Test Report

AIR-RM3010L-B-K9

FCC ID: LDK102094
IC: 2461B-102094

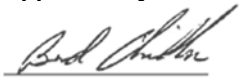
5150-5250 MHz

Against the following Specifications:

CFR47 Part 15.407

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

Approved by: Bud Chiller



Revision: 1

This report replaces any previously entered test report under EDCS – **1514390**.This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

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

Section 1: Overview

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

Specifications:
CFR47 Part 15.407

Measurements were made in accordance with

- ANSI C63.10:2013
- KDB 789033 D02 General UNII Test Procedures New Rules v01
- KDB 662911 D01 Multiple Transmitter Output

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*%

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

Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

Emission level [dBuV] = Indicated voltage level [dBuV] + Cable Loss [dB] + Other correction factors [dB]

The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss..

Note: to convert the results from dBuV/m to uV/m use the following formula:-

Level in uV/m = Common Antilogarithm [(X dBuV/m)/20] = Y uV/m

Measurement Uncertainty Values

voltage and power measurements	± 2 dB
conducted EIRP measurements	± 1.4 dB
radiated measurements	± 3.2 dB
frequency measurements	± 2.4 10-7
temperature measurements	± 0.54º
humidity measurements	± 2.3%
DC and low frequency measurements	± 2.5%

Where relevant measurement uncertainty levels have been estimated for tests performed on the apparatus. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Radiated emissions (expanded uncertainty, confidence interval 95%)

30 MHz - 300 MHz	+/- 3.8 dB
300 MHz - 1000 MHz	+/- 4.3 dB
1 GHz - 10 GHz	+/- 4.0 dB
10 GHz - 18GHz	+/- 8.2 dB
18GHz - 26.5GHz	+/- 4.1 dB
26.5GHz - 40GHz	+/- 3.9 dB

Conducted emissions (expanded uncertainty, confidence interval 95%)

30 MHz – 40GHz	+/- 0.38 dB

A product is considered to comply with a requirement if the nominal measured value is below the limit line. The product is considered to not be in compliance in case the nominal measured value is above the limit line.

2.2 Date of testing

February-15 - March-15

2.3 Report Issue Date

14-August-2015

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.,
125 West Tasman Drive
San Jose, CA 95134, USA

Registration Numbers for Industry Canada

Cisco System Site	Address	Site Identifier
Building P, 10m Chamber	125 West Tasman Dr San Jose, CA 95134	Company #: 2461N-2
Building P, 5m Chamber	125 West Tasman Dr San Jose, CA 95134	Company #: 2461N-1
Building I, 5m Chamber	285 W. Tasman Drive San Jose, California 95134	Company #: 2461M-1

ACCREDITED

Testing - Certificate Number: 1178-01

Test Engineers

John Liscio

2.5 Equipment Assessed (EUT)

AIR-RM3010L-B-K9

2.6 EUT Description

The AIR-RM3010L-B-K9 Cisco Aironet 802.11ac Radio 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.

802.11n/ac - Non HT/VHT20, One Antenna, 6 to 54 Mbps
802.11n/ac - Non HT/VHT20, Two Antennas, 6 to 54 Mbps
802.11n/ac - Non HT/VHT20, Three Antennas, 6 to 54 Mbps
802.11n/ac - Non HT/VHT20, Four Antennas, 6 to 54 Mbps

802.11n/ac - HT/VHT20, One Antenna, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT20, Two Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT20, Three Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT20, Four Antennas, M0 to M7, M0 to M9 1ss

802.11n/ac - HT/VHT20 STBC, Two Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT20 STBC, Three Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT20 STBC, Four Antennas, M0 to M7, M0 to M9 1ss

802.11n/ac - Non HT/VHT40 Duplicate, One Antenna, 6 to 54 Mbps
802.11n/ac - Non HT/VHT40 Duplicate, Two Antennas, 6 to 54 Mbps
802.11n/ac - Non HT/VHT40 Duplicate, Three Antennas, 6 to 54 Mbps
802.11n/ac - Non HT/VHT40 Duplicate, Four Antennas, 6 to 54 Mbps

802.11n/ac - HT/VHT40, One Antenna, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT40, Two Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT40, Three Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT40, Four Antennas, M0 to M7, M0 to M9 1ss

802.11n/ac - HT/VHT40 STBC, Two Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT40 STBC, Three Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT40 STBC, Four Antennas, M0 to M7, M0 to M9 1ss

802.11n/ac - Non HT/VHT80 Duplicate, One Antenna, 6 to 54 Mbps
802.11n/ac - Non HT/VHT80 Duplicate, Two Antennas, 6 to 54 Mbps
802.11n/ac - Non HT/VHT80 Duplicate, Three Antennas, 6 to 54 Mbps
802.11n/ac - Non HT/VHT80 Duplicate, Four Antennas, 6 to 54 Mbps

802.11n/ac - HT/VHT80, One Antenna, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT80, Two Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT80, Three Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT80, Four Antennas, M0 to M7, M0 to M9 1ss

802.11n/ac - HT/VHT80 STBC, Two Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT80 STBC, Three Antennas, M0 to M7, M0 to M9 1ss
802.11n/ac - HT/VHT80 STBC, Four Antennas, M0 to M7, M0 to M9 1ss

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)	2.4G Location Antenna Gain (dBi)	5G Location Antenna Gain (dBi)	2.4G WiFi Gain (dBi)	5G WiFi Gain (dBi)
2.4 / 5 GHZ	NA	WSSI Internal	2	3	4	-	-
	AIR-ANT-LOC-01	Ring - Omni	-	0	0	-	-
	AIR-ANT25-L0C-02	Omni Array	-	0	0	0	0
	AIR-ANT25-LOC-03	Directional Array	-	0	0	0	0

Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Technical Requirements / Details	Result
FCC 15.407	**99% & 26 dB Bandwidth:** The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. There is no limit for 99% OBW. The 26 dB emission is the width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.	Pass
FCC 15.407	**Output Power:** **15.407:** (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. 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 e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm). (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. 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.	Pass
FCC 15.407	**Power Spectral Density:** **15.407** The maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	Pass
FCC 15.407	**Conducted Spurious Emissions / Band-Edge:** For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.25 GHz band shall not exceed an EIRP of -27dBm/MHz.	Pass
FCC 15.407 FCC 15.209 FCC 152.05	**Restricted band:** Unwanted emissions falling within the restricted bands, as defined in FCC 15.205 (a) must also comply with the radiated emission limits specified in FCC 15.209 (a).	Pass

Radiated Emissions (General requirements)

Basic Standard	Technical Requirements / Details	Result
FCC 15.209 FCC 15.205	**TX Spurious Emissions:** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the filed strength limits table in this section.	Pass
FCC 15.207	**AC conducted Emissions:** Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries.	Pass

***** MPE calculation is recorded in a separate report

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.

4.1 Sample Details

Sample No.	Equipment Details	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	AIR-RM3010L-B-K9	Cisco Systems	P2	NA	NA	
S02*	AIR-PWR-C	Meanwell	A0	NA	NA	EB46E93226
S03	AIR-RM3010L-B-K9	Cisco Systems	P2	NA	NA	
S04*	AIR-PWR-C	Cisco Systems	A0	NA	NA	DAB1423M7R2

(*) S02 and S04 are support equipment Power supplies for EUT S01 and S03

4.2 System Details

System #	Description	Samples
1	Test Items A1-A4	S01, S02
2	Test Items B1-B3	S03, S04

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting

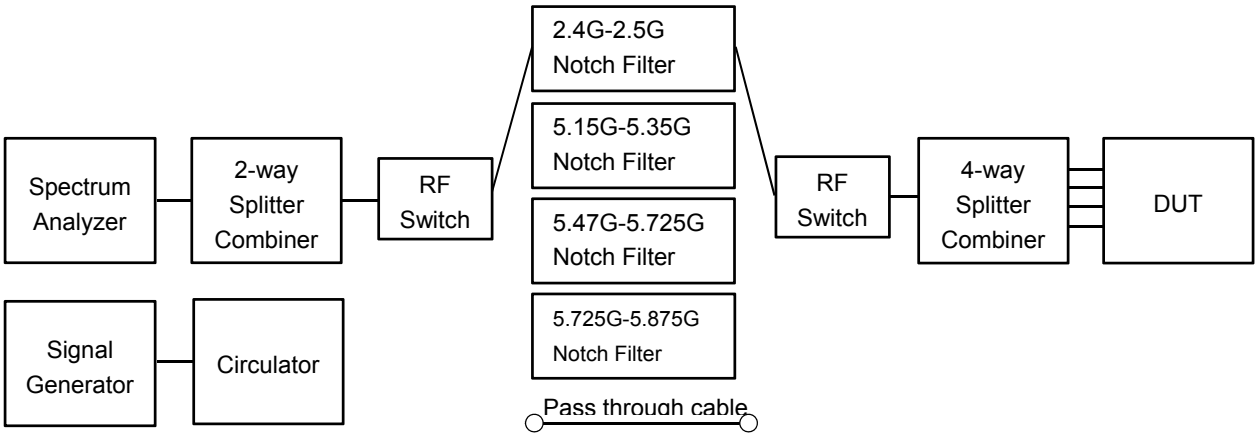
All measurements were made in accordance with

- ANSI C63.10:2013
- KDB 789033 D02 General UNII Test Procedures New Rules v01
- KDB 662911 D01 Multiple Transmitter Output

Appendix A: Emission Test Results

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

Conducted Test Setup Diagram



Target Maximum Channel Power

The following table details the targeted maximum supported Total Channel Powers for all operating modes. Actual measured powers are listed in section A2.

	Maximum Channel Power (dBm)	
	Frequency (MHz)	
Operating Mode	5180	5240
Non HT/VHT20, M0 to M7, M0 to M9 1-1ss	22	22
HT/VHT20 STBC, M0 to M7, M0 to M9 1-1ss	22	23
	5190	5230
Non HT/VHT40, M0 to M7, M0 to M9 1-1ss	19	23
HT/VHT40 STBC, M0 to M7, M0 to M9 1-1ss	20	23
	5210	
Non HT/VHT80, M0 to M7, M0 to M9 1-1ss	18	
HT/VHT80 STBC, M0 to M7, M0 to M9 1-1ss	18	

A.1 99% and 26dB Bandwidth

FCC 15.407 The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. There is no limit for 99% OBW.

The 26 dB emission is the width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.

Test Procedure

Ref. ANSI C63.10: 2013 Section 6.9.3

99% BW and EBW (-26dB)
Test Procedure
1. Set the radio in the continuous transmitting mode.
2. Allow the trace to stabilize.
3. Setting the x-dB bandwidth mode to -26dB and OBW power function to 99% within the measurement set up function.
4. Select the automatic OBW measurement function of an instrument to perform bandwidth measurement.
5. Capture graphs and record pertinent measurement data.

Ref. ANSI C63.10: 2013 Section 6.9.3

99% BW and EBW (-26dB)
Test parameters
Span = 1.5 x to 5.0 times OBW
RBW = approx. 1% to 5% of the OBW
VBW ≥ 3 x RBW
Detector = Peak or where practical sample shall be used
Trace = Max. Hold

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	☑	☐
	Support	S02	☐	☑

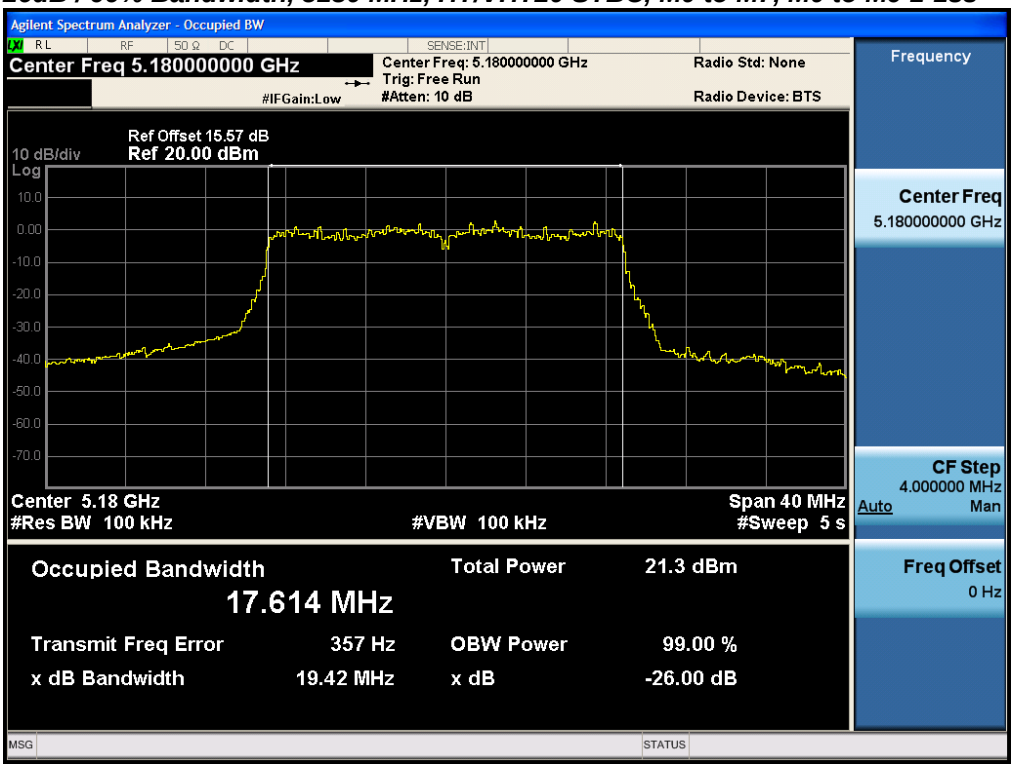
Tested By :	**Date of testing:**
John Liscio	February-15 - March-15
Test Result : PASS	

See Appendix C for list of test equipment

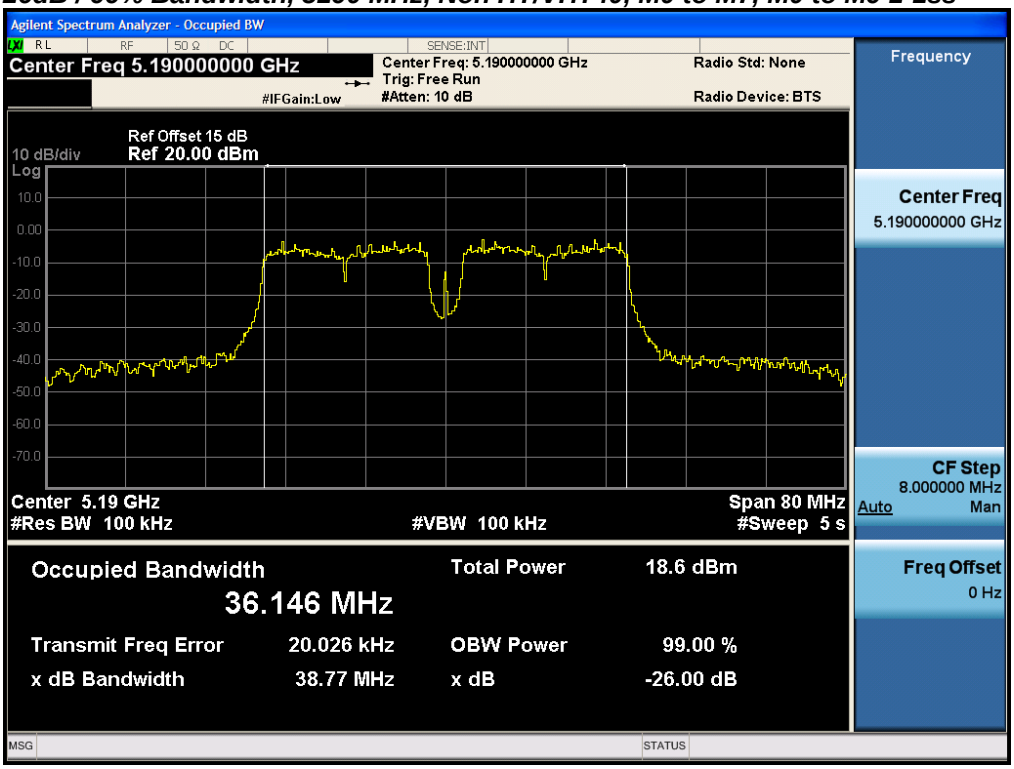
Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
5180	Non HT/VHT20, M0 to M7, M0 to M9 1-1ss	6	18.7	16.5
	HT/VHT20 STBC, M0 to M7, M0 to M9 1-1ss	m0	19.4	17.6
5190	Non HT/VHT40, M0 to M7, M0 to M9 1-1ss	6	38.8	36.1
	HT/VHT40 STBC, M0 to M7, M0 to M9 1-1ss	m0	38.4	36
5210	Non HT/VHT80, M0 to M7, M0 to M9 1-1ss	6	79.4	75.9
	HT/VHT80 STBC, M0 to M7, M0 to M9 1-1ss	m0x1	80.1	75.9
5230	Non HT/VHT40, M0 to M7, M0 to M9 1-1ss	6	45.1	36.3
	HT/VHT40 STBC, M0 to M7, M0 to M9 1-1ss	m0	38.6	36.1
5240	Non HT/VHT20, M0 to M7, M0 to M9 1-1ss	6	18.7	16.5
	HT/VHT20 STBC, M0 to M7, M0 to M9 1-1ss	m0	19.4	17.6

26dB / 99% Bandwidth, 5180 MHz, Non HT/VHT20, M0 to M7, M0 to M9 1-1ss

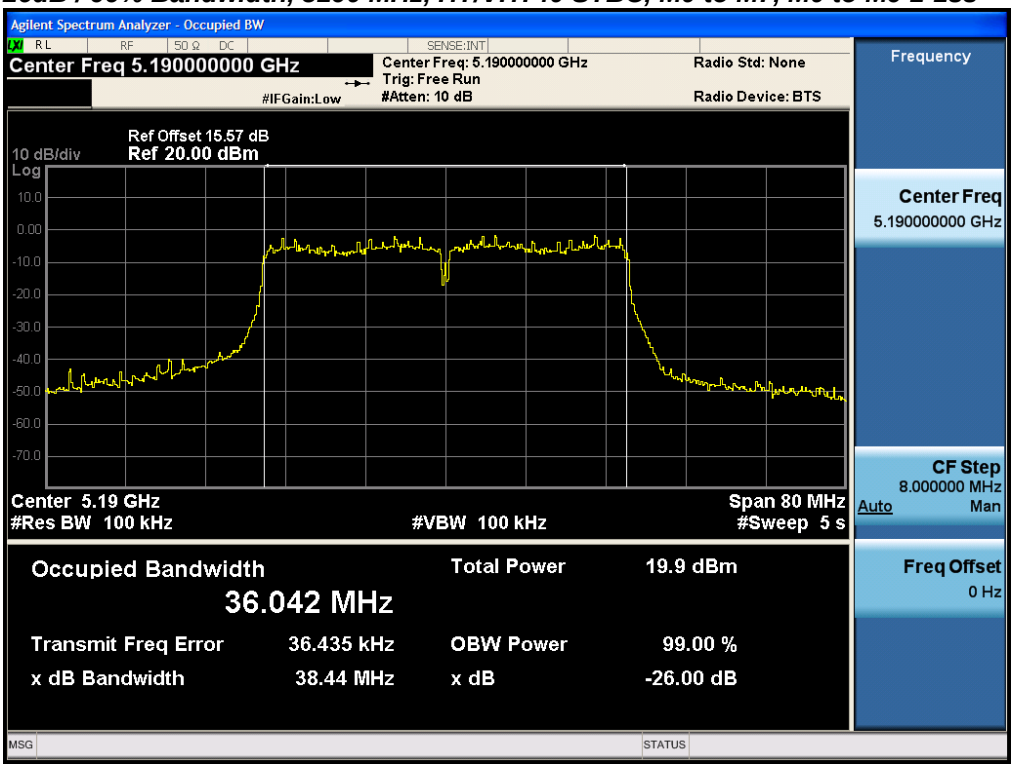
26dB / 99% Bandwidth, 5180 MHz, HT/VHT20 STBC, M0 to M7, M0 to M9 1-1ss



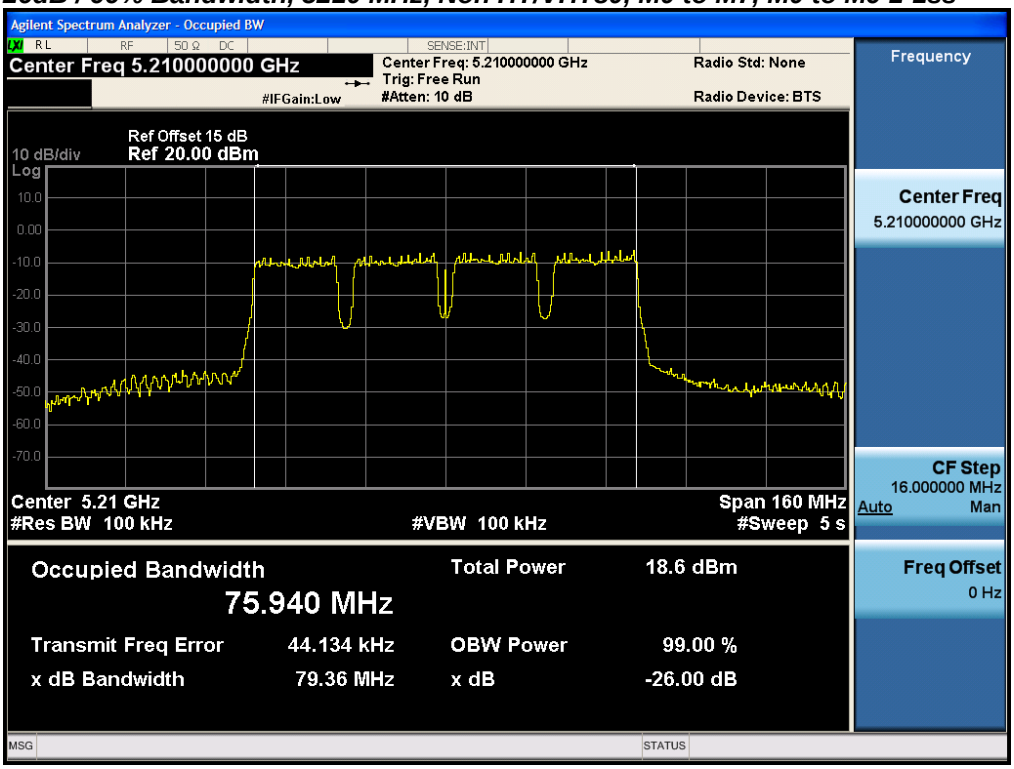
26dB / 99% Bandwidth, 5190 MHz, Non HT/VHT40, M0 to M7, M0 to M9 1-1ss



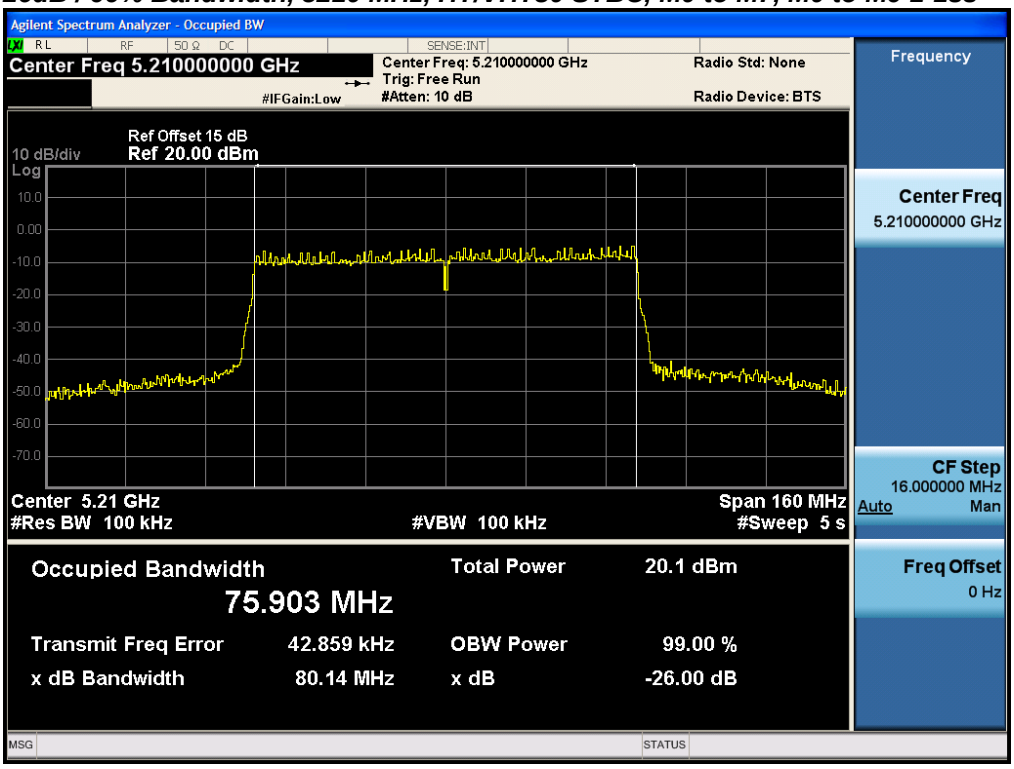
26dB / 99% Bandwidth, 5190 MHz, HT/VHT40 STBC, M0 to M7, M0 to M9 1-1ss



26dB / 99% Bandwidth, 5210 MHz, Non HT/VHT80, M0 to M7, M0 to M9 1-1ss

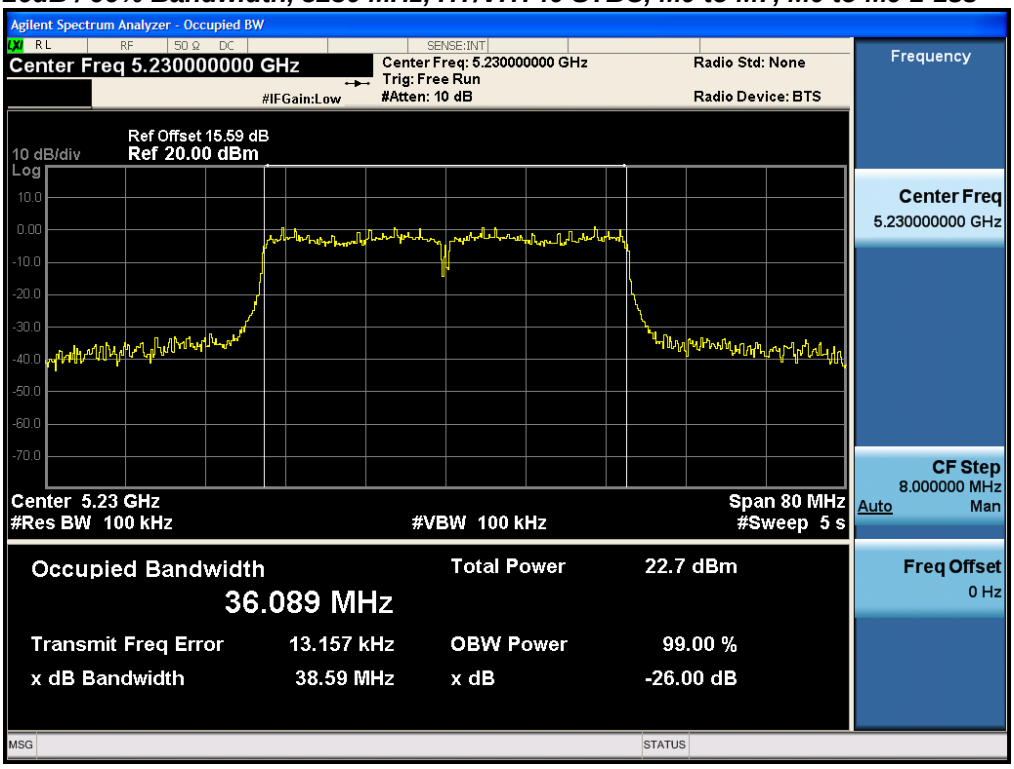


26dB / 99% Bandwidth, 5210 MHz, HT/VHT80 STBC, M0 to M7, M0 to M9 1-1ss

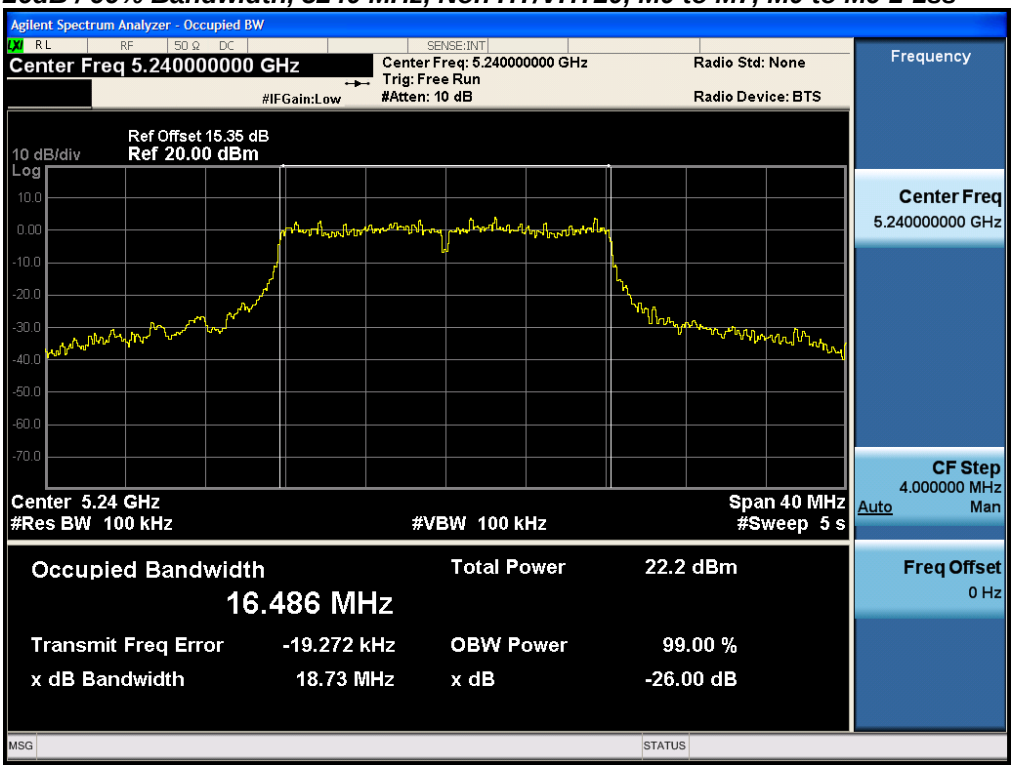


26dB / 99% Bandwidth, 5230 MHz, Non HT/VHT40, M0 to M7, M0 to M9 1-1ss

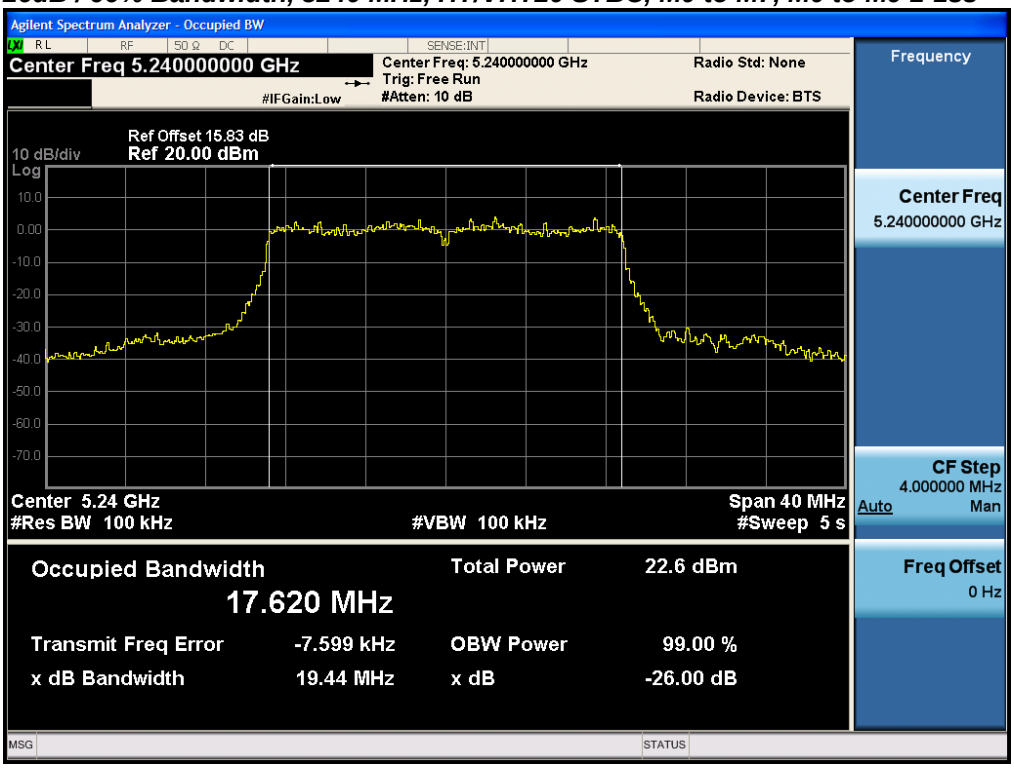
26dB / 99% Bandwidth, 5230 MHz, HT/VHT40 STBC, M0 to M7, M0 to M9 1-1ss



26dB / 99% Bandwidth, 5240 MHz, Non HT/VHT20, M0 to M7, M0 to M9 1-1ss



26dB / 99% Bandwidth, 5240 MHz, HT/VHT20 STBC, M0 to M7, M0 to M9 1-1ss



A.2 Maximum Conducted Output Power/ Power Spectral Density

15.407 (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01
ANSI C63.10: 2013

Output Power Test Procedure
1. Set the radio in the continuous transmitting mode at full power 2. Compute power by integrating the spectrum across the EBW (or alternatively entire 99% OBW) of the signal using the instrument's band power measurement function. The integration shall be performed using the spectrum analyzer band-power measurement function with band limits set equal to the EBW or the OBW band edges. 3. Capture graphs and record pertinent measurement data.

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01
ANSI C63.10: 2013 section 12.3.2.2 Method SA-1

Output Power Test parameters
Span = >1.5 times the OBW RBW = 1MHz VBW ≥ 3 x RBW Sweep = Auto couple Detector = sample Trace = Trace Average 100

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. (See ANSI C63.10 section 14.3.2.2)

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	☑	☐
	Support	S02	☐	☑

Tested By :	**Date of testing:**
John Liscio	February-15 - March-15
Test Result : PASS	

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Tx 3 Max Power (dBm)	Tx 4 Max Power (dBm)	Total Tx Channel Power (dBm)	Limit (dBm)	Margin (dB)
5180	Non HT/VHT20, 6 to 54 Mbps	1	4	16.1				16.1	30.0	13.9
	Non HT/VHT20, 6 to 54 Mbps	2	4	16.1	15.7			18.9	30.0	11.1
	Non HT/VHT20, 6 to 54 Mbps	3	4	16.1	15.7	15.7		20.6	30.0	9.4
	Non HT/VHT20, 6 to 54 Mbps	4	4	16.1	15.7	15.7	16.2	22.0	30.0	8.0
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	16.5				16.5	30.0	13.5
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	16.5	16.1			19.3	30.0	10.7
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	15.2	14.8	14.8		19.7	30.0	10.3
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	15.2	14.8	14.8	15.4	21.1	30.0	8.9
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	16.5	16.1			19.3	30.0	10.7
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	15.2	14.8	14.8		19.7	30.0	10.3
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	15.2	14.8	14.8	15.4	21.1	30.0	8.9
5190	Non HT/VHT40, 6 to 54 Mbps	1	4	13.0				13.0	30.0	17.0
	Non HT/VHT40, 6 to 54 Mbps	2	4	12.0	11.7			14.9	30.0	15.1
	Non HT/VHT40, 6 to 54 Mbps	3	4	12.0	11.7	11.8		16.6	30.0	13.4
	Non HT/VHT40, 6 to 54 Mbps	4	4	12.0	11.7	11.8	12.3	18.0	30.0	12.0
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	14.2				14.2	30.0	15.8
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	14.2	13.8			17.0	30.0	13.0
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	13.3	13.0	13.2		17.9	30.0	12.1
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	13.3	13.0	13.2	13.2	19.2	30.0	10.8
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	14.2	13.8			17.0	30.0	13.0
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	13.3	13.0	13.2		17.9	30.0	12.1
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	13.3	13.0	13.2	13.2	19.2	30.0	10.8
5210	Non HT/VHT80, 6 to 54 Mbps	1	4	13.8				13.8	30.0	16.2
	Non HT/VHT80, 6 to 54 Mbps	2	4	11.5	11.7			14.6	30.0	15.4
	Non HT/VHT80, 6 to 54 Mbps	3	4	11.5	11.7	11.5		16.3	30.0	13.7
	Non HT/VHT80, 6 to 54 Mbps	4	4	10.6	11.0	10.5	10.8	16.7	30.0	13.3
	HT/VHT80, M0 to M7, M0 to M9 1ss	1	4	14.6				14.6	30.0	15.4
	HT/VHT80, M0 to M7, M0 to M9 1ss	2	4	12.7	13.2			16.0	30.0	14.0
	HT/VHT80, M0 to M7, M0 to M9 1ss	3	4	11.5	11.9	11.3		16.3	30.0	13.7
	HT/VHT80, M0 to M7, M0 to M9 1ss	4	4	11.5	11.9	11.3	11.7	17.6	30.0	12.4
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	2	4	12.7	13.2			16.0	30.0	14.0
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	3	4	11.5	11.9	11.3		16.3	30.0	13.7

	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	4	4	11.5	11.9	11.3	11.7	17.6	30.0	12.4
5230	Non HT/VHT40, 6 to 54 Mbps	1	4	17.0				17.0	30.0	13.0
	Non HT/VHT40, 6 to 54 Mbps	2	4	17.0	17.0			20.0	30.0	10.0
	Non HT/VHT40, 6 to 54 Mbps	3	4	17.0	17.0	17.1		21.8	30.0	8.2
	Non HT/VHT40, 6 to 54 Mbps	4	4	17.0	17.0	17.1	16.9	23.0	30.0	7.0
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	16.6				16.6	30.0	13.4
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	16.6	16.3			19.5	30.0	10.5
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	16.6	16.3	16.0		21.1	30.0	8.9
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	16.6	16.3	16.0	16.0	22.3	30.0	7.7
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	16.6	16.3			19.5	30.0	10.5
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	16.6	16.3	16.0		21.1	30.0	8.9
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	16.6	16.3	16.0	16.0	22.3	30.0	7.7
5240	Non HT/VHT20, 6 to 54 Mbps	1	4	15.6				15.6	30.0	14.4
	Non HT/VHT20, 6 to 54 Mbps	2	4	15.6	15.7			18.7	30.0	11.3
	Non HT/VHT20, 6 to 54 Mbps	3	4	15.6	15.7	15.9		20.5	30.0	9.5
	Non HT/VHT20, 6 to 54 Mbps	4	4	15.6	15.7	15.9	16.0	21.8	30.0	8.2
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	16.2				16.2	30.0	13.8
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	16.2	16.2			19.2	30.0	10.8
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	16.2	16.2	16.2		21.0	30.0	9.0
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	16.2	16.2	16.2	16.1	22.2	30.0	7.8
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	16.2	16.2			19.2	30.0	10.8
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	16.2	16.2	16.2		21.0	30.0	9.0
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	16.2	16.2	16.2	16.1	22.2	30.0	7.8

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 PSD (dBm/MHz)	Tx 2 PSD (dBm/MHz)	Tx 3 PSD (dBm/MHz)	Tx 4 PSD (dBm/MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
5180	Non HT/VHT20, 6 to 54 Mbps	1	4	5.8				5.8	17.0	11.2
	Non HT/VHT20, 6 to 54 Mbps	2	7	5.8	5.3			8.6	16.0	7.4
	Non HT/VHT20, 6 to 54 Mbps	3	9	5.8	5.3	5.5		10.3	14.2	3.9
	Non HT/VHT20, 6 to 54 Mbps	4	10	5.8	5.3	5.5	5.9	11.7	13.0	1.3
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	5.7				5.7	17.0	11.3
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	7	5.7	5.3			8.5	16.0	7.5
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	9	4.5	4.2	4.2		9.1	14.2	5.2
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	10	4.5	4.2	4.2	4.7	10.4	13.0	2.6
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	5.7	5.3			8.5	17.0	8.5
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	6	4.5	4.2	4.2		9.1	17.0	7.9
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	7	4.5	4.2	4.2	4.7	10.4	16.0	5.6
5190	Non HT/VHT40, 6 to 54 Mbps	1	4	-0.3				-0.3	17.0	17.3
	Non HT/VHT40, 6 to 54 Mbps	2	7	-1.3	-1.6			1.6	16.0	14.4
	Non HT/VHT40, 6 to 54 Mbps	3	9	-1.3	-1.6	-1.4		3.3	14.2	10.9
	Non HT/VHT40, 6 to 54 Mbps	4	10	-1.3	-1.6	-1.4	-0.5	4.8	13.0	8.1
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	0.6				0.6	17.0	16.4
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	7	0.6	0.2			3.4	16.0	12.6
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	9	-0.2	-0.3	-0.6		4.4	14.2	9.8
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	10	-0.2	-0.3	-0.6	-0.7	5.6	13.0	7.4
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	0.6	0.2			3.4	17.0	13.6
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	6	-0.2	-0.3	-0.6		4.4	17.0	12.6
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	7	-0.2	-0.3	-0.6	-0.7	5.6	16.0	10.4
5210	Non HT/VHT80, 6 to 54 Mbps	1	4	-2.7				-2.7	17.0	19.7
	Non HT/VHT80, 6 to 54 Mbps	2	7	-4.9	-5.1			-2.0	16.0	18.0
	Non HT/VHT80, 6 to 54 Mbps	3	9	-4.9	-5.1	-4.9		-0.2	14.2	14.4
	Non HT/VHT80, 6 to 54 Mbps	4	10	-6.0	-5.5	-6.2	-5.9	0.1	13.0	12.9
	HT/VHT80, M0 to M7, M0 to M9 1ss	1	4	-2.2				-2.2	17.0	19.2
	HT/VHT80, M0 to M7, M0 to M9 1ss	2	7	-3.7	-3.8			-0.7	16.0	16.7
	HT/VHT80, M0 to M7, M0 to M9 1ss	3	9	-5.2	-5.2	-5.6		-0.6	14.2	14.8
	HT/VHT80, M0 to M7, M0 to M9 1ss	4	10	-5.2	-5.2	-5.6	-5.4	0.7	13.0	12.3
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	2	4	-3.7	-3.8			-0.7	17.0	17.7
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	3	4	-5.2	-5.2	-5.6		-0.6	17.0	17.6

	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	4	4	-5.2	-5.2	-5.6	-5.4	0.7	17.0	16.3
5230	Non HT/VHT40, 6 to 54 Mbps	1	4	3.9				3.9	17.0	13.1
	Non HT/VHT40, 6 to 54 Mbps	2	7	3.9	3.7			6.8	16.0	9.2
	Non HT/VHT40, 6 to 54 Mbps	3	9	3.9	3.7	4.0		8.6	14.2	5.6
	Non HT/VHT40, 6 to 54 Mbps	4	10	3.9	3.7	4.0	3.6	9.8	13.0	3.2
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	2.8				2.8	17.0	14.2
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	7	2.8	2.8			5.8	16.0	10.2
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	9	2.8	2.8	2.2		7.4	14.2	6.8
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	10	2.8	2.8	2.2	2.2	8.5	13.0	4.4
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	2.8	2.8			5.8	17.0	11.2
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	6	2.8	2.8	2.2		7.4	17.0	9.6
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	7	2.8	2.8	2.2	2.2	8.5	16.0	7.5
5240	Non HT/VHT20, 6 to 54 Mbps	1	4	5.1				5.1	17.0	11.9
	Non HT/VHT20, 6 to 54 Mbps	2	7	5.1	5.4			8.3	16.0	7.7
	Non HT/VHT20, 6 to 54 Mbps	3	9	5.1	5.4	5.8		10.2	14.2	4.0
	Non HT/VHT20, 6 to 54 Mbps	4	10	5.1	5.4	5.8	5.6	11.5	13.0	1.5
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	6.1				6.1	17.0	10.9
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	7	6.1	5.5			8.8	16.0	7.2
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	9	6.1	5.5	5.6		10.5	14.2	3.7
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	10	6.1	5.5	5.6	5.3	11.7	13.0	1.3
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	6.1	5.5			8.8	17.0	8.2
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	6	6.1	5.5	5.6		10.5	17.0	6.5
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	7	6.1	5.5	5.6	5.3	11.7	16.0	4.3

Peak Output Power, 5230 MHz, Non HT/VHT40, 6 to 54 Mbps

Antenna A

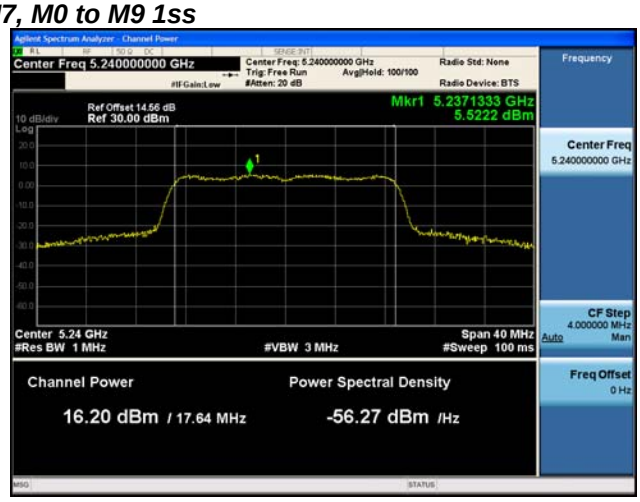
Antenna B

Antenna C

Antenna D

Power Spectral Density, 5240 MHz, HT/VHT20, M0 to M7, M0 to M9 1ss

Antenna A



Antenna B

Antenna C

Antenna D

A.3 Conducted Spurious Emissions

15.407 (i) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. However, any unwanted emissions that fall into the band 5250-5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz.

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)).

Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01
ANSI C63.10: 2013

Conducted Spurious Emissions Test Procedure
1. Connect the antenna port(s) to the spectrum analyzer input. 2. Place the radio in continuous transmit mode. Use the procedures in KDB 789033 D02 General UNII Test Procedues New Rules v01 to substitute conducted measurements in place of radiated measurements. 3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer). 4. Record the marker waveform peak to spur difference. Also measure any emissions in the restricted bands. 5. 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. The worst case output is recorded. 6. Capture graphs and record pertinent measurement data.

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01
ANSI C63.10: 2013 section 12.7.7.3 (average) & 12.7.6 (peak)

Conducted Spurious Emissions Test parameters
Span = 30MHz to 18GHz / 18GHz to 40GHz RBW = 1 MHz VBW ≥ 3 x RBW for Peak, 1kHz for Average Sweep = Auto couple Detector = Peak Trace = Max Hold.

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	☑	☐
	Support	S02	☐	☑

Tested By :	**Date of testing:**
John Liscio	February-15 - March-15
Test Result : PASS	

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Tx 3 Spur Power (dBm)	Tx 4 Spur Power (dBm)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
5180	Non HT/VHT20, 6 to 54 Mbps	1	4	-70.0				-66.0	-41.25	24.8
	Non HT/VHT20, 6 to 54 Mbps	2	4	-70.0	-70.5			-63.2	-41.25	22.0
	Non HT/VHT20, 6 to 54 Mbps	3	4	-70.0	-70.5	-68.9		-61.0	-41.25	19.7
	Non HT/VHT20, 6 to 54 Mbps	4	4	-70.0	-70.5	-68.9	-69.3	-59.6	-41.25	18.4
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	-70.0				-66.0	-41.25	24.8
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	-70.0	-70.6			-63.3	-41.25	22.0
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	-69.9	-70.3	-69.1		-61.0	-41.25	19.7
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	-69.9	-70.3	-69.1	-69.5	-59.7	-41.25	18.4
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	-70.0	-70.6			-63.3	-41.25	22.0
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	-69.9	-70.3	-69.1		-61.0	-41.25	19.7
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	-69.9	-70.3	-69.1	-69.5	-59.7	-41.25	18.4
5190	Non HT/VHT40, 6 to 54 Mbps	1	4	-70.0				-66.0	-41.25	24.8
	Non HT/VHT40, 6 to 54 Mbps	2	4	-69.9	-70.7			-63.3	-41.25	22.0
	Non HT/VHT40, 6 to 54 Mbps	3	4	-69.9	-70.7	-69.4		-61.2	-41.25	19.9
	Non HT/VHT40, 6 to 54 Mbps	4	4	-69.9	-70.7	-69.4	-69.3	-59.8	-41.25	18.5
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	-70.1				-66.1	-41.25	24.9
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	-70.1	-70.6			-63.3	-41.25	22.1
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	-70.1	-70.7	-69.4		-61.3	-41.25	20.0
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	-70.1	-70.7	-69.4	-69.5	-59.9	-41.25	18.6
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	-70.1	-70.6			-63.3	-41.25	22.1
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	-70.1	-70.7	-69.4		-61.3	-41.25	20.0
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	-70.1	-70.7	-69.4	-69.5	-59.9	-41.25	18.6
5210	Non HT/VHT80, 6 to 54 Mbps	1	4	-69.8				-65.8	-41.25	24.6
	Non HT/VHT80, 6 to 54 Mbps	2	4	-70.0	-55.4			-51.3	-41.25	10.0
	Non HT/VHT80, 6 to 54 Mbps	3	4	-70.0	-55.4	-69.4		-51.1	-41.25	9.8
	Non HT/VHT80, 6 to 54 Mbps	4	4	-70.0	-70.6	-69.4	-69.5	-59.8	-41.25	18.6
	HT/VHT80, M0 to M7, M0 to M9 1ss	1	4	-69.9				-65.9	-41.25	24.7
	HT/VHT80, M0 to M7, M0 to M9 1ss	2	4	-69.9	-70.9			-63.4	-41.25	22.1
	HT/VHT80, M0 to M7, M0 to M9 1ss	3	4	-69.9	-70.7	-69.4		-61.2	-41.25	19.9
	HT/VHT80, M0 to M7, M0 to M9 1ss	4	4	-69.9	-70.7	-69.4	-69.3	-59.8	-41.25	18.5
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	2	4	-69.9	-70.9			-63.4	-41.25	22.1
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	3	4	-69.9	-70.7	-69.4		-61.2	-41.25	19.9

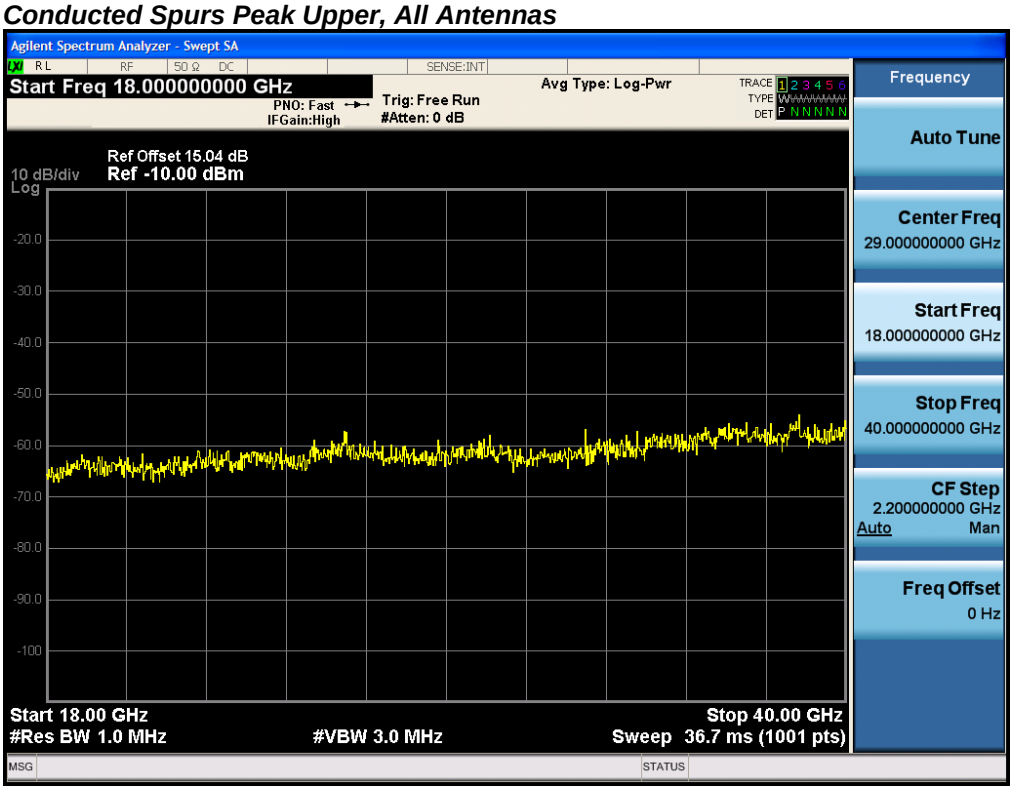
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	4	4	-69.9	-70.7	-69.4	-69.3	-59.8	-41.25	18.5
5230	Non HT/VHT40, 6 to 54 Mbps	1	4	-55.7				-51.7	-41.25	10.5
	Non HT/VHT40, 6 to 54 Mbps	2	4	-55.7	-56.3			-49.0	-41.25	7.7
	Non HT/VHT40, 6 to 54 Mbps	3	4	-55.7	-56.3	-69.6		-48.9	-41.25	7.6
	Non HT/VHT40, 6 to 54 Mbps	4	4	-55.7	-56.3	-69.6	-69.4	-48.8	-41.25	7.5
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	-70.1				-66.1	-41.25	24.9
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	-70.1	-71.0			-63.5	-41.25	22.3
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	-70.1	-71.0	-69.6		-61.4	-41.25	20.2
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	-70.1	-71.0	-69.6	-69.7	-60.0	-41.25	18.8
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	-70.1	-71.0			-63.5	-41.25	22.3
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	-70.1	-71.0	-69.6		-61.4	-41.25	20.2
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	-70.1	-71.0	-69.6	-69.7	-60.0	-41.25	18.8
5240	Non HT/VHT20, 6 to 54 Mbps	1	4	-69.7				-65.7	-41.25	24.5
	Non HT/VHT20, 6 to 54 Mbps	2	4	-69.7	-70.6			-63.1	-41.25	21.9
	Non HT/VHT20, 6 to 54 Mbps	3	4	-69.7	-70.6	-68.9		-60.9	-41.25	19.7
	Non HT/VHT20, 6 to 54 Mbps	4	4	-69.7	-70.6	-68.9	-69.3	-59.6	-41.25	18.3
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	-69.9				-65.9	-41.25	24.7
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	-69.9	-70.5			-63.2	-41.25	21.9
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	-69.9	-70.5	-69.0		-61.0	-41.25	19.7
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	-69.9	-70.5	-69.0	-69.4	-59.6	-41.25	18.4
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	-69.9	-70.5			-63.2	-41.25	21.9
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	-69.9	-70.5	-69.0		-61.0	-41.25	19.7
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	-69.9	-70.5	-69.0	-69.4	-59.6	-41.25	18.4

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Tx 3 Spur Power (dBm)	Tx 4 Spur Power (dBm)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
5180	Non HT/VHT20, 6 to 54 Mbps	1	4	-57.6				-53.6	-21.25	32.4
	Non HT/VHT20, 6 to 54 Mbps	2	4	-57.6	-62.4			-52.4	-21.25	31.1
	Non HT/VHT20, 6 to 54 Mbps	3	4	-57.6	-62.4	-58.6		-50.3	-21.25	29.1
	Non HT/VHT20, 6 to 54 Mbps	4	4	-57.6	-62.4	-58.6	-60.7	-49.4	-21.25	28.2
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	-59.7				-55.7	-21.25	34.5
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	-59.7	-59.8			-52.7	-21.25	31.5
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	-61.9	-60.4	-60.2		-52.0	-21.25	30.7
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	-61.9	-60.4	-60.2	-61.0	-50.8	-21.25	29.6
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	-59.7	-59.8			-52.7	-21.25	31.5
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	-61.9	-60.4	-60.2		-52.0	-21.25	30.7
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	-61.9	-60.4	-60.2	-61.0	-50.8	-21.25	29.6
5190	Non HT/VHT40, 6 to 54 Mbps	1	4	-62.7				-58.7	-21.25	37.5
	Non HT/VHT40, 6 to 54 Mbps	2	4	-62.1	-62.6			-55.3	-21.25	34.1
	Non HT/VHT40, 6 to 54 Mbps	3	4	-62.1	-62.6	-60.6		-52.9	-21.25	31.7
	Non HT/VHT40, 6 to 54 Mbps	4	4	-62.1	-62.6	-60.6	-60.7	-51.4	-21.25	30.1
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	-61.2				-57.2	-21.25	36.0
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	-61.2	-63.5			-55.2	-21.25	33.9
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	-62.1	-63.1	-60.4		-52.9	-21.25	31.7
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	-62.1	-63.1	-60.4	-59.1	-50.9	-21.25	29.6
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	-61.2	-63.5			-55.2	-21.25	33.9
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	-62.1	-63.1	-60.4		-52.9	-21.25	31.7
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	-62.1	-63.1	-60.4	-59.1	-50.9	-21.25	29.6
5210	Non HT/VHT80, 6 to 54 Mbps	1	4	-60.2				-56.2	-21.25	35.0
	Non HT/VHT80, 6 to 54 Mbps	2	4	-59.8	-61.6			-53.6	-21.25	32.3
	Non HT/VHT80, 6 to 54 Mbps	3	4	-59.8	-61.6	-62.4		-52.4	-21.25	31.1
	Non HT/VHT80, 6 to 54 Mbps	4	4	-62.0	-63.0	-59.2	-59.1	-50.5	-21.25	29.2
	HT/VHT80, M0 to M7, M0 to M9 1ss	1	4	-61.4				-57.4	-21.25	36.2
	HT/VHT80, M0 to M7, M0 to M9 1ss	2	4	-60.1	-59.9			-53.0	-21.25	31.7
	HT/VHT80, M0 to M7, M0 to M9 1ss	3	4	-63.1	-63.1	-60.8		-53.4	-21.25	32.2
	HT/VHT80, M0 to M7, M0 to M9 1ss	4	4	-63.1	-63.1	-60.8	-60.0	-51.5	-21.25	30.3
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	2	4	-60.1	-59.9			-53.0	-21.25	31.7
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	3	4	-63.1	-63.1	-60.8		-53.4	-21.25	32.2

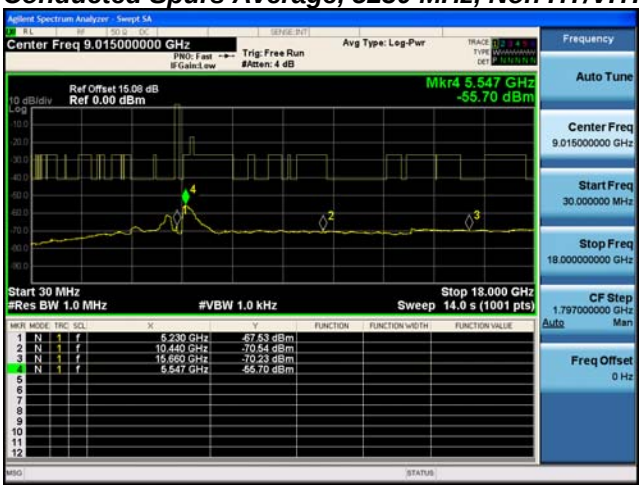
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	4	4	-63.1	-63.1	-60.8	-60.0	-51.5	-21.25	30.3
5230	Non HT/VHT40, 6 to 54 Mbps	1	4	-62.5				-58.5	-21.25	37.3
	Non HT/VHT40, 6 to 54 Mbps	2	4	-62.5	-62.3			-55.4	-21.25	34.1
	Non HT/VHT40, 6 to 54 Mbps	3	4	-62.5	-62.3	-61.9		-53.5	-21.25	32.2
	Non HT/VHT40, 6 to 54 Mbps	4	4	-62.5	-62.3	-61.9	-61.0	-51.9	-21.25	30.6
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	-60.5				-56.5	-21.25	35.3
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	-60.5	-62.6			-54.4	-21.25	33.2
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	-60.5	-62.6	-62.7		-53.0	-21.25	31.8
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	-60.5	-62.6	-62.7	-61.4	-51.7	-21.25	30.4
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	-60.5	-62.6			-54.4	-21.25	33.2
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	-60.5	-62.6	-62.7		-53.0	-21.25	31.8
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	-60.5	-62.6	-62.7	-61.4	-51.7	-21.25	30.4
5240	Non HT/VHT20, 6 to 54 Mbps	1	4	-61.1				-57.1	-21.25	35.9
	Non HT/VHT20, 6 to 54 Mbps	2	4	-61.1	-61.7			-54.4	-21.25	33.1
	Non HT/VHT20, 6 to 54 Mbps	3	4	-61.1	-61.7	-60.9		-52.4	-21.25	31.2
	Non HT/VHT20, 6 to 54 Mbps	4	4	-61.1	-61.7	-60.9	-60.4	-51.0	-21.25	29.7
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	-61.8				-57.8	-21.25	36.6
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	-61.8	-61.5			-54.6	-21.25	33.4
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	-61.8	-61.5	-58.4		-51.5	-21.25	30.3
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	-61.8	-61.5	-58.4	-61.3	-50.5	-21.25	29.2
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	-61.8	-61.5			-54.6	-21.25	33.4
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	-61.8	-61.5	-58.4		-51.5	-21.25	30.3
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	-61.8	-61.5	-58.4	-61.3	-50.5	-21.25	29.2

Conducted Spurs Average Upper, All Antennas

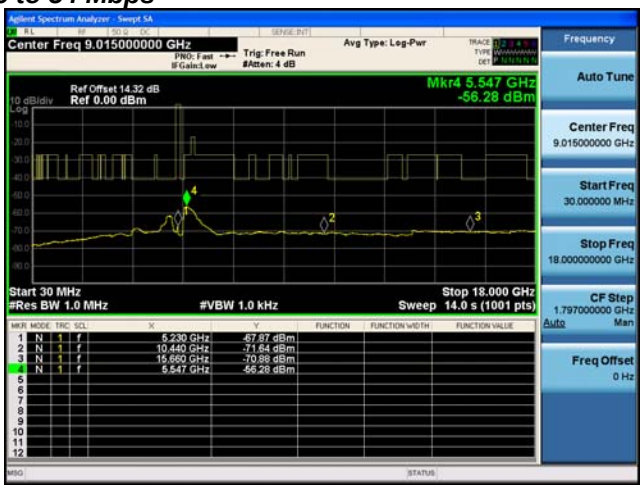
Conducted Spurs Peak Upper, All Antennas



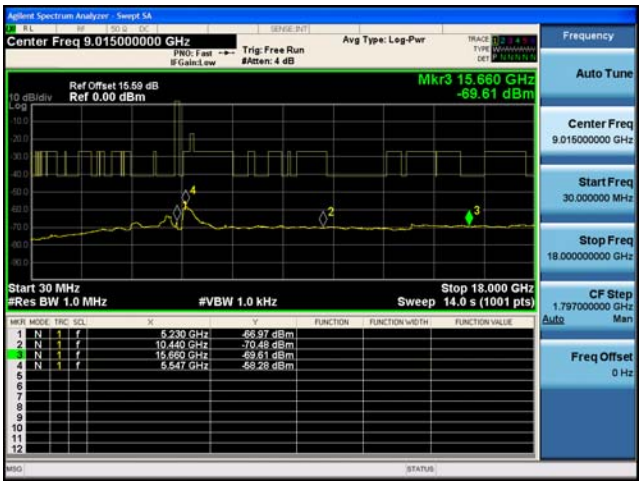
Conducted Spurs Average, 5230 MHz, Non HT/VHT40, 6 to 54 Mbps



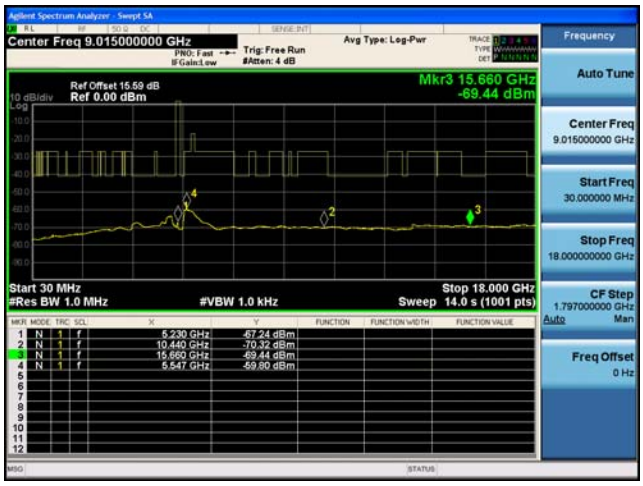
Antenna A



Antenna B

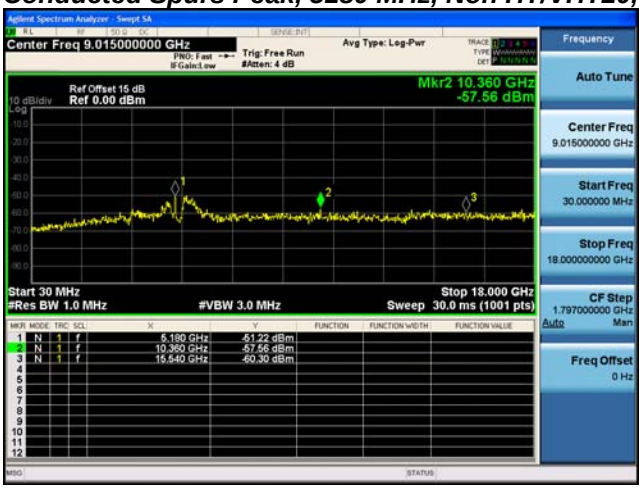


Antenna C



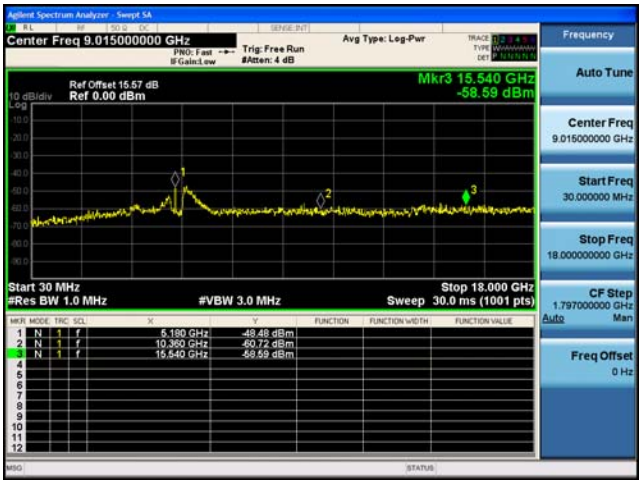
Antenna D

Conducted Spurs Peak, 5180 MHz, Non HT/VHT20, 6 to 54 Mbps

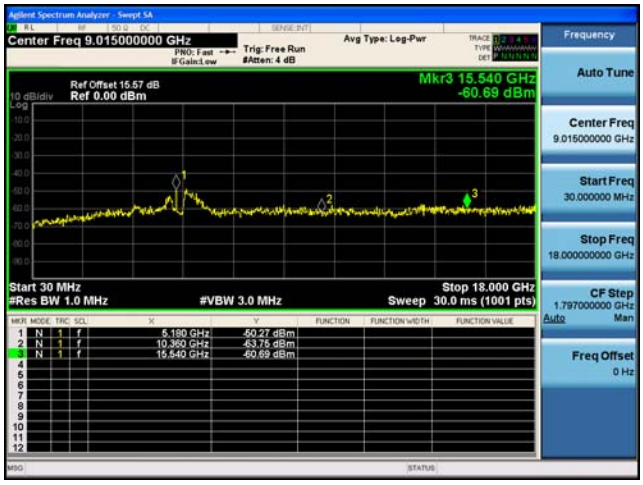


Antenna A

Antenna B



Antenna C



Antenna D

A.4 Conducted Bandedge

15.407 (i) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

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)).

Test Procedure

Ref. ANSI C63.10: 2013

Conducted Bandedge Test Procedure
1. Connect the antenna port(s) to the spectrum analyzer input. 2. Place the radio in continuous transmit mode. Use the procedures in ANSI C63.10: 2013 to substitute conducted measurements in place of radiated measurements. 3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer). 4. 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. 5. 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. The worst case output is recorded. 6. 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 7. Capture graphs and record pertinent measurement data.

Ref. ANSI C63.10: 2013 section 12.7.6 (peak) & 12.7.7.3 (average, Method VB-A (Alternative))

Conducted Bandedge Test parameters restricted Band
RBW = 1 MHz VBW ≥ 3 x RBW for Peak, 100Hz for Average Sweep = Auto couple Detector = Peak Trace = Max Hold.

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	☑	☐
	Support	S02	☐	☑

Tested By :	**Date of testing:**
John Liscio	February-15 - March-15
Test Result : PASS	

See Appendix C for list of test equipment

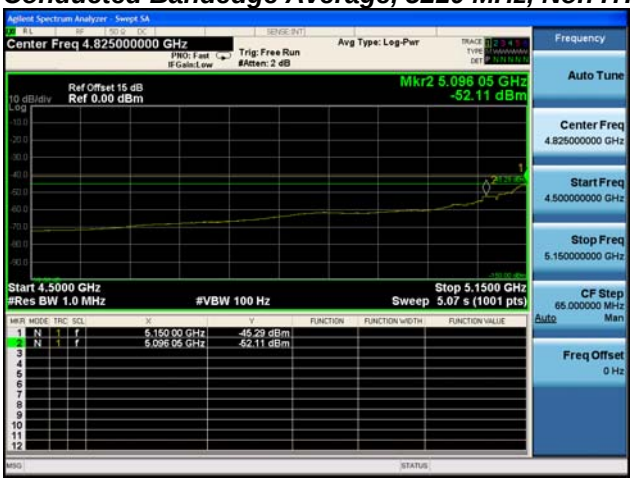
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Tx 3 Bandedge Level (dBm)	Tx 4 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
5180	Non HT/VHT20, 6 to 54 Mbps	1	4	-51.8				-47.8	-41.25	6.6
	Non HT/VHT20, 6 to 54 Mbps	2	4	-51.8	-51.1			-44.4	-41.25	3.2
	Non HT/VHT20, 6 to 54 Mbps	3	4	-51.8	-51.1	-54.5		-43.5	-41.25	2.2
	Non HT/VHT20, 6 to 54 Mbps	4	4	-51.8	-51.1	-54.5	-51.6	-42.0	-41.25	0.8
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	-48.4				-44.4	-41.25	3.2
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	-48.4	-48.4			-41.4	-41.25	0.1
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	-52.9	-52.2	-55.8		-44.6	-41.25	3.4
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	-52.9	-52.2	-55.8	-52.9	-43.2	-41.25	2.0
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	-48.4	-48.4			-41.4	-41.25	0.1
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	-52.9	-52.2	-55.8		-44.6	-41.25	3.4
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	-52.9	-52.2	-55.8	-52.9	-43.2	-41.25	2.0
5190	Non HT/VHT40, 6 to 54 Mbps	1	4	-49.0				-45.0	-41.25	3.8
	Non HT/VHT40, 6 to 54 Mbps	2	4	-53.0	-52.6			-45.8	-41.25	4.5
	Non HT/VHT40, 6 to 54 Mbps	3	4	-53.0	-52.6	-57.0		-45.0	-41.25	3.8
	Non HT/VHT40, 6 to 54 Mbps	4	4	-53.0	-52.6	-57.0	-54.4	-43.9	-41.25	2.7
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	-49.0				-45.0	-41.25	3.8
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	-49.0	-49.3			-42.1	-41.25	0.9
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	-52.6	-52.8	-53.2		-44.1	-41.25	2.8
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	-52.6	-52.8	-53.2	-53.5	-43.0	-41.25	1.7
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	-49.0	-49.3			-42.1	-41.25	0.9
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	-52.6	-52.8	-53.2		-44.1	-41.25	2.8
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	-52.6	-52.8	-53.2	-53.5	-43.0	-41.25	1.7
5210	Non HT/VHT80, 6 to 54 Mbps	1	4	-45.3				-41.3	-41.25	0.0
	Non HT/VHT80, 6 to 54 Mbps	2	4	-52.1	-49.4			-43.5	-41.25	2.3
	Non HT/VHT80, 6 to 54 Mbps	3	4	-52.1	-49.4	-50.3		-41.7	-41.25	0.4
	Non HT/VHT80, 6 to 54 Mbps	4	4	-53.2	-51.6	-51.5	-51.2	-41.8	-41.25	0.5
	HT/VHT80, M0 to M7, M0 to M9 1ss	1	4	-45.3				-41.3	-41.25	0.0
	HT/VHT80, M0 to M7, M0 to M9 1ss	2	4	-51.2	-48.3			-42.5	-41.25	1.3
	HT/VHT80, M0 to M7, M0 to M9 1ss	3	4	-53.8	-52.0	-52.8		-44.0	-41.25	2.8
	HT/VHT80, M0 to M7, M0 to M9 1ss	4	4	-53.8	-52.0	-52.8	-52.9	-42.8	-41.25	1.6
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	2	4	-51.2	-48.3			-42.5	-41.25	1.3
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	3	4	-53.8	-52.0	-52.8		-44.0	-41.25	2.8

	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	4	4	-53.8	-52.0	-52.8	-52.9	-42.8	-41.25	1.6

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Tx 3 Bandedge Level (dBm)	Tx 4 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
5180	Non HT/VHT20, 6 to 54 Mbps	1	4	-42.3				-38.3	-21.25	17.1
	Non HT/VHT20, 6 to 54 Mbps	2	4	-42.3	-40.9			-34.5	-21.25	13.3
	Non HT/VHT20, 6 to 54 Mbps	3	4	-42.3	-40.9	-36.9		-30.6	-21.25	9.4
	Non HT/VHT20, 6 to 54 Mbps	4	4	-42.3	-40.9	-36.9	-37.7	-28.9	-21.25	7.6
	HT/VHT20, M0 to M7, M0 to M9 1ss	1	4	-35.0				-31.0	-21.25	9.8
	HT/VHT20, M0 to M7, M0 to M9 1ss	2	4	-35.0	-34.5			-27.7	-21.25	6.5
	HT/VHT20, M0 to M7, M0 to M9 1ss	3	4	-34.4	-40.7	-37.7		-28.1	-21.25	6.8
	HT/VHT20, M0 to M7, M0 to M9 1ss	4	4	-34.4	-40.7	-37.7	-33.8	-25.9	-21.25	4.6
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	2	4	-35.0	-34.5			-27.7	-21.25	6.5
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	3	4	-34.4	-40.7	-37.7		-28.1	-21.25	6.8
	HT/VHT20 STBC, M0 to M7, M0 to M9 1ss	4	4	-34.4	-40.7	-37.7	-33.8	-25.9	-21.25	4.6
5190	Non HT/VHT40, 6 to 54 Mbps	1	4	-32.3				-28.3	-21.25	7.1
	Non HT/VHT40, 6 to 54 Mbps	2	4	-37.3	-35.8			-29.5	-21.25	8.2
	Non HT/VHT40, 6 to 54 Mbps	3	4	-37.3	-35.8	-32.9		-26.2	-21.25	4.9
	Non HT/VHT40, 6 to 54 Mbps	4	4	-37.3	-35.8	-32.9	-35.8	-25.1	-21.25	3.9
	HT/VHT40, M0 to M7, M0 to M9 1ss	1	4	-31.4				-27.4	-21.25	6.2
	HT/VHT40, M0 to M7, M0 to M9 1ss	2	4	-31.4	-40.3			-26.9	-21.25	5.6
	HT/VHT40, M0 to M7, M0 to M9 1ss	3	4	-28.5	-40.2	-31.0		-22.4	-21.25	1.1
	HT/VHT40, M0 to M7, M0 to M9 1ss	4	4	-28.5	-40.2	-31.0	-39.6	-22.2	-21.25	0.9
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	2	4	-31.4	-40.3			-26.9	-21.25	5.6
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	3	4	-28.5	-40.2	-31.0		-22.4	-21.25	1.1
	HT/VHT40 STBC, M0 to M7, M0 to M9 1ss	4	4	-28.5	-40.2	-31.0	-39.6	-22.2	-21.25	0.9
5210	Non HT/VHT80, 6 to 54 Mbps	1	4	-25.4				-21.4	-21.25	0.2
	Non HT/VHT80, 6 to 54 Mbps	2	4	-33.3	-33.3			-26.3	-21.25	5.0
	Non HT/VHT80, 6 to 54 Mbps	3	4	-33.3	-33.3	-34.9		-25.0	-21.25	3.7
	Non HT/VHT80, 6 to 54 Mbps	4	4	-32.6	-36.5	-36.4	-32.7	-24.1	-21.25	2.9
	HT/VHT80, M0 to M7, M0 to M9 1ss	1	4	-27.2				-23.2	-21.25	2.0
	HT/VHT80, M0 to M7, M0 to M9 1ss	2	4	-37.0	-39.2			-31.0	-21.25	9.7
	HT/VHT80, M0 to M7, M0 to M9 1ss	3	4	-38.5	-42.7	-40.5		-31.5	-21.25	10.2
	HT/VHT80, M0 to M7, M0 to M9 1ss	4	4	-38.5	-42.7	-40.5	-36.5	-28.9	-21.25	7.7
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	2	4	-37.0	-39.2			-31.0	-21.25	9.7
	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	3	4	-38.5	-42.7	-40.5		-31.5	-21.25	10.2

	HT/VHT80 STBC, M0 to M7, M0 to M9 1ss	4	4	-38.5	-42.7	-40.5	-36.5	-28.9	-21.25	7.7

Conducted Bandedge Average, 5210 MHz, Non HT/VHT80, 6 to 54 Mbps



Antenna A

Conducted Bandedge Peak, 5210 MHz, Non HT/VHT80, 6 to 54 Mbps

Antenna A

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

Cis Number	Manufacturer	Model	Description	Calibration Due Date
3003	HP	83731B	Synthesized Signal Generator	3/13/2016
4882	EMC Test Systems	3115	Double Ridged Guide Horn Antenna	7/24/2015
5691	Miteq	NSP1800-25-S1	Broadband Preamplifier (1-18GHz)	1/29/2016
8166	HP	8491B Opt 010	10dB Attenuator	2/2/2016
20975	Micro-Coax	UFB311A-0-1344-520520	RF Coaxial Cable, to 18GHz, 134.4 in	2/18/2016
30559	Micro-Coax	UFB311A-1-0950-504504	RF Coaxial Cable, to 18GHz, 95 in	2/20/2016
30652	Sunol Sciences	JB1	Combination Antenna, 30MHz-2GHz	11/5/2015
33988	Agilent	E4446A	Spectrum Analyzer, 3Hz-44GHz	12/9/2015
41929	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	12/20/2015
41979	Cisco	1840	18-40GHz EMI Test Head/Verification Fixture	7/9/2015
43124	Cisco	Above 1GHz Site Cal	Above 1GHz Cispr Site Verification	1/15/2016
CIS-50378	Agilent	N9030A	PXA Spectrum Analyzer	1/5/2016
47282	Huber + Suhner	Sucoflex 102E	40GHz Cable K Connector	5/2/2015
47410	Agilent	N9038A	EMI Receiver	1/5/2016
51642	Huber+Suhner	Sucoflex 106PA	RF N Type Cable 8.5m	2/10/2016
51684	Dynaware	5400-9810-6251	SMA 50 Ohm Termination 18GHz	5/22/2015
51690	Dynaware	5400-9810-6251	SMA 50 Ohm Termination 18GHz	5/22/2015
51692	Dynaware	5400-9810-6251	SMA 50 Ohm Termination 18GHz	5/22/2015
51695	Dynaware	5400-9810-6251	SMA 50 Ohm Termination 18GHz	5/22/2015
CIS-32307	Micro-Tronics	BRM50702-02	2.4-2.5G Notch Filter	10/3/2015
CIS-35606	Micro-Tronics	BRC50704-02	5.47-5.725G Notch Filter	10/3/2015
CIS-43988	Micro-Tronics	BRC50703-02	5.15-5.35G Notch Filter	10/3/2015
CIS-43989	Micro-Tronics	BRC50705-02	5.725-5.875G Notch Filter	10/3/2015

Appendix C: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz ($1x10^3$)
EN	European Norm	MHz	MegaHertz ($1x10^6$)
IEC	International Electro technical Commission	GHz	Gigahertz ($1x10^9$)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt ($1x10^3$)
L1	Line 1	µV	Microvolt ($1x10^{-6}$)
L2	Line2	A	Amp
L3	Line 3	µA	Micro Amp ($1x10^{-6}$)
DC	Direct Current	mS	Milli Second ($1x10^{-3}$)
RAW	Uncorrected measurement value, as indicated by the measuring device	µS	Micro Second ($1x10^{-6}$)
RF	Radio Frequency	µS	Micro Second ($1x10^{-6}$)
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current

End