Test Report

AIR-CAP702W-A-K9

FCC ID: LDK102092
IC:2461B-102092

Also Covers:

AIR-CAP702W-D-K9

AIR-CAP702W-N-K9

AIR-CAP702W-T-K9

AIR-CAP702W-Z-K9

2400-2483.5 MHz

Against the following Specifications:

CFR47 Part 15.247

RSS210

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

Test Engineer: _____

Date: 11/25/2013

This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

Section 1: Overview

1.1 Test Summary

The samples were assessed against the tests detailed in section 3 under the requirements of the following specifications:

Emission	Immunity
CFR47 Part 15.247 RSS210	N/A

The specifications listed above represent actual tests performed to demonstrate compliance against the specifications and basic standards listed on the front cover of this report. This list is not a one to one match to the front cover for one or more of the following reasons.

1. Basic standards call up many different test phenomena specifications such as the 61000-4-X series. The basic standards define which elements and levels shall be applied from these specifications and as such it is not appropriate to list the individual specifications on the front cover.
2. A Standard listed on the front cover may be required in a particular country but is not appropriate for the particular technologies included in the equipment under test. E.g. You cannot test a DC product to the mains Harmonics requirements in EN61000-3-2. See section 3.2.
3. Test results against a particular standard or specification may be included in a different test report. See section 3.2 for an EDCS reference of this data.
4. Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
5. Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.
6. Testing may have been performed to an equivalent test that satisfies the requirements of the standards and specifications listed on the front cover of the report. See section 3.2.
7. Where radiated emissions testing has been performed to EN55022/CISPR22 the additional requirements of VCCI: V- 3/2006.04, EN55022: 1994 +A1/2 and CAN/CSA- CISPR 22-02 have also been evaluated unless otherwise stated.
8. Testing to the requirements of CFR47 Part 15 was performed against the CISPR22 limits. The results are therefore deemed satisfactory evidence of compliance with Industry Canada Interference Causing Equipment Standard ICES-003.
9. Where assessment has been performed to CISPR24, all the applicable test requirements may have not been covered. Refer to the results section for the tests performed.

Notes:

1) Where a specification listed on the front cover of this report has deviations from the basic standards listed above, the additional technical requirements of the specification were also assessed.
2) Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
3) Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.

Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc:

With regard to this assessment, the following points should be noted:

a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.

b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.

c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).

d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.

e) All AC testing was performed at one or more of the following supply voltages:
110V 60 Hz (+/-20%)
220V 50 Hz (+/-20%)

2.2 Date of testing

18-October-2013

2.3 Report Issue Date

Cisco uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,	Cisco Systems, Inc.
4125 Highlander Parkway	170 West Tasman Drive
Richfield, OH 44286	San Jose, CA 95134
USA	USA

Test Engineers

Jim Nicholson

2.5 Equipment Assessed (EUT)

AIR-CAP702W-A-K9

2.6 EUT Description

The AIR-CAP702W-A-K9 Cisco Aironet 802.11n Dual Band Access Points support the following modes of operation. The modes are further defined in the radio Theory of Operation. The modes included in this report represent the worst case data for all modes.

Legacy CCK, One Antenna, 1 to 11 Mbps
Legacy CCK, Two Antennas, 1 to 11 Mbps

Non HT-20, One Antenna, 6 to 54 Mbps
Non HT-20, Two Antennas, 6 to 54 Mbps

Non HT-20 Beam Forming, Two Antennas, 6 to 54 Mbps

HT-20, One Antenna, M0 to M7
HT-20, Two Antennas, M0 to M15

HT-20 Beam Forming, Two Antennas, M0 to M15

HT-20 STBC, Two Antennas, M0 to M7

The following antennas are supported by this product series.
The data included in this report represent the worst case data for all antennas.

Frequency	Part Number	Antenna Type	Antenna Gain (dBi)
2.4/5 GHz	Internal	Omni-Directional	2 / 4

Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. Please also refer to the “Justification for worst Case test Configuration” section of this report for further details on the selection of EUT samples.

4.1 Sample Details (Photographs of the test samples, where appropriate can be found in appendix H)

Sample No.	Equipment Details	Part Number	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	AIR-CAP702W-A-K9		Cisco Systems	NA	NA	NA	
S02	AIR-PWRINJ5	341-0556-01	Cisco Systems	NA	NA	NA	

4.2 System Details

System #	Description	Samples
1	EUT	S01, S02

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting

All tests in this report were performed as described in FCC KDB 662911 D01

Appendix A: Emission Test Results

Testing Laboratory: Cisco Systems, Inc., 4125 Highlander Parkway, Richfield, OH, USA

Target Maximum Channel Power

The following table details the maximum supported Total Channel Power for all operating modes.

	Maximum Channel Power (dBm)		
	Frequency (MHz)		
Operating Mode	2412	2437	2462
Legacy CCK, 1 to 11 Mbps	**19**	**19**	**19**
Non HT-20, 6 to 54 Mbps	**19**	**19**	**19**
Non HT-20 Beam Forming, 6 to 54 Mbps	**17**	**19**	**17**
HT-20, M0 to M15	**17**	**19**	**18**
HT-20 Beam Forming, M0 to M15	**17**	**19**	**18**
HT-20 STBC, M0 to M7	**17**	**19**	**18**

6dB Bandwidth

15.247 / RSS-210 A8.2: Systems using digital modulation techniques may operate in the 2400-2483.5MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.

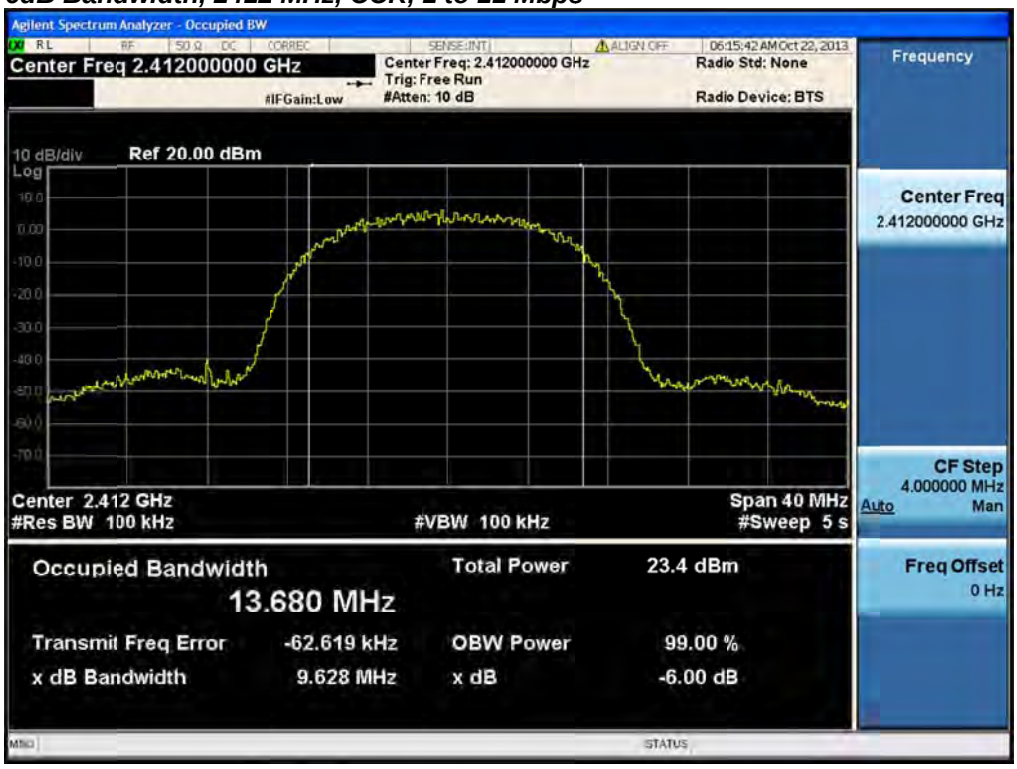
Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency:	Frequency from table below
Span:	2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	5 s
Resolution Bandwidth:	100 kHz
Video Bandwidth:	100 kHz
X dB Bandwidth:	6 dB
Detector:	Peak
Trace:	Single

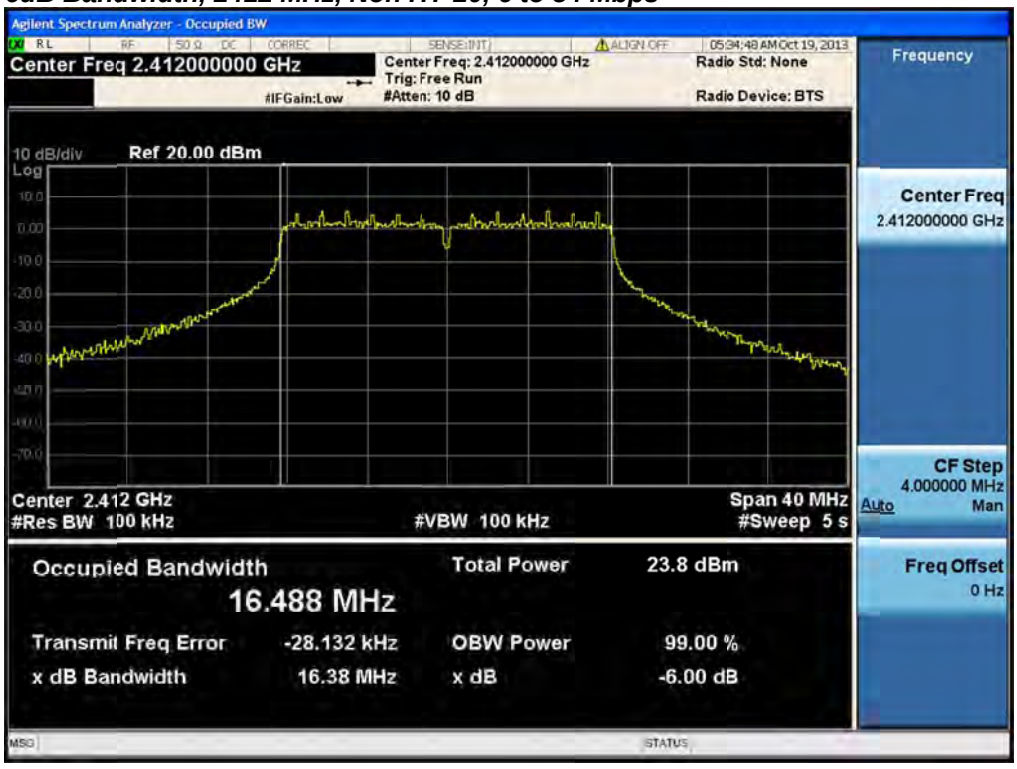
Place the radio in continuous transmit mode. View the transmitter waveform on the spectrum analyzer, and record the pertinent measurements:

Frequency (MHz)	Mode	Data Rate (Mbps)	6dB BW (MHz)	Limit (kHz)	Margin (MHz)
2412	CCK, 1 to 11 Mbps	11	9.6	>500	9.1
	Non HT-20, 6 to 54 Mbps	6	16.4	>500	15.9
	HT-20, M0 to M23	m0	17.4	>500	16.9
2437	CCK, 1 to 11 Mbps	11	10	>500	9.5
	Non HT-20, 6 to 54 Mbps	6	16.4	>500	15.9
	HT-20, M0 to M23	m0	17.3	>500	16.8
2462	CCK, 1 to 11 Mbps	11	9.6	>500	9.1
	Non HT-20, 6 to 54 Mbps	6	16.4	>500	15.9
	HT-20, M0 to M23	m0	17.4	>500	16.9

6dB Bandwidth, 2412 MHz, CCK, 1 to 11 Mbps

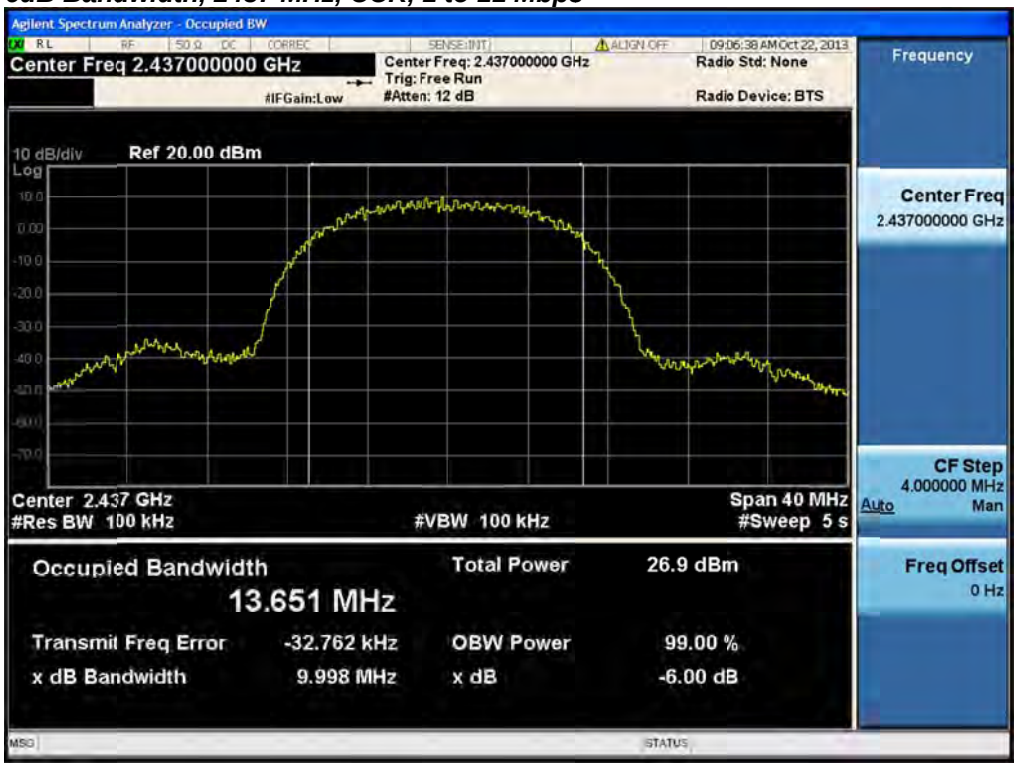


6dB Bandwidth, 2412 MHz, Non HT-20, 6 to 54 Mbps



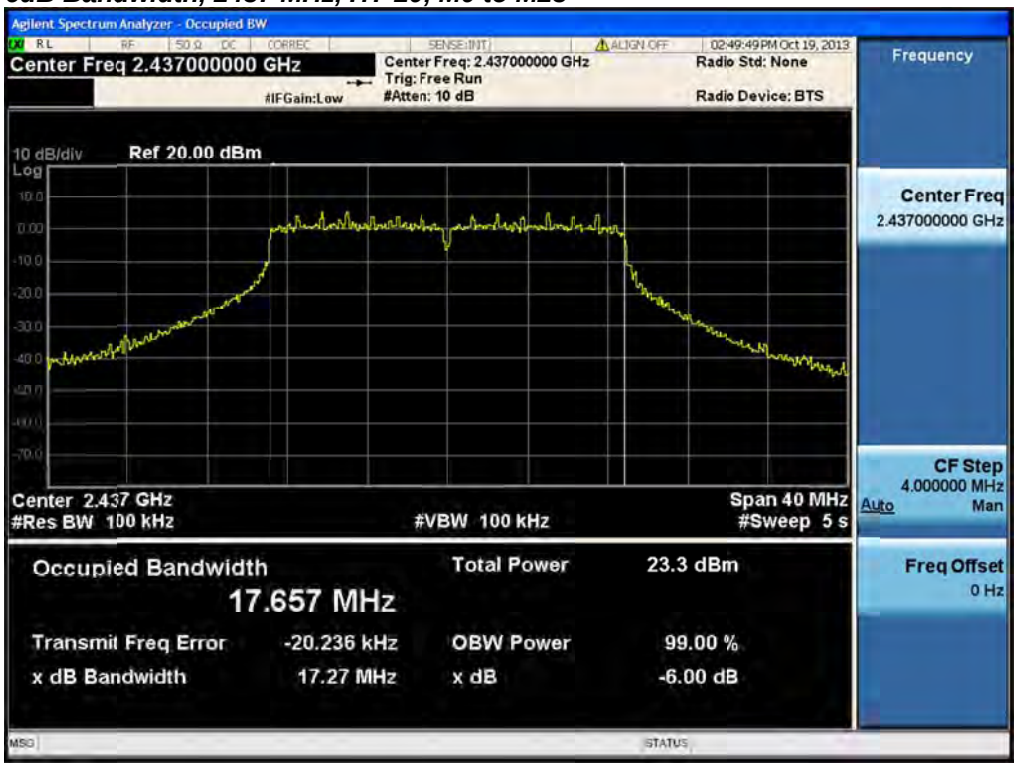
6dB Bandwidth, 2412 MHz, HT-20, M0 to M23

6dB Bandwidth, 2437 MHz, CCK, 1 to 11 Mbps



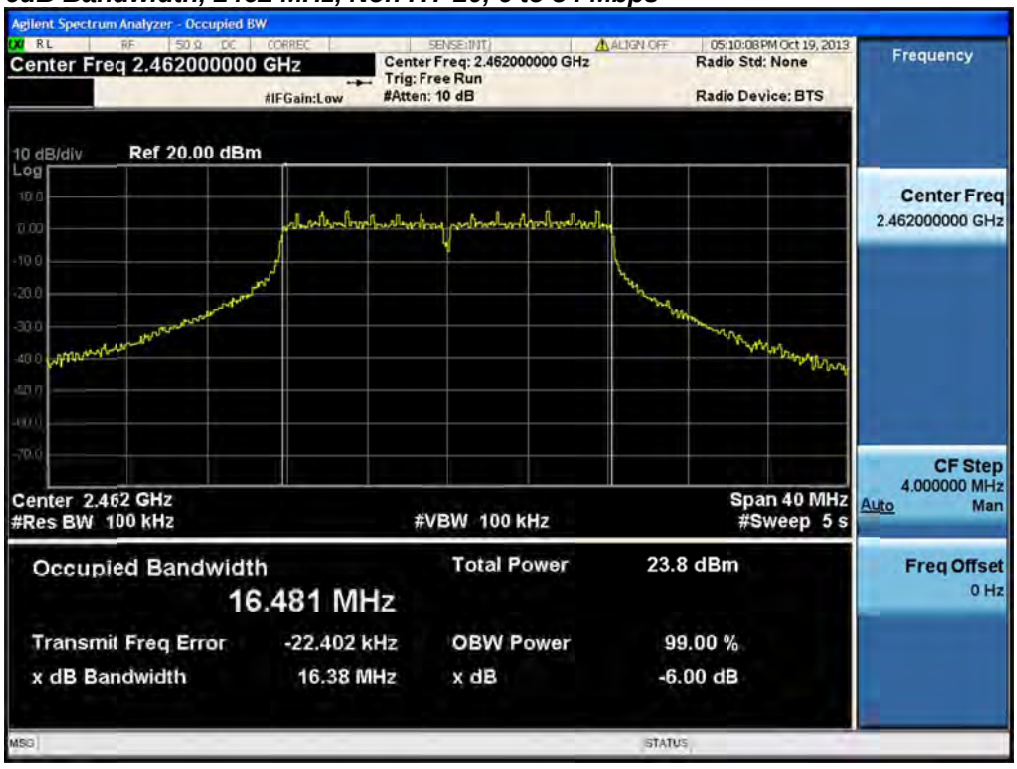
6dB Bandwidth, 2437 MHz, Non HT-20, 6 to 54 Mbps

6dB Bandwidth, 2437 MHz, HT-20, M0 to M23



6dB Bandwidth, 2462 MHz, CCK, 1 to 11 Mbps

6dB Bandwidth, 2462 MHz, Non HT-20, 6 to 54 Mbps



6dB Bandwidth, 2462 MHz, HT-20, M0 to M23

99% and 26dB Bandwidth

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency:	Frequency from table be.low
Span:	2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	5 s
Resolution Bandwidth:	1%-3% of 26 dB Bandwidth
Video Bandwidth:	≥Resolution Bandwidth
X dB Bandwidth:	26 dB
Detector:	Peak
Trace:	Single

Place the radio in continuous transmit mode. View the transmitter waveform on the spectrum analyzer, and record the pertinent measurements:

Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
2412	CCK, 1 to 11 Mbps	11	16.8	13.7
	Non HT-20, 6 to 54 Mbps	6	19.9	16.5
	HT-20, M0 to M23	m0	20.6	17.7
2437	CCK, 1 to 11 Mbps	11	16.8	13.7
	Non HT-20, 6 to 54 Mbps	6	19.6	16.5
	HT-20, M0 to M23	m0	20.7	17.7
2462	CCK, 1 to 11 Mbps	11	16.8	13.7
	Non HT-20, 6 to 54 Mbps	6	19.8	16.5
	HT-20, M0 to M23	m0	20.6	17.7

26dB / 99% Bandwidth, 2412 MHz, CCK, 1 to 11 Mbps

26dB / 99% Bandwidth, 2412 MHz, Non HT-20, 6 to 54 Mbps

26dB / 99% Bandwidth, 2412 MHz, HT-20, M0 to M23

26dB / 99% Bandwidth, 2437 MHz, CCK, 1 to 11 Mbps

26dB / 99% Bandwidth, 2437 MHz, Non HT-20, 6 to 54 Mbps

26dB / 99% Bandwidth, 2437 MHz, HT-20, M0 to M23

26dB / 99% Bandwidth, 2462 MHz, CCK, 1 to 11 Mbps

26dB / 99% Bandwidth, 2462 MHz, Non HT-20, 6 to 54 Mbps

26dB / 99% Bandwidth, 2462 MHz, HT-20, M0 to M23

Peak Output Power

15.247 / RSS-210 A8.4: The maximum conducted output power of the intentional radiator for systems using digital modulation in the 2400-2483.5 MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum supported antenna gain is 2dBi. The peak correlated gain for each mode is listed in the table below. See the Theory of Operation for details on the correlated gain for each mode.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below.

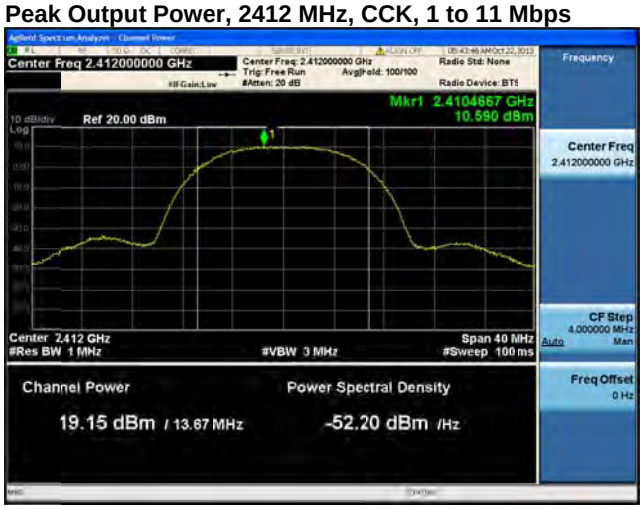
Enable "Channel Power" function of analyzer	
Center Frequency:	Frequency from table below
Span:	20 MHz (must be greater than 26dB bandwidth, adjust as necessary)
Ref Level Offset:	Correct for attenuator and cable loss.
Reference Level:	20 dBm
Attenuation:	20 dB
Sweep Time:	100ms, Single sweep
Resolution Bandwidth:	1 MHz
Video Bandwidth:	3 MHz
Detector:	Sample
Trace:	Trace Average 100 traces in Power Averaging Mode
Integration BW:	=26 dB BW from 26 dB Bandwidth Data

After averaging 100 traces of the transmitter waveform on the spectrum analyzer, record the spectrum analyzer Channel Power.

The “measure-and-sum technique” is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units.

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Total Tx Channel Power (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	2	19.2		19.2	30	10.8
	CCK, 1 to 11 Mbps	2	2	16.1	15.9	19.0	30	11.0
	Non HT-20, 6 to 54 Mbps	1	2	17.2		17.2	30	12.8
	Non HT-20, 6 to 54 Mbps	2	2	16.4	16.3	19.4	30	10.6
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	14.5	14.4	17.5	30	12.5
	HT-20, M0 to M7	1	2	16.3		16.3	30	13.7
	HT-20, M0 to M7	2	2	14.2	14.3	17.3	30	12.7
	HT-20, M8 to M15	2	2	14.2	14.3	17.3	30	12.7
	HT-20 Beam Forming, M0 to M7	2	5	10.8	11.0	13.9	30	16.1
	HT-20 Beam Forming, M8 to M15	2	2	14.2	14.3	17.3	30	12.7
	HT-20 STBC, M0 to M7	2	2	14.2	14.3	17.3	30	12.7
2437	CCK, 1 to 11 Mbps	1	2	19.4		19.4	30	10.6
	CCK, 1 to 11 Mbps	2	2	16.0	16.7	19.4	30	10.6
	Non HT-20, 6 to 54 Mbps	1	2	19.3		19.3	30	10.7
	Non HT-20, 6 to 54 Mbps	2	2	16.4	16.5	19.5	30	10.5
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	16.4	16.5	19.5	30	10.5
	HT-20, M0 to M7	1	2	16.1		16.1	30	13.9
	HT-20, M0 to M7	2	2	16.1	16.3	19.2	30	10.8
	HT-20, M8 to M15	2	2	16.1	16.3	19.2	30	10.8
	HT-20 Beam Forming, M0 to M7	2	5	16.1	16.3	19.2	30	10.8
	HT-20 Beam Forming, M8 to M15	2	2	16.1	16.3	19.2	30	10.8
	HT-20 STBC, M0 to M7	2	2	16.1	16.3	19.2	30	10.8
2462	CCK, 1 to 11 Mbps	1	2	19.1		19.1	30	10.9
	CCK, 1 to 11 Mbps	2	2	15.6	16.2	18.9	30	11.1
	Non HT-20, 6 to 54 Mbps	1	2	17.1		17.1	30	12.9
	Non HT-20, 6 to 54 Mbps	2	2	16.2	16.2	19.2	30	10.8
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	14.3	14.2	17.3	30	12.7
	HT-20, M0 to M7	1	2	16.1		16.1	30	13.9
	HT-20, M0 to M7	2	2	15.1	15.0	18.1	30	11.9
	HT-20, M8 to M15	2	2	15.1	15.0	18.1	30	11.9
	HT-20 Beam Forming, M0 to M7	2	5	14.1	14.1	17.1	30	12.9
	HT-20 Beam Forming, M8 to M15	2	2	15.1	15.0	18.1	30	11.9
	HT-20 STBC, M0 to M7	2	2	15.1	15.0	18.1	30	11.9

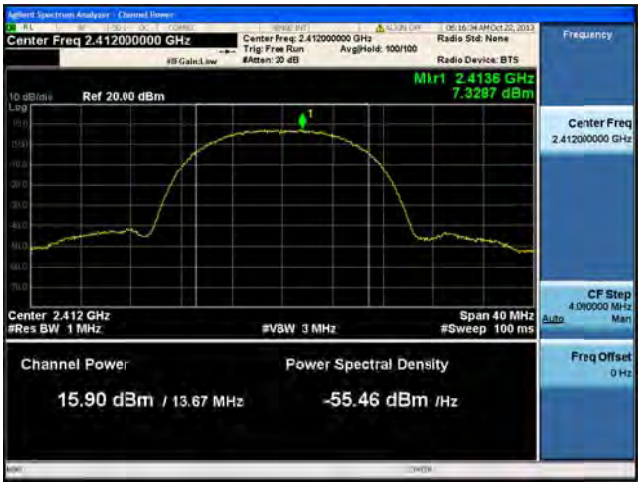
Peak Output Power, 2412 MHz, CCK, 1 to 11 Mbps



Antenna A

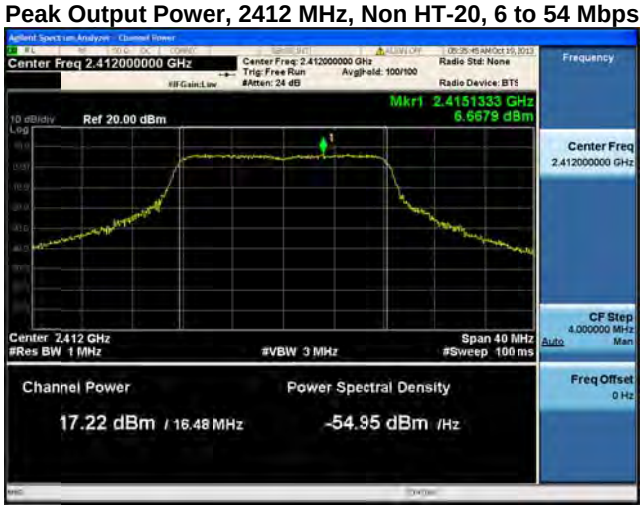
Peak Output Power, 2412 MHz, CCK, 1 to 11 Mbps

Antenna A



Antenna B

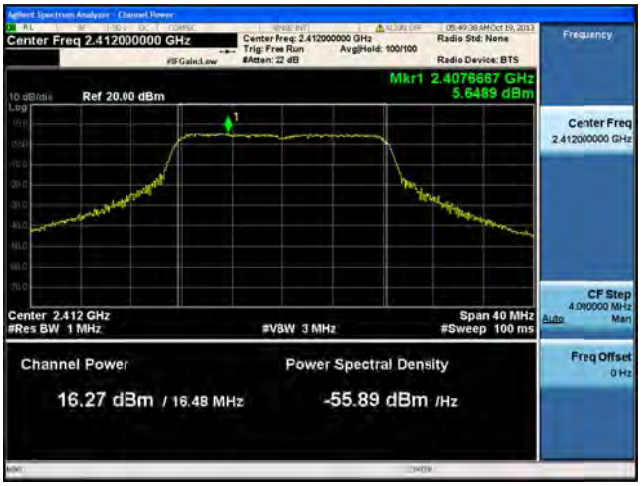
Peak Output Power, 2412 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

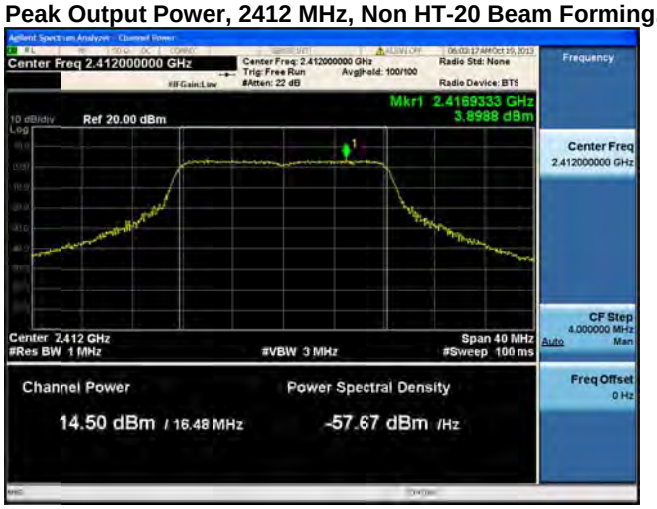
Peak Output Power, 2412 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

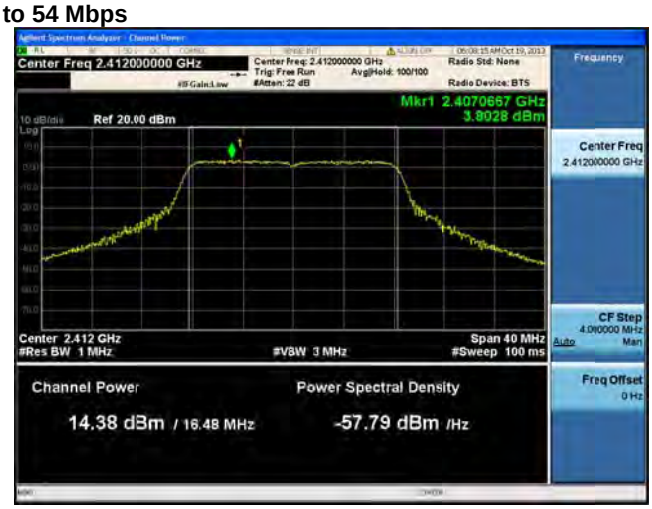


Antenna B

Peak Output Power, 2412 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

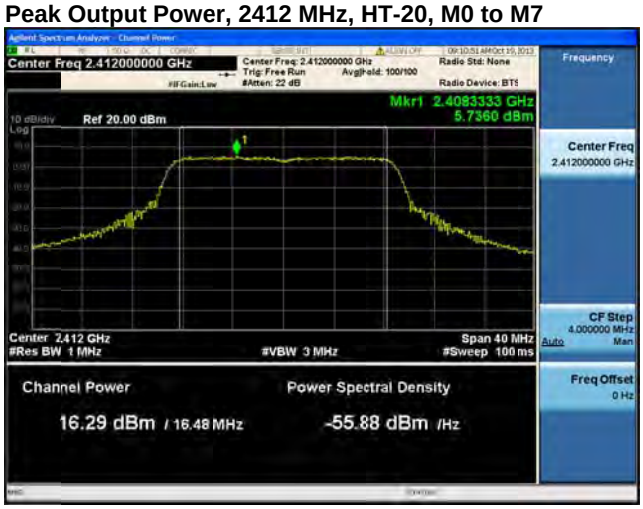


Antenna A



Antenna B

Peak Output Power, 2412 MHz, HT-20, M0 to M7



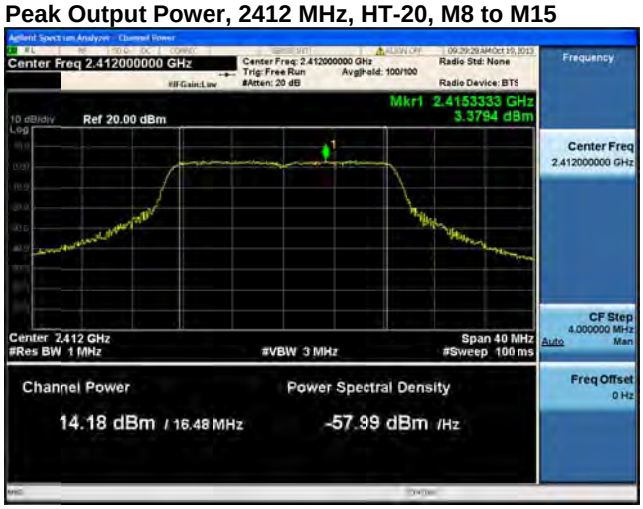
Antenna A

Peak Output Power, 2412 MHz, HT-20, M0 to M7

Antenna A

Antenna B

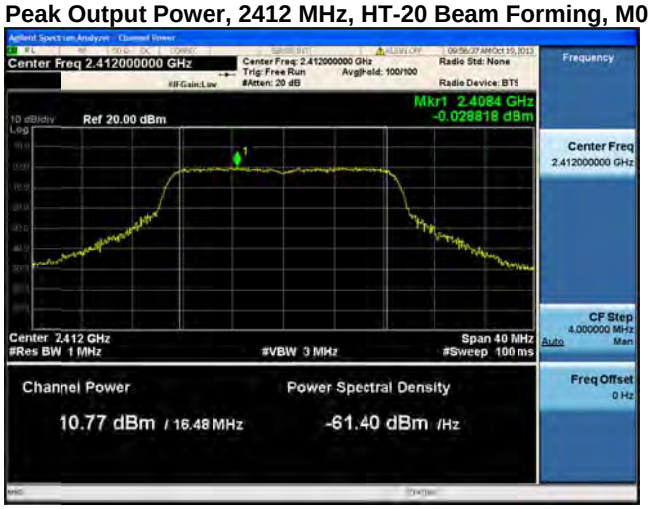
Peak Output Power, 2412 MHz, HT-20, M8 to M15



Antenna A

Antenna B

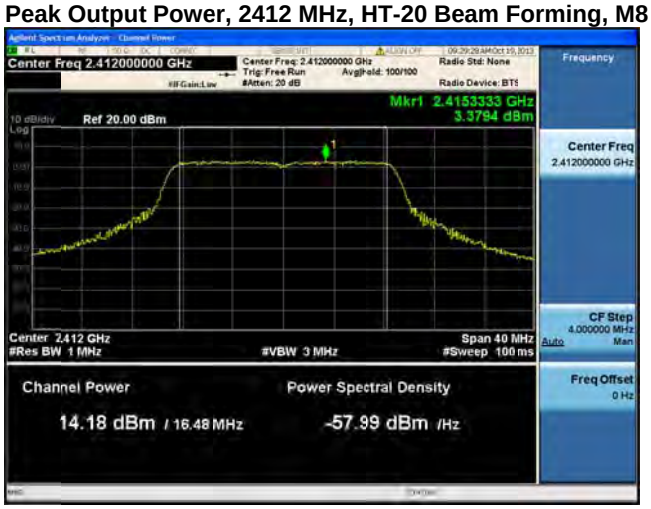
Peak Output Power, 2412 MHz, HT-20 Beam Forming, M0 to M7



Antenna A

Antenna B

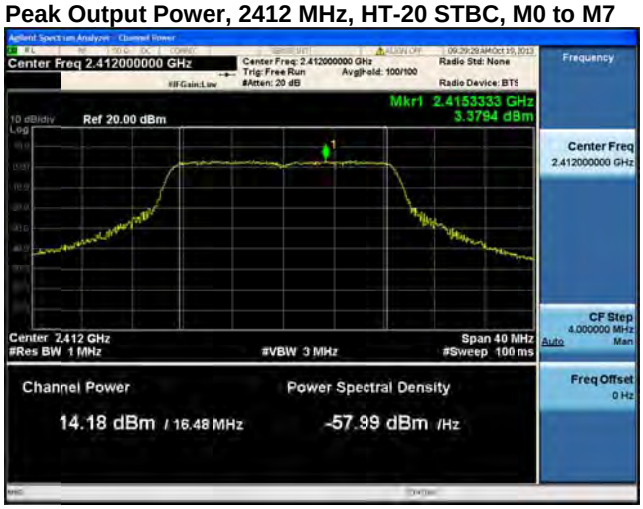
Peak Output Power, 2412 MHz, HT-20 Beam Forming, M8 to M15



Antenna A

Antenna B

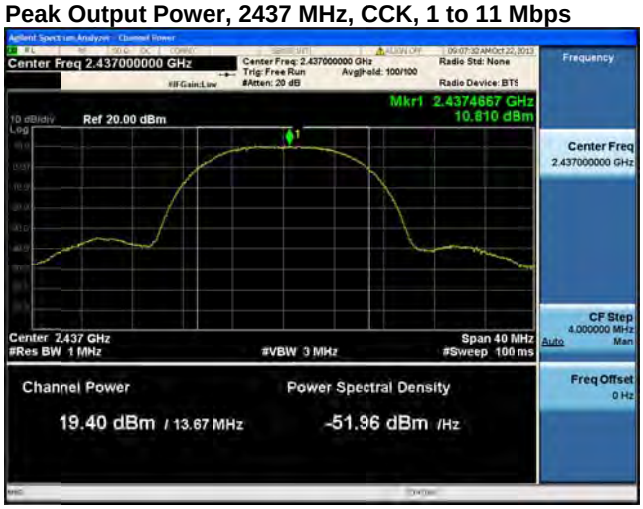
Peak Output Power, 2412 MHz, HT-20 STBC, M0 to M7



Antenna A

Antenna B

Peak Output Power, 2437 MHz, CCK, 1 to 11 Mbps



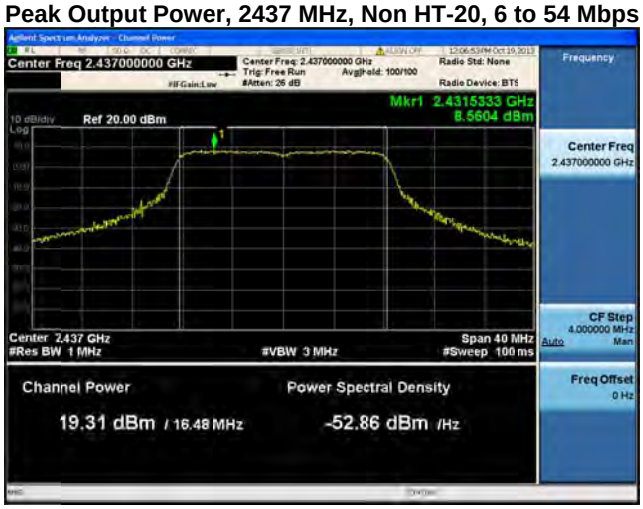
Antenna A

Peak Output Power, 2437 MHz, CCK, 1 to 11 Mbps

Antenna A

Antenna B

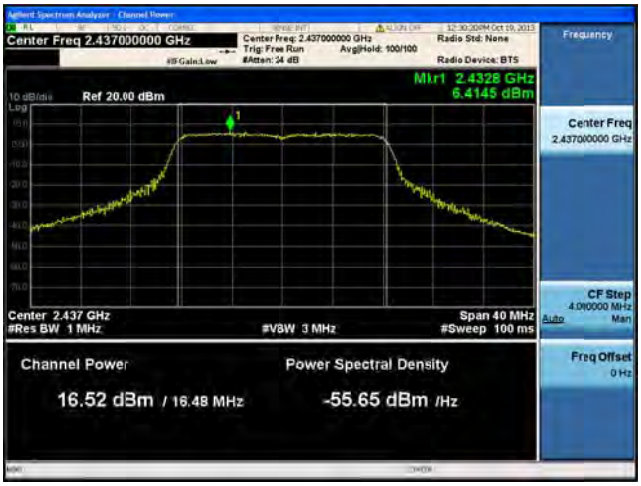
Peak Output Power, 2437 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

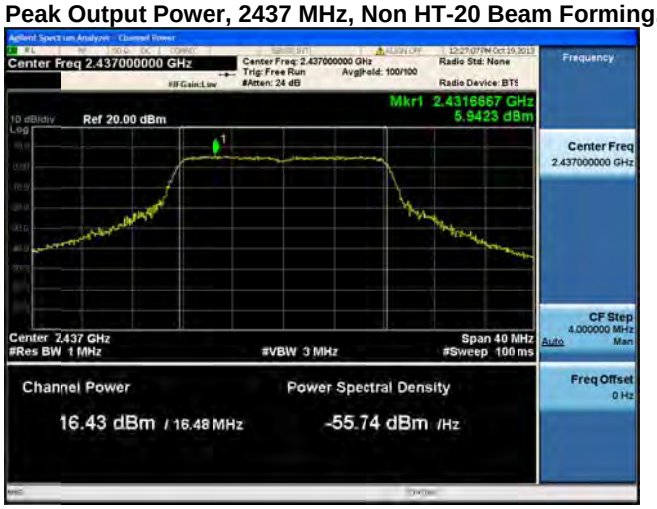
Peak Output Power, 2437 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

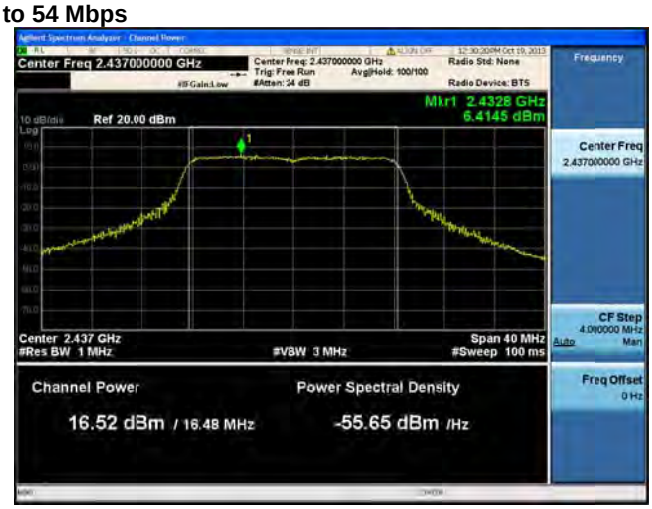


Antenna B

Peak Output Power, 2437 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

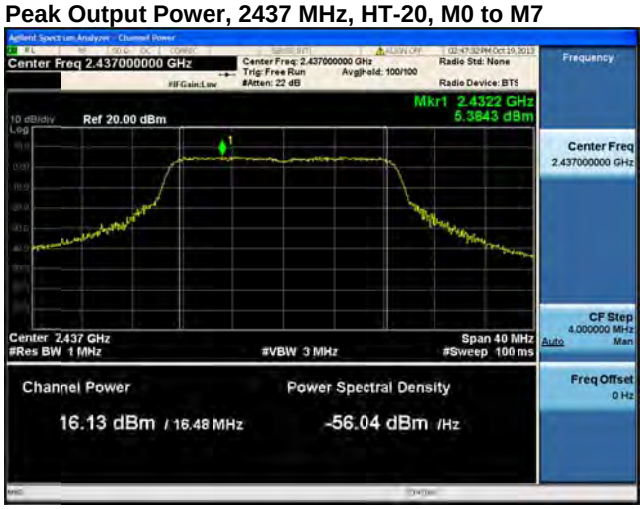


Antenna A



Antenna B

Peak Output Power, 2437 MHz, HT-20, M0 to M7



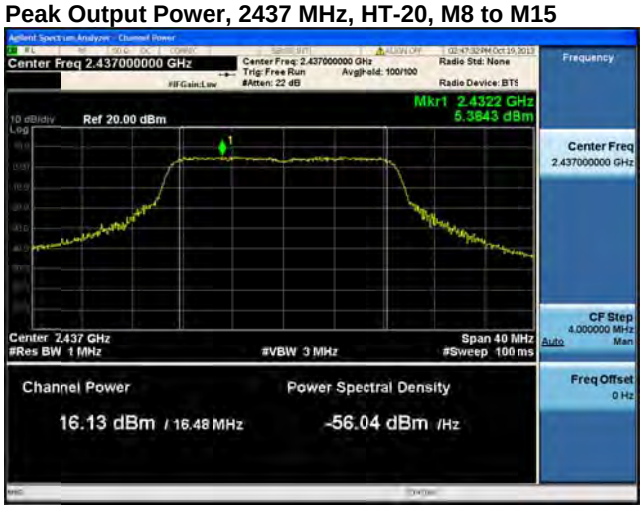
Antenna A

Peak Output Power, 2437 MHz, HT-20, M0 to M7

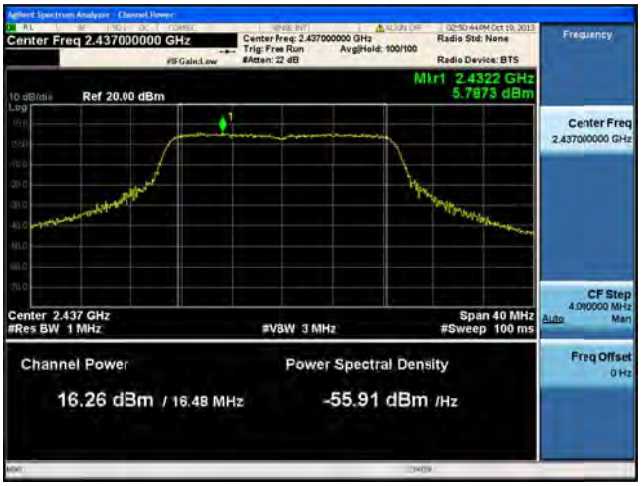
Antenna A

Antenna B

Peak Output Power, 2437 MHz, HT-20, M8 to M15

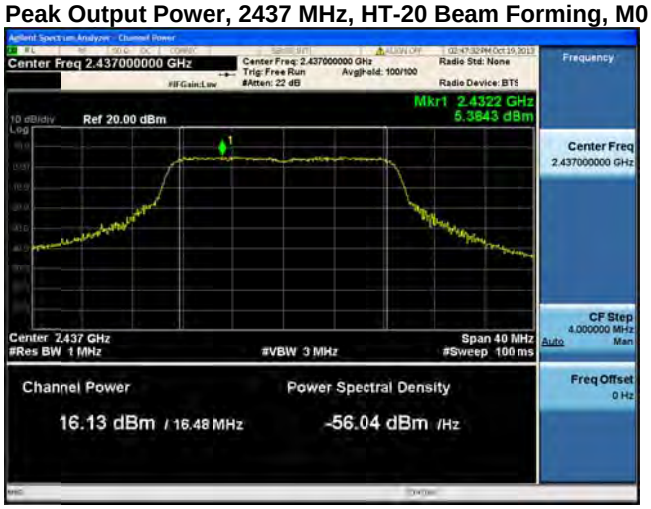


Antenna A



Antenna B

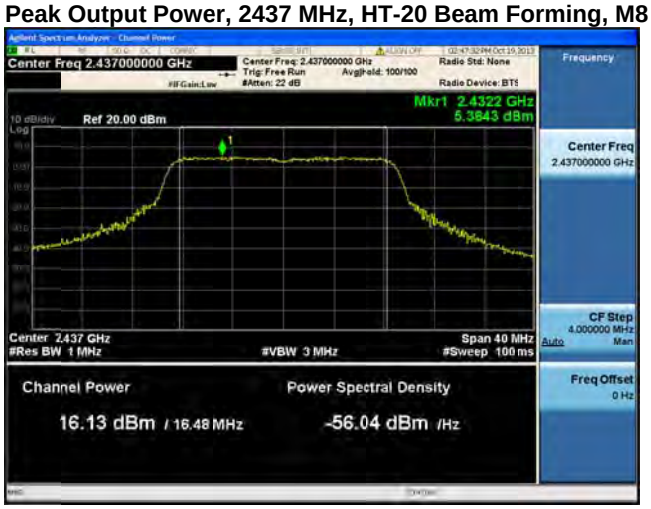
Peak Output Power, 2437 MHz, HT-20 Beam Forming, M0 to M7



Antenna A

Antenna B

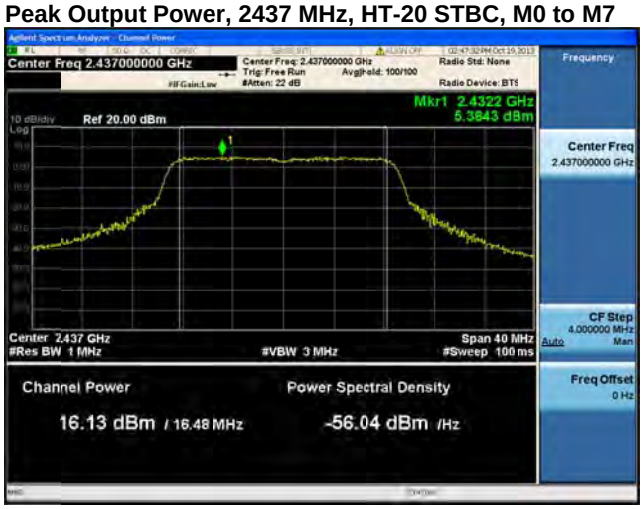
Peak Output Power, 2437 MHz, HT-20 Beam Forming, M8 to M15



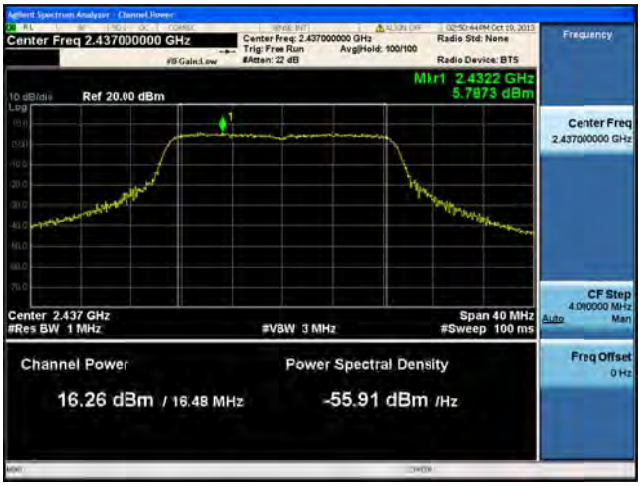
Antenna A

Antenna B

Peak Output Power, 2437 MHz, HT-20 STBC, M0 to M7

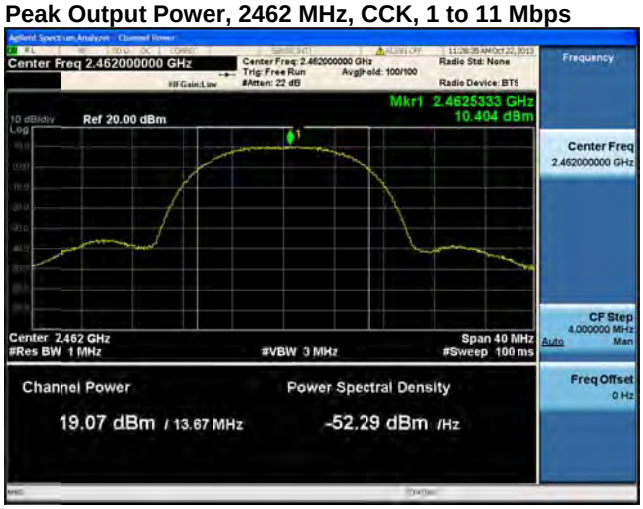


Antenna A



Antenna B

Peak Output Power, 2462 MHz, CCK, 1 to 11 Mbps



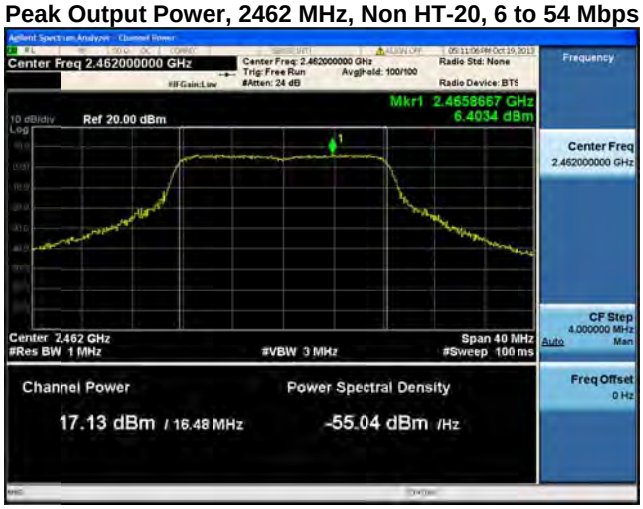
Antenna A

Peak Output Power, 2462 MHz, CCK, 1 to 11 Mbps

Antenna A

Antenna B

Peak Output Power, 2462 MHz, Non HT-20, 6 to 54 Mbps



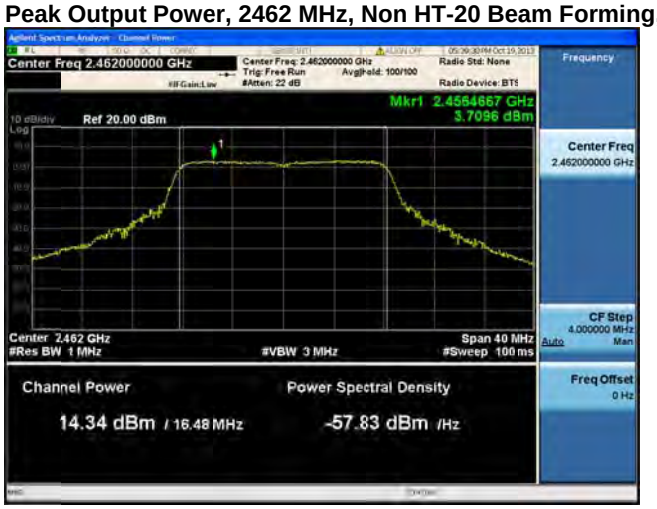
Antenna A

Peak Output Power, 2462 MHz, Non HT-20, 6 to 54 Mbps

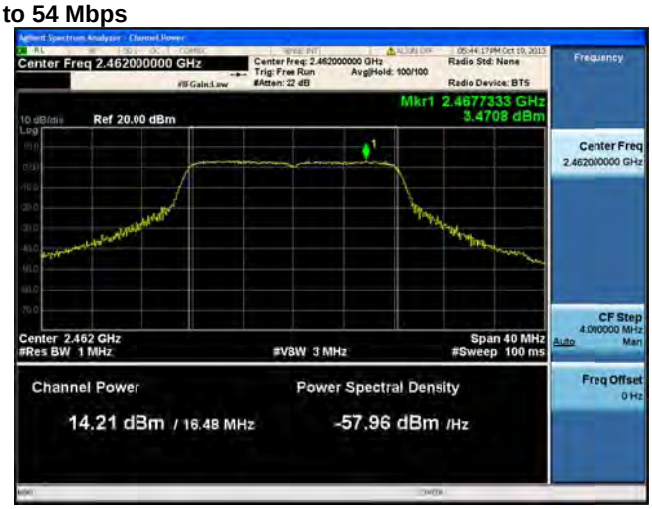
Antenna A

Antenna B

Peak Output Power, 2462 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

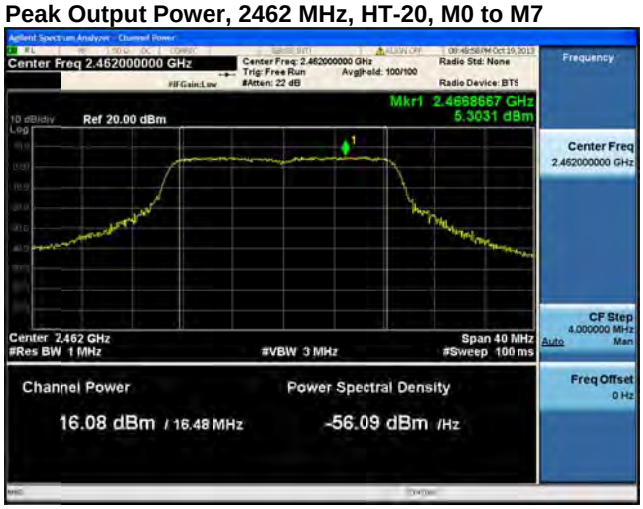


Antenna A



Antenna B

Peak Output Power, 2462 MHz, HT-20, M0 to M7



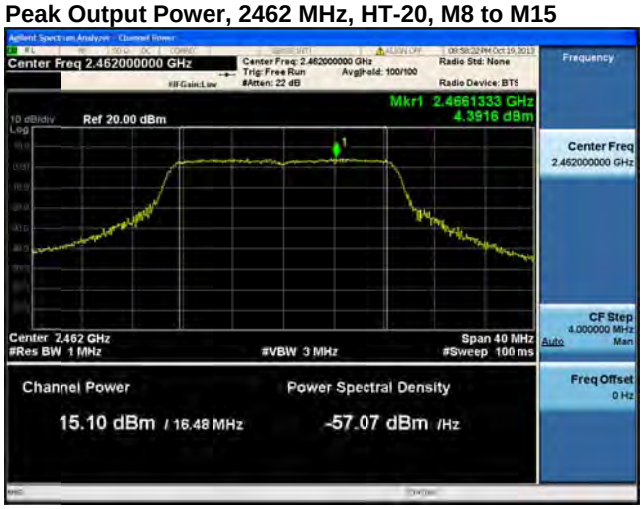
Antenna A

Peak Output Power, 2462 MHz, HT-20, M0 to M7

Antenna A

Antenna B

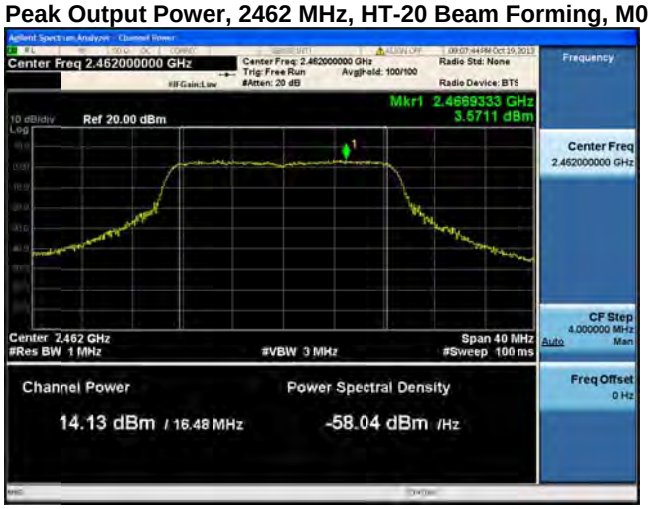
Peak Output Power, 2462 MHz, HT-20, M8 to M15



Antenna A

Antenna B

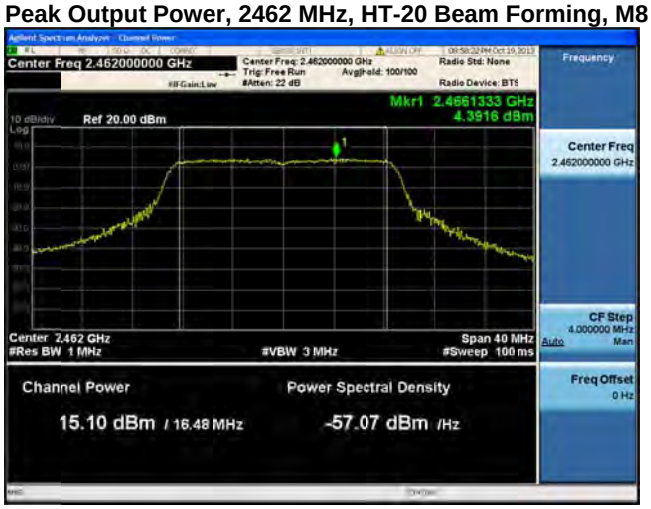
Peak Output Power, 2462 MHz, HT-20 Beam Forming, M0 to M7



Antenna A

Antenna B

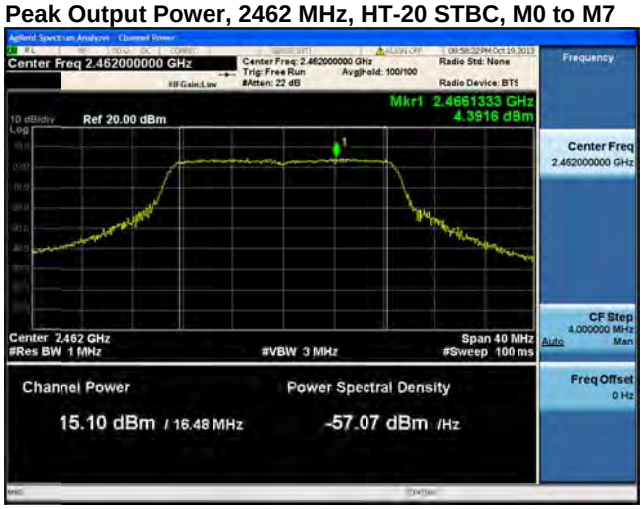
Peak Output Power, 2462 MHz, HT-20 Beam Forming, M8 to M15



Antenna A

Antenna B

Peak Output Power, 2462 MHz, HT-20 STBC, M0 to M7



Antenna A

Antenna B

Power Spectral Density

15.247 / RSS-210 A8.2: For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below.

Center Frequency:	Frequency from table below
Span:	20 MHz
Ref Level Offset:	Correct for attenuator and cable loss.
Reference Level:	20 dBm
Attenuation:	20 dB
Sweep Time:	10s
Resolution Bandwidth:	3 kHz
Video Bandwidth:	10 kHz
Detector:	Peak
Trace:	Single
Marker:	Peak Search

Record the Marker value.

The “Measure and add 10 log(N) dB technique”, where N is the number of outputs, is used for measuring in-band Power Spectral Density. With this technique, spectrum measurements are performed at each output of the device, and the quantity 10 log(4) (or 6dB) is added to the worst case spectrum value before comparing to the emission limit.

Frequency (MHz)	Mode	Data Rate (Mbps)	PSD / Antenna (dBm/3kHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
2412	CCK, 1 to 11 Mbps	11	-7.6	-4.6	8.0	12.6
	Non HT-20, 6 to 54 Mbps	6	-10.3	-7.3	8.0	15.3
	HT-20, M0 to M23	m0	-11.3	-8.3	8.0	16.3
2437	CCK, 1 to 11 Mbps	11	-7.5	-4.5	8.0	12.5
	Non HT-20, 6 to 54 Mbps	6	-11.6	-8.6	8.0	16.6
	HT-20, M0 to M23	m0	-11.2	-8.2	8.0	16.2
2462	CCK, 1 to 11 Mbps	11	-7.9	-4.9	8.0	12.9
	Non HT-20, 6 to 54 Mbps	6	-11.6	-8.6	8.0	16.6
	HT-20, M0 to M23	m0	-11	-8.0	8.0	16.0

Power Spectral Density, 2412 MHz, CCK, 1 to 11 Mbps

Power Spectral Density, 2412 MHz, Non HT-20, 6 to 54 Mbps

Power Spectral Density, 2412 MHz, HT-20, M0 to M23

Power Spectral Density, 2437 MHz, CCK, 1 to 11 Mbps

Power Spectral Density, 2437 MHz, Non HT-20, 6 to 54 Mbps

Power Spectral Density, 2437 MHz, HT-20, M0 to M23

Power Spectral Density, 2462 MHz, CCK, 1 to 11 Mbps

Power Spectral Density, 2462 MHz, Non HT-20, 6 to 54 Mbps

Power Spectral Density, 2462 MHz, HT-20, M0 to M23

Conducted Spurious Emissions

15.247 / RSS-210 A8.5: In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	30 MHz-26 GHz
Reference Level:	20 dBm
Attenuation;	10 dB
Sweep Time:	5s
Resolution Bandwidth:	100 kHz
Video Bandwidth:	300 kHz
Detector:	Peak
Trace:	Single
Marker:	Peak

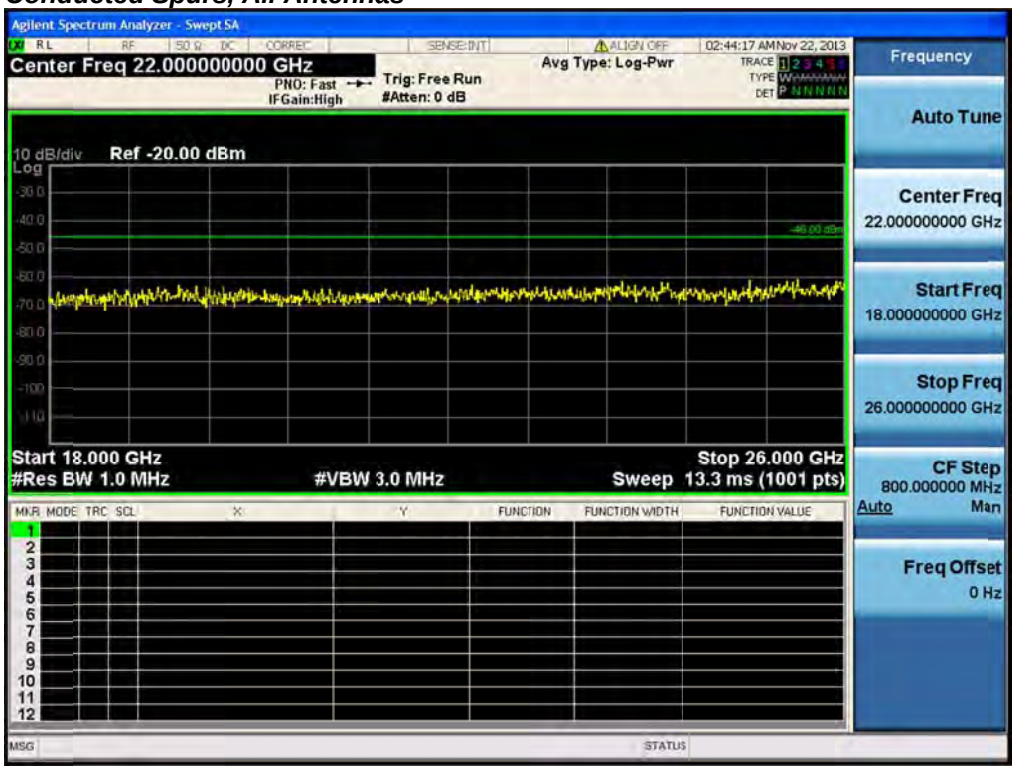
Record the marker waveform peak to spur difference

Out-of-band and spurious emissions tests are performed on each output individually without summing or adding 10 log(N) since the measurements are made relative to the in-band emissions on the individual outputs. The worst case output is recorded.

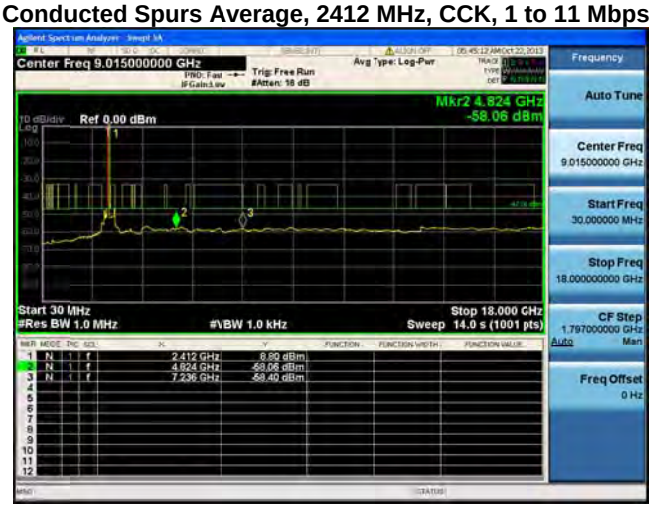
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Total Conducted Spur (dBm)	Limit (dBm)	MargIn (dB)
2412	CCK, 1 to 11 Mbps	1	2	-58.1		-56.1	-41.25	14.9
	CCK, 1 to 11 Mbps	2	2	-58.5	-58.5	-53.5	-41.25	12.2
	Non HT-20, 6 to 54 Mbps	1	2	-58.6		-56.6	-41.25	15.4
	Non HT-20, 6 to 54 Mbps	2	2	-58.5	-58.6	-53.5	-41.25	12.3
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-58.5	-58.5	-50.5	-41.25	9.2
	HT-20, M0 to M7	1	2	-58.5		-56.5	-41.25	15.3
	HT-20, M0 to M7	2	2	-58.4	-58.4	-53.4	-41.25	12.1
	HT-20, M8 to M15	2	2	-58.4	-58.4	-53.4	-41.25	12.1
	HT-20 Beam Forming, M0 to M7	2	5	-58.5	-58.6	-50.5	-41.25	9.3
	HT-20 Beam Forming, M8 to M15	2	2	-58.4	-58.4	-53.4	-41.25	12.1
	HT-20 STBC, M0 to M7	2	2	-58.4	-58.4	-53.4	-41.25	12.1
2437	CCK, 1 to 11 Mbps	1	2	-56.1		-54.1	-41.25	12.9
	CCK, 1 to 11 Mbps	2	2	-57.8	-57.7	-52.7	-41.25	11.5
	Non HT-20, 6 to 54 Mbps	1	2	-55.7		-53.7	-41.25	12.5
	Non HT-20, 6 to 54 Mbps	2	2	-57.8	-57.8	-52.8	-41.25	11.5
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-57.8	-57.8	-49.8	-41.25	8.5
	HT-20, M0 to M7	1	2	-57.8		-55.8	-41.25	14.6
	HT-20, M0 to M7	2	2	-57.8	-57.8	-52.8	-41.25	11.5
	HT-20, M8 to M15	2	2	-57.8	-57.8	-52.8	-41.25	11.5
	HT-20 Beam Forming, M0 to M7	2	5	-57.8	-57.8	-49.8	-41.25	8.5
	HT-20 Beam Forming, M8 to M15	2	2	-57.8	-57.8	-52.8	-41.25	11.5
	HT-20 STBC, M0 to M7	2	2	-57.8	-57.8	-52.8	-41.25	11.5
2462	CCK, 1 to 11 Mbps	1	2	-55.8		-53.8	-41.25	12.6
	CCK, 1 to 11 Mbps	2	2	-58.0	-57.7	-52.8	-41.25	11.6
	Non HT-20, 6 to 54 Mbps	1	2	-58.1		-56.1	-41.25	14.9
	Non HT-20, 6 to 54 Mbps	2	2	-57.9	-58.0	-52.9	-41.25	11.7
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-58.0	-58.2	-50.1	-41.25	8.8
	HT-20, M0 to M7	1	2	-58.1		-56.1	-41.25	14.9
	HT-20, M0 to M7	2	2	-58.1	-58.3	-53.2	-41.25	11.9
	HT-20, M8 to M15	2	2	-58.1	-58.3	-53.2	-41.25	11.9
	HT-20 Beam Forming, M0 to M7	2	5	-58.3	-58.1	-50.2	-41.25	8.9
	HT-20 Beam Forming, M8 to M15	2	2	-58.1	-58.3	-53.2	-41.25	11.9
	HT-20 STBC, M0 to M7	2	2	-58.1	-58.3	-53.2	-41.25	11.9

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Total Conducted Spur (dBm)	Limit (dBm)	MargIn (dB)
2412	CCK, 1 to 11 Mbps	1	2	-61.8		-59.8	-27	32.8
	CCK, 1 to 11 Mbps	2	2	-62.0	-61.1	-56.5	-27	29.5
	Non HT-20, 6 to 54 Mbps	1	2	-62.1		-60.1	-27	33.1
	Non HT-20, 6 to 54 Mbps	2	2	-63.2	-62.3	-57.7	-27	30.7
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-60.9	-63.3	-53.9	-27	26.9
	HT-20, M0 to M7	1	2	-61.3		-59.3	-27	32.3
	HT-20, M0 to M7	2	2	-62.6	-63.4	-58.0	-27	31.0
	HT-20, M8 to M15	2	2	-62.6	-63.4	-58.0	-27	31.0
	HT-20 Beam Forming, M0 to M7	2	5	-62.5	-62.4	-54.4	-27	27.4
	HT-20 Beam Forming, M8 to M15	2	2	-62.6	-63.4	-58.0	-27	31.0
	HT-20 STBC, M0 to M7	2	2	-62.6	-63.4	-58.0	-27	31.0
2437	CCK, 1 to 11 Mbps	1	2	-63.2		-61.2	-27	34.2
	CCK, 1 to 11 Mbps	2	2	-62.2	-62.6	-57.4	-27	30.4
	Non HT-20, 6 to 54 Mbps	1	2	-61.0		-59.0	-27	32.0
	Non HT-20, 6 to 54 Mbps	2	2	-59.4	-62.6	-55.7	-27	28.7
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-59.4	-62.6	-52.7	-27	25.7
	HT-20, M0 to M7	1	2	-59.5		-57.5	-27	30.5
	HT-20, M0 to M7	2	2	-59.5	-62.0	-55.6	-27	28.6
	HT-20, M8 to M15	2	2	-59.5	-62.0	-55.6	-27	28.6
	HT-20 Beam Forming, M0 to M7	2	5	-59.5	-62.0	-52.6	-27	25.6
	HT-20 Beam Forming, M8 to M15	2	2	-59.5	-62.0	-55.6	-27	28.6
	HT-20 STBC, M0 to M7	2	2	-59.5	-62.0	-55.6	-27	28.6
2462	CCK, 1 to 11 Mbps	1	2	-61.5		-59.5	-27	32.5
	CCK, 1 to 11 Mbps	2	2	-61.3	-59.8	-55.5	-27	28.5
	Non HT-20, 6 to 54 Mbps	1	2	-63.5		-61.5	-27	34.5
	Non HT-20, 6 to 54 Mbps	2	2	-61.4	-61.4	-56.4	-27	29.4
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-61.6	-60.6	-53.1	-27	26.1
	HT-20, M0 to M7	1	2	-61.9		-59.9	-27	32.9
	HT-20, M0 to M7	2	2	-61.8	-62.2	-57.0	-27	30.0
	HT-20, M8 to M15	2	2	-61.8	-62.2	-57.0	-27	30.0
	HT-20 Beam Forming, M0 to M7	2	5	-61.6	-62.2	-53.9	-27	26.9
	HT-20 Beam Forming, M8 to M15	2	2	-61.8	-62.2	-57.0	-27	30.0
	HT-20 STBC, M0 to M7	2	2	-61.8	-62.2	-57.0	-27	30.0

Conducted Spurs, All Antennas



Conducted Spurs Average, 2412 MHz, CCK, 1 to 11 Mbps



Antenna A

Conducted Spurs Average, 2412 MHz, CCK, 1 to 11 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2412 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Conducted Spurs Average, 2412 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2412 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2412 MHz, HT-20, M0 to M7

Antenna A

Conducted Spurs Average, 2412 MHz, HT-20, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2412 MHz, HT-20, M8 to M15

Antenna A

Antenna B

Conducted Spurs Average, 2412 MHz, HT-20 Beam Forming, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2412 MHz, HT-20 Beam Forming, M8 to M15

Antenna A

Antenna B

Conducted Spurs Average, 2412 MHz, HT-20 STBC, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, CCK, 1 to 11 Mbps

Antenna A

Conducted Spurs Average, 2437 MHz, CCK, 1 to 11 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Conducted Spurs Average, 2437 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, HT-20, M0 to M7

Antenna A

Conducted Spurs Average, 2437 MHz, HT-20, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, HT-20, M8 to M15

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, HT-20 Beam Forming, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, HT-20 Beam Forming, M8 to M15

Antenna A

Antenna B

Conducted Spurs Average, 2437 MHz, HT-20 STBC, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2462 MHz, CCK, 1 to 11 Mbps

Antenna A

Conducted Spurs Average, 2462 MHz, CCK, 1 to 11 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2462 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Conducted Spurs Average, 2462 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2462 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

Antenna A

Antenna B

Conducted Spurs Average, 2462 MHz, HT-20, M0 to M7

Antenna A

Conducted Spurs Average, 2462 MHz, HT-20, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2462 MHz, HT-20, M8 to M15

Antenna A

Antenna B

Conducted Spurs Average, 2462 MHz, HT-20 Beam Forming, M0 to M7

Antenna A

Antenna B

Conducted Spurs Average, 2462 MHz, HT-20 Beam Forming, M8 to M15

Antenna A

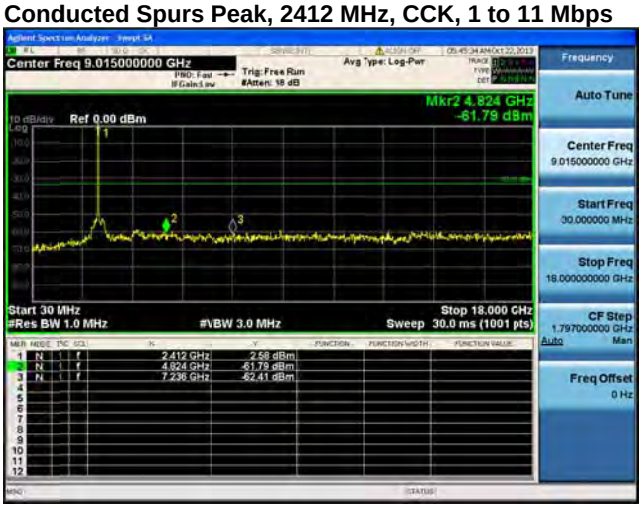
Antenna B

Conducted Spurs Average, 2462 MHz, HT-20 STBC, M0 to M7

Antenna A

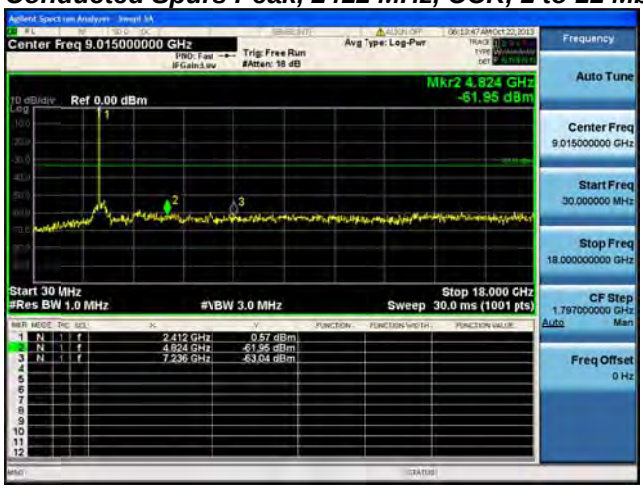
Antenna B

Conducted Spurs Peak, 2412 MHz, CCK, 1 to 11 Mbps

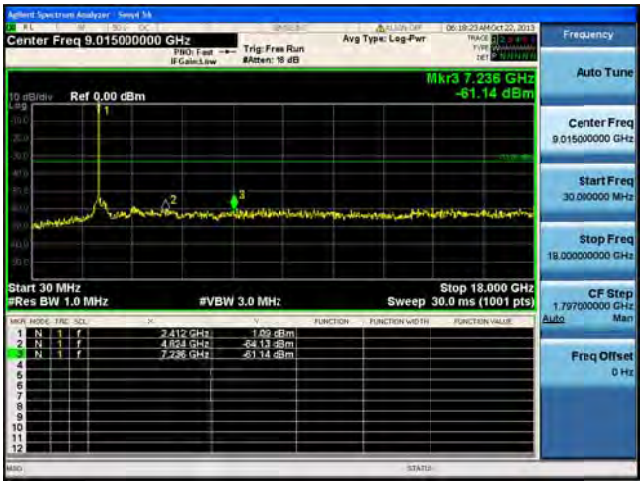


Antenna A

Conducted Spurs Peak, 2412 MHz, CCK, 1 to 11 Mbps

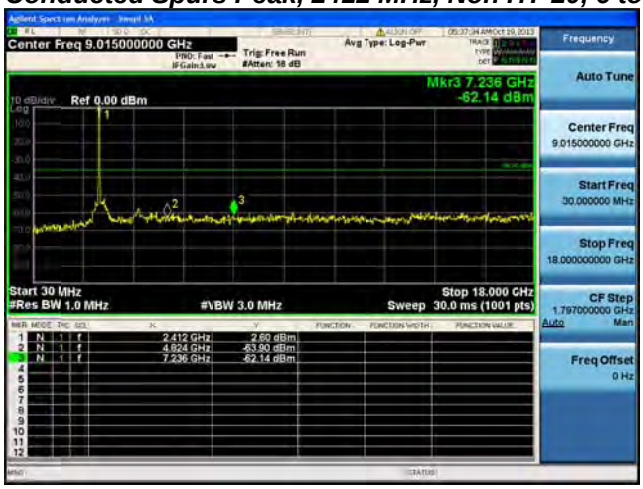


Antenna A



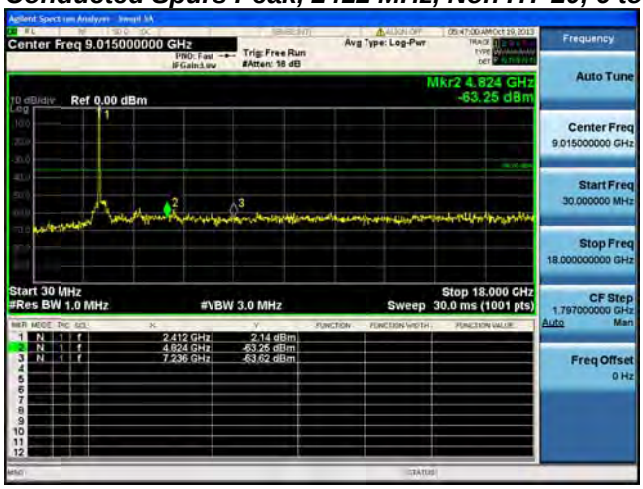
Antenna B

Conducted Spurs Peak, 2412 MHz, Non HT-20, 6 to 54 Mbps

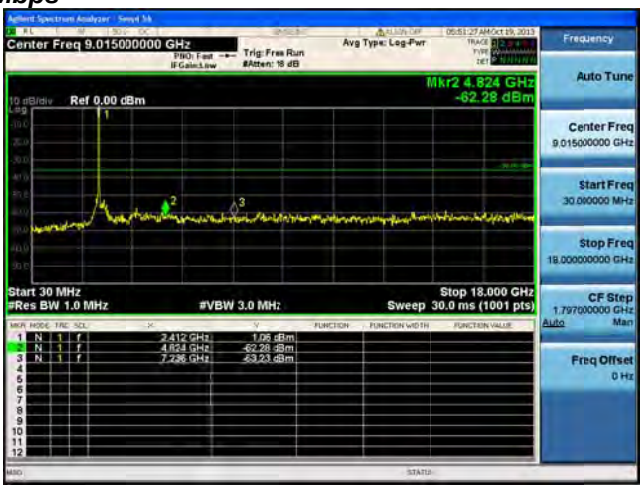


Antenna A

Conducted Spurs Peak, 2412 MHz, Non HT-20, 6 to 54 Mbps

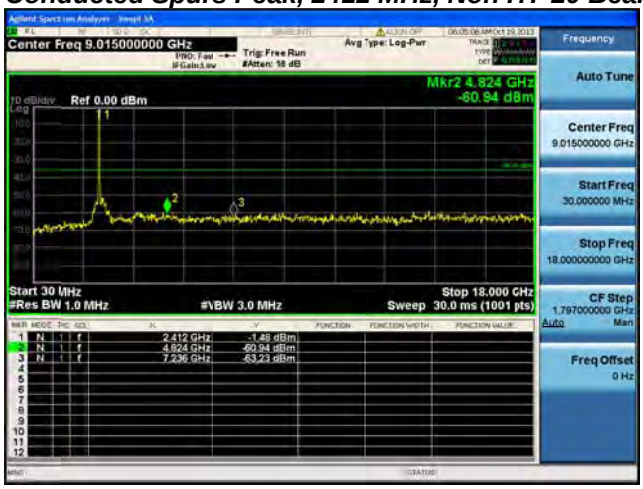


Antenna A

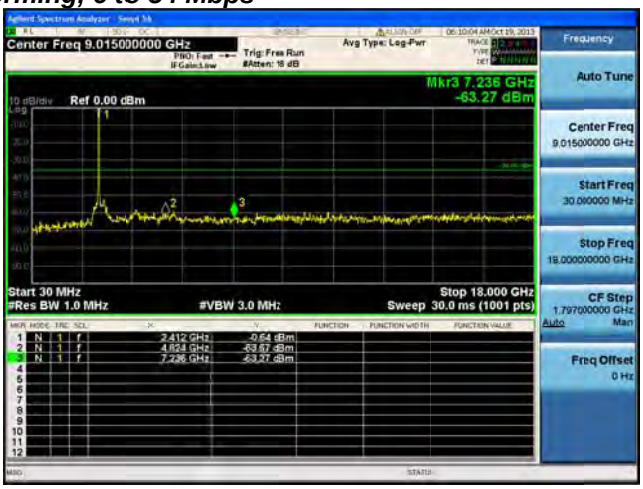


Antenna B

Conducted Spurs Peak, 2412 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

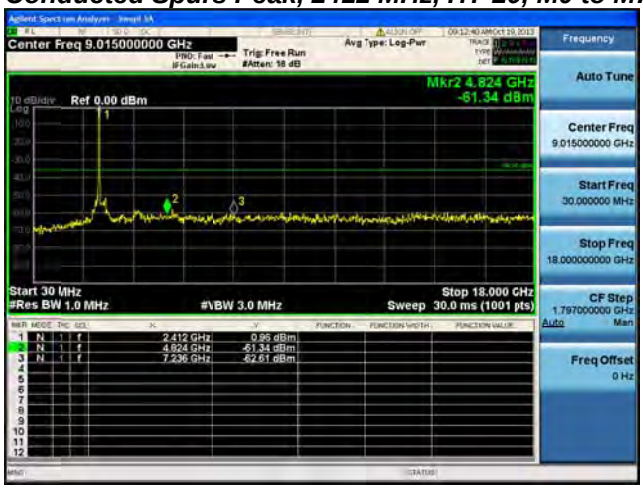


Antenna A



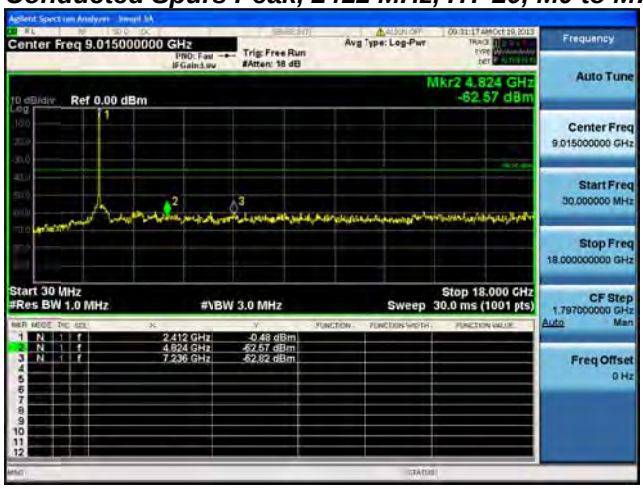
Antenna B

Conducted Spurs Peak, 2412 MHz, HT-20, M0 to M7

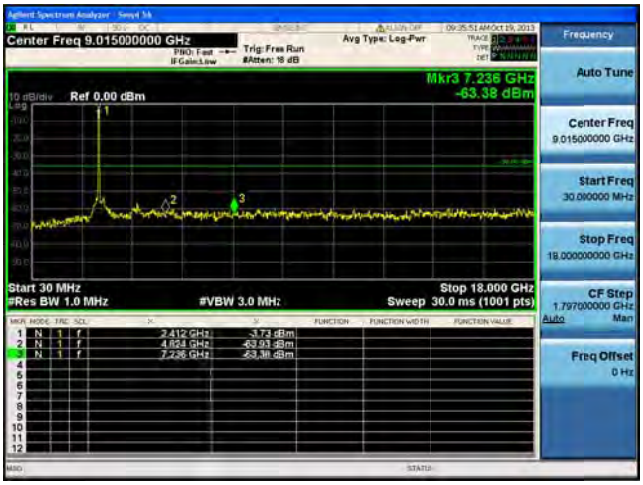


Antenna A

Conducted Spurs Peak, 2412 MHz, HT-20, M0 to M7

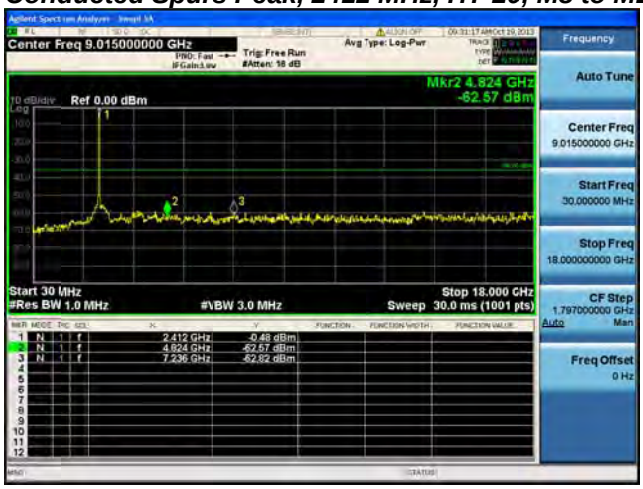


Antenna A

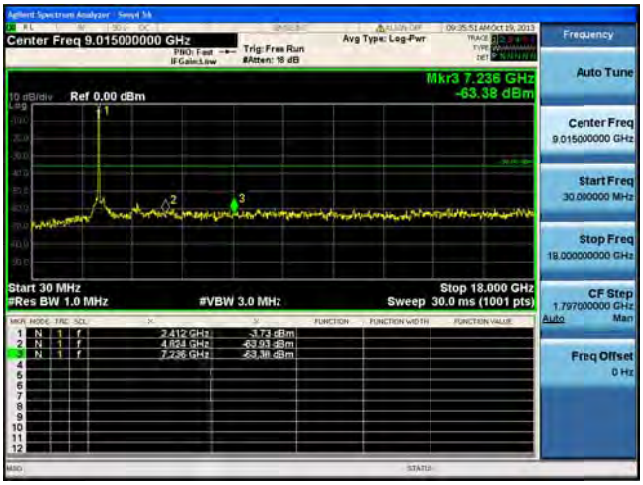


Antenna B

Conducted Spurs Peak, 2412 MHz, HT-20, M8 to M15

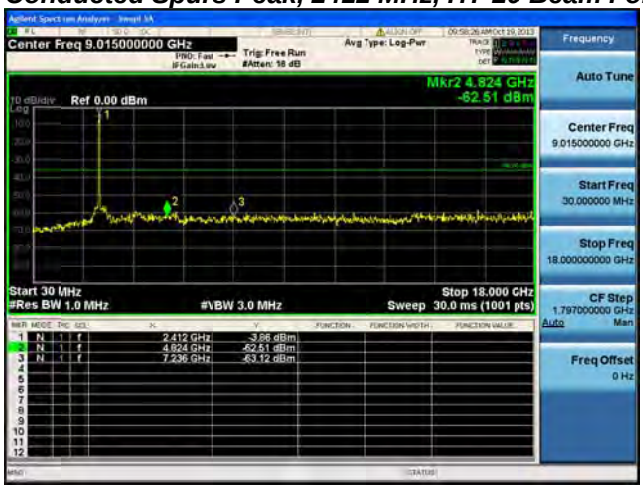


Antenna A

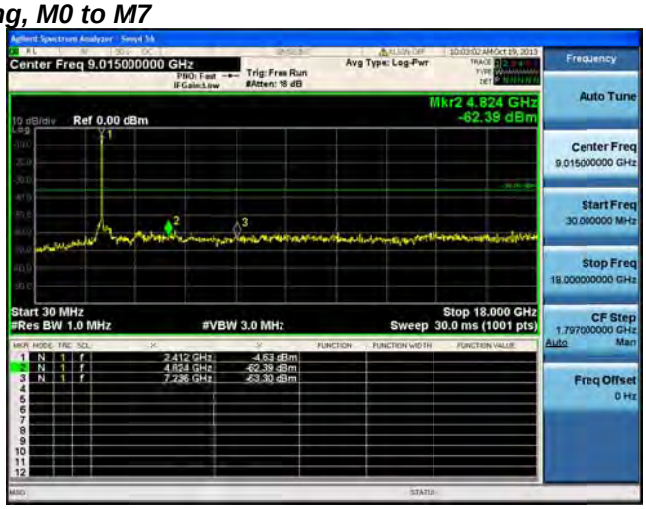


Antenna B

Conducted Spurs Peak, 2412 MHz, HT-20 Beam Forming, M0 to M7

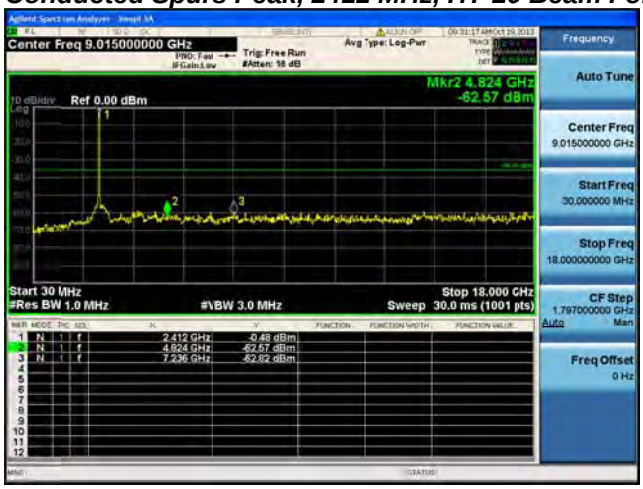


Antenna A

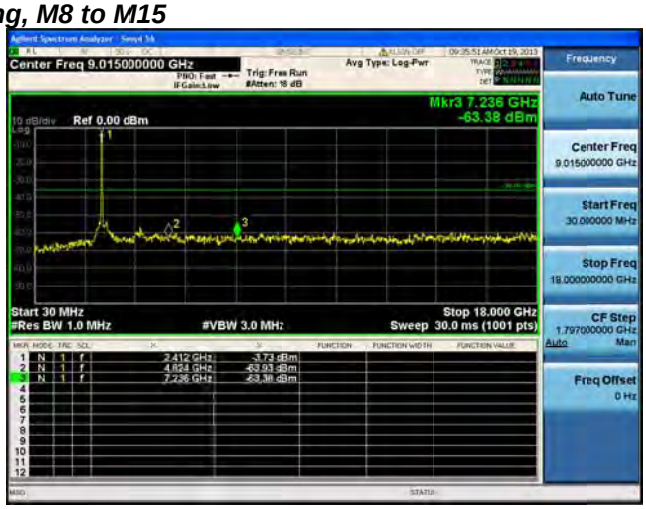


Antenna B

Conducted Spurs Peak, 2412 MHz, HT-20 Beam Forming, M8 to M15

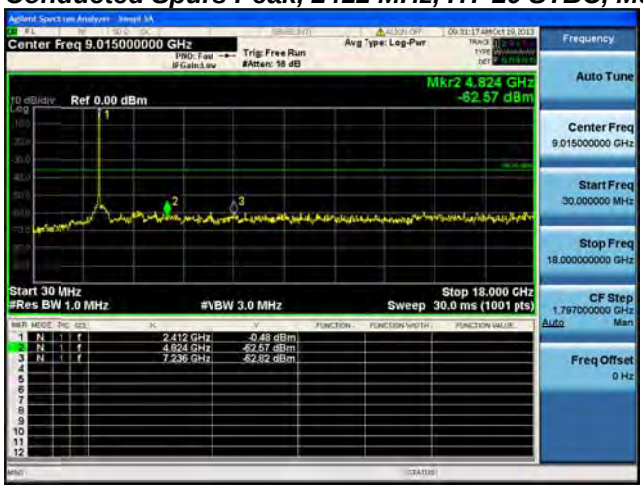


Antenna A

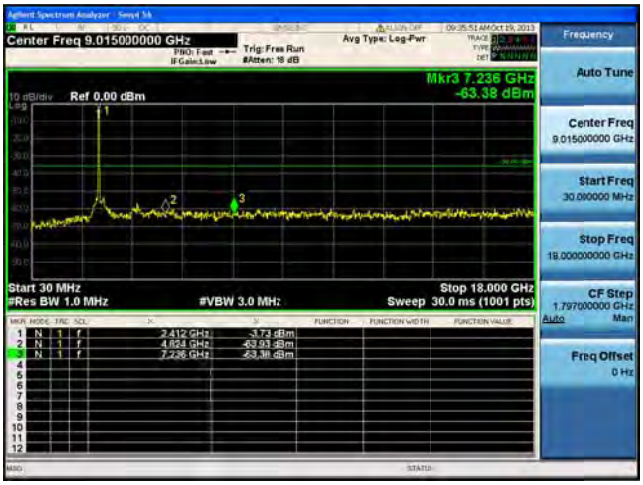


Antenna B

Conducted Spurs Peak, 2412 MHz, HT-20 STBC, M0 to M7

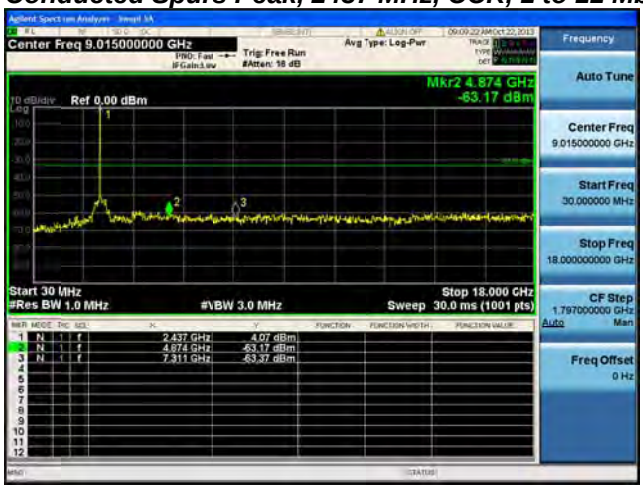


Antenna A



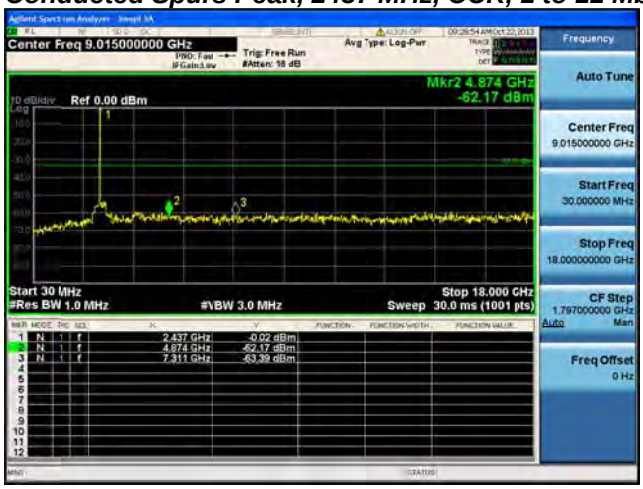
Antenna B

Conducted Spurs Peak, 2437 MHz, CCK, 1 to 11 Mbps

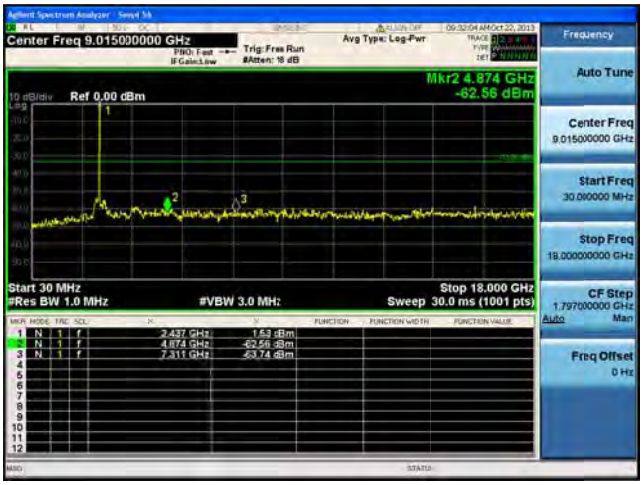


Antenna A

Conducted Spurs Peak, 2437 MHz, CCK, 1 to 11 Mbps

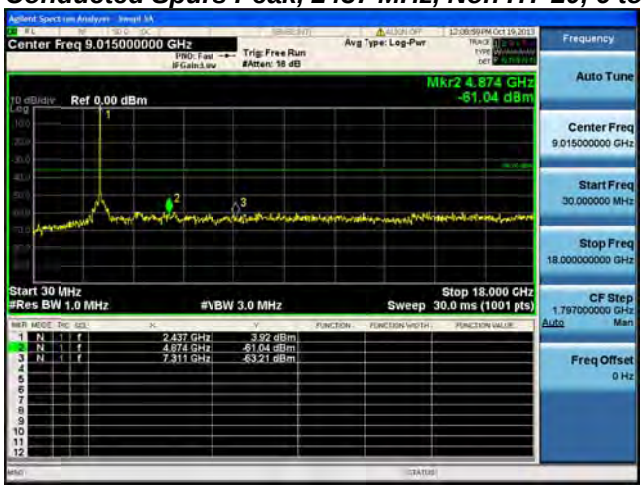


Antenna A



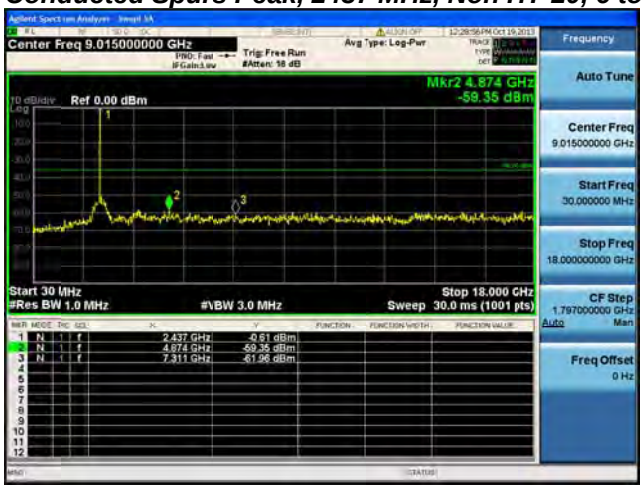
Antenna B

Conducted Spurs Peak, 2437 MHz, Non HT-20, 6 to 54 Mbps

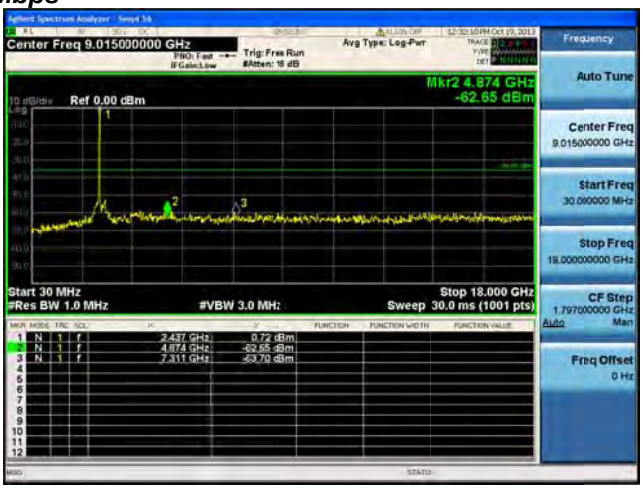


Antenna A

Conducted Spurs Peak, 2437 MHz, Non HT-20, 6 to 54 Mbps

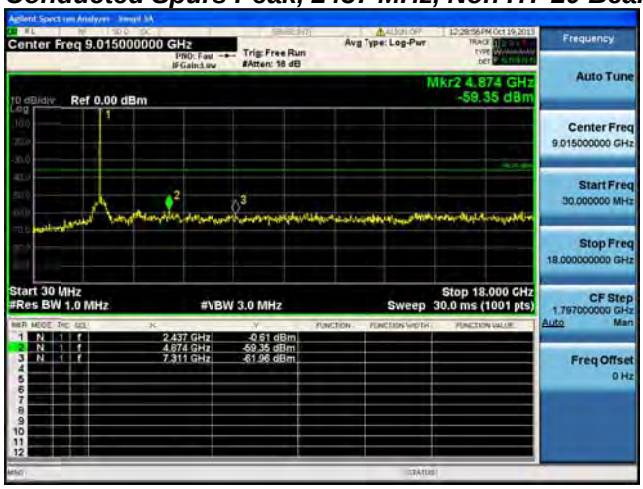


Antenna A

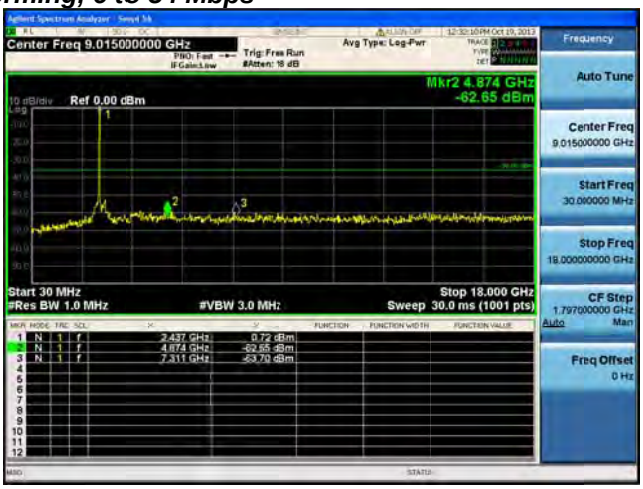


Antenna B

Conducted Spurs Peak, 2437 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

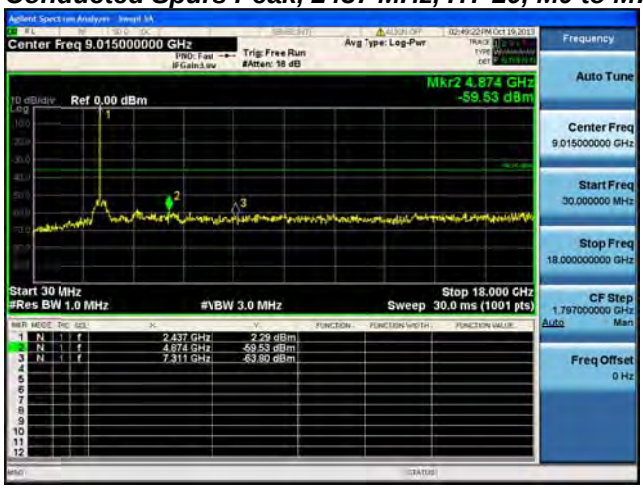


Antenna A



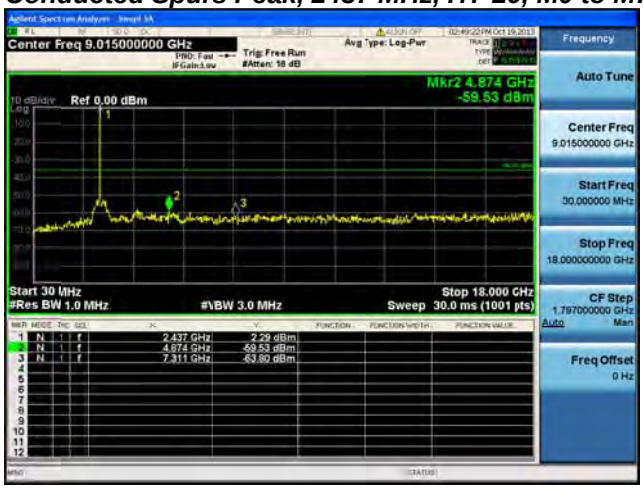
Antenna B

Conducted Spurs Peak, 2437 MHz, HT-20, M0 to M7

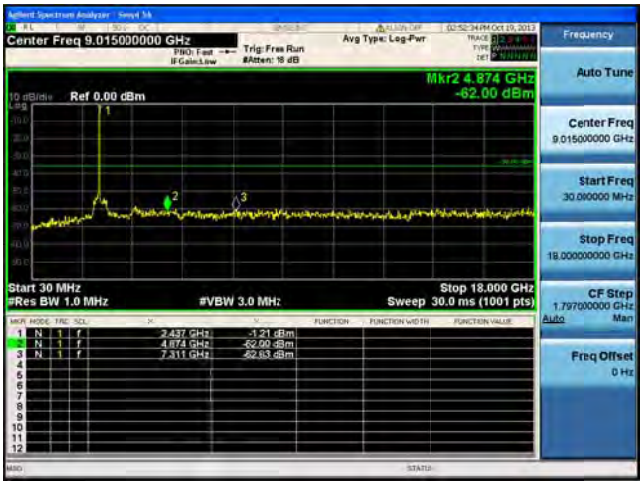


Antenna A

Conducted Spurs Peak, 2437 MHz, HT-20, M0 to M7

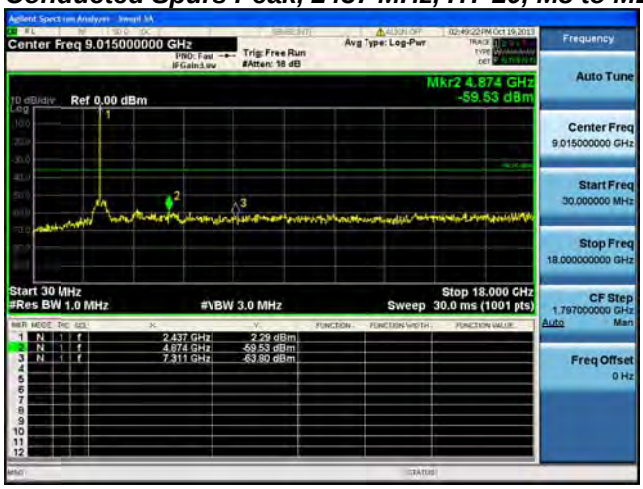


Antenna A

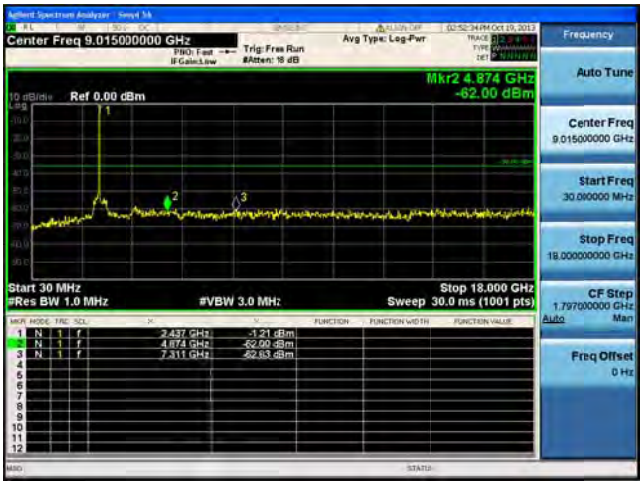


Antenna B

Conducted Spurs Peak, 2437 MHz, HT-20, M8 to M15

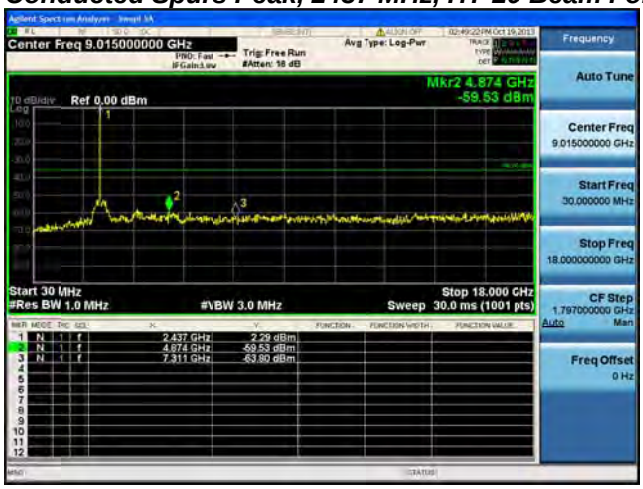


Antenna A

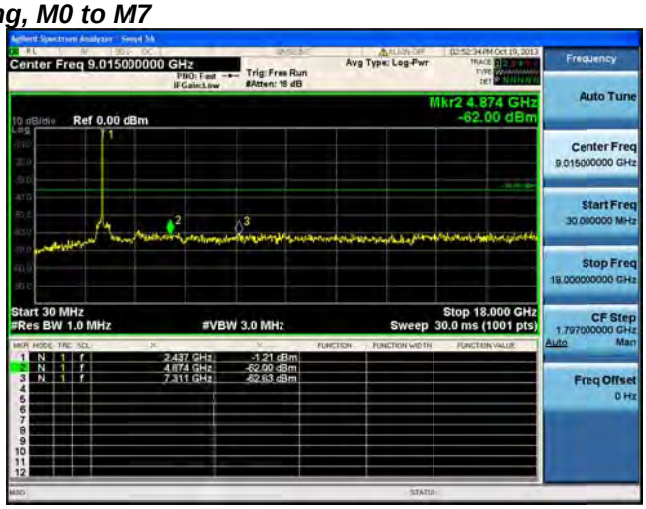


Antenna B

Conducted Spurs Peak, 2437 MHz, HT-20 Beam Forming, M0 to M7

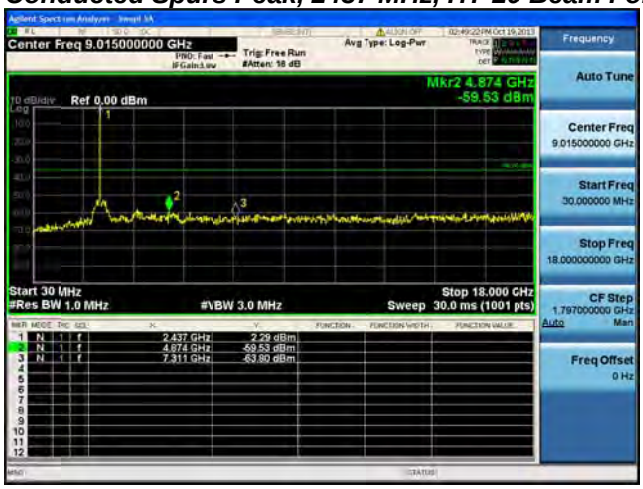


Antenna A

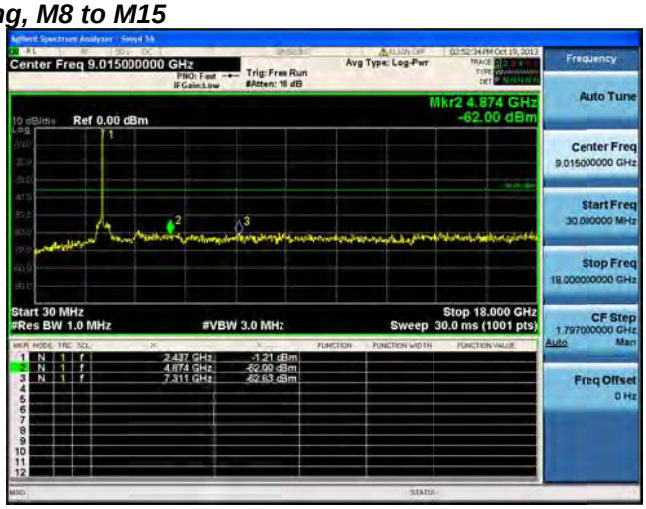


Antenna B

Conducted Spurs Peak, 2437 MHz, HT-20 Beam Forming, M8 to M15

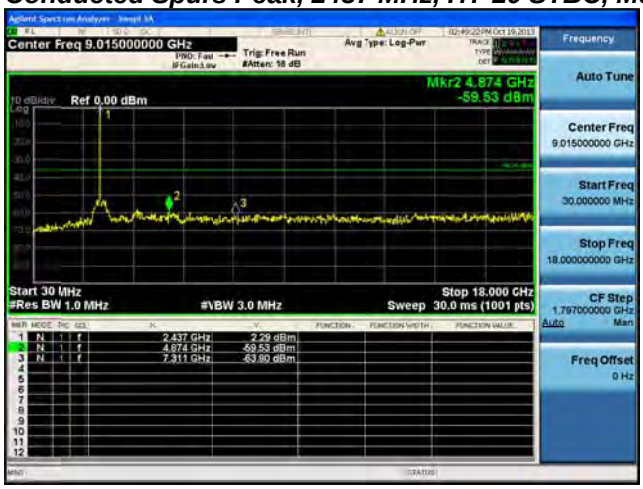


Antenna A

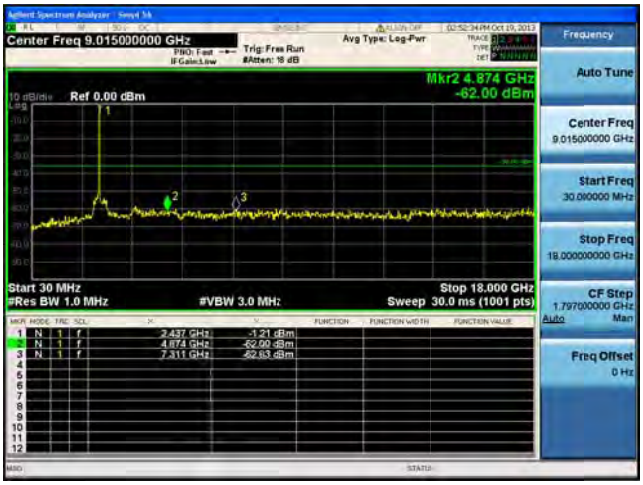


Antenna B

Conducted Spurs Peak, 2437 MHz, HT-20 STBC, M0 to M7

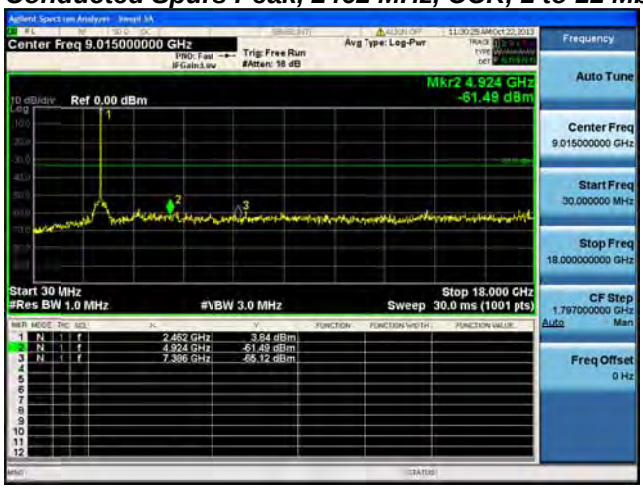


Antenna A



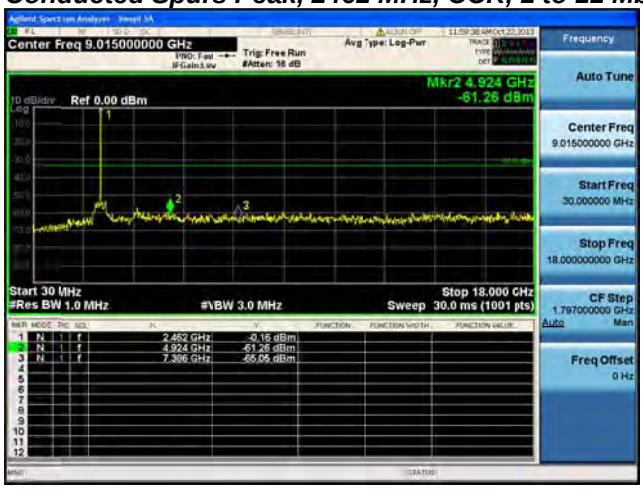
Antenna B

Conducted Spurs Peak, 2462 MHz, CCK, 1 to 11 Mbps

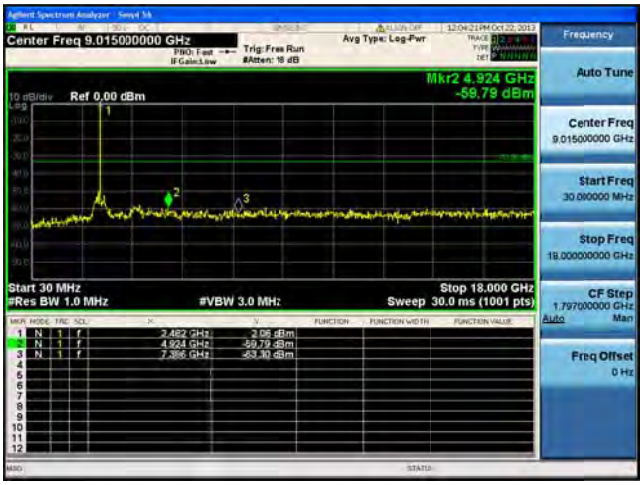


Antenna A

Conducted Spurs Peak, 2462 MHz, CCK, 1 to 11 Mbps

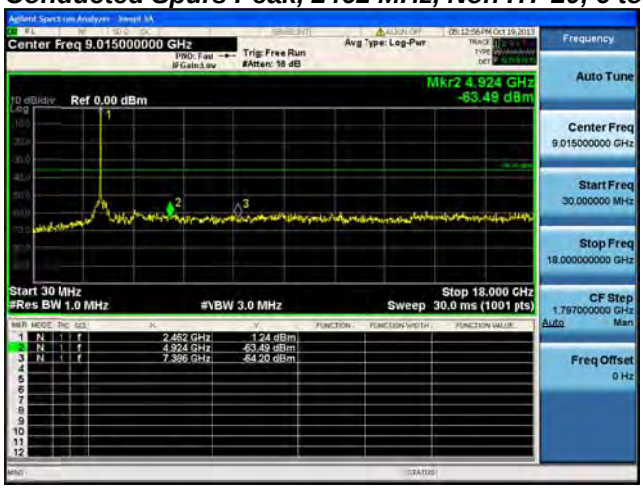


Antenna A



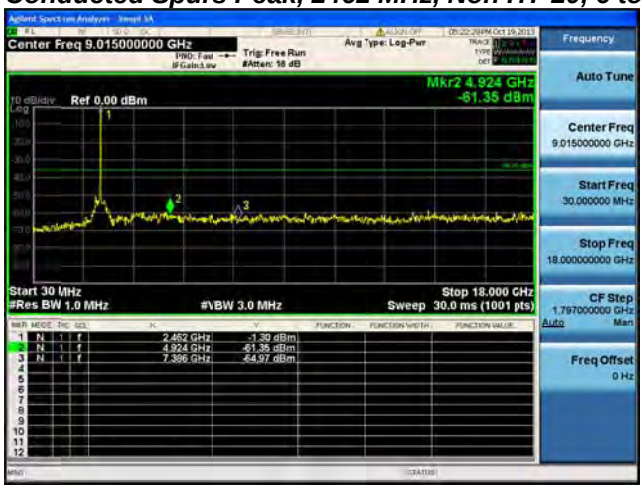
Antenna B

Conducted Spurs Peak, 2462 MHz, Non HT-20, 6 to 54 Mbps

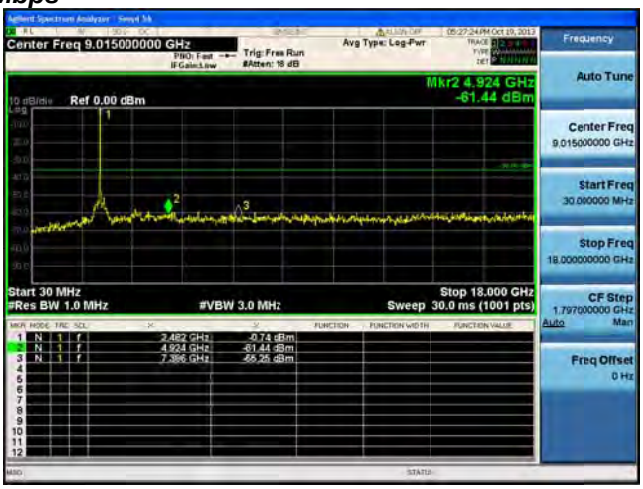


Antenna A

Conducted Spurs Peak, 2462 MHz, Non HT-20, 6 to 54 Mbps

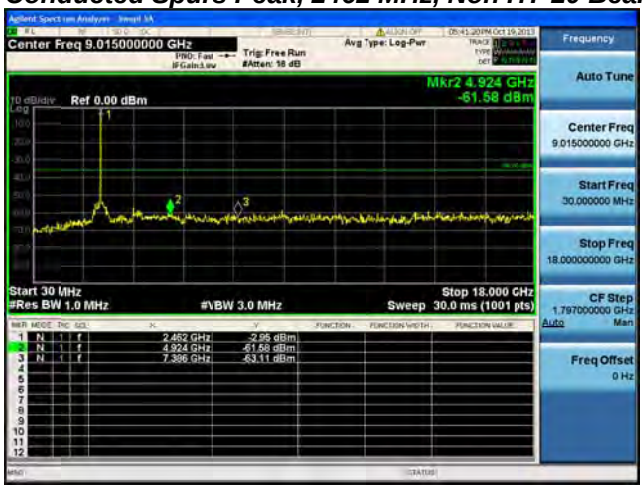


Antenna A

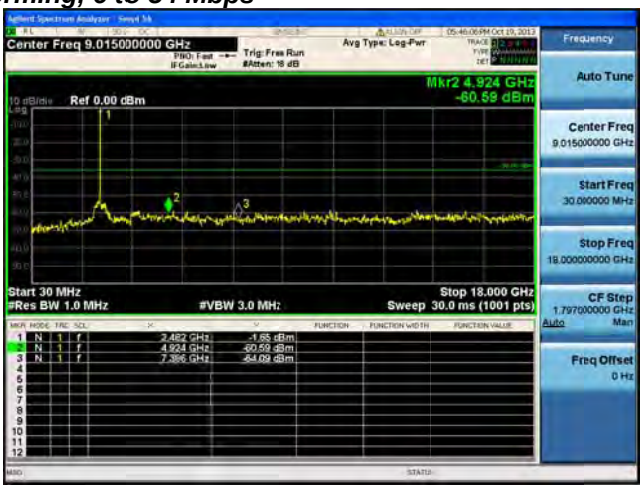


Antenna B

Conducted Spurs Peak, 2462 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

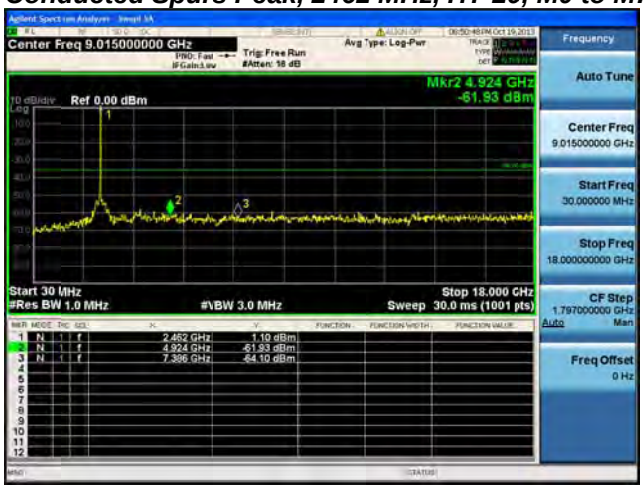


Antenna A



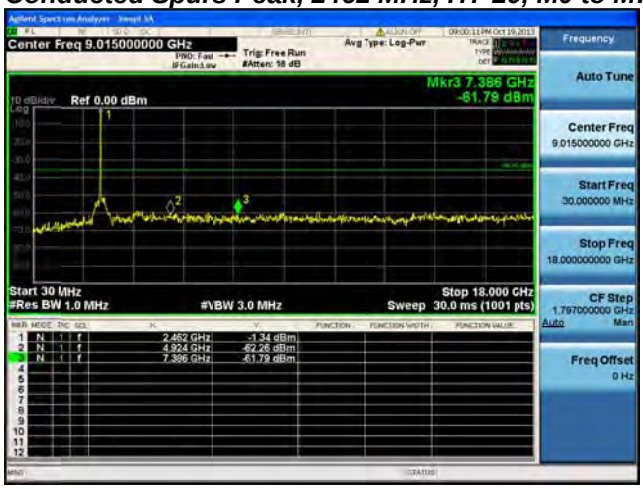
Antenna B

Conducted Spurs Peak, 2462 MHz, HT-20, M0 to M7

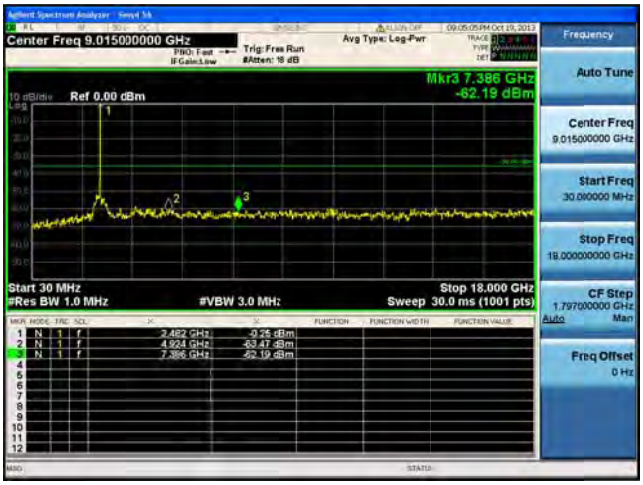


Antenna A

Conducted Spurs Peak, 2462 MHz, HT-20, M0 to M7

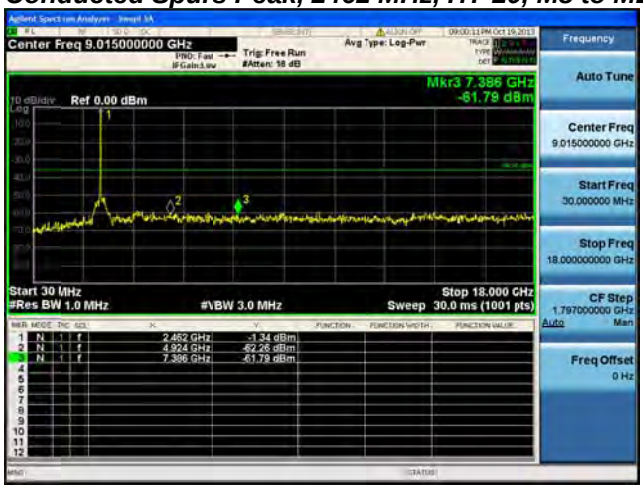


Antenna A

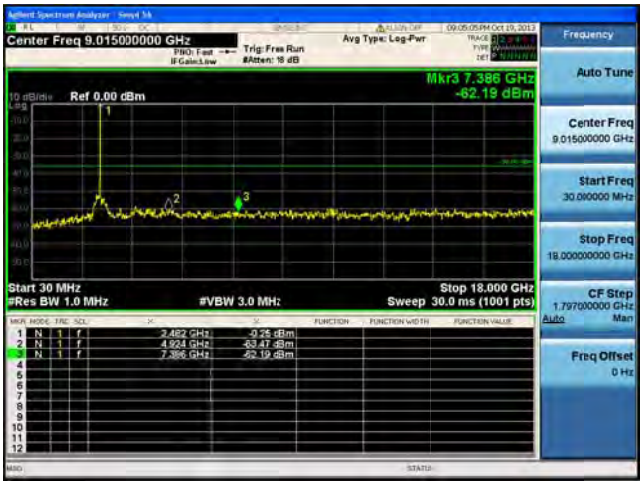


Antenna B

Conducted Spurs Peak, 2462 MHz, HT-20, M8 to M15

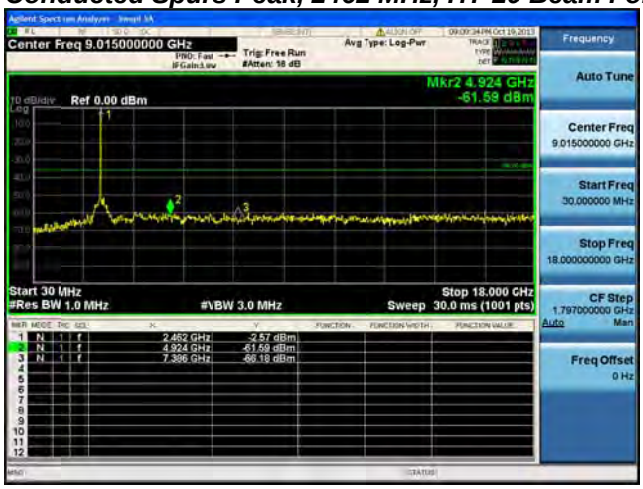


Antenna A

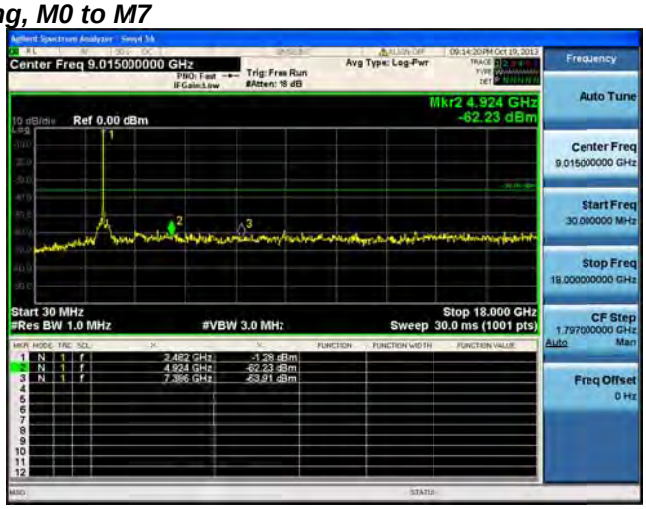


Antenna B

Conducted Spurs Peak, 2462 MHz, HT-20 Beam Forming, M0 to M7

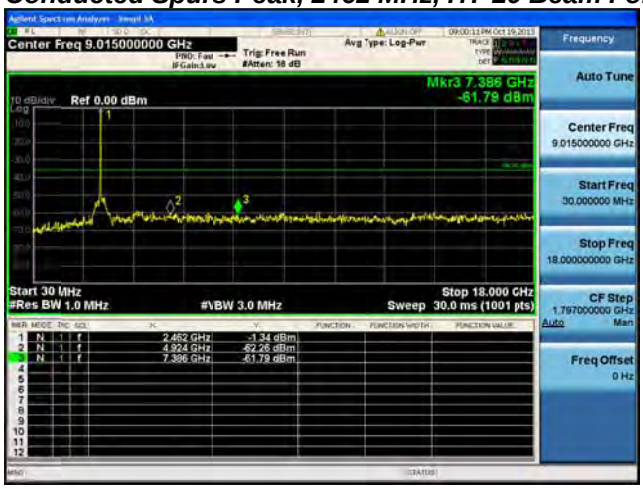


Antenna A

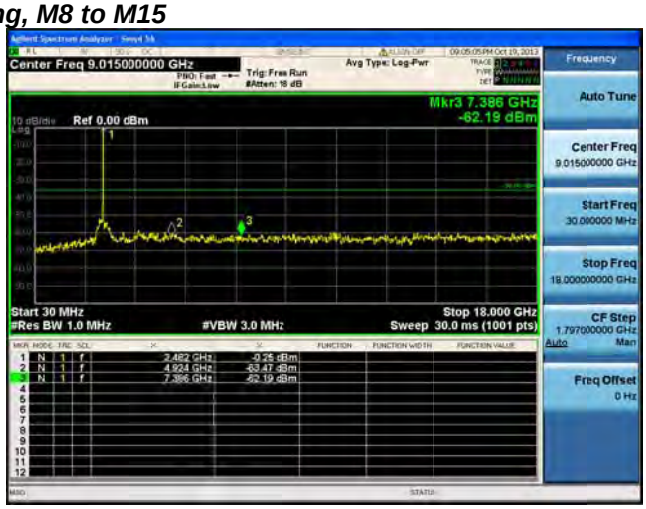


Antenna B

Conducted Spurs Peak, 2462 MHz, HT-20 Beam Forming, M8 to M15

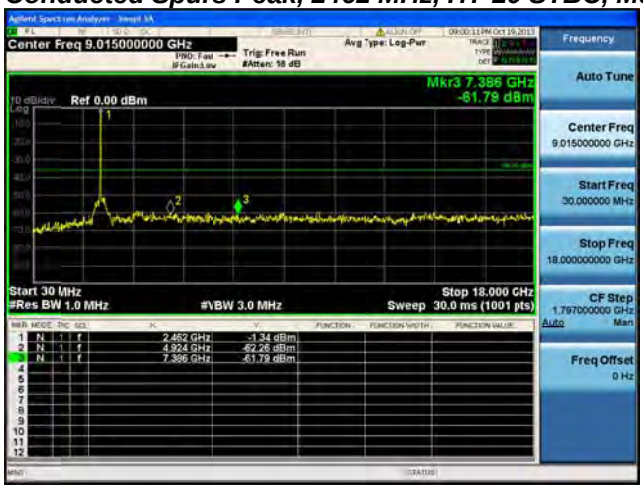


Antenna A

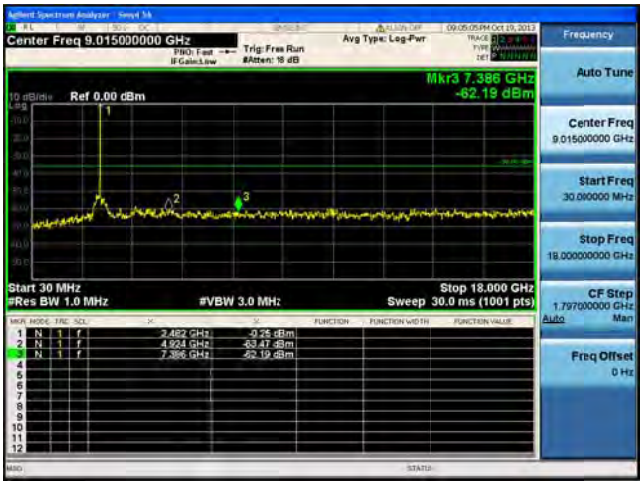


Antenna B

Conducted Spurs Peak, 2462 MHz, HT-20 STBC, M0 to M7



Antenna A



Antenna B

Conducted Bandedge

15.205 / RSS-210 2.7: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Use the procedures in 718828 D01 DTS Meas Guidance v01 to substitute conducted measurements in place of radiated measurements.
Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Be sure to enter all losses between the transmitter output and the spectrum analyzer.

Reference Level:	10 dBm
Attenuation:	4 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 100 Hz for average
Detector:	Peak

Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= -41.25 dBm eirp (54dBuV/m @3m)
2) Peak plot (Vertical and Horizontal), Limit = -21.25 dBm eirp (74dBuV/m @3m)

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands.

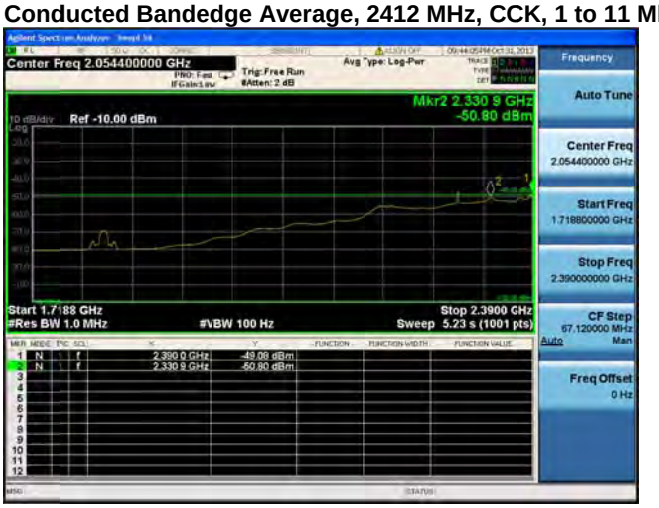
The “measure-and-sum technique” is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units.

This report represents the worst case data for all supported operating modes and antennas.

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	2	-49.1		-47.1	-41.25	5.9
	CCK, 1 to 11 Mbps	2	2	-52.6	-47.9	-44.6	-41.25	3.4
	Non HT-20, 6 to 54 Mbps	1	2	-43.9		-41.9	-41.25	0.7
	Non HT-20, 6 to 54 Mbps	2	2	-45.7	-47.2	-41.4	-41.25	0.1
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-48.8	-50.0	-41.3	-41.25	0.1
	HT-20, M0 to M7	1	2	-44.1		-42.1	-41.25	0.9
	HT-20, M0 to M7	2	2	-47.1	-48.6	-42.8	-41.25	1.5
	HT-20, M8 to M15	2	2	-47.1	-48.6	-42.8	-41.25	1.5
	HT-20 Beam Forming, M0 to M7	2	5	-52.0	-50.7	-43.3	-41.25	2.0
	HT-20 Beam Forming, M8 to M15	2	2	-47.1	-48.6	-42.8	-41.25	1.5
	HT-20 STBC, M0 to M7	2	2	-47.1	-48.6	-42.8	-41.25	1.5
2462	CCK, 1 to 11 Mbps	1	2	-49.6		-47.6	-41.25	6.4
	CCK, 1 to 11 Mbps	2	2	-53.2	-54.3	-48.7	-41.25	7.5
	Non HT-20, 6 to 54 Mbps	1	2	-44.5		-42.5	-41.25	1.3
	Non HT-20, 6 to 54 Mbps	2	2	-46.7	-47.5	-42.1	-41.25	0.8
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-50.2	-50.2	-42.2	-41.25	0.9
	HT-20, M0 to M7	1	2	-46.1		-44.1	-41.25	2.9
	HT-20, M0 to M7	2	2	-47.7	-47.7	-42.7	-41.25	1.4
	HT-20, M8 to M15	2	2	-47.7	-47.7	-42.7	-41.25	1.4
	HT-20 Beam Forming, M0 to M7	2	5	-49.7	-49.2	-41.4	-41.25	0.2
	HT-20 Beam Forming, M8 to M15	2	2	-47.7	-47.7	-42.7	-41.25	1.4
	HT-20 STBC, M0 to M7	2	2	-47.7	-47.7	-42.7	-41.25	1.4

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	2	-40.5		-38.5	-21.25	17.3
	CCK, 1 to 11 Mbps	2	2	-43.4	-41.4	-37.3	-21.25	16.0
	Non HT-20, 6 to 54 Mbps	1	2	-30.9		-28.9	-21.25	7.7
	Non HT-20, 6 to 54 Mbps	2	2	-33.2	-35.9	-29.3	-21.25	8.1
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-36.4	-38.6	-29.4	-21.25	8.1
	HT-20, M0 to M7	1	2	-29.5		-27.5	-21.25	6.3
	HT-20, M0 to M7	2	2	-34.5	-37.4	-30.7	-21.25	9.5
	HT-20, M8 to M15	2	2	-34.5	-37.4	-30.7	-21.25	9.5
	HT-20 Beam Forming, M0 to M7	2	5	-41.6	-38.9	-32.0	-21.25	10.8
	HT-20 Beam Forming, M8 to M15	2	2	-34.5	-37.4	-30.7	-21.25	9.5
	HT-20 STBC, M0 to M7	2	2	-34.5	-37.4	-30.7	-21.25	9.5
2462	CCK, 1 to 11 Mbps	1	2	-40.0		-38.0	-21.25	16.8
	CCK, 1 to 11 Mbps	2	2	-43.5	-38.9	-35.6	-21.25	14.4
	Non HT-20, 6 to 54 Mbps	1	2	-29.2		-27.2	-21.25	6.0
	Non HT-20, 6 to 54 Mbps	2	2	-31.1	-34.7	-27.5	-21.25	6.3
	Non HT-20 Beam Forming, 6 to 54 Mbps	2	5	-35.9	-38.2	-28.9	-21.25	7.6
	HT-20, M0 to M7	1	2	-32.2		-30.2	-21.25	9.0
	HT-20, M0 to M7	2	2	-34.2	-33.1	-28.6	-21.25	7.4
	HT-20, M8 to M15	2	2	-34.2	-33.1	-28.6	-21.25	7.4
	HT-20 Beam Forming, M0 to M7	2	5	-33.8	-36.0	-26.8	-21.25	5.5
	HT-20 Beam Forming, M8 to M15	2	2	-34.2	-33.1	-28.6	-21.25	7.4
	HT-20 STBC, M0 to M7	2	2	-34.2	-33.1	-28.6	-21.25	7.4

Conducted Bandedge Average, 2412 MHz, CCK, 1 to 11 Mbps



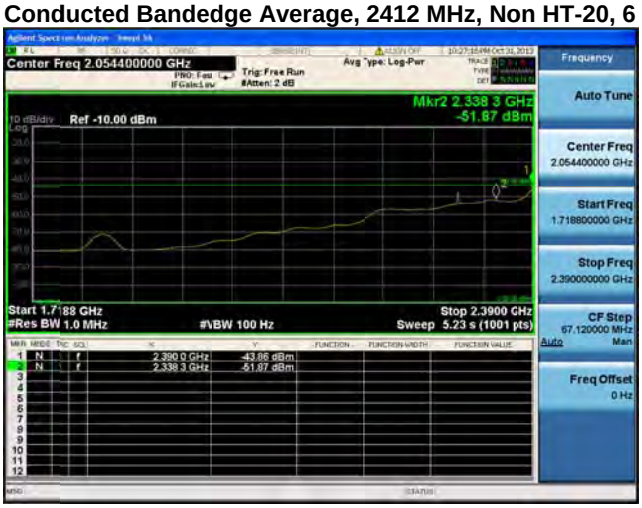
Antenna A

Conducted Bandedge Average, 2412 MHz, CCK, 1 to 11 Mbps

Antenna A

Antenna B

Conducted Bandedge Average, 2412 MHz, Non HT-20, 6 to 54 Mbps



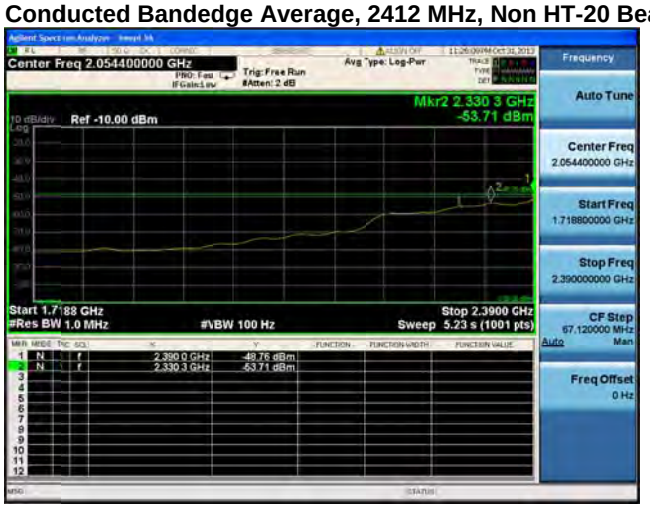
Antenna A

Conducted Bandedge Average, 2412 MHz, Non HT-20, 6 to 54 Mbps

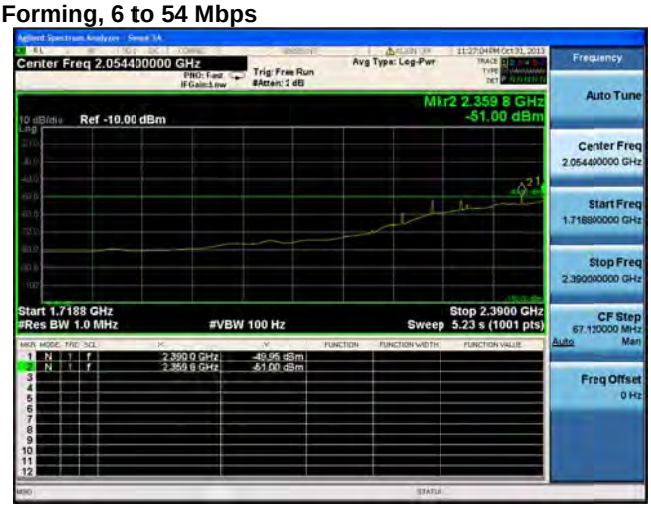
Antenna A

Antenna B

Conducted Bandedge Average, 2412 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

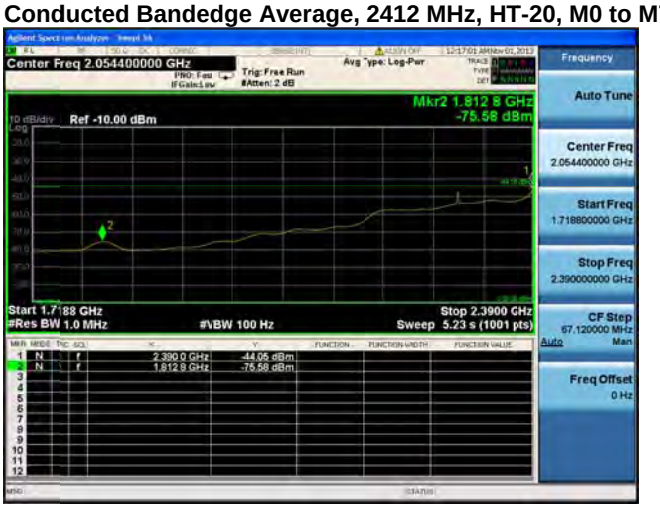


Antenna A



Antenna B

Conducted Bandedge Average, 2412 MHz, HT-20, M0 to M7



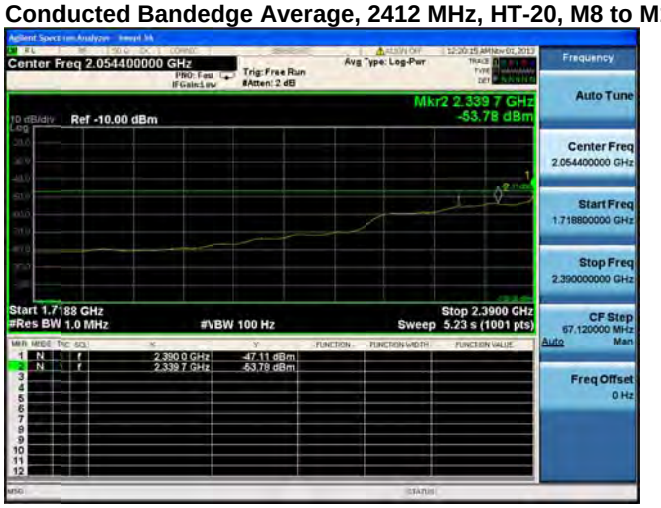
Antenna A

Conducted Bandedge Average, 2412 MHz, HT-20, M0 to M7

Antenna A

Antenna B

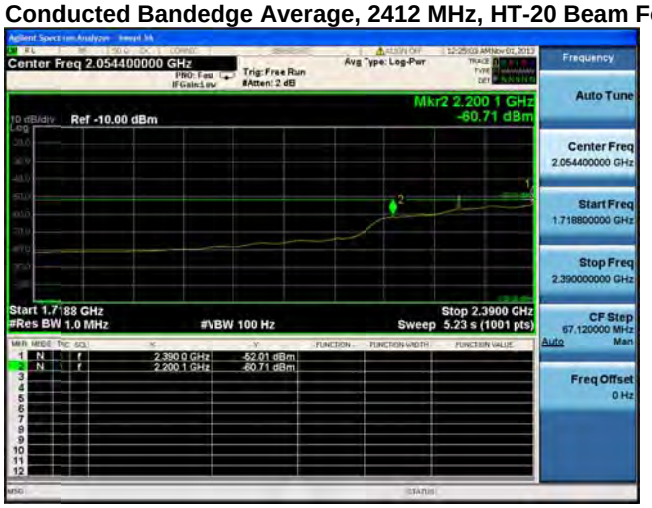
Conducted Bandedge Average, 2412 MHz, HT-20, M8 to M15



Antenna A

Antenna B

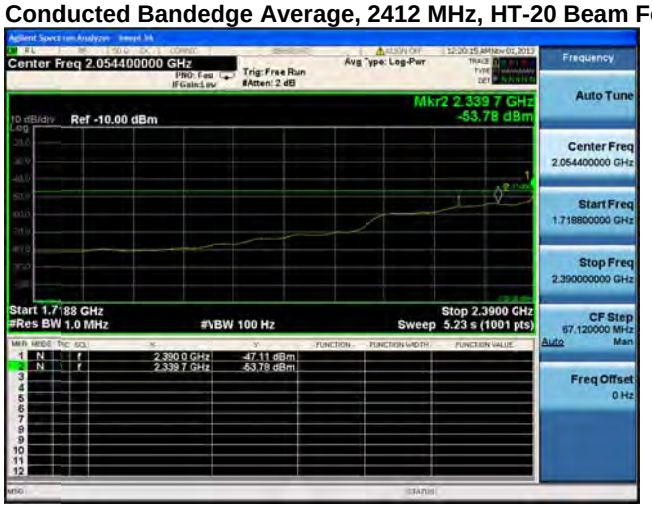
Conducted Bandedge Average, 2412 MHz, HT-20 Beam Forming, M0 to M7



Antenna A

Antenna B

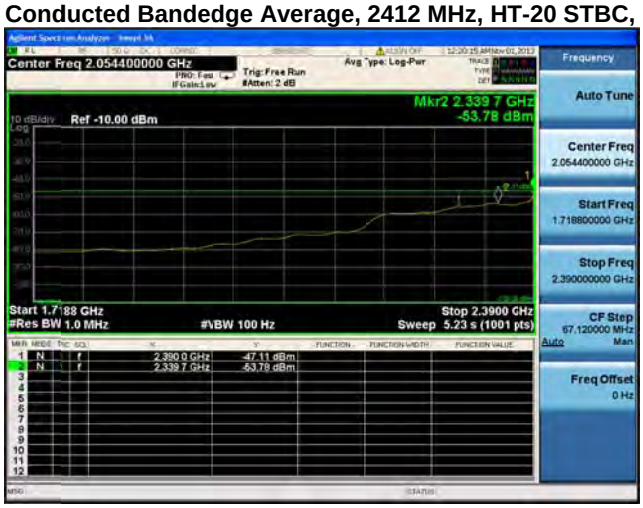
Conducted Bandedge Average, 2412 MHz, HT-20 Beam Forming, M8 to M15



Antenna A

Antenna B

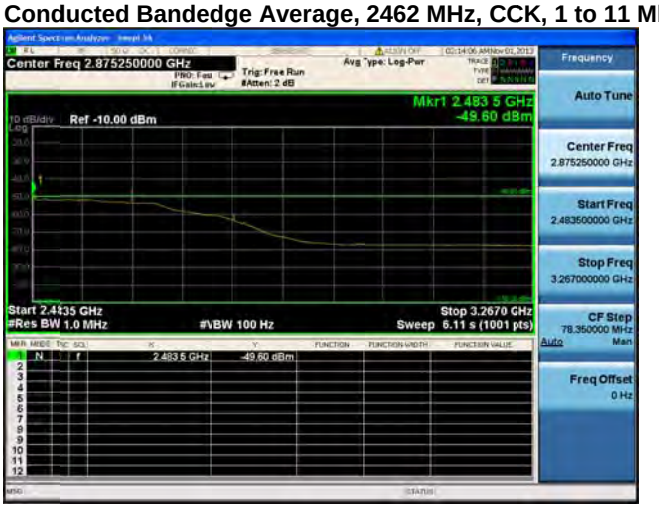
Conducted Bandedge Average, 2412 MHz, HT-20 STBC, M0 to M7



Antenna A

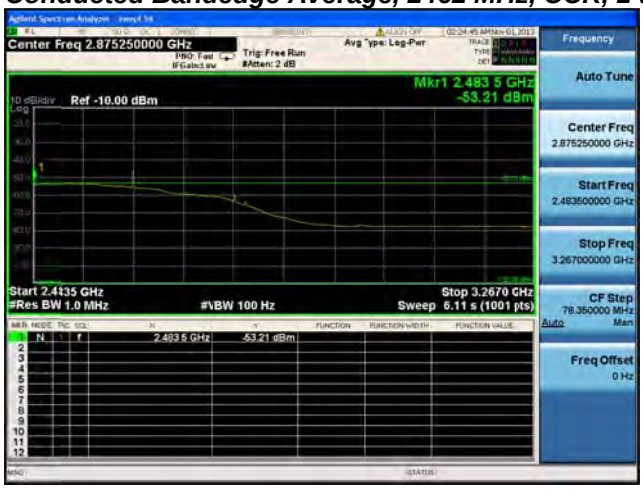
Antenna B

Conducted Bandedge Average, 2462 MHz, CCK, 1 to 11 Mbps



Antenna A

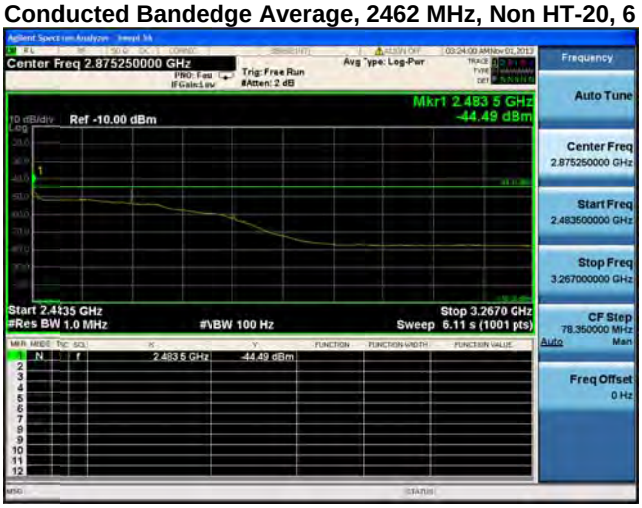
Conducted Bandedge Average, 2462 MHz, CCK, 1 to 11 Mbps



Antenna A

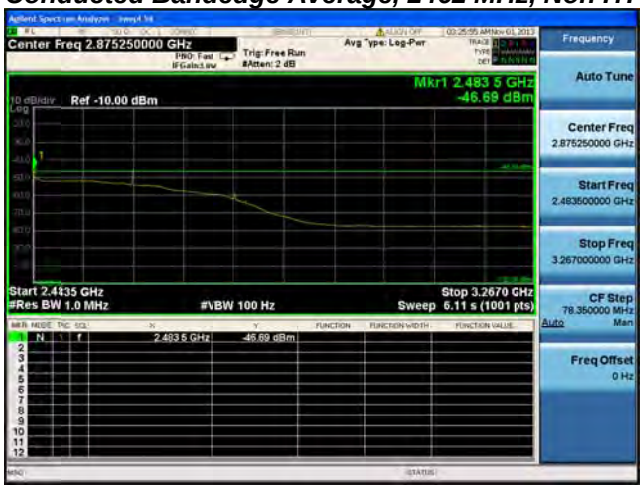
Antenna B

Conducted Bandedge Average, 2462 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

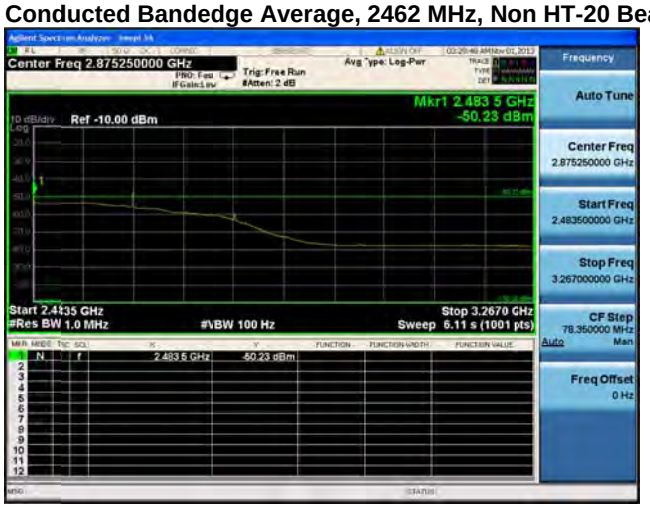
Conducted Bandedge Average, 2462 MHz, Non HT-20, 6 to 54 Mbps



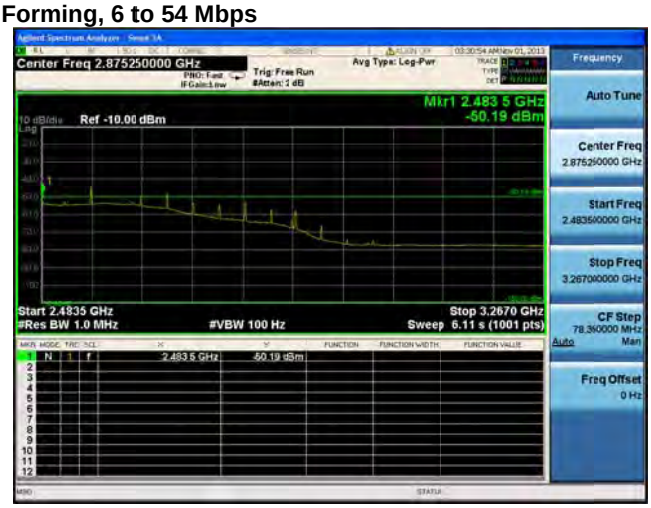
Antenna A

Antenna B

Conducted Bandedge Average, 2462 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps

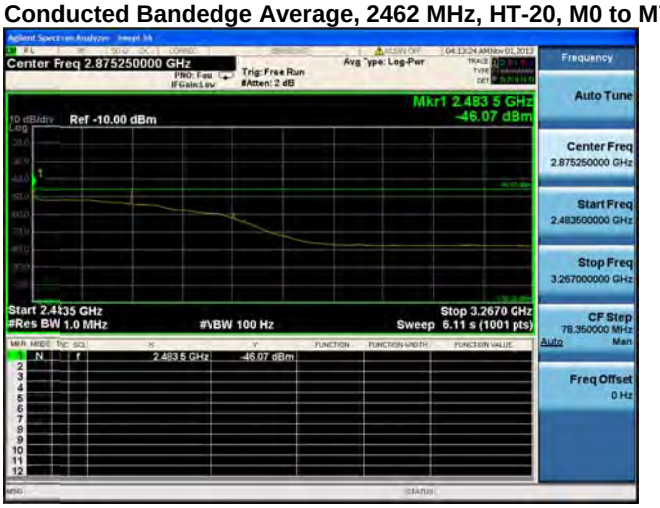


Antenna A



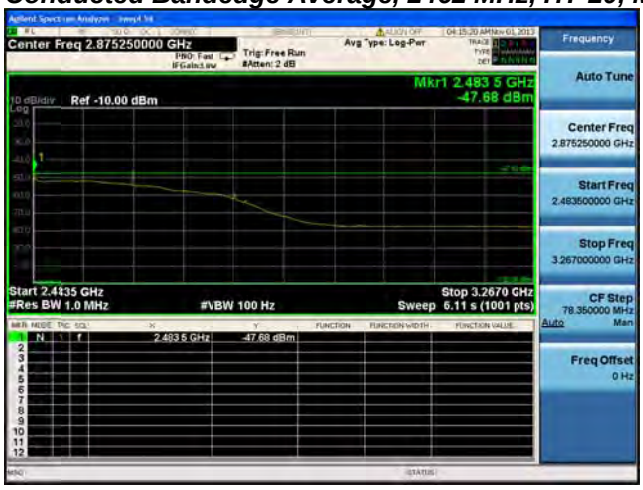
Antenna B

Conducted Bandedge Average, 2462 MHz, HT-20, M0 to M7



Antenna A

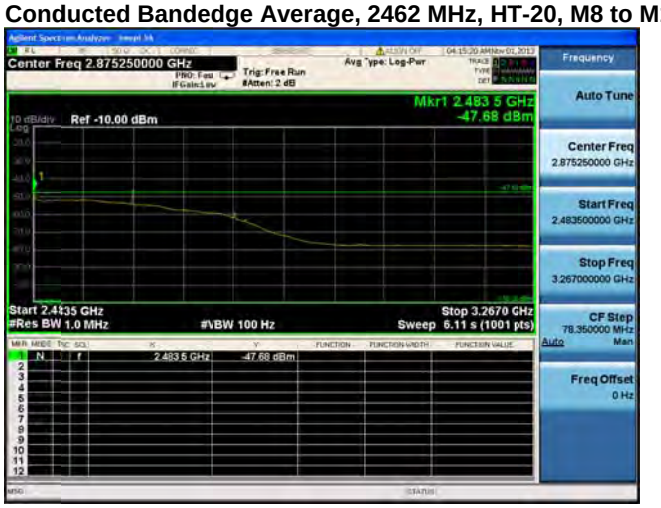
Conducted Bandedge Average, 2462 MHz, HT-20, M0 to M7



Antenna A

Antenna B

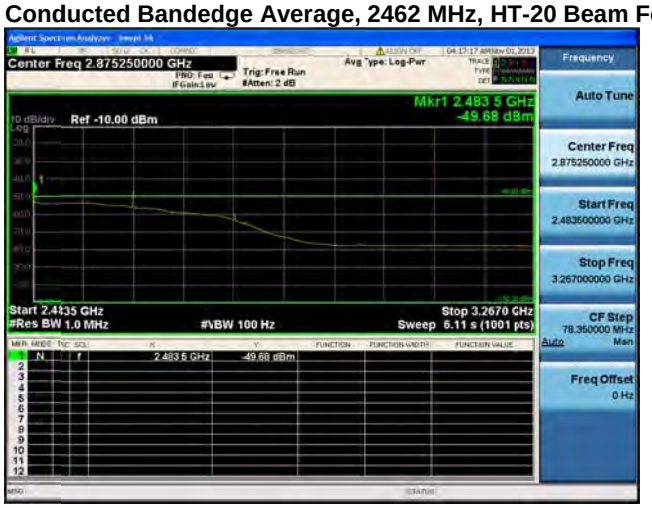
Conducted Bandedge Average, 2462 MHz, HT-20, M8 to M15



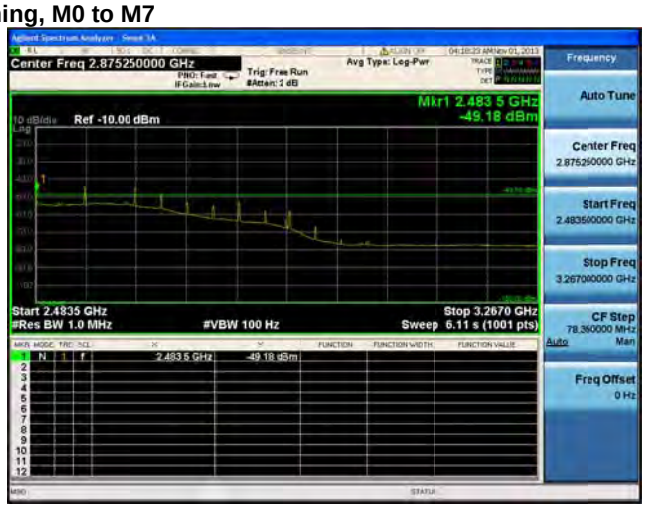
Antenna A

Antenna B

Conducted Bandedge Average, 2462 MHz, HT-20 Beam Forming, M0 to M7

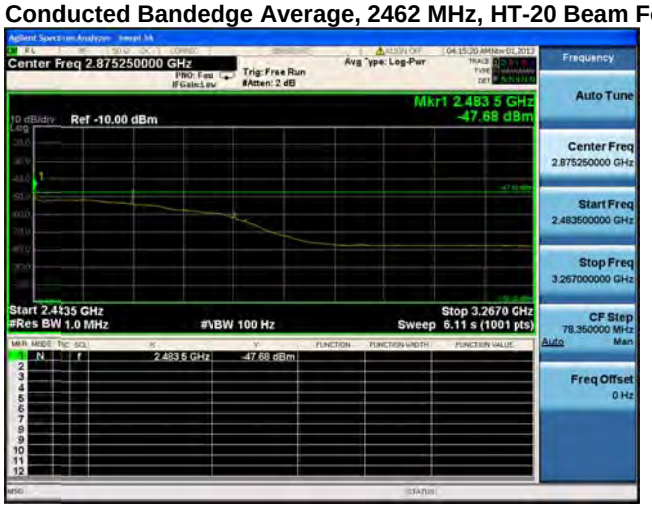


Antenna A

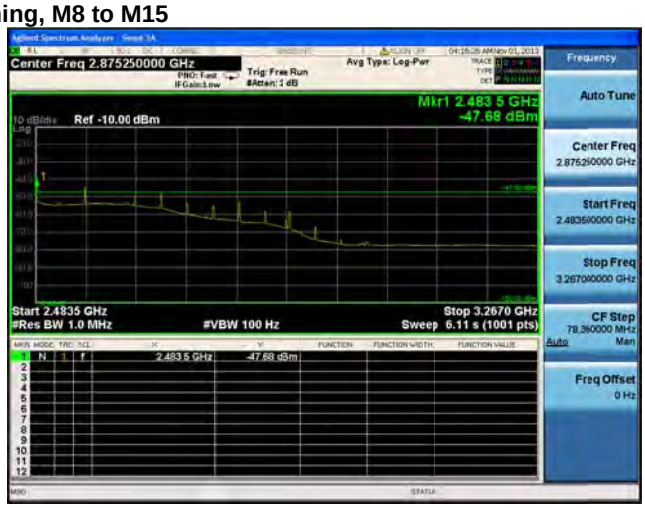


Antenna B

Conducted Bandedge Average, 2462 MHz, HT-20 Beam Forming, M8 to M15

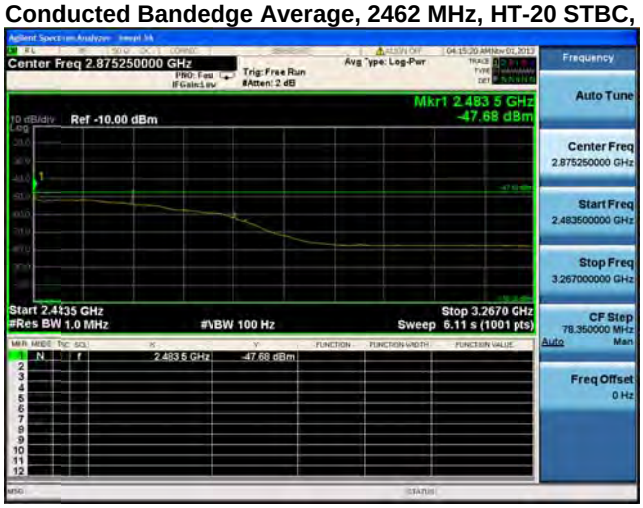


Antenna A



Antenna B

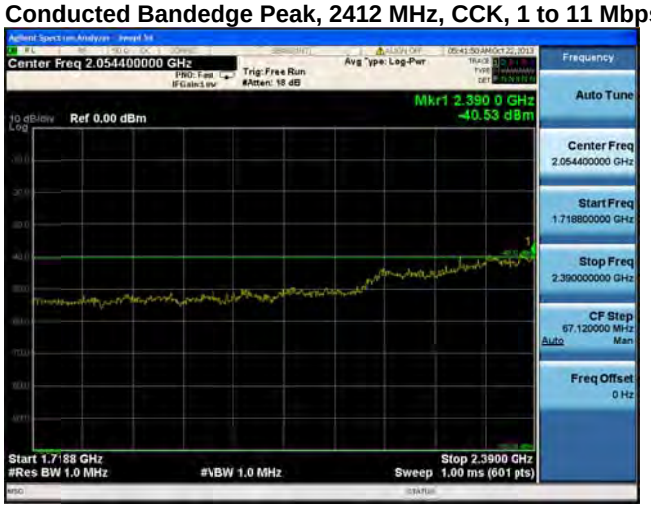
Conducted Bandedge Average, 2462 MHz, HT-20 STBC, M0 to M7



Antenna A

Antenna B

Conducted Bandedge Peak, 2412 MHz, CCK, 1 to 11 Mbps



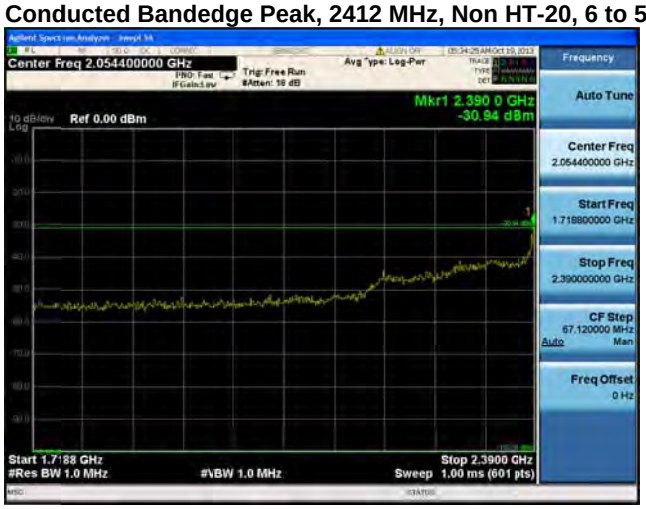
Antenna A

Conducted Bandedge Peak, 2412 MHz, CCK, 1 to 11 Mbps

Antenna A

Antenna B

Conducted Bandedge Peak, 2412 MHz, Non HT-20, 6 to 54 Mbps



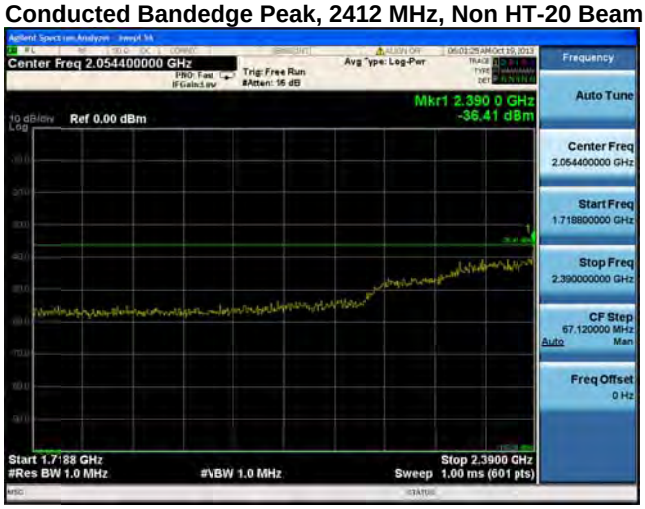
Antenna A

Conducted Bandedge Peak, 2412 MHz, Non HT-20, 6 to 54 Mbps

Antenna A

Antenna B

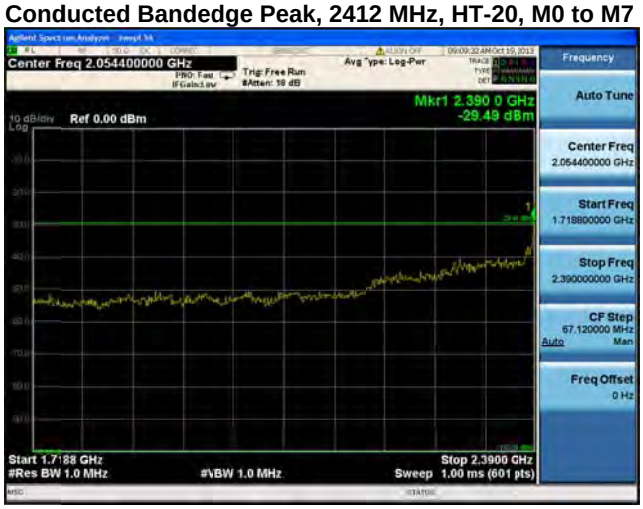
Conducted Bandedge Peak, 2412 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps



Antenna A

Antenna B

Conducted Bandedge Peak, 2412 MHz, HT-20, M0 to M7



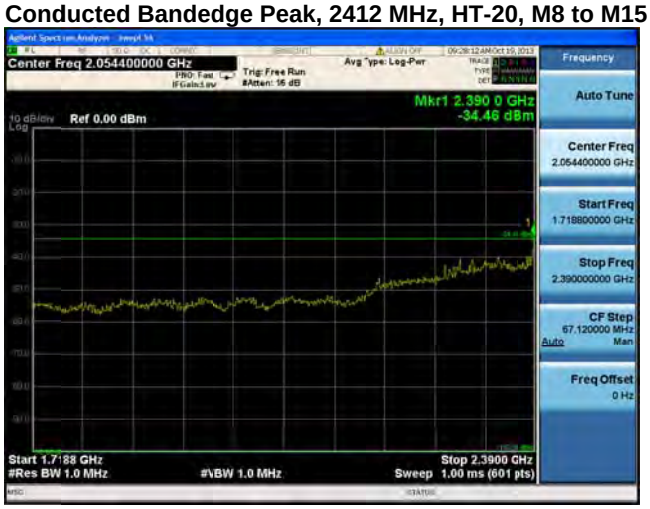
Antenna A

Conducted Bandedge Peak, 2412 MHz, HT-20, M0 to M7

Antenna A

Antenna B

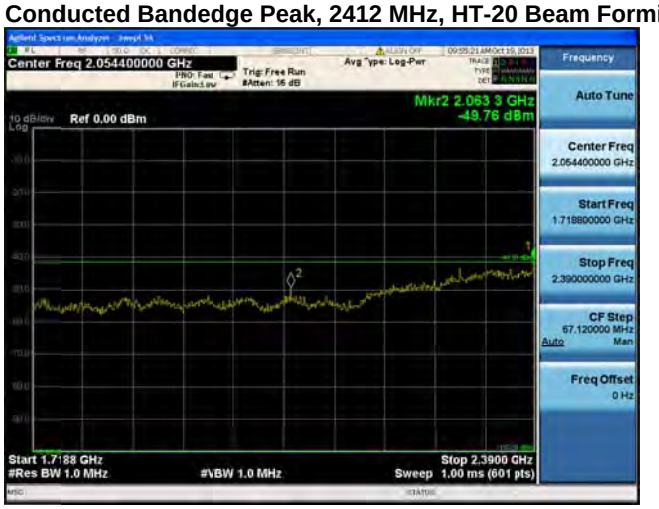
Conducted Bandedge Peak, 2412 MHz, HT-20, M8 to M15



Antenna A

Antenna B

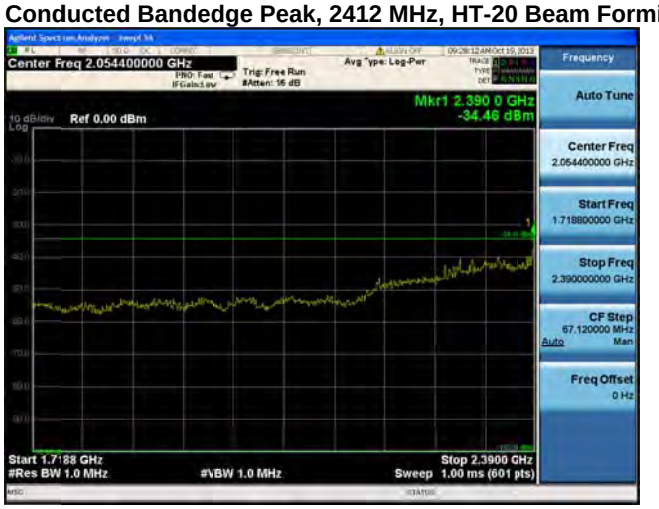
Conducted Bandedge Peak, 2412 MHz, HT-20 Beam Forming, M0 to M7



Antenna A

Antenna B

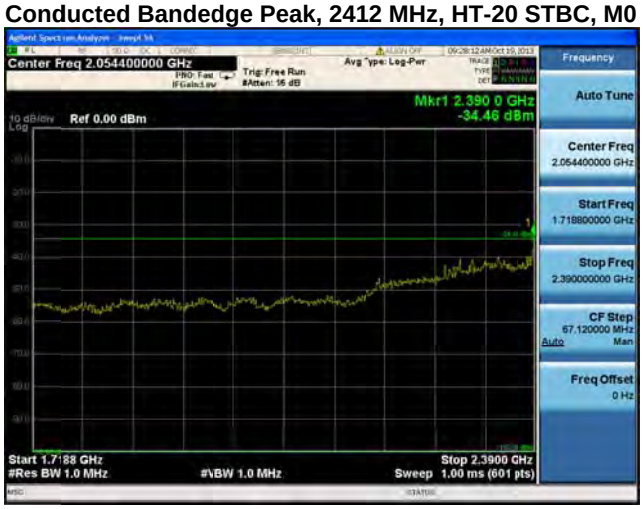
Conducted Bandedge Peak, 2412 MHz, HT-20 Beam Forming, M8 to M15



Antenna A

Antenna B

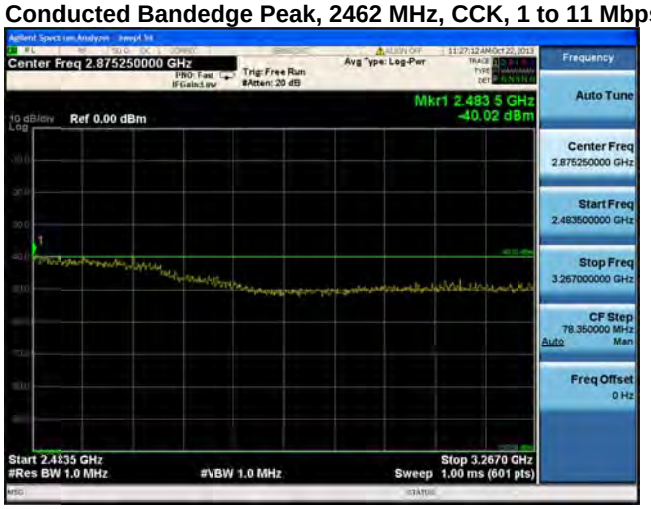
Conducted Bandedge Peak, 2412 MHz, HT-20 STBC, M0 to M7



Antenna A

Antenna B

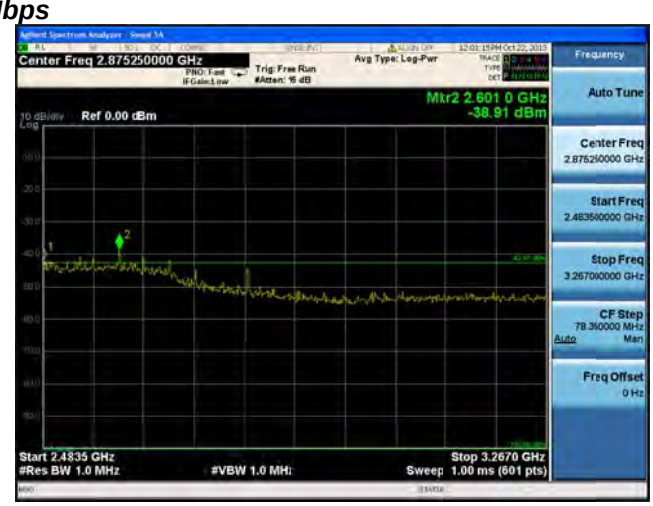
Conducted Bandedge Peak, 2462 MHz, CCK, 1 to 11 Mbps



Antenna A

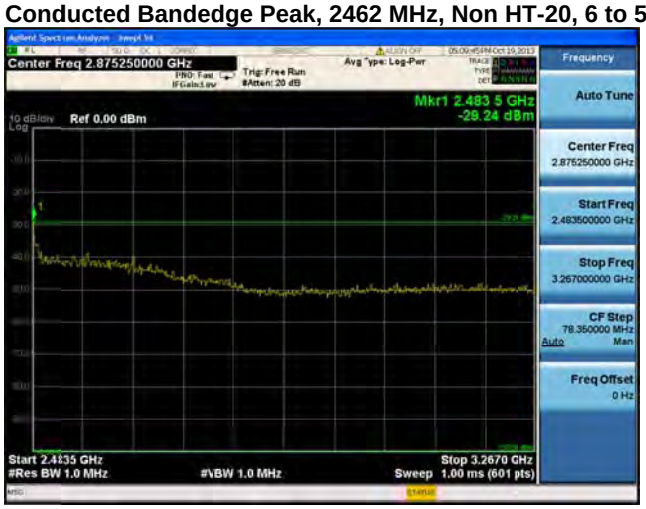
Conducted Bandedge Peak, 2462 MHz, CCK, 1 to 11 Mbps

Antenna A



Antenna B

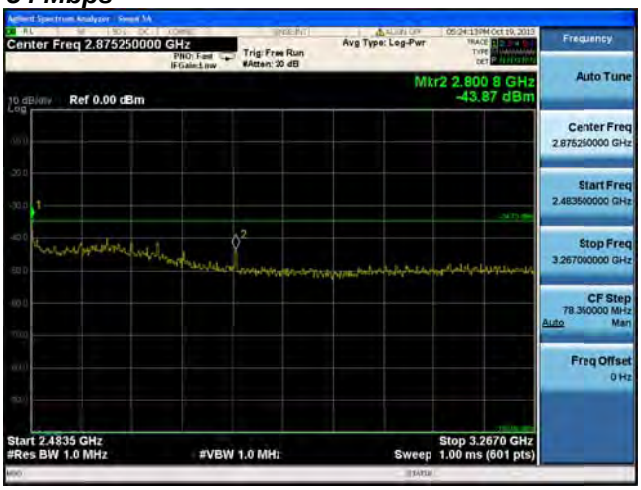
Conducted Bandedge Peak, 2462 MHz, Non HT-20, 6 to 54 Mbps



Antenna A

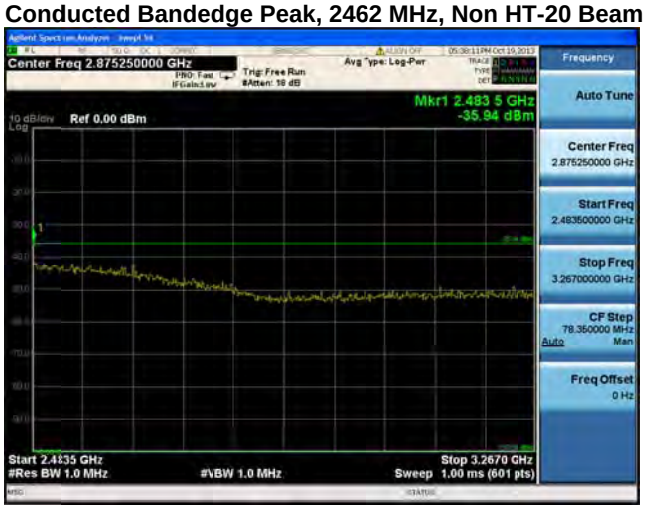
Conducted Bandedge Peak, 2462 MHz, Non HT-20, 6 to 54 Mbps

Antenna A



Antenna B

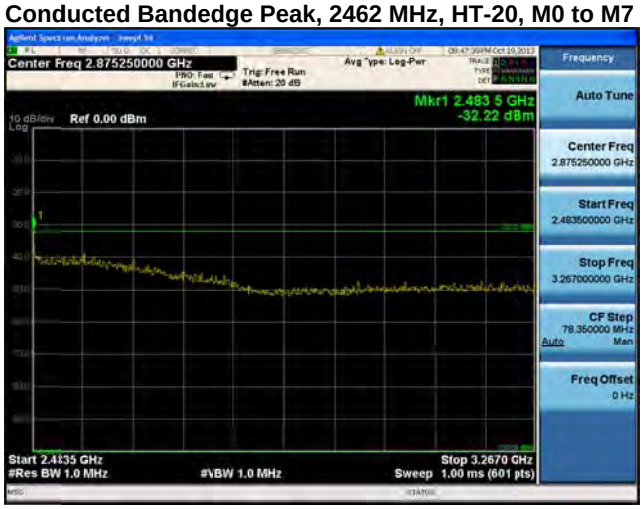
Conducted Bandedge Peak, 2462 MHz, Non HT-20 Beam Forming, 6 to 54 Mbps



Antenna A

Antenna B

Conducted Bandedge Peak, 2462 MHz, HT-20, M0 to M7



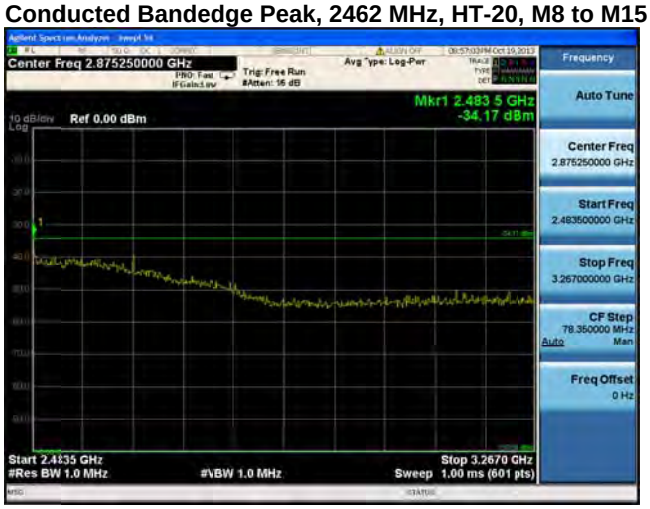
Antenna A

Conducted Bandedge Peak, 2462 MHz, HT-20, M0 to M7

Antenna A

Antenna B

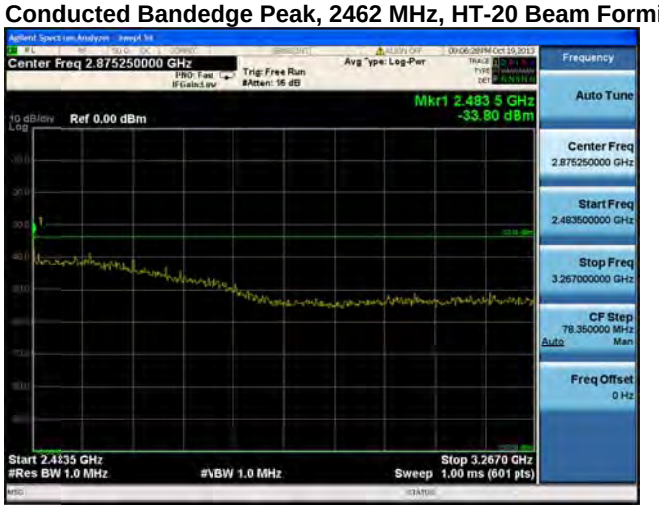
Conducted Bandedge Peak, 2462 MHz, HT-20, M8 to M15



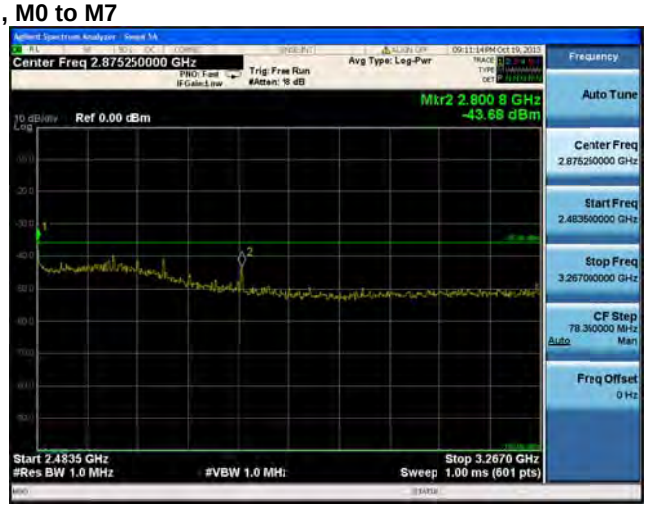
Antenna A

Antenna B

Conducted Bandedge Peak, 2462 MHz, HT-20 Beam Forming, M0 to M7

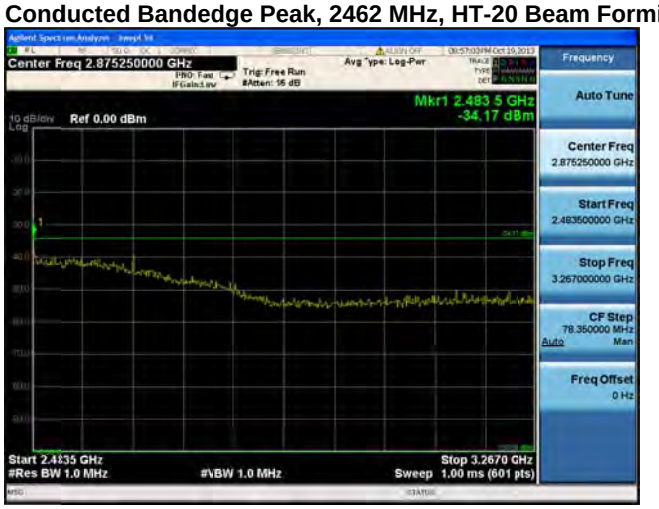


Antenna A

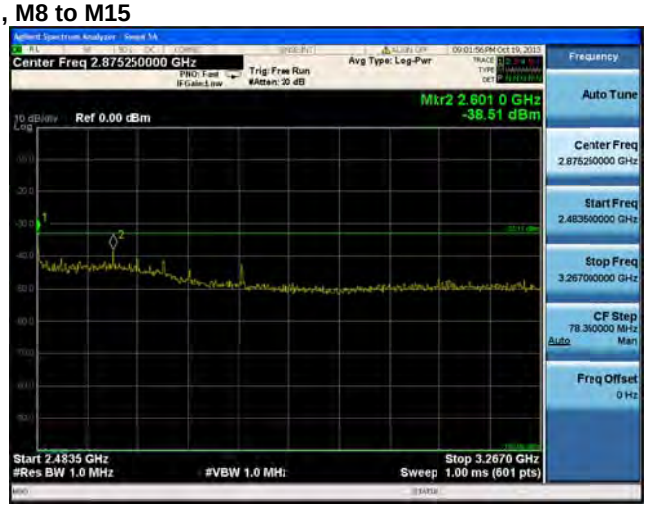


Antenna B

Conducted Bandedge Peak, 2462 MHz, HT-20 Beam Forming, M8 to M15

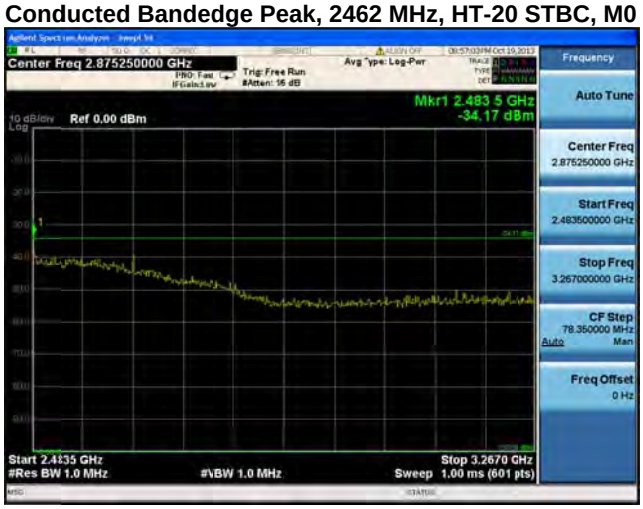


Antenna A



Antenna B

Conducted Bandedge Peak, 2462 MHz, HT-20 STBC, M0 to M7



Antenna A

Antenna B

Conducted Test Setup

Appendix B: Emission Test Results

Testing Laboratory: Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134, USA

Radiated Spurious Emissions

15.205 / RSS-210 2.7: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 18 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

Terminate the access Point RF ports with 50 ohm loads.

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

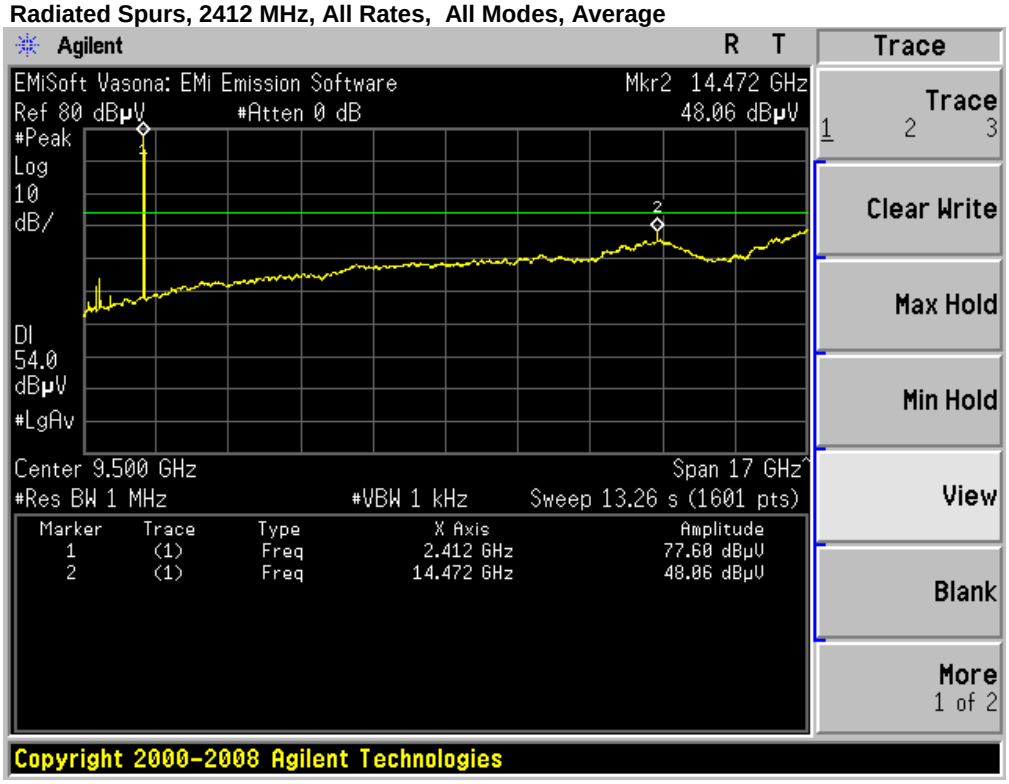
Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV/m @3m
2) Peak plot (Vertical and Horizontal), Limit = 74dBuV/m @3m

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands.

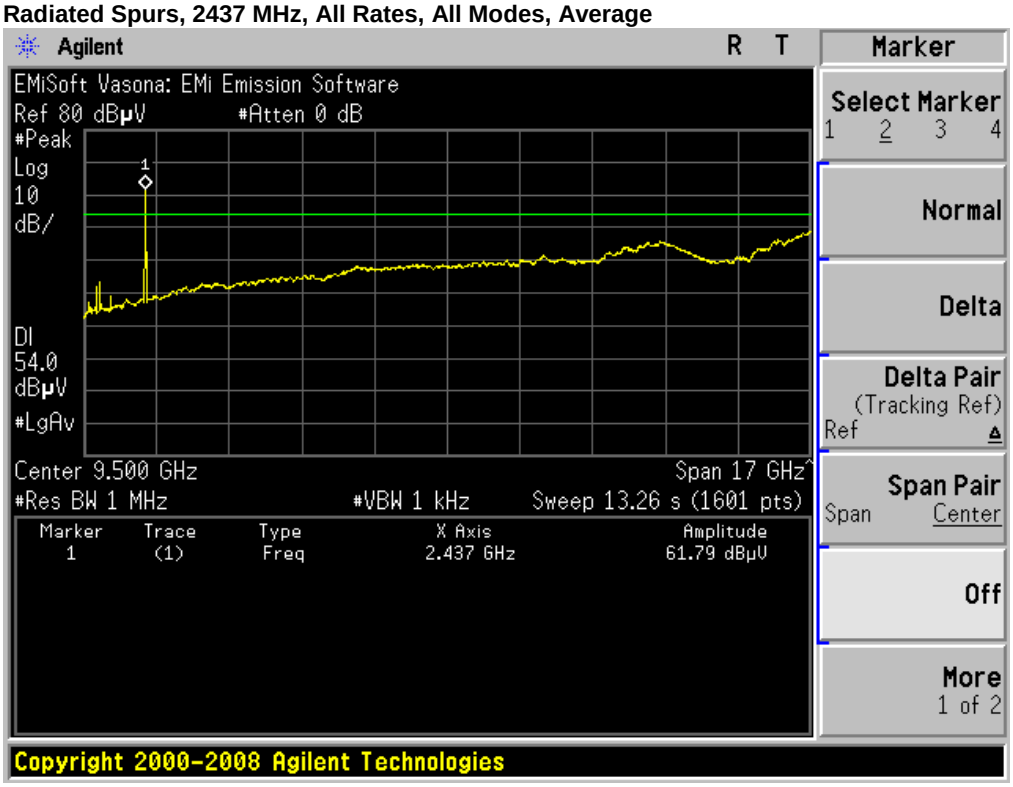
This report represents the worst case data for all supported operating modes and antennas. There are no measurable emissions above 18 GHz.

Frequency (MHz)	Mode	Data Rate (Mbps)	Spurious Emission Level (dBuV/m)	Limit (dBuV/m)
2412	Legacy CCK, 1 to 11 Mbps	1	**<54**	**54**
	Non HT-20, 6 to 54 Mbps	6	**<54**	**54**
	Non HT-20 Beam Forming, 6 to 54 Mbps	6	**<54**	**54**
	HT-20, M0 to M23	m0	**<54**	**54**
	HT-20 STBC, M0 to M7	m0	**<54**	**54**
	HT-20 Beam Forming, M0 to M23	m0	**<54**	**54**
2437	Legacy CCK, 1 to 11 Mbps	1	**<54**	**54**
	Non HT-20, 6 to 54 Mbps	6	**<54**	**54**
	Non HT-20 Beam Forming, 6 to 54 Mbps	6	**<54**	**54**
	HT-20, M0 to M23	m0	**<54**	**54**
	HT-20 STBC, M0 to M7	m0	**<54**	**54**
	HT-20 Beam Forming, M0 to M23	m0	**<54**	**54**
2462	Legacy CCK, 1 to 11 Mbps	1	**<54**	**54**
	Non HT-20, 6 to 54 Mbps	6	**<54**	**54**
	Non HT-20 Beam Forming, 6 to 54 Mbps	6	**<54**	**54**
	HT-20, M0 to M23	m0	**<54**	**54**
	HT-20 STBC, M0 to M7	m0	**<54**	**54**
	HT-20 Beam Forming, M0 to M23	m0	**<54**	**54**

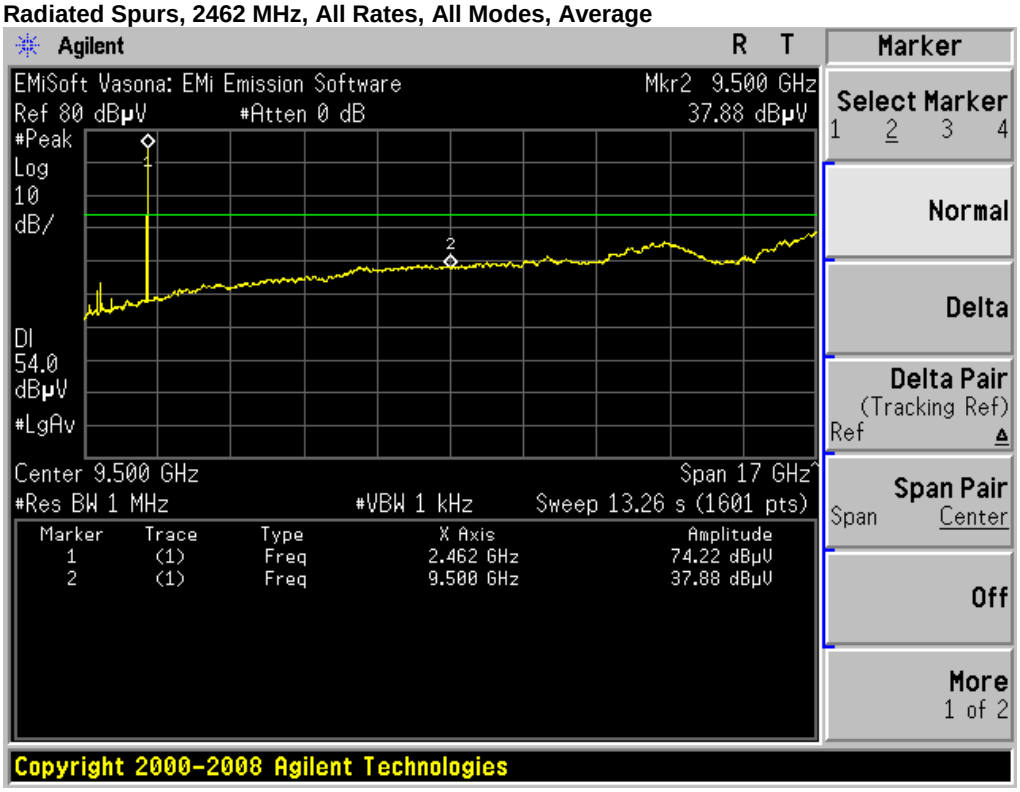
Radiated Spurs, 2412 MHz, All Rates, All Modes, Average



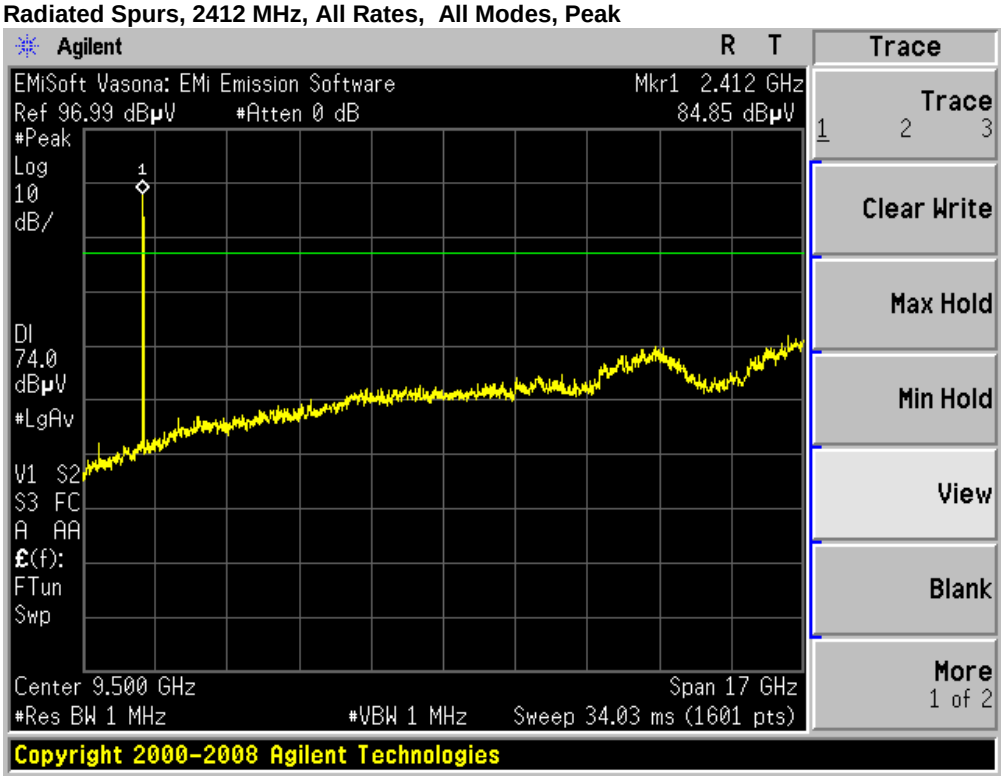
Radiated Spurs, 2437 MHz, All Rates, All Modes, Average



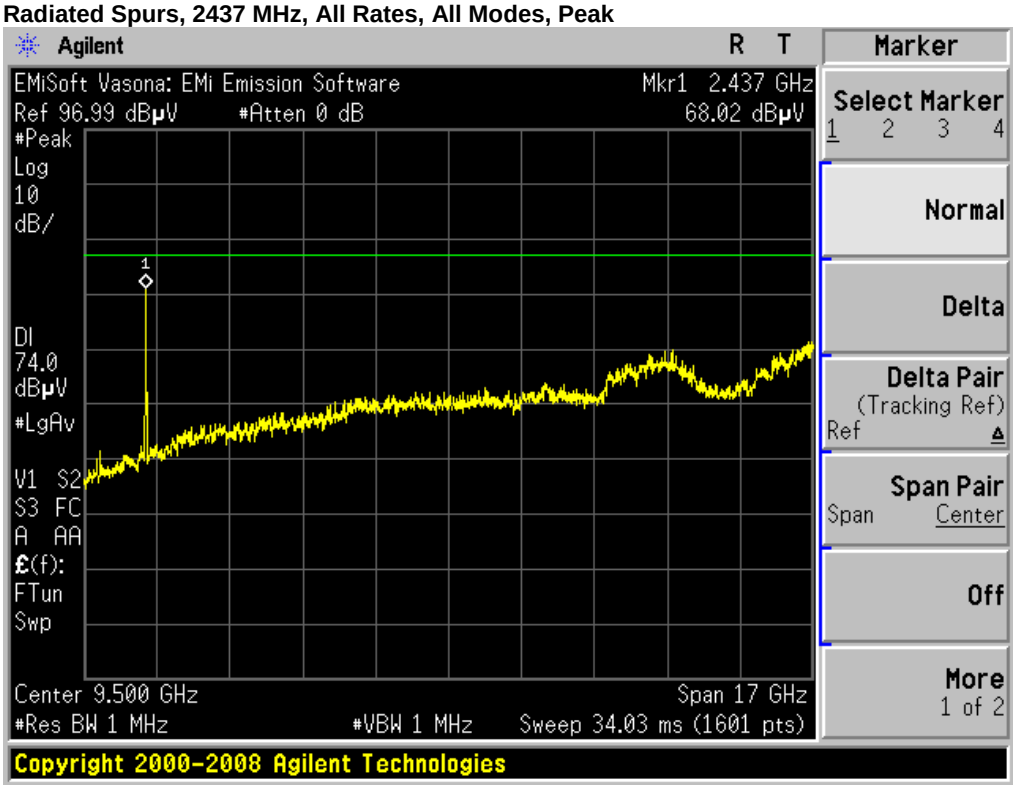
Radiated Spurs, 2462 MHz, All Rates, All Modes, Average



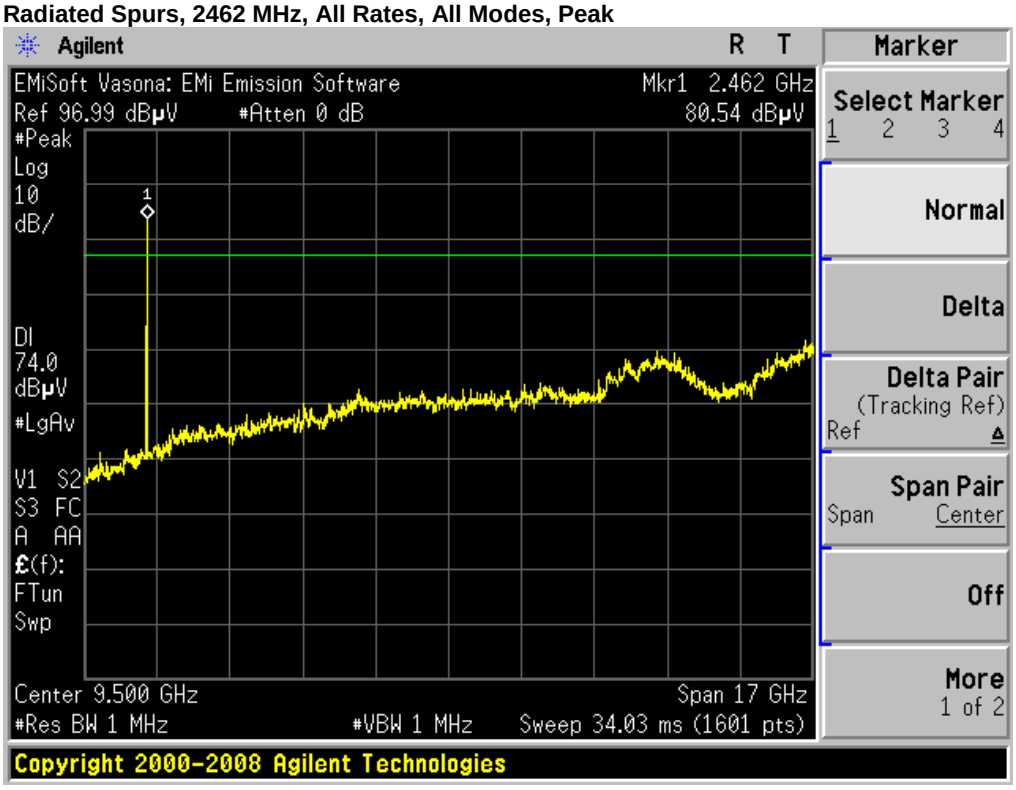
Radiated Spurs, 2412 MHz, All Rates, All Modes, Peak



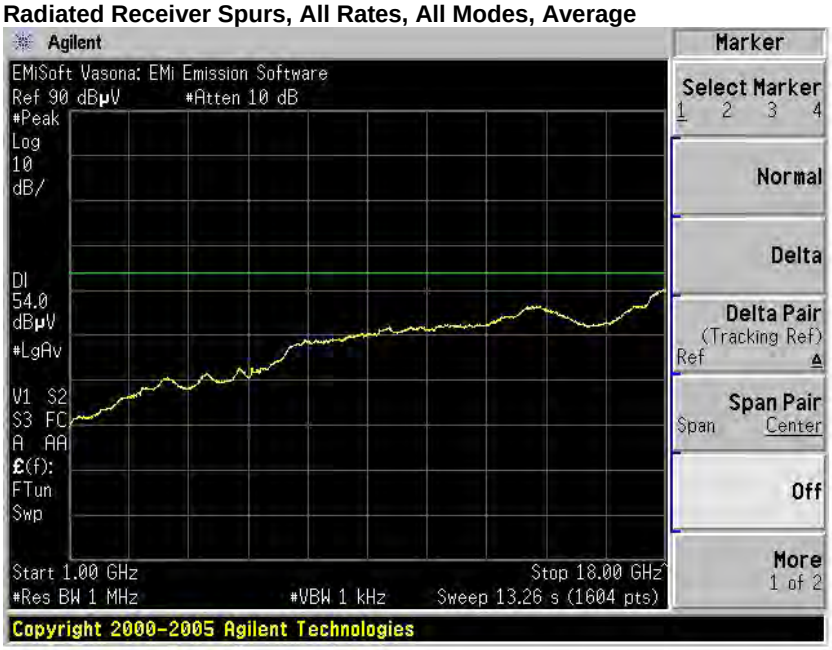
Radiated Spurs, 2437 MHz, All Rates, All Modes, Peak



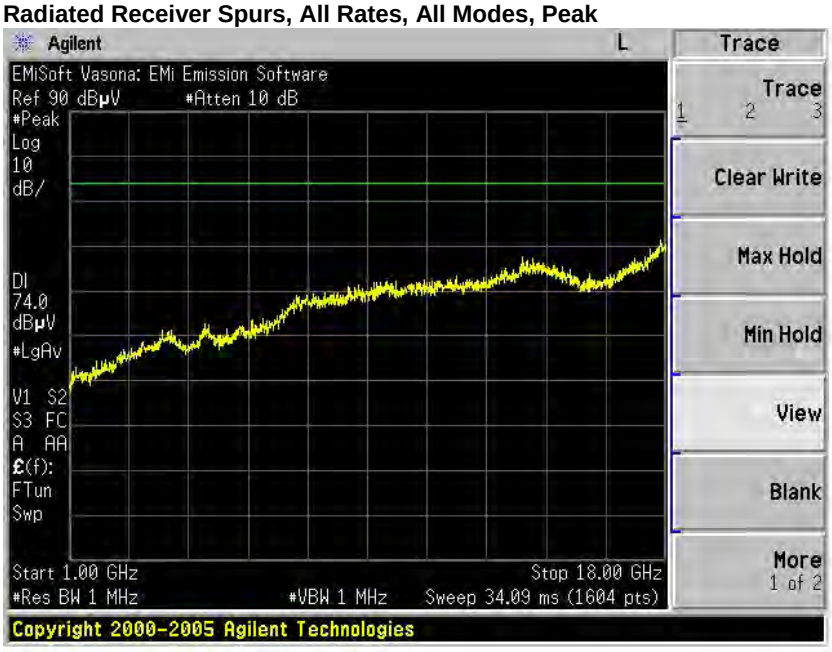
Radiated Spurs, 2462 MHz, All Rates, All Modes, Peak

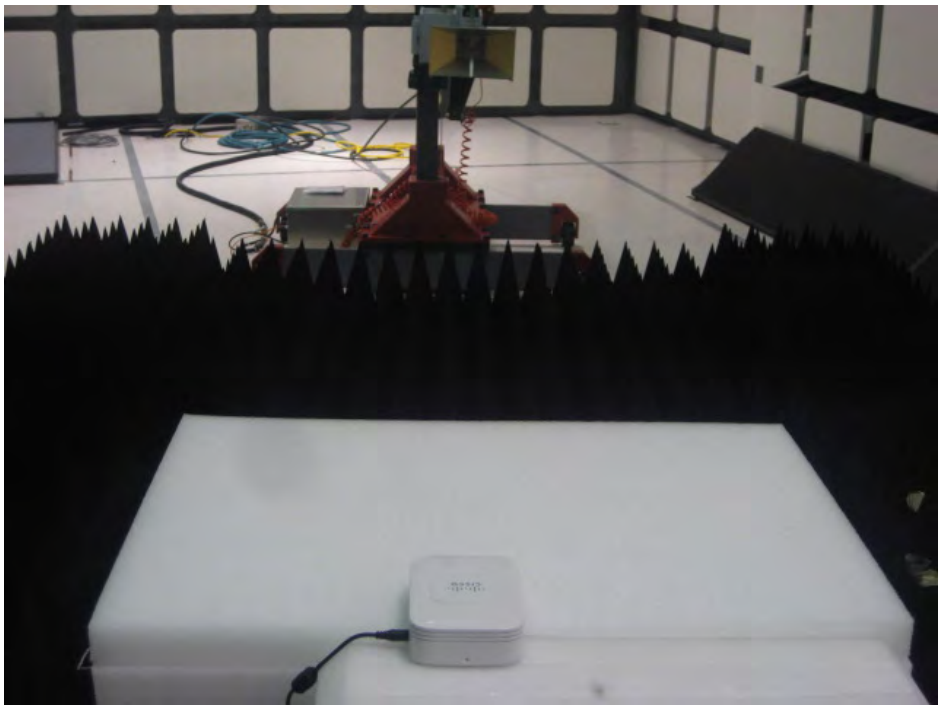


Radiated Receiver Spurs, All Rates, All Modes, Average



Radiated Receiver Spurs, All Rates, All Modes, Peak





Test Setup for Radiated Measurements

Maximum Permissible Exposure (MPE) Calculations

15.247: U-NII devices are subject to the radio frequency radiation exposure requirements specified in Sec. 1.1307(b), Sec. 2.1091 and Sec. 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a ``general population/uncontrolled'' environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

Given

E=√(30*P*G)/d and S=E^2/3770

where

E=Field Strength in Volts/meter
P=Power in Watts
G=Numeric Antenna Gain
d=Distance in meters
S=Power Density in mW/cm^2

Combine equations and rearrange the terms to express the distance as a function of the remaining variables:

d=√((30*P*G)/(3770*S))

Changing to units of power in mW and distance in cm, using:

P(mW)=P(W)/1000 d(cm)=100*d(m)

yields

d=100*√((30*(P/1000)*G)/(3770*S))
d=0.282*√(P*G/S)

where

d=Distance in cm
P=Power in mW
G=Numerica Antenna Gain
S=Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P(mW)=10^(P(dBm)/10) G(numeric)=10^(G(dBi)/10)

yields

d=0.282*10^((P+G)/20)/√S Equation (1)

and

s=((0.282*10^((P+G)/20))/d)^2 Equation (2)

where

d=MPE distance in cm
P=Power in dBm
G=Antenna Gain in dBi
S=Power Density in mW/cm^2

Equation (1) and the measured peak power are used to calculate the MPE distance. Note that for mobile or fixed location transmitters such as an access point, the minimum separation distance is 20 cm even if the calculations indicate that the MPE distance may be less.

S=1mW/cm^2 maximum. The highest supported antenna gain is 2 dBi (5dBi with beamforming). Using the peak power levels recorded in the test report along with Equation 1 above, the MPE distances are calculated as follows.

MPE Calculations:

Frequency (MHz)	Power Density (mW/cm^2)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)	Limit (cm)	Margin (cm)
2437	1	19.5	5	**4.73**	20	15.27
2462	1	17.1	5	**3.59**	20	16.41

To maintain compliance, installations will assure a separation distance of at least 20cm.

Using Equation 2, the MPE levels (s) at 20 cm are calculated as follows:

Frequency (MHz)	MPE Distance (cm)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Margin (mW/cm^2)
2437	20	19.5	5	**0.06**	1	0.94
2462	20	17.1	5	**0.03**	1	0.97

Appendix C: Test Equipment/Software Used to perform the test

Equip #	Manufacturer	Model	Description	Last Cal	Next Due
CIS-50378	Agilent	N9030A	PXA Spectrum Analyzer	2/27/2013	2/27/2014