 GHz

Peak Power Spectral Density					
Mode	**Carrier**	**Frequency**	**Measured PPSD**	**Limit**	**Margin**
	Channel	**(MHz)**	**(dBm)**	**(dBm)**	**(dB)**
802.11b	Low	2412	-5.709	6.23	-11.939
	Mid	2437	-6.06	6.23	-12.29
	High	2462	-5.885	6.23	-12.115
802.11g	Low	2412	-10.16	6.23	-16.39
	Mid	2437	-10.36	6.23	-16.59
	High	2462	-10.49	6.23	-16.72
802.11n 20 MHz Port 1	Low	2412	-8.646	6.23	-14.876
	Mid	2437	-9.912	6.23	-16.142
	High	2462	-10.38	6.23	-16.61
802.11n 20 MHz Port 2	Low	2412	-9.156	6.23	-15.386
	Mid	2437	-9.163	6.23	-15.393
	High	2462	-10.07	6.23	-16.3
802.11n 20 MHz Port 3	Low	2412	-9.905	6.23	-16.135
	Mid	2437	-10.17	6.23	-16.4
	High	2462	-9.15	6.23	-15.38
802.11n 20 MHz Sum Port 1-3	Low	2412	-4.43	6.23	-10.66
	Mid	2437	-4.96	6.23	-11.19
	High	2462	-5.06	6.23	-11.29
802.11n 40 MHz Port 1	Low	2422	-12.17	6.23	-18.4
	Mid	2437	-10	6.23	-16.23
	High	2452	-12.05	6.23	-18.28
802.11n 40 MHz Port 2	Low	2422	-10.44	6.23	-16.67
	Mid	2437	-12.03	6.23	-18.26
	High	2452	-12.07	6.23	-18.3
802.11n 40 MHz Port 3	Low	2422	-11.02	6.23	-17.25
	Mid	2437	-12.13	6.23	-18.36
	High	2452	-9.83	6.23	-16.06
802.11n 40 MHz Sum Port 1-3	Low	2412	-6.38	6.23	-12.61
	Mid	2437	-6.50	6.23	-12.73
	High	2462	-6.41	6.23	-12.64

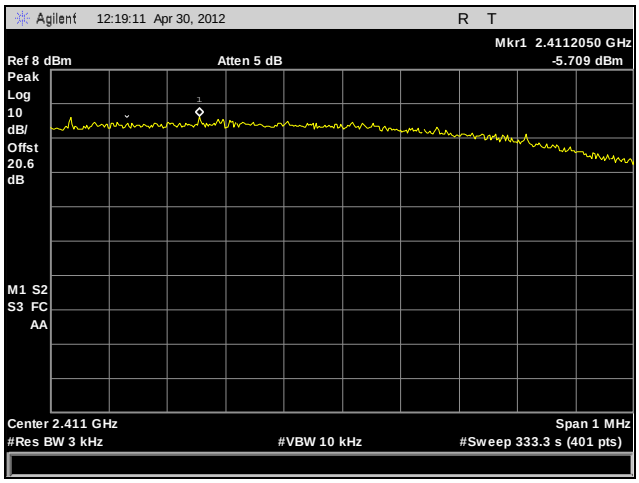
Table 31. Peak Power Spectral Density, Test Results, 2.4 GHz

Peak Power Spectral Density Test Results, 5 GHz

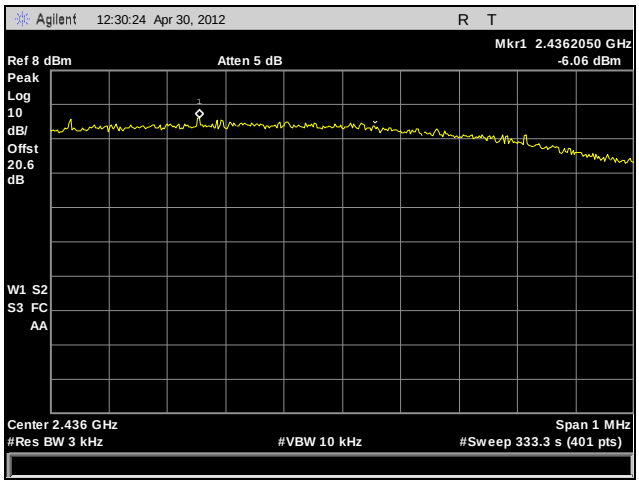
Peak Power Spectral Density					
Mode	Carrier Channel	Frequency (MHz)	Measured PPSD (dBm)	Limit (dBm)	Margin (dB)
802.11a	Low	5745	-9.098	6.23	-15.328
	Mid	5785	-9.417	6.23	-15.647
	High	5825	-9.003	6.23	-15.233
802.11n 20 MHz Port 1	Low	5745	-8.703	6.23	-14.933
	Mid	5785	-10.33	6.23	-16.56
	High	5825	-9.07	6.23	-15.3
802.11n 20 MHz Port 2	Low	5745	-8.394	6.23	-14.624
	Mid	5785	-9.495	6.23	-15.725
	High	5825	-9.103	6.23	-15.333
802.11n 20 MHz Port 3	Low	5745	-9.004	6.23	-15.234
	Mid	5785	-9.702	6.23	-15.932
	High	5825	-8.788	6.23	-15.018
802.11n 20 MHz Sum Port 1-3	Low	5745	-3.92	6.23	-10.15
	Mid	5785	-5.06	6.23	-11.29
	High	5825	-4.21	6.23	-10.44
802.11n 40 MHz Port 1	Low	5755	-11.16	6.23	-17.39
	High	5795	-12.19	6.23	-18.42
802.11n 40 MHz Port 2	Low	5755	-10.84	6.23	-17.07
	High	5795	-11.22	6.23	-17.45
802.11n 40 MHz Port 3	Low	5755	-8.746	6.23	-14.976
	High	5795	-11.47	6.23	-17.7
802.11n 40 MHz Sum Port 1-3	Low	5755	-5.34	6.23	-11.57
	High	5795	-6.84	6.23	-13.07

Table 32. Peak Power Spectral Density, Test Results, 5 GHz

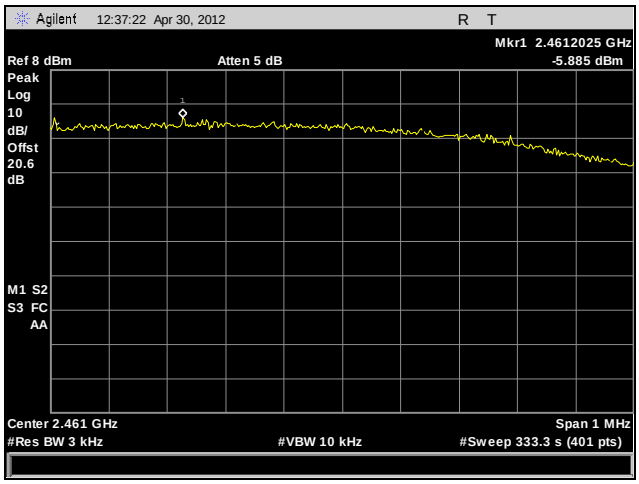
Peak Power Spectral Density, 802.11b, 2.4 GHz



Plot 377. Peak Power Spectral Density, Low Channel, 802.11b, 2.4 GHz

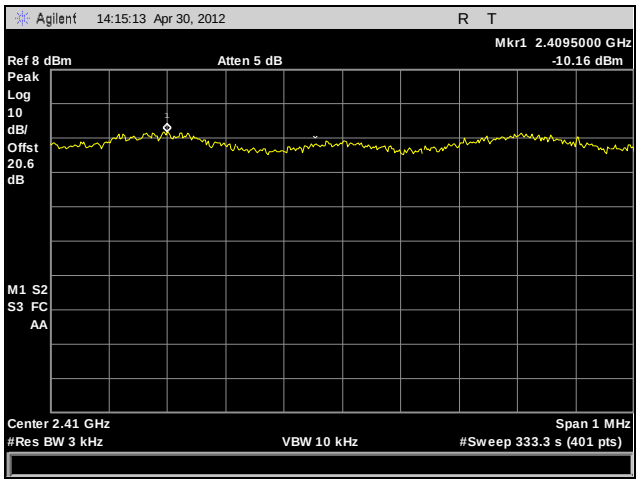


Plot 378. Peak Power Spectral Density, Mid Channel, 802.11b, 2.4 GHz

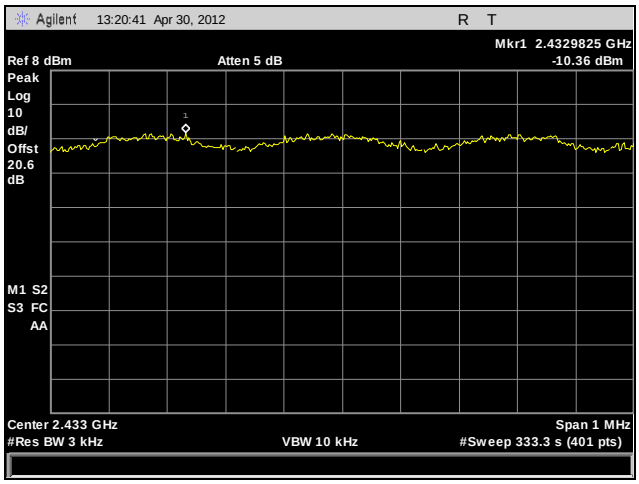


Plot 379. Peak Power Spectral Density, High Channel, 802.11b, 2.4 GHz

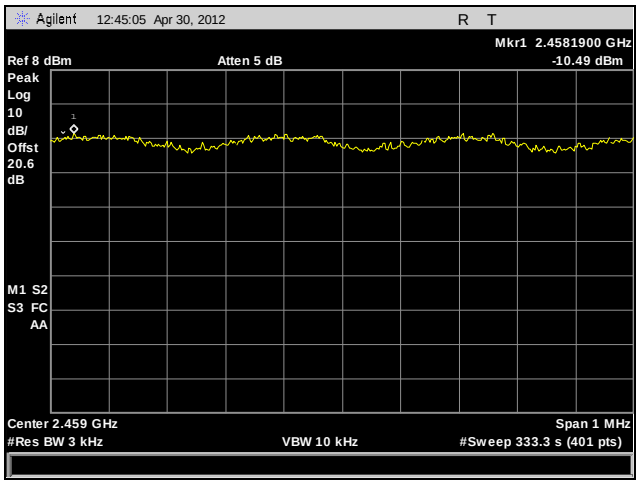
Peak Power Spectral Density, 802.11g, 2.4 GHz



Plot 380. Peak Power Spectral Density, Low Channel, 802.11g, 2.4 GHz

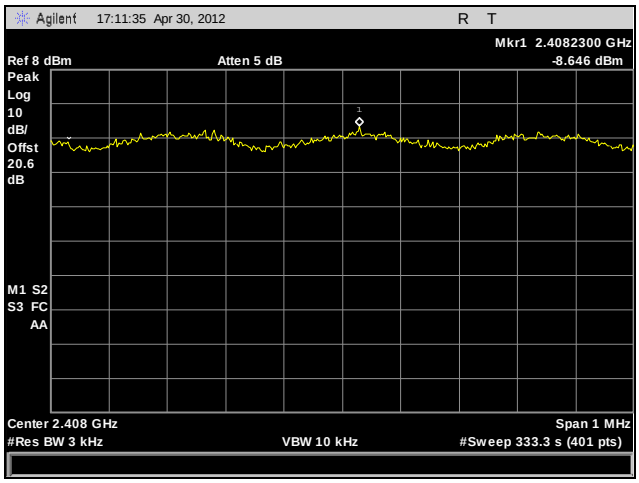


Plot 381. Peak Power Spectral Density, Mid Channel, 802.11g, 2.4 GHz

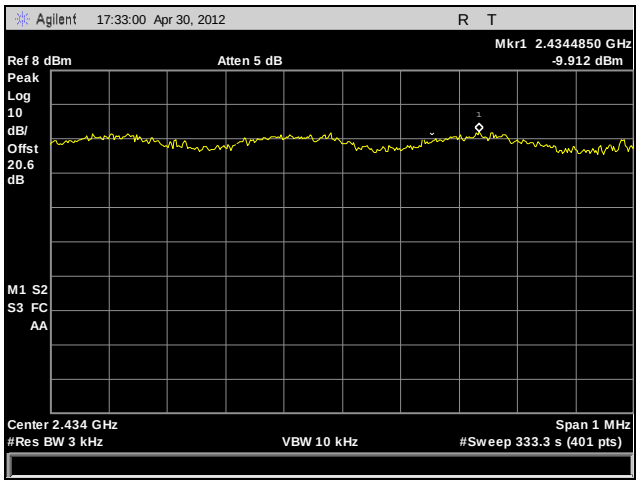


Plot 382. Peak Power Spectral Density, High Channel, 802.11g, 2.4 GHz

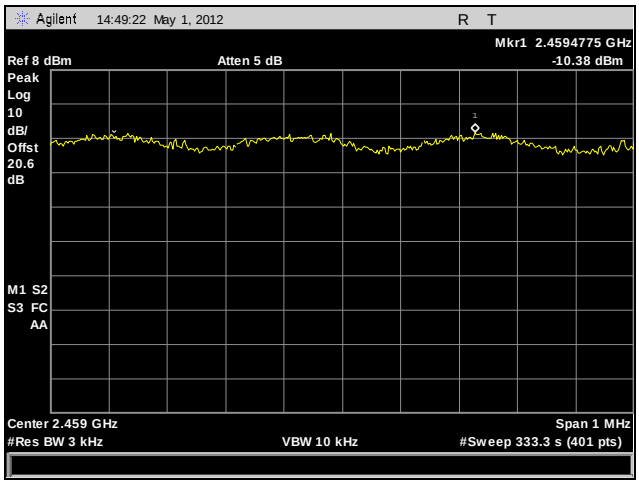
Peak Power Spectral Density, 802.11n HT20, Port 1, 2.4 GHz



Plot 383. Peak Power Spectral Density, Low Channel, 802.11n HT20, Port 1, 2.4 GHz

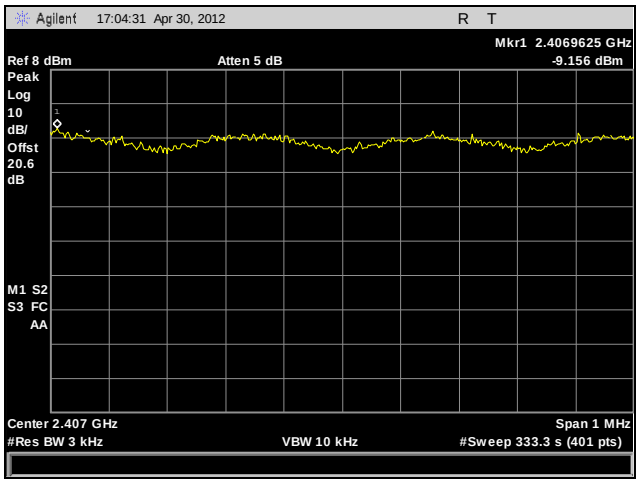


Plot 384. Peak Power Spectral Density, Mid Channel, 802.11n HT20, Port 1, 2.4 GHz

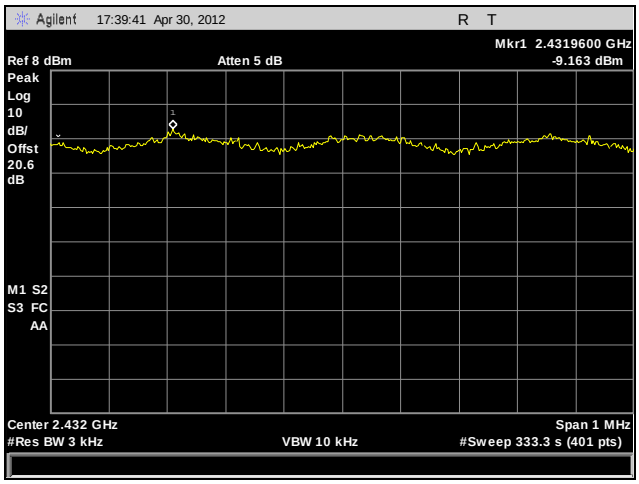


Plot 385. Peak Power Spectral Density, High Channel, 802.11n HT20, Port 1, 2.4 GHz

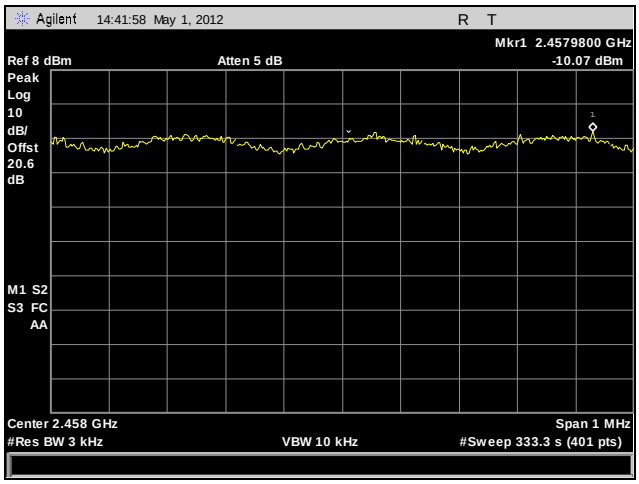
Peak Power Spectral Density, 802.11n HT20, Port 2, 2.4 GHz



Plot 386. Peak Power Spectral Density, Low Channel, 802.11n HT20, Port 2, 2.4 GHz

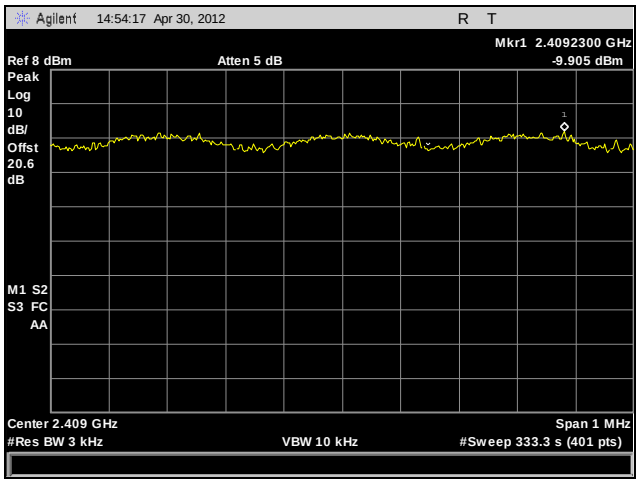


Plot 387. Peak Power Spectral Density, Mid Channel, 802.11n HT20, Port 2, 2.4 GHz

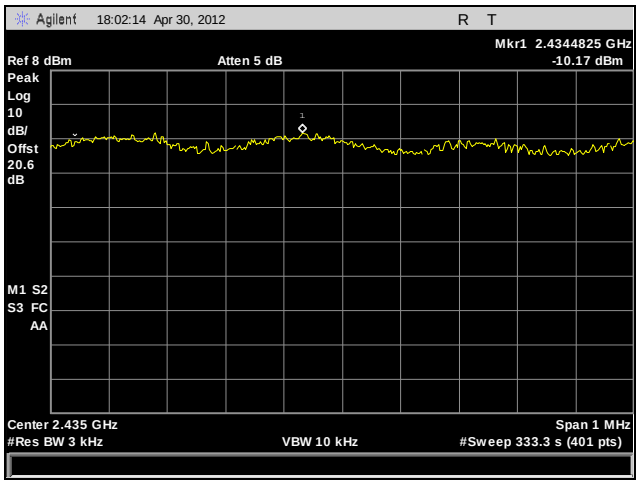


Plot 388. Peak Power Spectral Density, High Channel, 802.11n HT20, Port 2, 2.4 GHz

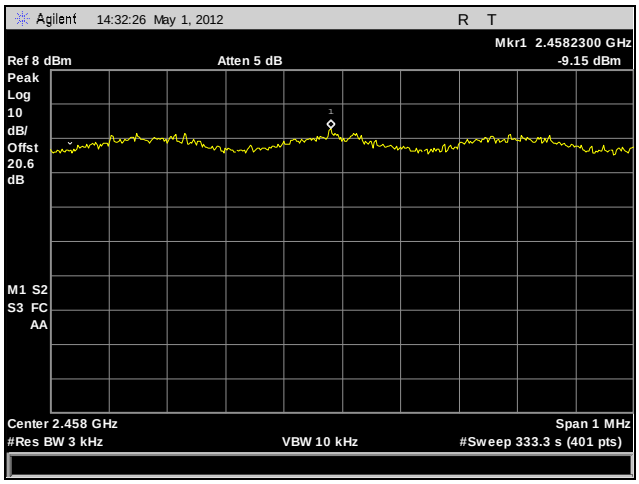
Peak Power Spectral Density, 802.11n HT20, Port 3, 2.4 GHz



Plot 389. Peak Power Spectral Density, Low Channel, 802.11n HT20, Port 3, 2.4 GHz

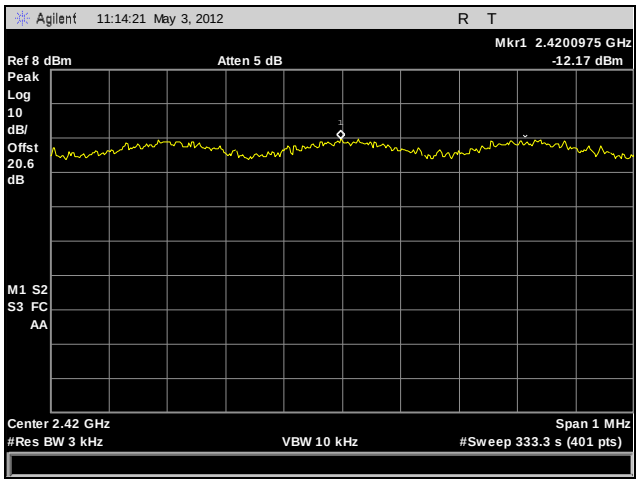


Plot 390. Peak Power Spectral Density, Mid Channel, 802.11n HT20, Port 3, 2.4 GHz

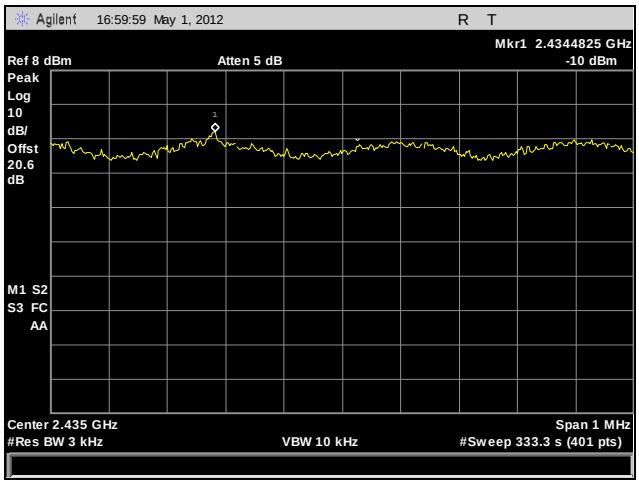


Plot 391. Peak Power Spectral Density, High Channel, 802.11n HT20, Port 3, 2.4 GHz

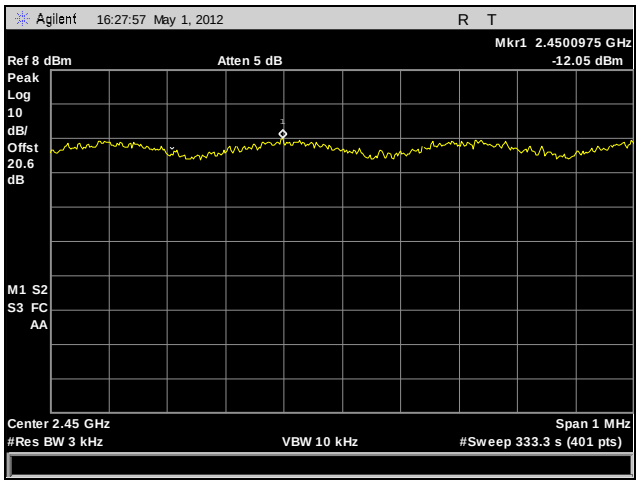
Peak Power Spectral Density, 802.11n HT40, Port 1, 2.4 GHz



Plot 392. Peak Power Spectral Density, Low Channel, 802.11n HT40, Port 1, 2.4 GHz

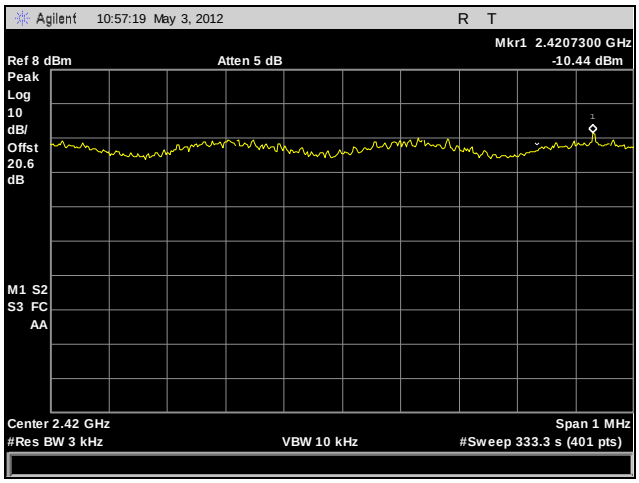


Plot 393. Peak Power Spectral Density, Mid Channel, 802.11n HT40, Port 1, 2.4 GHz

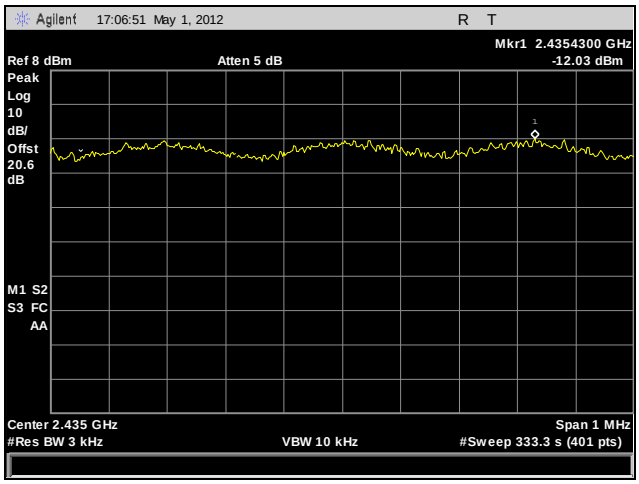


Plot 394. Peak Power Spectral Density, High Channel, 802.11n HT40, Port 1, 2.4 GHz

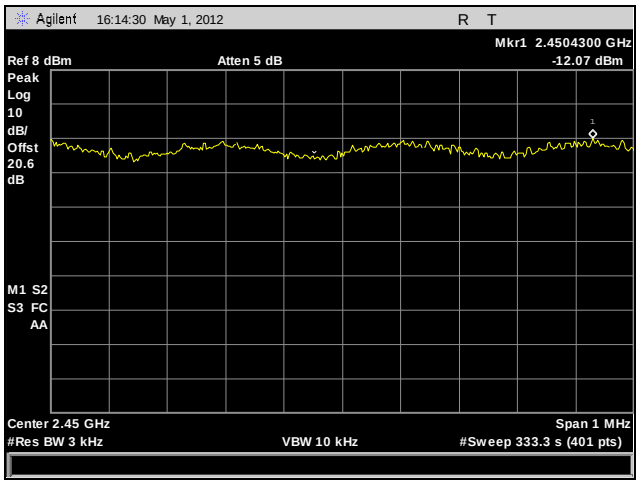
Peak Power Spectral Density, 802.11n HT40, Port 2, 2.4 GHz



Plot 395. Peak Power Spectral Density, Low Channel, 802.11n HT40, Port 2, 2.4 GHz

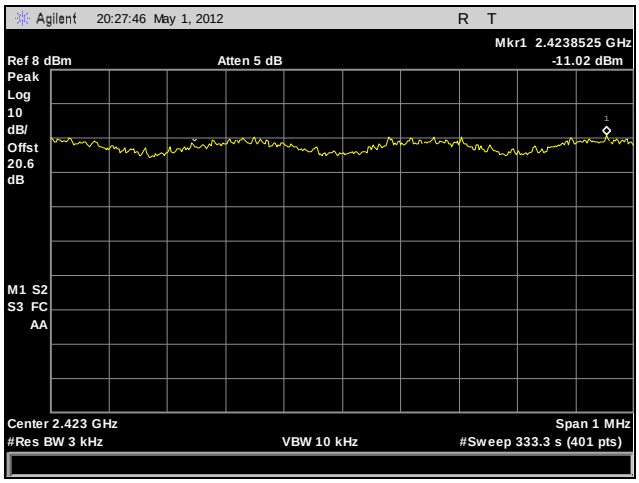


Plot 396. Peak Power Spectral Density, Mid Channel, 802.11n HT40, Port 2, 2.4 GHz

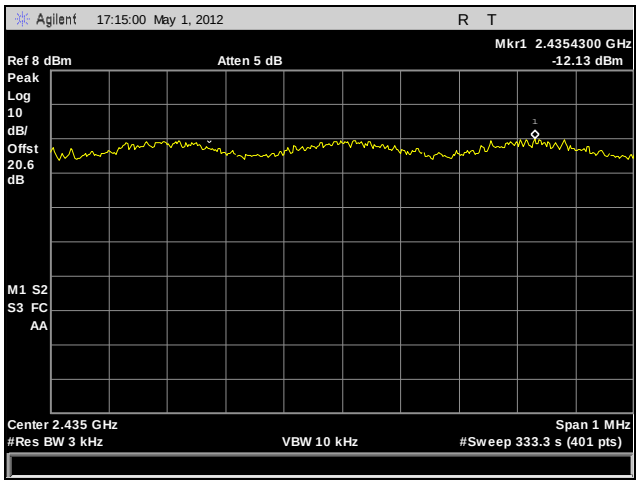


Plot 397. Peak Power Spectral Density, High Channel, 802.11n HT40, Port 2, 2.4 GHz

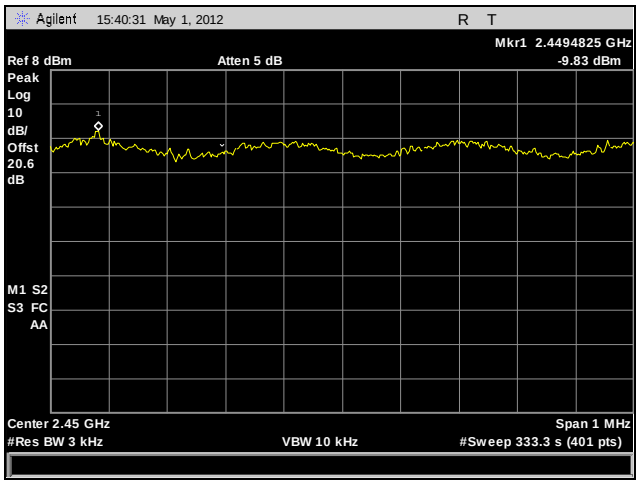
Peak Power Spectral Density, 802.11n HT40, Port 3, 2.4 GHz



Plot 398. Peak Power Spectral Density, Low Channel, 802.11n HT40, Port 3, 2.4 GHz

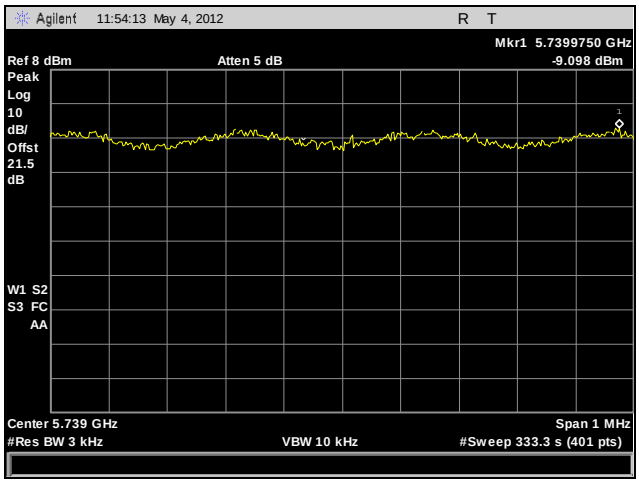


Plot 399. Peak Power Spectral Density, Mid Channel, 802.11n HT40, Port 3, 2.4 GHz

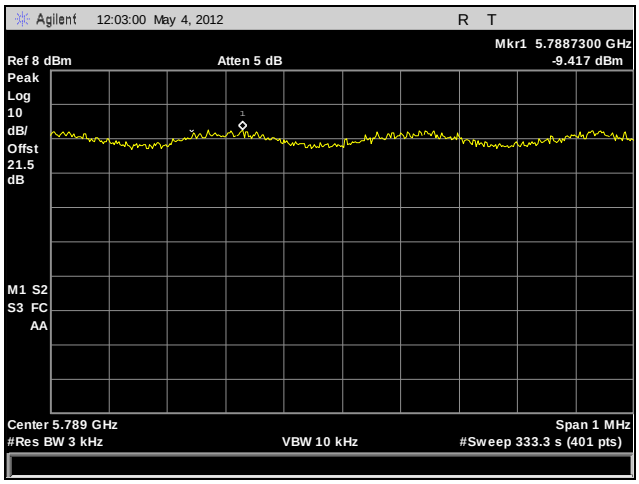


Plot 400. Peak Power Spectral Density, High Channel, 802.11n HT40, Port 3, 2.4 GHz

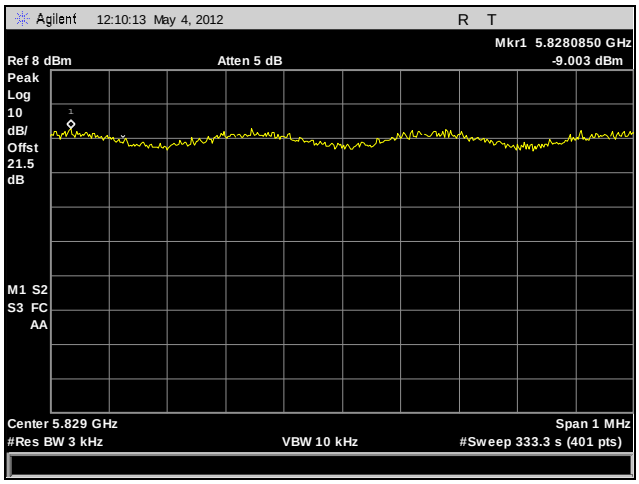
Peak Power Spectral Density, 802.11a, 5 GHz



Plot 401. Peak Power Spectral Density, Low Channel, 802.11a, 5 GHz

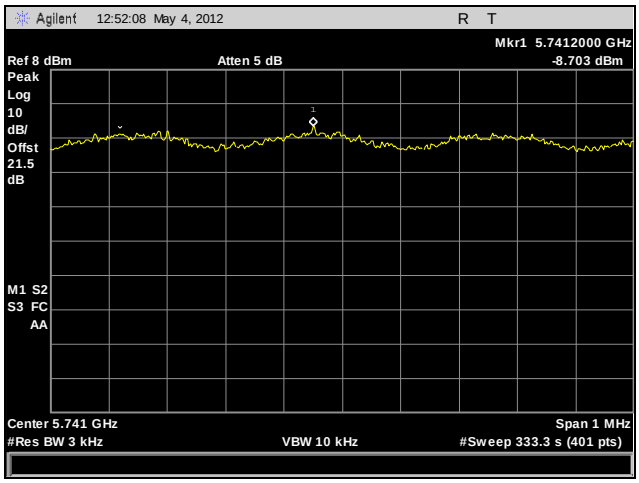


Plot 402. Peak Power Spectral Density, Mid Channel, 802.11a, 5 GHz

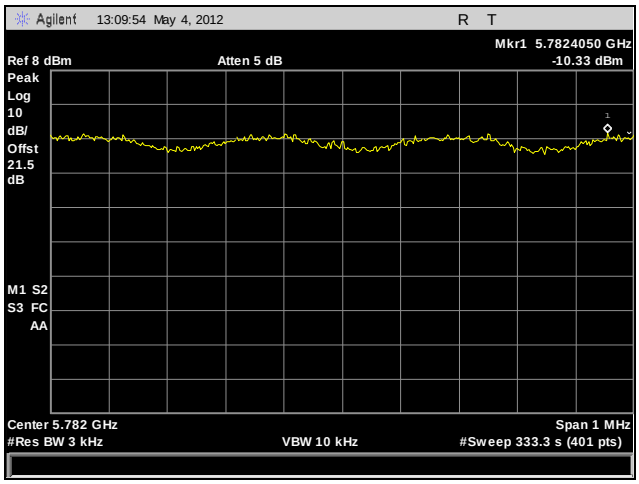


Plot 403. Peak Power Spectral Density, High Channel, 802.11a, 5 GHz

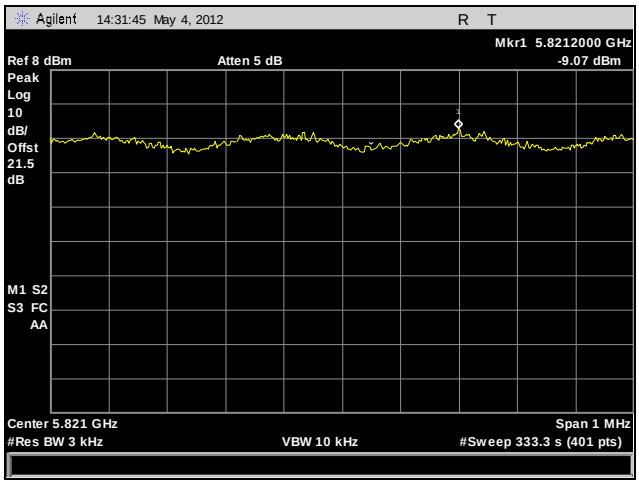
Peak Power Spectral Density, 802.11n HT20, Port 1, 5 GHz



Plot 404. Peak Power Spectral Density, Low Channel, 802.11n HT20, Port 1, 5 GHz

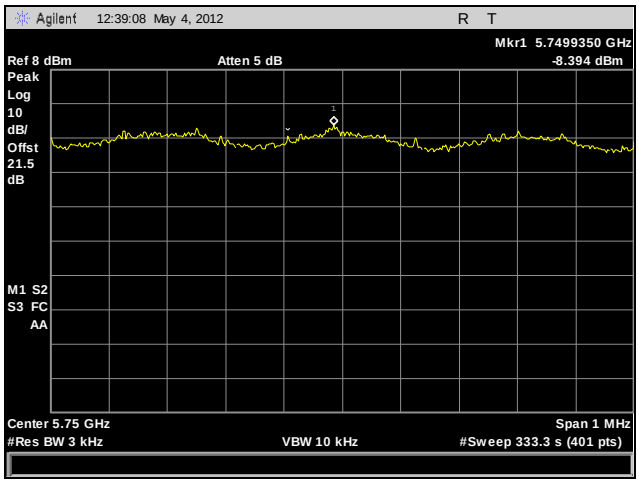


Plot 405. Peak Power Spectral Density, Mid Channel, 802.11n HT20, Port 1, 5 GHz

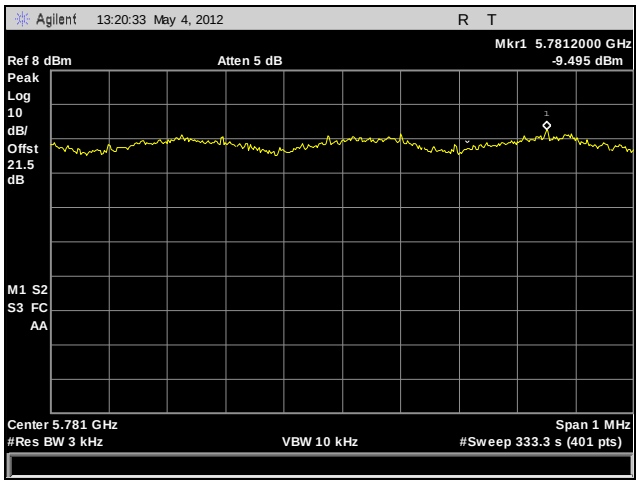


Plot 406. Peak Power Spectral Density, High Channel, 802.11n HT20, Port 1, 5 GHz

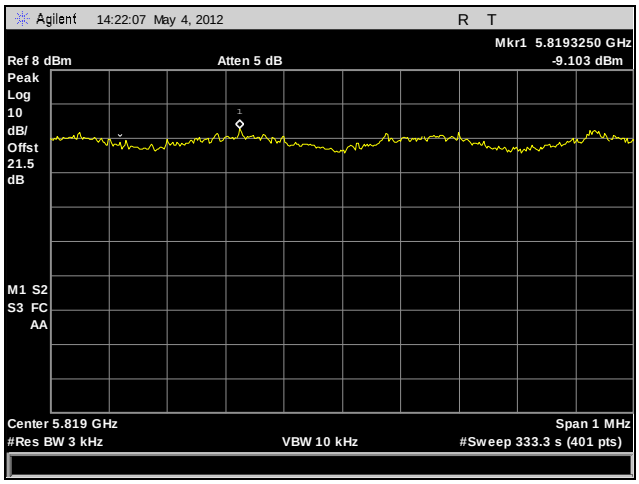
Peak Power Spectral Density, 802.11n HT20, Port 2, 5 GHz



Plot 407. Peak Power Spectral Density, Low Channel, 802.11n HT20, Port 2, 5 GHz

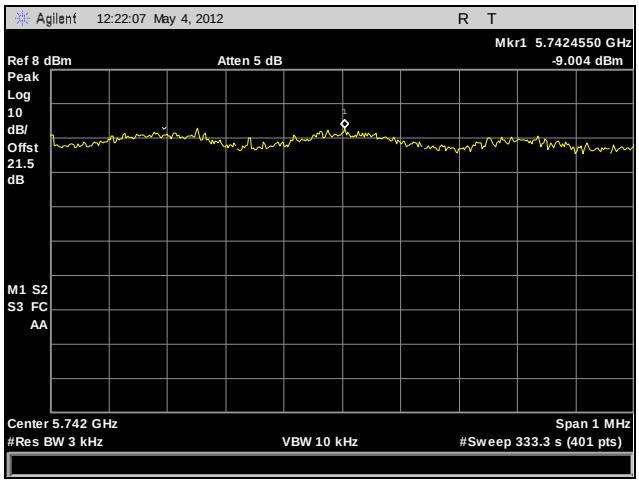


Plot 408. Peak Power Spectral Density, Mid Channel, 802.11n HT20, Port 2, 5 GHz

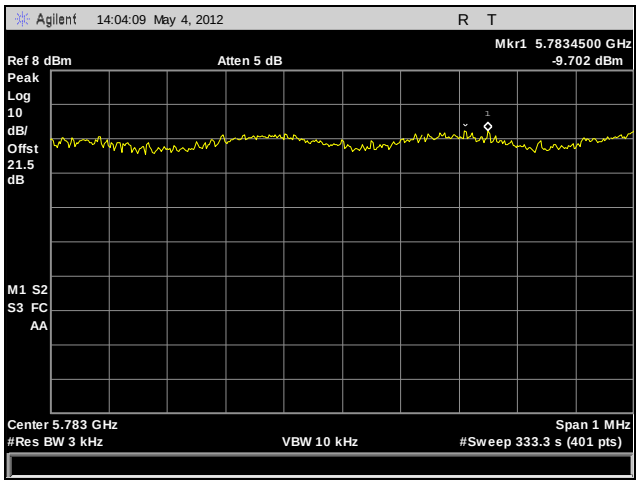


Plot 409. Peak Power Spectral Density, High Channel, 802.11n HT20, Port 2, 5 GHz

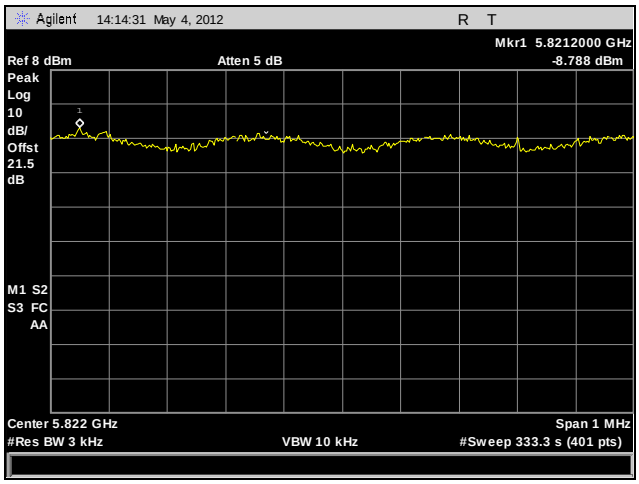
Peak Power Spectral Density, 802.11n HT20, Port 3, 5 GHz



Plot 410. Peak Power Spectral Density, Low Channel, 802.11n HT20, Port 3, 5 GHz

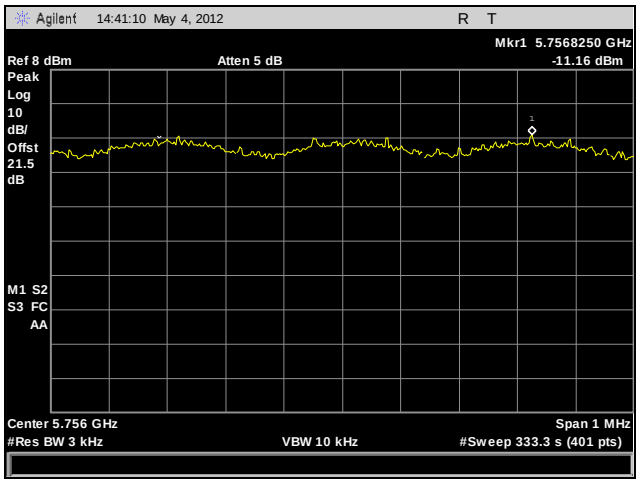


Plot 411. Peak Power Spectral Density, Mid Channel, 802.11n HT20, Port 3, 5 GHz

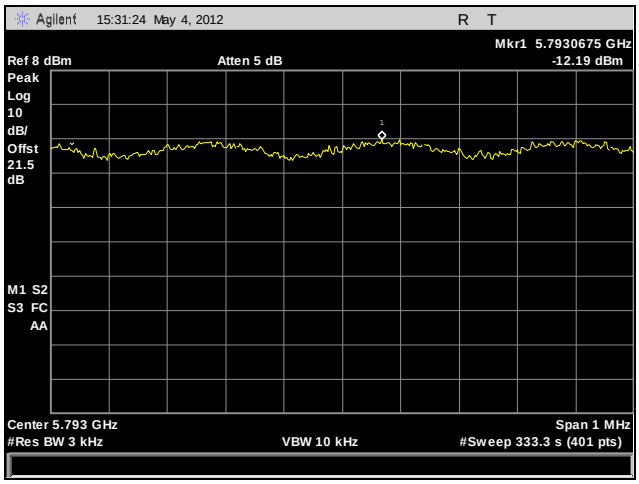


Plot 412. Peak Power Spectral Density, High Channel, 802.11n HT20, Port 3, 5 GHz

Peak Power Spectral Density, 802.11n HT40, Port 1, 5 GHz

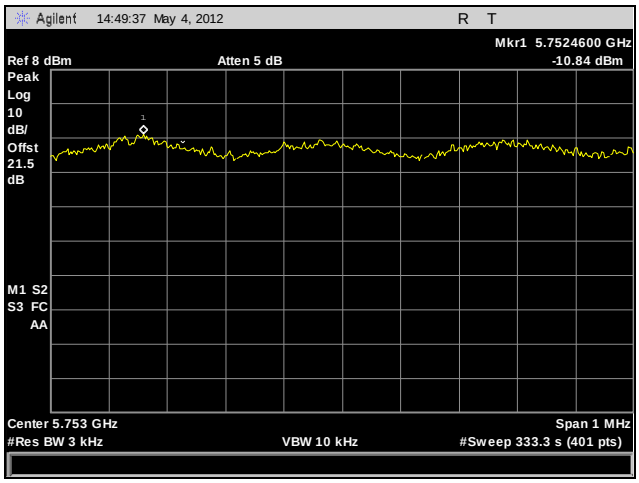


Plot 413. Peak Power Spectral Density, Low Channel, 802.11n HT40, Port 1, 5 GHz

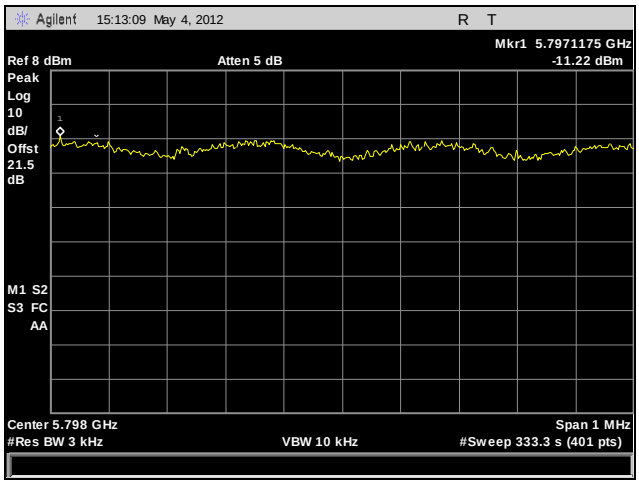


Plot 414. Peak Power Spectral Density, High Channel, 802.11n HT40, Port 1, 5 GHz

Peak Power Spectral Density, 802.11n HT40, Port 2, 5 GHz

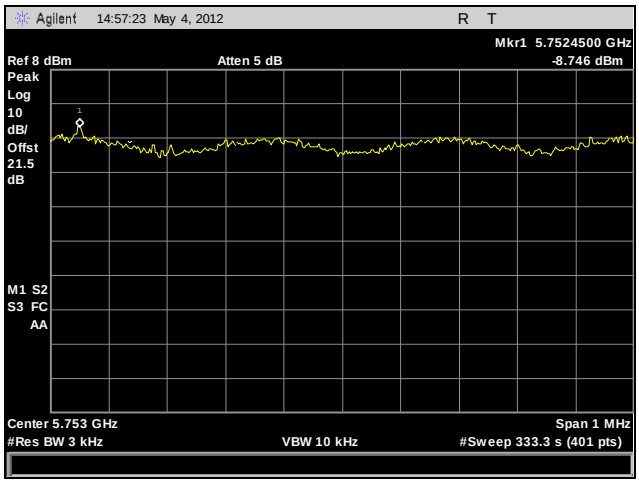


Plot 415. Peak Power Spectral Density, Low Channel, 802.11n HT40, Port 2, 5 GHz

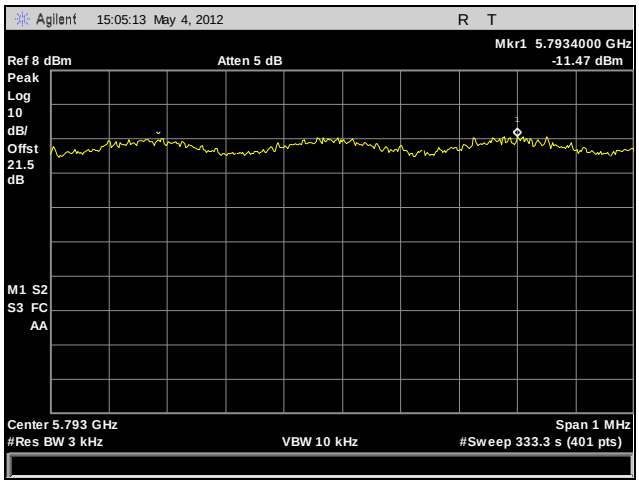


Plot 416. Peak Power Spectral Density, High Channel, 802.11n HT40, Port 2, 5 GHz

Peak Power Spectral Density, 802.11n HT40, Port 3, 5 GHz



Plot 417. Peak Power Spectral Density, Low Channel, 802.11n HT40, Port 3, 5 GHz



Plot 418. Peak Power Spectral Density, High Channel, 802.11n HT40, Port 3, 5 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(i) Maximum Permissible Exposure

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

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

MPE Limit Calculation: EUT's operating frequencies @ 2400-2483.5 MHz; highest conducted power = *27.15dBm* (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

EUT maximum antenna gain = *4dBi x 3 = 8.77dBi.*

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

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

where, S = Power Density (1 mW/cm^2)
P = Power Input to antenna (518.80mW)
G = Antenna Gain (7.53 numeric)

$S = (518.80*7.53 / 4*3.14*20^{2)} = (3908.41 / 5024) = 0.778$ mW/cm^2

Since S < 1 mW/cm^2, the Minimum Distance (R) is 20cm.

MPE Limit Calculation: EUT's operating frequencies @ 5725-5850 MHz; highest conducted power = *25.42dBm* (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

EUT maximum antenna gain = *5dBi x 3 = 9.77dBi.*

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

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

where, S = Power Density (1 mW/cm^2)
P = Power Input to antenna (348.337)
G = Antenna Gain (9.48 numeric)

$S = (348.337*9.48 / 4*3.14*20^{2)} = (3303.70 / 5024) = 0.656$ mW/cm^2

Since S < 1 mW/cm^2, the Minimum Distance (R) is 20cm.

Electromagnetic Compatibility Criteria for Intentional Radiators

RSS-GEN Receiver Spurious Emissions Requirements

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

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 33.

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

Table 33. Spurious Emission Limits for Receivers

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

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

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

Test Engineer(s): Lionel Gabrillo

Test Date(s): 04/27/12

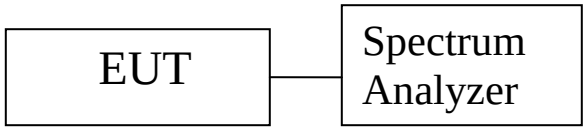
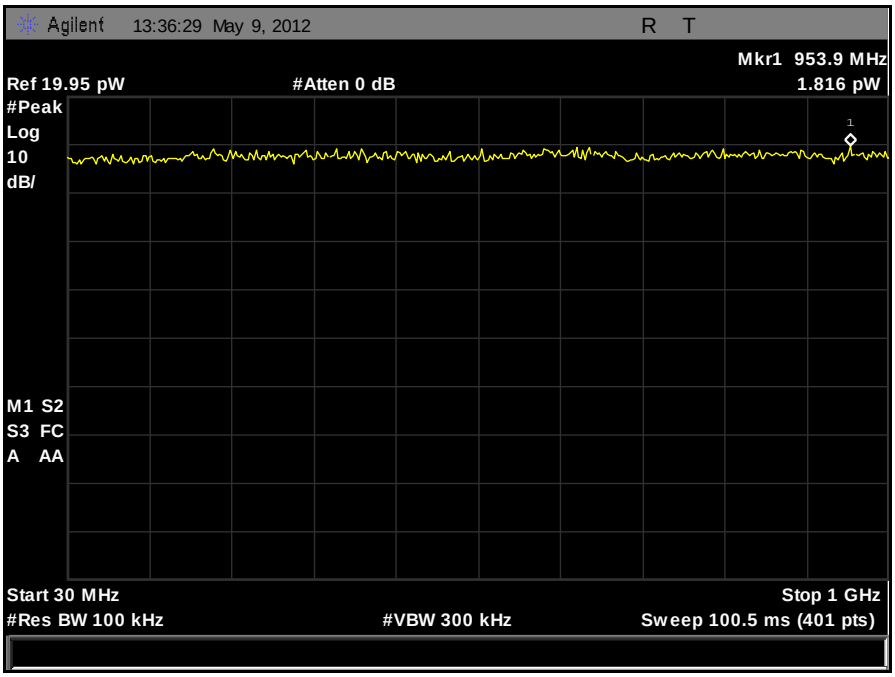
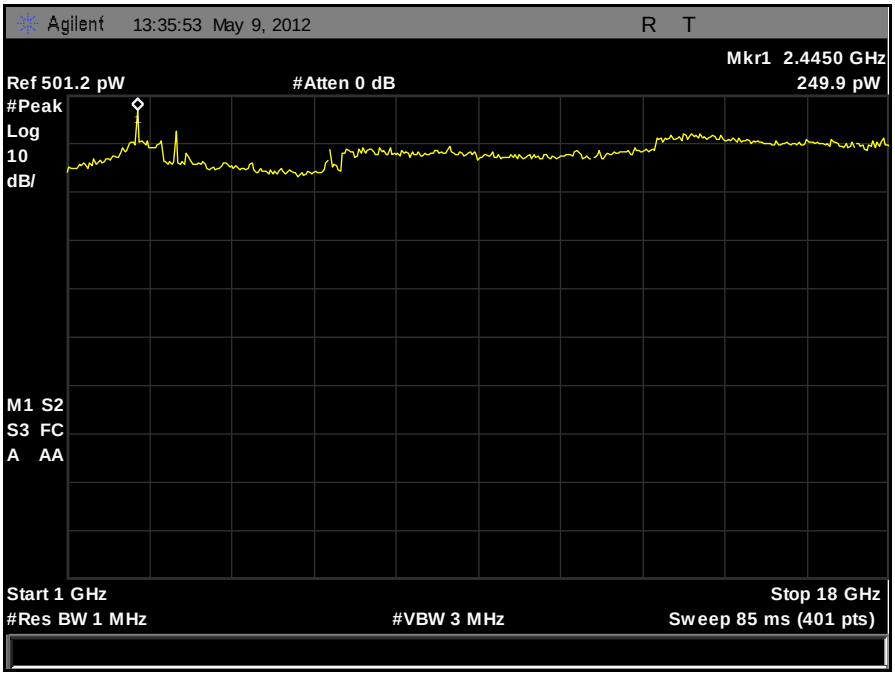


Figure 6. Block Diagram, Conducted Receiver Spurious Emissions Test Setup

Conducted Receiver Spurious Emissions, Port 1

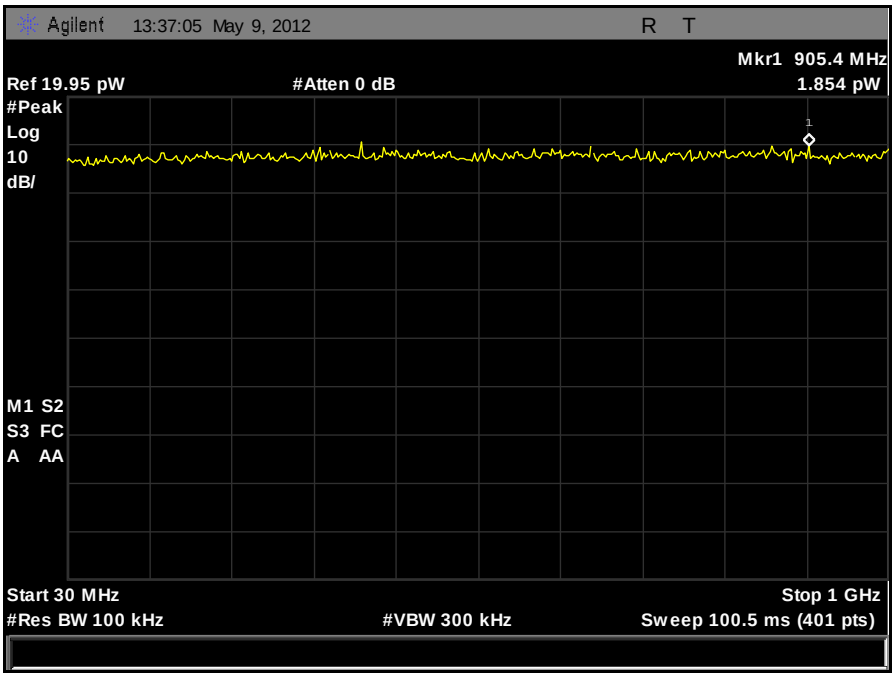


Plot 419. Receiver Spurious Emission, 30 MHz – 1 GHz, Port 1

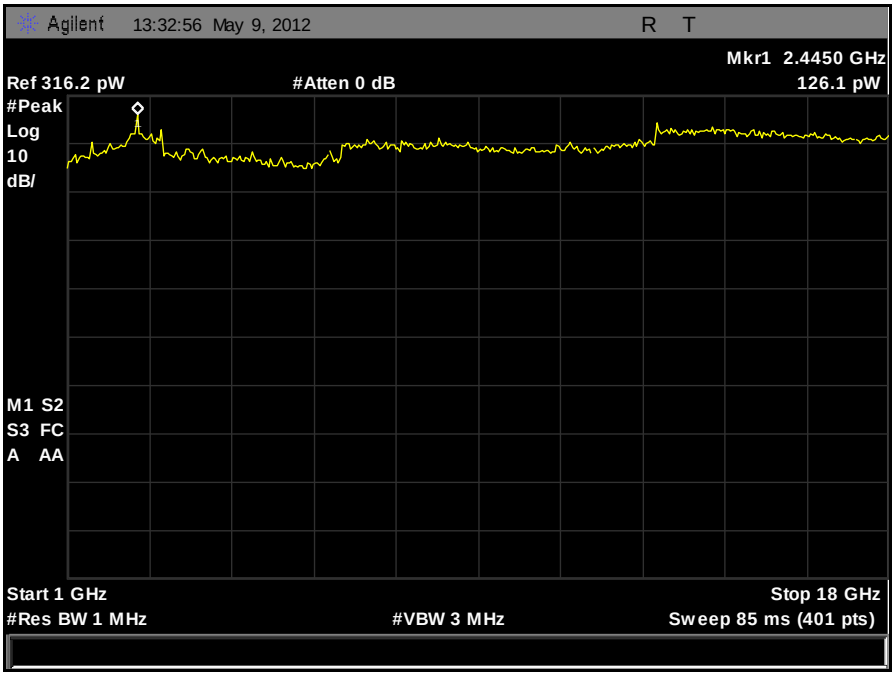


Plot 420. Receiver Spurious Emission, 1 – 18 GHz, Port 1

Conducted Receiver Spurious Emissions, Port 2

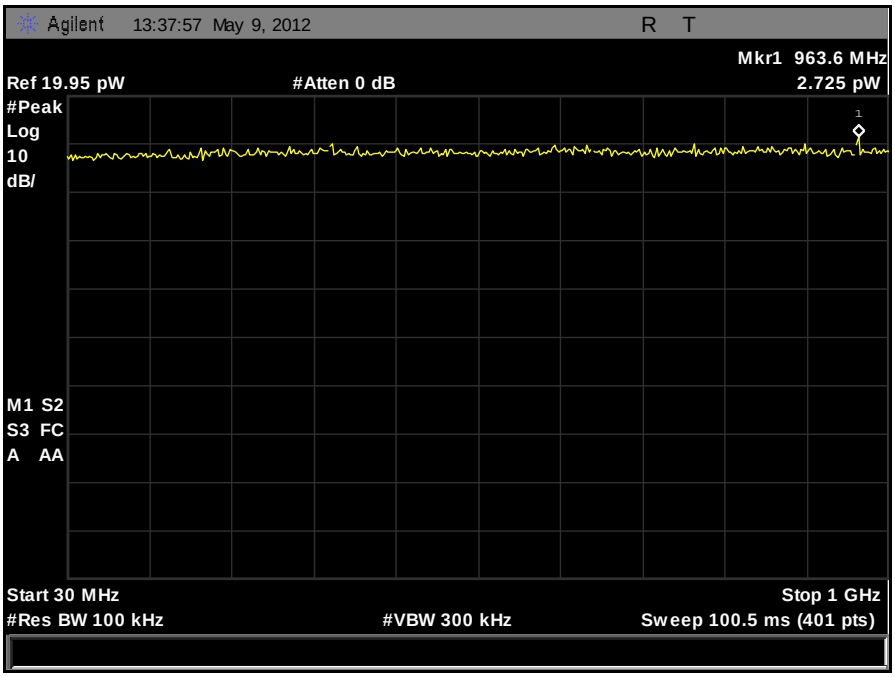


Plot 421. Receiver Spurious Emission, 30 MHz – 1 GHz, Port 2

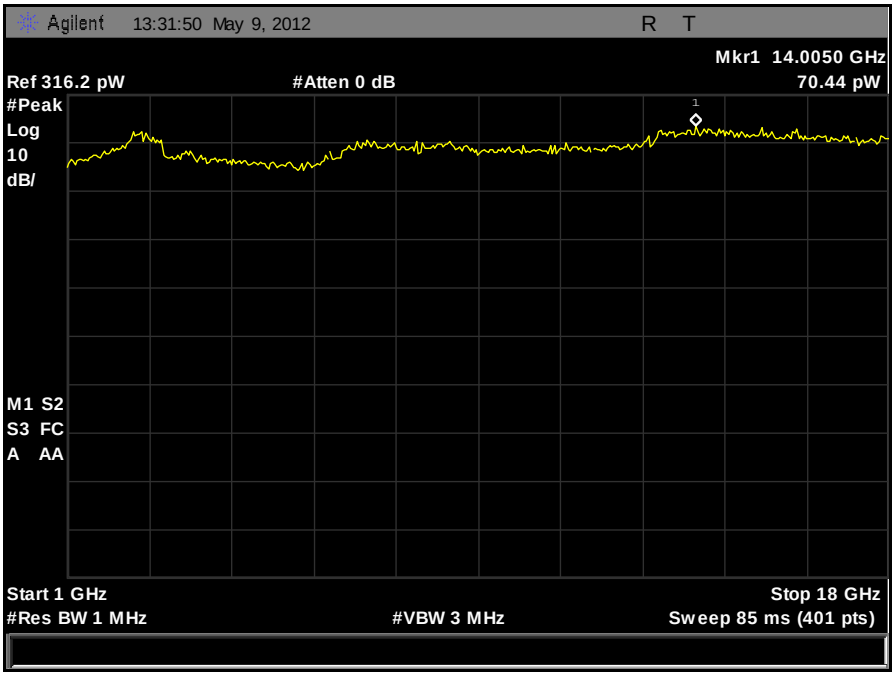


Plot 422. Receiver Spurious Emission, 1 – 18 GHz, Port 2

Conducted Receiver Spurious Emissions, Port 3



Plot 423. Receiver Spurious Emission, 30 MHz – 1 GHz, Port 3



Plot 424. Receiver Spurious Emission, 1 – 18 GHz, Port 3

IV. Test Equipment

Test Equipment

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

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2603	HORN ANTENNA	ETS-LINDGREN	3117	05/09/2011	05/09/2012
1S2202	HORN ANTENNA	EMCO	3116	04/23/2010	04/23/2013
1S2460	ANALYZER, SPECTRUM	AGILENT	E4407B	07/12/2011	07/12/2012
1S2482	CHAMBER, 5 METER	PANASHIELD	641431	11/22/2011	11/22/2012
1S2583	SPECTRUM ANALYZER	AGILENT/HP	E4447A	3/27/2012	9/27/2013
1S2198	HORN ANTENNA	EMCO	3115	9/29/2011	9/29/2012
1S2485	BILOG ANTENNA	TESEQ	CBL6112D	5/17/2011	5/17/2012
1S2698	DOUBLE RIDGE GUIDE HORN ANTENNA (26GHZ – 40GHZ)	A.H. SYSTEMS, INC.	SAS-574	5/24/2011	5/24/2012
1S2523	PREAMP (1-26.5GHZ)	AGILENT	8449B	SEE NOTE	
1S2714	THERM/CLOCK/HUMIDITY MONITOR	CONTROL COMPANY	06-662-4, FB7025B	11/9/2011	11/9/2013
1T4300A	SEMI-ANECHOIC CHAMBER # 1 (FCC)	EMC TEST SYSTEMS	NONE	01/31/2010	01/31/2013
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	06/14/2011	06/14/2012
1T4568	RADIATING NOISE SOURCE	MET LABORATORIES	N/A	SEE NOTE	
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	12/07/2011	12/07/2012
1T4787	HYGROMETER/THERMOMETER/BAROMETER/DEW POINT PEN	CONTROL COMPANY	15-078-198, FB70423, 245CD	02/15/2012	02/15/2014
1T4771	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	06/25/2011	06/25/2012
1T4773	THERMO/HYGROMETER	CONTROL COMPANY	4040	05/21/2010	05/21/2012
1T4564	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	11/04/2011	11/04/2012
1T4565	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	12/15/2011	12/15/2012
1T4503	SHIELDED ROOM	UNIVERSAL SHIELDING CORP	N/A	NOT REQUIRED	

Table 34. 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

1. Label and User's Manual Information

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

§ 15.19 Labeling requirements.

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

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

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

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

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

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

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

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

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

§ 15.21 Information to user.

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

Verification & User's Manual Information

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

§ 15.105 Information to the user.

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

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

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

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

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

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

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

ICES-003 Procedural & Labeling Requirements

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

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

Procedural Requirements:

According to Industry Canada's Interference Causing Equipment Standard for Digital Apparatus ICES-003 Issue 4, February 2004:

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

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

Labeling Requirements:

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

> This Class [2] digital apparatus complies with Canadian ICES-003.
>
> Cet appareil numérique de la classe [1] est conforme à la norme NMB-003 du Canada.

[2] Insert either A or B but not both as appropriate for the equipment requirements.

End of Report

