Test Report

C1101-4PLTEPW
with ISR-AP1101AC-x

Cisco 802.11ac Dual Band Access Points

FCC ID: LDKC11011757

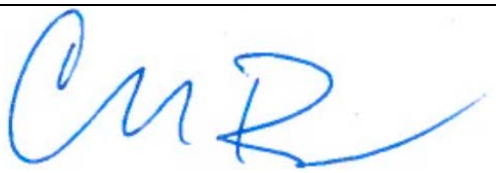
5470-5725 MHz

Against the following Specifications:

CFR47 Part 15.407

ACCREDITED

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

	
Author: Chris Blair **Tested By:** Chris Blair, Dennis Thai	**Approved By:** Gerard Thorpe **Title:** Manager, Engineering **Revision:** See Doc Central

This report replaces any previously entered test report under EDCS – 12062328.This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

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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

Applicable measurement guidance:

- ANSI C63.10:2013
- KDB 789033 D02 General UNII Test Procedures New Rules v01r03
- KDB 662911 D01 Multiple Transmitter Output v02r01

Section2: 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	+/- 5.2 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

21-Dec-17 - 17-Apr-18

2.3 Report Issue Date

25-Apr-18

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

Test Engineers

Chris Blair, Marie Higa

2.5 Equipment Assessed (EUT)

C1101-4PLTEPW with embedded WiFi modem: ISR-AP1101AC-x.

2.6 EUT Description

C1101-4PLTEPW with ISR-AP1101AC-x is Enterprise/MSP/M2M next generation low end router with the unified platform GE WAN, next generation Wave 2 802.11a/g/n/ac WLAN, and next generation LTE WWAN on Polaris IOS XE. It supports the following 5G WLAN modes:

802.11a - Non HT20, One Antenna, 6 to 54 Mbps, 1ss
802.11a - Non HT20, Two Antennas, 6 to 54 Mbps, 1ss

802.11a - Non HT20 Beam Forming, Two Antennas, 6 to 54 Mbps, 1ss

802.11n/ac - HT/VHT20, One Antenna, M0 to M7, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT20, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT20, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

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

802.11a - Non HT40, One Antenna, 6 to 54 Mbps, 1ss
802.11a - Non HT40, Two Antennas, 6 to 54 Mbps, 1ss

802.11n/ac - HT/VHT40, One Antenna, M0 to M7, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT40, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT40, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

802.11n/ac - HT/VHT40 Beam Forming, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT40 Beam Forming, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

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

802.11a - Non HT80, One Antenna, 6 to 54 Mbps, 1ss
802.11a - Non HT80, Two Antennas, 6 to 54 Mbps, 1ss

802.11n/ac - HT/VHT80, One Antenna, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT80, Two Antennas, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT80, Two Antennas, M0.2 to M9.2, 2ss

802.11n/ac - HT/VHT80 Beam Forming, Two Antennas, M0.1 to M9.1, 1ss
802.11n/ac - HT/VHT80 Beam Forming, Two Antennas, M0.2 to M9.2, 2ss

802.11n/ac - HT/VHT80 STBC, Two Antennas, M0.1 to M9.1

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.
Data is recorded at the lowest supported data rate for each mode.

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/5G	ANTS2M1-CCF34-EH	Internal PIFA	2.14/4

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** (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 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	**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:** **15.407** (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.	Pass
FCC 15.407 FCC 15.209 FCC 15.205	**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	C1101-4PLTEPW with ISR-AP1101AC-x wifi adapter	Cisco Systems	P1B (WiFi adapter = P2)	e1c63a0bb171f78c5800c1478007abc1	8.4.1.10	FOC2131026Q
S02*	ADP-66CR B	Delta	01	NA	NA	DAB2110G3CH
S03	C1101-4PLTEPW with ISR-AP1101AC-x wifi adapter	Cisco Systems	P2B (WiFi adapter = P2)	e1c63a0bb171f78c5800c1478007abc1	8.4.1.10	FOC2147556Z
S04	P-LTE-VZ pluggable LTE/GPS module	Cisco Systems	P2	NA	NA	FOC215217QC
S05	ADP-66CR B	Delta	01	NA	NA	DAB2122G378
S06	C1101-4PLTEPW with ISR-AP1101AC-x wifi adapter	Cisco Systems	P2	2.0	c1100-universalk9_ias.BLD_POLARIS_DEV_LATEST_20171209_001819.SSA.bin	FGL220490Y0
S07	ADP-66CR B	Delta Electronics Inc.	01	n/a	n/a	DAB2122G3CZ
S08	P-LTE-EA	Cisco Systems	P2	n/a	n/a	FOC215217LF
S09	Power Splitter ZB8PD-2-S+	Cisco Systems	n/a	n/a	n/a	n/a
S10	Laptop81C3	Lenova Yoga	n/a	n/a	n/a	MP1C6AA7

Traffic Generators

Sample No.	CIS No	Model Number	Manufacturer	Description.
S11	CIS055442	XM2	Ixia	IP Performance Monitor
S12	CIS047262	CMW500	Rohde & Schwarz	Wideband Radio Communication Tester

4.2 System Details

System #	Description	Samples
1	Conducted tests	S01, S02
2	RSE	S03, S04, S05
3	AC CE	S06, S07, S08, S09, S10, S11, S12

4.3 Mode of Operation Details

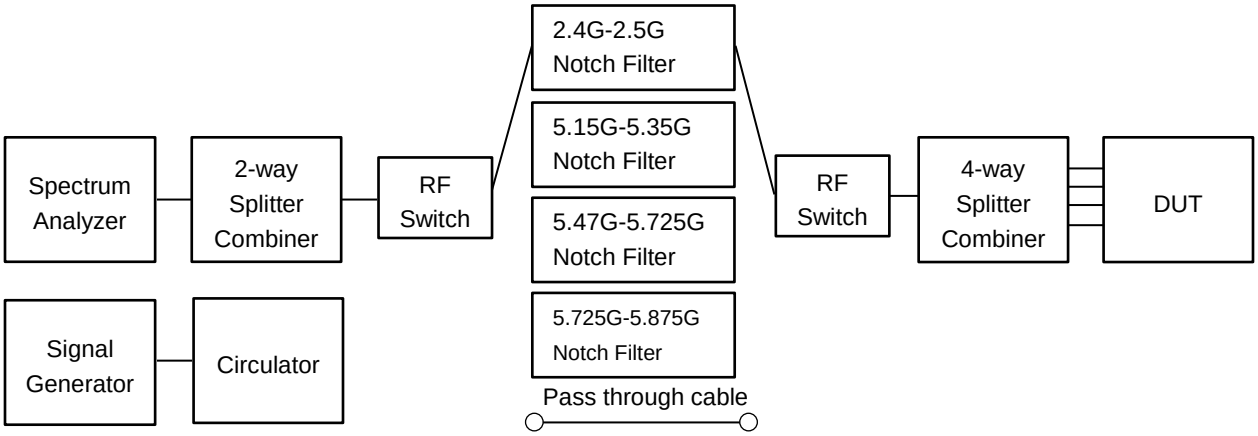
Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting, max duty cycle, dfstool menu
2	Continuous Receiving	For Rx RSE, dfstool menu
3	Idle	WiFi adapter on for CE on AC lines (IOS)

Applicable measurement guidance:

- ANSI C63.10:2013
- KDB 789033 D02 General UNII Test Procedures New Rules v01r03
- KDB 662911 D01 Multiple Transmitter Output v02r01

Appendix A: Emission Test Results

Conducted Test Setup Diagram



Target Maximum Channel Power

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

Operating Mode	Maximum Channel Power (dBm) Frequency (MHz)		
	5500	5560	5720
Non HT/VHT20, 6 to 54 Mbps	17	20	20
Non HT/VHT20 Beam Forming, 6 to 54 Mbps	16	20	20
HT/VHT20, M0 to M15	17	20	20
HT/VHT20 Beam Forming, M0 to M15	17	20	20
HT/VHT20 STBC, M0 to M7	17	20	20
	5510	5550	5710
Non HT/VHT40, 6 to 54 Mbps	15	19	20
HT/VHT40, M0 to M15	15	20	20
HT/VHT40 Beam Forming, M0 to M15	15	20	20
HT/VHT40 STBC, M0 to M7	15	20	20
	5530	5610	5690
Non VHT80, 6 to 54 Mbps	14	20	17
VHT80, M0 to M9, M0 to M9 1-2ss	14	19	19
VHT80 Beam Forming, M0 to M9, M0 to M9 1-2ss	14	19	19
VHT80 STBC, M0 to M9 1ss	14	19	19

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.

KDB 644545 D03 v01 section D1b
Band-crossing emissions: For an emission that crosses the boundary between two adjacent U-NII bands, the boundary frequency between the bands serves as one edge for defining the portion of the EBW that falls within a particular U-NII band. However, the -26 dB points are measured relative to the highest point on the contiguous segment—regardless of which band contains that highest point (Figure4).

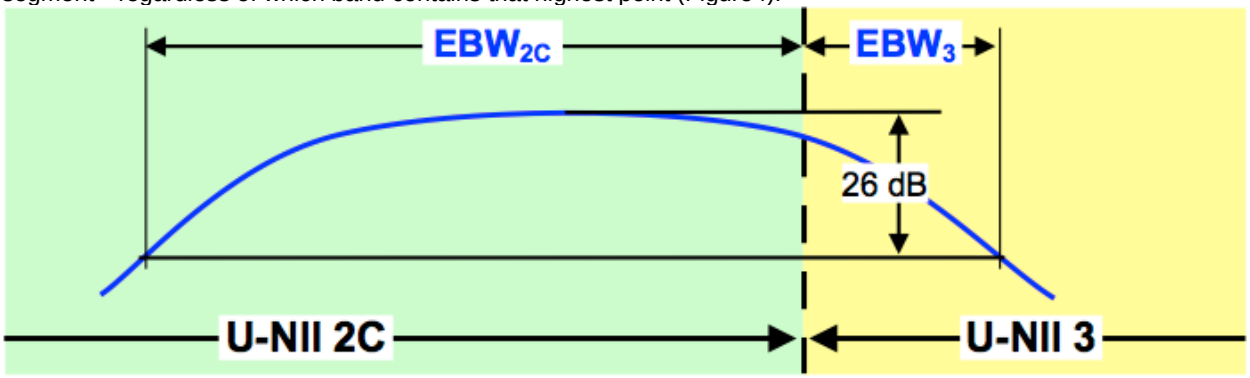


Figure 4. Emission Bandwidth (EBW) within a Band for Band-Crossing Signals

Test Procedure

Ref. ANSI C63.10: 2013 Section 6.9.3
KDB 644545 D03 v01
KDB 789033 D02 General UNII Test Procedures New Rules v01r03
KDB 662911

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
X dB BW = -26dB (using the OBW function of the spectrum analyzer) OBW = 99% (using the OBW function of the spectrum analyzer) 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

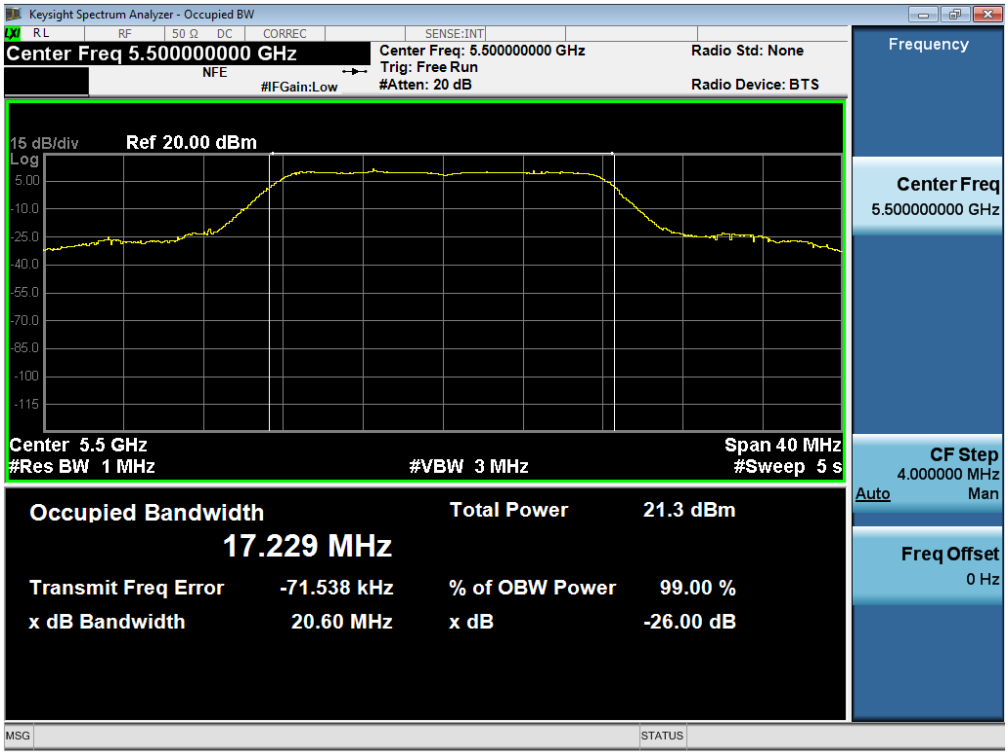
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	☑	☐
	Support	S02	☐	☑

Tested By :	**Date of testing:**
Chris Blair	21-Dec-17 - 05-Jan-18
Test Result : PASS	

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
5500	**Non HT/VHT20, 6 to 54 Mbps**	**6**	**20.6**	**17.229**
	HT/VHT20, M0 to M15	m0	21.6	18.205
5510	Non HT/VHT40, 6 to 54 Mbps	6	39.7	35.575
	HT/VHT40, M0 to M15	m0	40.5	36.056
5530	Non VHT80, 6 to 54 Mbps	6	83.1	75.718
	VHT80, M0 to M9, M0 to M9 1-2ss	m0x1	83.7	75.831
5550	Non HT/VHT40, 6 to 54 Mbps	6	65.1	35.806
	HT/VHT40, M0 to M15	m0	56.6	36.422
5560	Non HT/VHT20, 6 to 54 Mbps	6	28.4	17.512
	HT/VHT20, M0 to M15	m0	23.9	18.439
5690	Non VHT80, 6 to 54 Mbps	6	142.5	76.486
5610	Non VHT80, 6 to 54 Mbps	6	105.7	75.908
	VHT80, M0 to M9, M0 to M9 1-2ss	m0x1	100.3	76.295
5690	Non VHT80, 6 to 54 Mbps	6	120.3	75.904
	VHT80, M0 to M9, M0 to M9 1-2ss	m0x1	111.6	76.269
5710	Non HT/VHT40, 6 to 54 Mbps	6	67.2	35.924
	HT/VHT40, M0 to M15	m0	61.1	36.510
5720	Non HT/VHT20, 6 to 54 Mbps	6	30.7	17.678
	HT/VHT20, M0 to M15	m0	28.5	18.579

26dB / 99% Bandwidth, 5500 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps



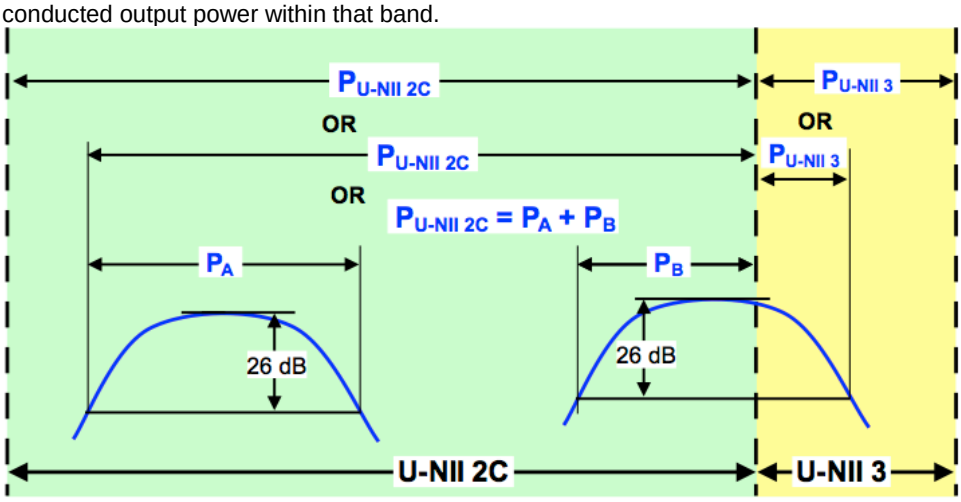
A.2 Maximum Conducted Output Power/ Power Spectral Density

15.407 (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 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.

15.407 a (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

KDB 644545 D03 (section F.2.b.ii)
When measuring the portion of the maximum conducted output power within a single U-NII band, the power shall be integrated across only the portion of the EBW that falls within that band. That is, if an EBW extends across the boundary between two adjacent bands, the boundary frequency between the bands serves as one edge of the frequency range to be integrated. Integration across an entire U-NII band without regard to 26 dB points is also acceptable for determining conducted output power within that band.



Conducted output power within a U-NII band: Integrate over the band, or integrate over a span including the 26 dB EBWs of transmission segments within the band, or integrate over 26 dB EBW of each transmission segment in the band and sum.

Figure 5. Conducted Output Power Measurement Examples

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. (ANSI C63.10: 2013, section 14.3.2.2)

Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01r03
ANSI C63.10: 2013
KDB 644545 D03 v01

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 v01r03
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)

Power Spectral Density (UNII 2C band) Test parameters ANSI C63.10: 2013 , sec12.3.2.2 Method SA-1
Span = >1.5 times the OBW RBW = 1MHz VBW ≥ 3 x RBW Sweep = Auto couple Detector = Sample Trace = Trace Average 100 Marker = Peak Search

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. (ANSI C63.10 2013 section 14.3.2.3)

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

Tested By :	**Date of testing:**
Chris Blair	21-Dec-17 - 05-Jan-18
Test Result : PASS	

See Appendix C for list of test equipment

Maximum Output Power

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)
5500	Non HT/VHT20, 6 to 54 Mbps	1	4	15.5		15.5	23.3	7.8
	Non HT/VHT20, 6 to 54 Mbps	2	4	14.5	14.0	17.3	23.2	5.9
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	13.6	13.0	16.3	22.2	5.9
	HT/VHT20, M0 to M7	1	4	15.5		15.5	23.5	8.0
	HT/VHT20, M0 to M7	2	4	14.5	14.0	17.3	23.4	6.1
	HT/VHT20, M8 to M15	2	4	14.5	14.0	17.3	23.4	6.1
	HT/VHT20 Beam Forming, M0 to M7	2	7	13.6	13.0	16.3	22.4	6.1
	HT/VHT20 Beam Forming, M8 to M15	2	4	14.5	14.0	17.3	23.4	6.1
	HT/VHT20 STBC, M0 to M7	2	4	14.5	14.0	17.3	23.4	6.1
5510	Non HT/VHT40, 6 to 54 Mbps	1	4	12.4		12.4	23.8	11.4
	Non HT/VHT40, 6 to 54 Mbps	2	4	12.4	11.6	15.0	23.8	8.8
	HT/VHT40, M0 to M7	1	4	12.9		12.9	23.8	10.9
	HT/VHT40, M0 to M7	2	4	12.9	12.0	15.5	23.8	8.3
	HT/VHT40, M8 to M15	2	4	12.9	12.0	15.5	23.8	8.3
	HT/VHT40 Beam Forming, M0 to M7	2	7	11.9	11.0	14.5	22.8	8.3
	HT/VHT40 Beam Forming, M8 to M15	2	4	12.9	12.0	15.5	23.8	8.3
	HT/VHT40 STBC, M0 to M7	2	4	12.9	12.0	15.5	23.8	8.3
5530	Non VHT80, 6 to 54 Mbps	1	4	12.7		12.7	23.2	10.5
	Non VHT80, 6 to 54 Mbps	2	4	11.7	10.7	14.2	23.2	8.9
	VHT80, M0 to M9 1ss	1	4	12.4		12.4	23.2	10.8
	VHT80, M0 to M9 1ss	2	4	11.5	10.5	14.0	23.2	9.1
	VHT80, M0 to M9 2ss	2	4	11.5	10.5	14.0	23.2	9.1
	VHT80 Beam Forming, M0 to M9 1ss	2	7	10.5	9.5	13.0	22.2	9.1
	VHT80 Beam Forming, M0 to M9 2ss	2	4	11.5	10.5	14.0	23.2	9.1
	VHT80 STBC, M0 to M9 1ss	2	4	11.5	10.5	14.0	23.2	9.1
5550	Non HT/VHT40, 6 to 54 Mbps	1	4	16.8		16.8	23.8	7.0
	Non HT/VHT40, 6 to 54 Mbps	2	4	16.8	15.7	19.3	23.8	4.5
	HT/VHT40, M0 to M7	1	4	17.3		17.3	23.8	6.5
	HT/VHT40, M0 to M7	2	4	17.3	16.3	19.8	23.8	4.0
	HT/VHT40, M8 to M15	2	4	17.3	16.3	19.8	23.8	4.0
	HT/VHT40 Beam Forming, M0 to M7	2	7	17.3	16.3	19.8	22.8	3.0
	HT/VHT40 Beam Forming, M8 to M15	2	4	17.3	16.3	19.8	23.8	4.0
	HT/VHT40 STBC, M0 to M7	2	4	17.3	16.3	19.8	23.8	4.0

5560	Non HT/VHT20, 6 to 54 Mbps	1	4	17.1		17.1	23.4	6.3
	Non HT/VHT20, 6 to 54 Mbps	2	4	17.1	16.2	19.7	23.2	3.5
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	17.1	16.2	19.7	22.2	2.5
	HT/VHT20, M0 to M7	1	4	17.0		17.0	23.6	6.6
	HT/VHT20, M0 to M7	2	4	17.0	16.2	19.6	23.5	3.9
	HT/VHT20, M8 to M15	2	4	17.0	16.2	19.6	23.5	3.9
	HT/VHT20 Beam Forming, M0 to M7	2	7	17.0	16.2	19.6	22.5	2.9
	HT/VHT20 Beam Forming, M8 to M15	2	4	17.0	16.2	19.6	23.5	3.9
	HT/VHT20 STBC, M0 to M7	2	4	17.0	16.2	19.6	23.5	3.9
5690	Non VHT80, 6 to 54 Mbps	1	4	17.1		17.1	23.2	6.0
5610	Non VHT80, 6 to 54 Mbps	1	4	17.0		17.0	23.2	6.2
	Non VHT80, 6 to 54 Mbps	2	4	17.0	16.0	19.5	23.2	3.6
	VHT80, M0 to M9 1ss	1	4	16.7		16.7	23.2	6.5
	VHT80, M0 to M9 1ss	2	4	16.7	15.8	19.3	23.2	3.9
	VHT80, M0 to M9 2ss	2	4	16.7	15.8	19.3	23.2	3.9
	VHT80 Beam Forming, M0 to M9 1ss	2	7	16.7	15.8	19.3	22.2	2.9
	VHT80 Beam Forming, M0 to M9 2ss	2	4	16.7	15.8	19.3	23.2	3.9
	VHT80 STBC, M0 to M9 1ss	2	4	16.7	15.8	19.3	23.2	3.9
5690	Non VHT80, 6 to 54 Mbps	2	4	17.1	16.1	19.6	23.2	3.5
	VHT80, M0 to M9 1ss	1	4	16.7		16.7	23.2	6.5
	VHT80, M0 to M9 1ss	2	4	16.7	15.8	19.3	23.2	3.9
	VHT80, M0 to M9 2ss	2	4	16.7	15.8	19.3	23.2	3.9
	VHT80 Beam Forming, M0 to M9 1ss	2	7	16.7	15.8	19.3	22.2	2.9
	VHT80 Beam Forming, M0 to M9 2ss	2	4	16.7	15.8	19.3	23.2	3.9
	VHT80 STBC, M0 to M9 1ss	2	4	16.7	15.8	19.3	23.2	3.9
5710	Non HT/VHT40, 6 to 54 Mbps	1	4	17.3		17.3	23.8	6.5
	Non HT/VHT40, 6 to 54 Mbps	2	4	17.3	15.9	19.7	23.8	4.1
	HT/VHT40, M0 to M7	1	4	17.7		17.7	23.8	6.1
	HT/VHT40, M0 to M7	2	4	17.7	16.4	20.1	23.8	3.7
	HT/VHT40, M8 to M15	2	4	17.7	16.4	20.1	23.8	3.7
	HT/VHT40 Beam Forming, M0 to M7	2	7	17.7	16.4	20.1	22.8	2.7
	HT/VHT40 Beam Forming, M8 to M15	2	4	17.7	16.4	20.1	23.8	3.7
	HT/VHT40 STBC, M0 to M7	2	4	17.7	16.4	20.1	23.8	3.7

5720	Non HT/VHT20, 6 to 54 Mbps	1	4	17.5		17.5	23.6	6.1
	Non HT/VHT20, 6 to 54 Mbps	2	4	17.5	16.5	20.0	23.3	3.3
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	**2**	**7**	**17.5**	**16.5**	**20.0**	**22.3**	**2.3**
	HT/VHT20, M0 to M7	1	4	17.5		17.5	23.8	6.3
	HT/VHT20, M0 to M7	2	4	17.5	16.4	20.0	23.5	3.5
	HT/VHT20, M8 to M15	2	4	17.5	16.4	20.0	23.5	3.5
	HT/VHT20 Beam Forming, M0 to M7	2	7	17.5	16.4	20.0	22.5	2.5
	HT/VHT20 Beam Forming, M8 to M15	2	4	17.5	16.4	20.0	23.5	3.5
	HT/VHT20 STBC, M0 to M7	2	4	17.5	16.4	20.0	23.5	3.5

Maximum Transmit Output Power, 5720 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps

Antenna A

Antenna B

Power Spectral Density

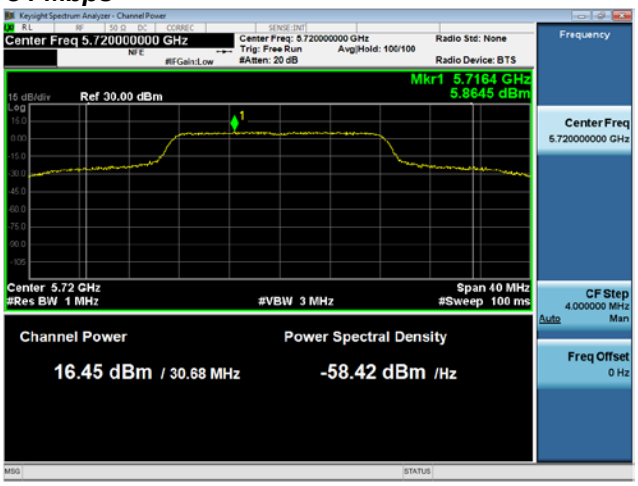
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 PSD (dBm/MHz)	Tx 2 PSD (dBm/MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
5500	Non HT/VHT20, 6 to 54 Mbps	1	4	4.6		4.6	10.8	6.2
	Non HT/VHT20, 6 to 54 Mbps	2	7	3.7	3.2	6.5	9.8	3.3
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	2.8	2.5	5.7	9.8	4.1
	HT/VHT20, M0 to M7	1	4	4.4		4.4	10.8	6.4
	HT/VHT20, M0 to M7	2	7	3.7	3.4	6.6	9.8	3.2
	HT/VHT20, M8 to M15	2	4	3.7	3.4	6.6	10.8	4.2
	HT/VHT20 Beam Forming, M0 to M7	2	7	2.5	2.0	5.3	9.8	4.5
	HT/VHT20 Beam Forming, M8 to M15	2	4	3.7	3.4	6.6	10.8	4.2
	HT/VHT20 STBC, M0 to M7	2	4	3.7	3.4	6.6	10.8	4.2
5510	Non HT/VHT40, 6 to 54 Mbps	1	4	-0.3		-0.3	10.8	11.1
	Non HT/VHT40, 6 to 54 Mbps	2	7	-0.3	-0.9	2.4	9.8	7.4
	HT/VHT40, M0 to M7	1	4	-0.9		-0.9	10.8	11.7
	HT/VHT40, M0 to M7	2	7	-0.9	-1.7	1.7	9.8	8.1
	HT/VHT40, M8 to M15	2	4	-0.9	-1.7	1.7	10.8	9.1
	HT/VHT40 Beam Forming, M0 to M7	2	7	-2.0	-2.6	0.7	9.8	9.1
	HT/VHT40 Beam Forming, M8 to M15	2	4	-0.9	-1.7	1.7	10.8	9.1
	HT/VHT40 STBC, M0 to M7	2	4	-0.9	-1.7	1.7	10.8	9.1
5530	Non VHT80, 6 to 54 Mbps	1	4	-3.8		-3.8	10.2	14.0
	Non VHT80, 6 to 54 Mbps	2	7	-4.9	-5.2	-2.0	9.2	11.2
	VHT80, M0 to M9 1ss	1	4	-4.5		-4.5	10.2	14.7
	VHT80, M0 to M9 1ss	2	7	-5.5	-6.4	-2.9	9.2	12.1
	VHT80, M0 to M9 2ss	2	4	-5.5	-6.4	-2.9	10.2	13.1
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-6.6	-7.5	-4.0	9.2	13.2
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-5.5	-6.4	-2.9	10.2	13.1
	VHT80 STBC, M0 to M9 1ss	2	4	-5.5	-6.4	-2.9	10.2	13.1
5550	Non HT/VHT40, 6 to 54 Mbps	1	4	4.7		4.7	10.8	6.1
	Non HT/VHT40, 6 to 54 Mbps	2	7	4.7	3.3	7.1	9.8	2.7
	HT/VHT40, M0 to M7	1	4	3.6		3.6	10.8	7.2
	HT/VHT40, M0 to M7	2	7	3.6	2.7	6.2	9.8	3.6
	HT/VHT40, M8 to M15	2	4	3.6	2.7	6.2	10.8	4.6
	HT/VHT40 Beam Forming, M0 to M7	2	7	3.6	2.7	6.2	9.8	3.6
	HT/VHT40 Beam Forming, M8 to M15	2	4	3.6	2.7	6.2	10.8	4.6

	HT/VHT40 STBC, M0 to M7	2	4	3.6	2.7	6.2	10.8	4.6
5560	Non HT/VHT20, 6 to 54 Mbps	1	4	6.4		6.4	10.8	4.4
	Non HT/VHT20, 6 to 54 Mbps	2	7	6.4	5.5	9.0	9.8	0.8
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	6.4	5.5	9.0	9.8	0.8
	HT/VHT20, M0 to M7	1	4	5.9		5.9	10.8	4.9
	HT/VHT20, M0 to M7	2	7	5.9	5.3	8.6	9.8	1.2
	HT/VHT20, M8 to M15	2	4	5.9	5.3	8.6	10.8	2.2
	HT/VHT20 Beam Forming, M0 to M7	2	7	5.9	5.3	8.6	9.8	1.2
	HT/VHT20 Beam Forming, M8 to M15	2	4	5.9	5.3	8.6	10.8	2.2
	HT/VHT20 STBC, M0 to M7	2	4	5.9	5.3	8.6	10.8	2.2
5690	Non VHT80, 6 to 54 Mbps	1	4	0.4		0.4	10.2	9.8
5610	Non VHT80, 6 to 54 Mbps	1	4	0.3		0.3	10.2	9.9
	Non VHT80, 6 to 54 Mbps	2	7	0.3	-0.6	2.9	9.2	6.3
	VHT80, M0 to M9 1ss	1	4	-0.3		-0.3	10.2	10.5
	VHT80, M0 to M9 1ss	2	7	-0.3	-1.2	2.3	9.2	6.9
	VHT80, M0 to M9 2ss	2	4	-0.3	-1.2	2.3	10.2	7.9
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-0.3	-1.2	2.3	9.2	6.9
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-0.3	-1.2	2.3	10.2	7.9
	VHT80 STBC, M0 to M9 1ss	2	4	-0.3	-1.2	2.3	10.2	7.9
5690	Non VHT80, 6 to 54 Mbps	2	7	0.4	-0.5	3.0	9.2	6.2
	VHT80, M0 to M9 1ss	1	4	-0.2		-0.2	10.2	10.4
	VHT80, M0 to M9 1ss	2	7	-0.2	-1.0	2.4	9.2	6.7
	VHT80, M0 to M9 2ss	2	4	-0.2	-1.0	2.4	10.2	7.7
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-0.2	-1.0	2.4	9.2	6.7
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-0.2	-1.0	2.4	10.2	7.7
	VHT80 STBC, M0 to M9 1ss	2	4	-0.2	-1.0	2.4	10.2	7.7
5710	Non HT/VHT40, 6 to 54 Mbps	1	4	4.6		4.6	10.8	6.2
	Non HT/VHT40, 6 to 54 Mbps	2	7	4.6	3.2	7.0	9.8	2.8
	HT/VHT40, M0 to M7	1	4	4.0		4.0	10.8	6.8
	HT/VHT40, M0 to M7	2	7	4.0	2.8	6.5	9.8	3.3
	HT/VHT40, M8 to M15	2	4	4.0	2.8	6.5	10.8	4.3
	HT/VHT40 Beam Forming, M0 to M7	2	7	4.0	2.8	6.5	9.8	3.3
	HT/VHT40 Beam Forming, M8 to M15	2	4	4.0	2.8	6.5	10.8	4.3
	HT/VHT40 STBC, M0 to M7	2	4	4.0	2.8	6.5	10.8	4.3

5720	Non HT/VHT20, 6 to 54 Mbps	1	4	6.6		6.6	10.8	4.2
	Non HT/VHT20, 6 to 54 Mbps	**2**	**7**	**6.6**	**5.9**	**9.3**	**9.8**	**0.5**
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	6.6	5.9	9.3	9.8	0.5
	HT/VHT20, M0 to M7	1	4	6.3		6.3	10.8	4.5
	HT/VHT20, M0 to M7	2	7	6.3	5.5	8.9	9.8	0.9
	HT/VHT20, M8 to M15	2	4	6.3	5.5	8.9	10.8	1.9
	HT/VHT20 Beam Forming, M0 to M7	2	7	6.3	5.5	8.9	9.8	0.9
	HT/VHT20 Beam Forming, M8 to M15	2	4	6.3	5.5	8.9	10.8	1.9
	HT/VHT20 STBC, M0 to M7	2	4	6.3	5.5	8.9	10.8	1.9

Power Spectral Density, 5720 MHz, Non HT/VHT20, 6 to 54 Mbps

Antenna A



Antenna B

A.3 Conducted Spurious Emissions

15.407 (b) *Undesirable emission limits.* Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz..
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01r03
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 Procedures New Rules v01r03 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 v01r03
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.

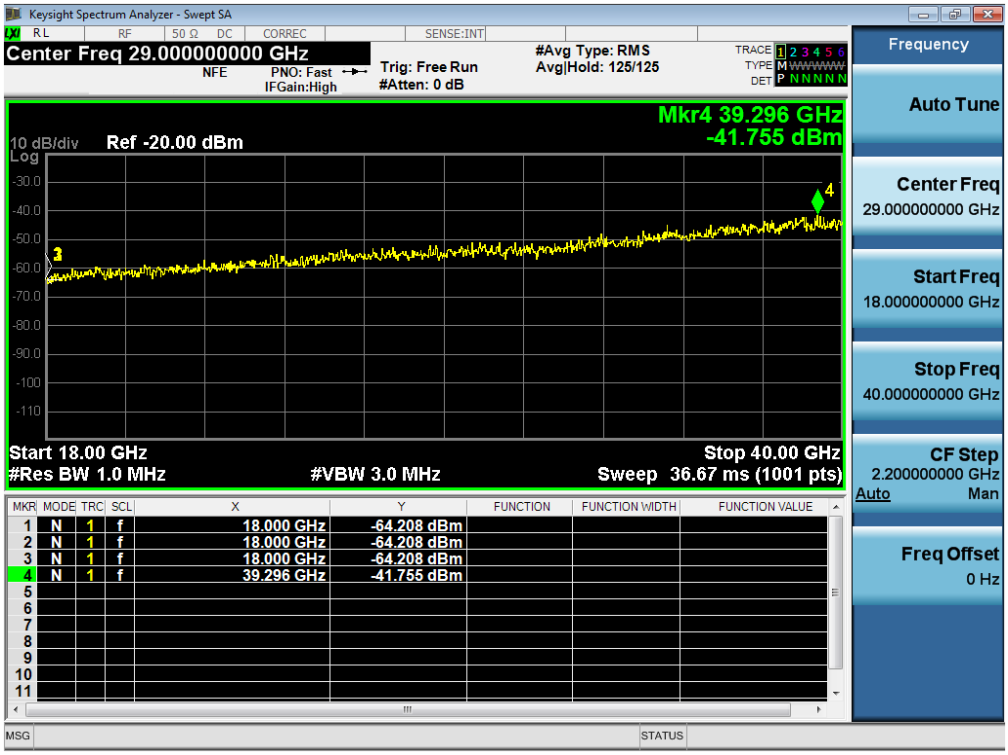
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	☑	☐
	Support	S02	☐	☑

Tested By :	**Date of testing:**
Chris Blair	21-Dec-17 - 05-Jan-18
Test Result : PASS	

See Appendix C for list of test equipment

Conducted Spurs Average Upper, All Antennas

Conducted Spurs Peak Upper, All Antennas



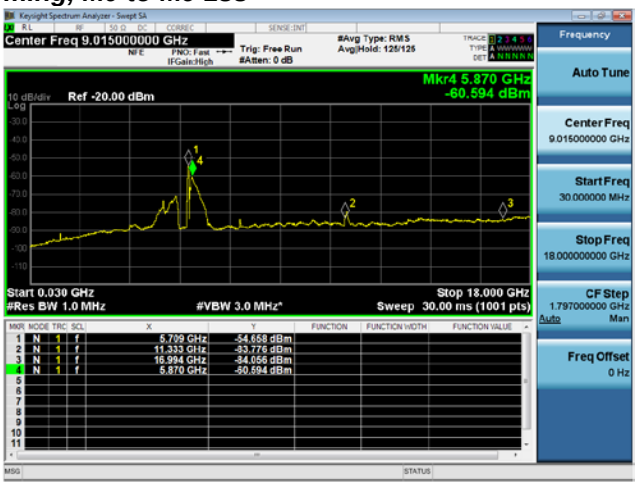
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
5500	Non HT/VHT20, 6 to 54 Mbps	1	4	-67.2		-63.2	-41.45	21.8
	Non HT/VHT20, 6 to 54 Mbps	2	4	-67.1	-65.5	-59.2	-41.45	17.8
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-67.0	-65.7	-56.3	-41.45	14.8
	HT/VHT20, M0 to M7	1	4	-67.3		-63.3	-41.45	21.9
	HT/VHT20, M0 to M7	2	4	-67.2	-65.5	-59.3	-41.45	17.8
	HT/VHT20, M8 to M15	2	4	-67.2	-65.5	-59.3	-41.45	17.8
	HT/VHT20 Beam Forming, M0 to M7	2	7	-67.1	-65.6	-56.3	-41.45	14.8
	HT/VHT20 Beam Forming, M8 to M15	2	4	-67.2	-65.5	-59.3	-41.45	17.8
	HT/VHT20 STBC, M0 to M7	2	4	-67.2	-65.5	-59.3	-41.45	17.8
5510	Non HT/VHT40, 6 to 54 Mbps	1	4	-66.9		-62.9	-41.45	21.5
	Non HT/VHT40, 6 to 54 Mbps	2	4	-66.9	-65.6	-59.2	-41.45	17.7
	HT/VHT40, M0 to M7	1	4	-67.3		-63.3	-41.45	21.9
	HT/VHT40, M0 to M7	2	4	-67.3	-65.8	-59.5	-41.45	18.0
	HT/VHT40, M8 to M15	2	4	-67.3	-65.8	-59.5	-41.45	18.0
	HT/VHT40 Beam Forming, M0 to M7	2	7	-67.2	-65.5	-56.3	-41.45	14.8
	HT/VHT40 Beam Forming, M8 to M15	2	4	-67.3	-65.8	-59.5	-41.45	18.0
	HT/VHT40 STBC, M0 to M7	2	4	-67.3	-65.8	-59.5	-41.45	18.0
5530	Non VHT80, 6 to 54 Mbps	1	4	-66.1		-62.1	-42.10	20.0
	Non VHT80, 6 to 54 Mbps	2	4	-67.9	-66.0	-59.8	-42.10	17.7
	VHT80, M0 to M9 1ss	1	4	-66.6		-62.6	-42.10	20.5
	VHT80, M0 to M9 1ss	2	4	-66.3	-66.4	-59.3	-42.10	17.2
	VHT80, M0 to M9 2ss	2	4	-66.3	-66.4	-59.3	-42.10	17.2
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-66.4	-66.5	-56.4	-42.10	14.3
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-66.3	-66.4	-59.3	-42.10	17.2
	VHT80 STBC, M0 to M9 1ss	2	4	-66.3	-66.4	-59.3	-42.10	17.2
5550	Non HT/VHT40, 6 to 54 Mbps	1	4	-67.3		-63.3	-41.45	21.9
	Non HT/VHT40, 6 to 54 Mbps	2	4	-67.3	-67.2	-60.2	-41.45	18.8
	HT/VHT40, M0 to M7	1	4	-65.5		-61.5	-41.45	20.1
	HT/VHT40, M0 to M7	2	4	-65.5	-64.2	-57.8	-41.45	16.3
	HT/VHT40, M8 to M15	2	4	-65.5	-64.2	-57.8	-41.45	16.3
	HT/VHT40 Beam Forming, M0 to M7	2	7	-65.5	-64.2	-54.8	-41.45	13.3
	HT/VHT40 Beam Forming, M8 to M15	2	4	-65.5	-64.2	-57.8	-41.45	16.3
	HT/VHT40 STBC, M0 to M7	2	4	-65.5	-64.2	-57.8	-41.45	16.3

5560	Non HT/VHT20, 6 to 54 Mbps	1	4	-64.9		-60.9	-41.45	19.5
	Non HT/VHT20, 6 to 54 Mbps	2	4	-64.9	-66.0	-58.4	-41.45	17.0
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-64.9	-66.0	-55.4	-41.45	14.0
	HT/VHT20, M0 to M7	1	4	-64.8		-60.8	-41.45	19.4
	HT/VHT20, M0 to M7	2	4	-64.8	-66.2	-58.4	-41.45	17.0
	HT/VHT20, M8 to M15	2	4	-64.8	-66.2	-58.4	-41.45	17.0
	HT/VHT20 Beam Forming, M0 to M7	2	7	-64.8	-66.2	-55.4	-41.45	14.0
	HT/VHT20 Beam Forming, M8 to M15	2	4	-64.8	-66.2	-58.4	-41.45	17.0
	HT/VHT20 STBC, M0 to M7	2	4	-64.8	-66.2	-58.4	-41.45	17.0
5690	Non VHT80, 6 to 54 Mbps	1	4	-57.7		-53.7	-42.10	11.6
5610	Non VHT80, 6 to 54 Mbps	1	4	-64.6		-60.6	-42.10	18.5
	Non VHT80, 6 to 54 Mbps	2	4	-64.6	-65.3	-57.9	-42.10	15.8
	VHT80, M0 to M9 1ss	1	4	-64.9		-60.9	-42.10	18.8
	VHT80, M0 to M9 1ss	2	4	-64.9	-65.9	-58.4	-42.10	16.3
	VHT80, M0 to M9 2ss	2	4	-64.9	-65.9	-58.4	-42.10	16.3
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-64.9	-65.9	-55.4	-42.10	13.3
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-64.9	-65.9	-58.4	-42.10	16.3
	VHT80 STBC, M0 to M9 1ss	2	4	-64.9	-65.9	-58.4	-42.10	16.3
5690	Non VHT80, 6 to 54 Mbps	2	4	-57.7	-60.7	-51.9	-42.10	9.8
	VHT80, M0 to M9 1ss	1	4	-58.5		-54.5	-42.10	12.4
	VHT80, M0 to M9 1ss	2	4	-58.5	-60.6	-52.4	-42.10	10.3
	VHT80, M0 to M9 2ss	2	4	-58.5	-60.6	-52.4	-42.10	10.3
	VHT80 Beam Forming, M0 to M9 1ss	**2**	**7**	**-58.5**	**-60.6**	**-49.4**	**-42.10**	**7.3**
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-58.5	-60.6	-52.4	-42.10	10.3
	VHT80 STBC, M0 to M9 1ss	2	4	-58.5	-60.6	-52.4	-42.10	10.3
5710	Non HT/VHT40, 6 to 54 Mbps	1	4	-62.9		-58.9	-41.45	17.5
	Non HT/VHT40, 6 to 54 Mbps	2	4	-62.9	-63.6	-56.2	-41.45	14.8
	HT/VHT40, M0 to M7	1	4	-61.4		-57.4	-41.45	16.0
	HT/VHT40, M0 to M7	2	4	-61.4	-60.9	-54.1	-41.45	12.7
	HT/VHT40, M8 to M15	2	4	-61.4	-60.9	-54.1	-41.45	12.7
	HT/VHT40 Beam Forming, M0 to M7	2	7	-61.4	-60.9	-51.1	-41.45	9.7
	HT/VHT40 Beam Forming, M8 to M15	2	4	-61.4	-60.9	-54.1	-41.45	12.7
	HT/VHT40 STBC, M0 to M7	2	4	-61.4	-60.9	-54.1	-41.45	12.7

5720	Non HT/VHT20, 6 to 54 Mbps	1	4	-63.0		-59.0	-41.45	17.6
	Non HT/VHT20, 6 to 54 Mbps	2	4	-63.0	-63.7	-56.3	-41.45	14.9
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-63.0	-63.7	-53.3	-41.45	11.9
	HT/VHT20, M0 to M7	1	4	-63.0		-59.0	-41.45	17.6
	HT/VHT20, M0 to M7	2	4	-63.0	-63.8	-56.4	-41.45	14.9
	HT/VHT20, M8 to M15	2	4	-63.0	-63.8	-56.4	-41.45	14.9
	HT/VHT20 Beam Forming, M0 to M7	2	7	-63.0	-63.8	-53.4	-41.45	11.9
	HT/VHT20 Beam Forming, M8 to M15	2	4	-63.0	-63.8	-56.4	-41.45	14.9
	HT/VHT20 STBC, M0 to M7	2	4	-63.0	-63.8	-56.4	-41.45	14.9

Conducted Spurs Average, 5690 MHz, VHT80 Beam Forming, M0 to M9 1ss

Antenna A



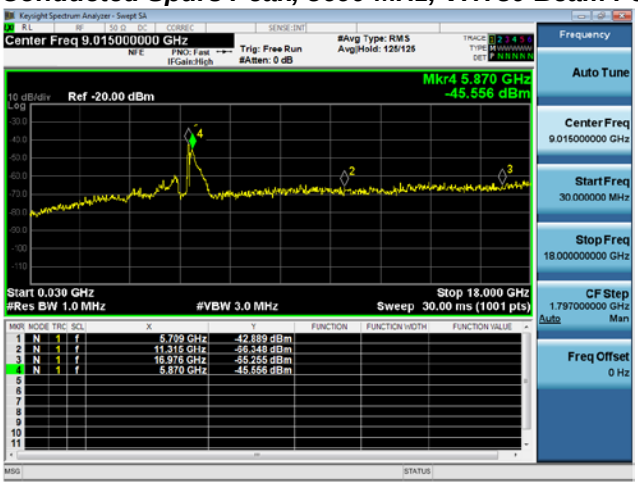
Antenna B

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)
5500	Non HT/VHT20, 6 to 54 Mbps	1	4	-56.3		-52.3	-21.45	30.9
	Non HT/VHT20, 6 to 54 Mbps	2	4	-56.3	-55.5	-48.9	-21.45	27.4
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-55.9	-55.4	-45.6	-21.45	24.2
	HT/VHT20, M0 to M7	1	4	-56.8		-52.8	-21.45	31.4
	HT/VHT20, M0 to M7	2	4	-55.9	-54.5	-48.1	-21.45	26.7
	HT/VHT20, M8 to M15	2	4	-55.9	-54.5	-48.1	-21.45	26.7
	HT/VHT20 Beam Forming, M0 to M7	2	7	-54.8	-54.6	-44.7	-21.45	23.2
	HT/VHT20 Beam Forming, M8 to M15	2	4	-55.9	-54.5	-48.1	-21.45	26.7
	HT/VHT20 STBC, M0 to M7	2	4	-55.9	-54.5	-48.1	-21.45	26.7
5510	Non HT/VHT40, 6 to 54 Mbps	1	4	-56.5		-52.5	-21.45	31.1
	Non HT/VHT40, 6 to 54 Mbps	2	4	-56.5	-54.5	-48.4	-21.45	26.9
	HT/VHT40, M0 to M7	1	4	-56.1		-52.1	-21.45	30.7
	HT/VHT40, M0 to M7	2	4	-56.1	-54.9	-48.4	-21.45	27.0
	HT/VHT40, M8 to M15	2	4	-56.1	-54.9	-48.4	-21.45	27.0
	HT/VHT40 Beam Forming, M0 to M7	2	7	-55.9	-54.2	-45.0	-21.45	23.5
	HT/VHT40 Beam Forming, M8 to M15	2	4	-56.1	-54.9	-48.4	-21.45	27.0
	HT/VHT40 STBC, M0 to M7	2	4	-56.1	-54.9	-48.4	-21.45	27.0
5530	Non VHT80, 6 to 54 Mbps	1	4	-55.2		-51.2	-22.10	29.1
	Non VHT80, 6 to 54 Mbps	2	4	-55.6	-55.4	-48.5	-22.10	26.4
	VHT80, M0 to M9 1ss	1	4	-55.6		-51.6	-22.10	29.5
	VHT80, M0 to M9 1ss	2	4	-55.6	-55.4	-48.5	-22.10	26.4
	VHT80, M0 to M9 2ss	2	4	-55.6	-55.4	-48.5	-22.10	26.4
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-55.4	-55.8	-45.6	-22.10	23.5
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-55.6	-55.4	-48.5	-22.10	26.4
	VHT80 STBC, M0 to M9 1ss	2	4	-55.6	-55.4	-48.5	-22.10	26.4
5550	Non HT/VHT40, 6 to 54 Mbps	1	4	-56.9		-52.9	-21.45	31.5
	Non HT/VHT40, 6 to 54 Mbps	2	4	-56.9	-56.1	-49.5	-21.45	28.0
	HT/VHT40, M0 to M7	1	4	-54.4		-50.4	-21.45	29.0
	HT/VHT40, M0 to M7	2	4	-54.4	-53.3	-46.8	-21.45	25.4
	HT/VHT40, M8 to M15	2	4	-54.4	-53.3	-46.8	-21.45	25.4
	HT/VHT40 Beam Forming, M0 to M7	2	7	-54.4	-53.3	-43.8	-21.45	22.4
	HT/VHT40 Beam Forming, M8 to M15	2	4	-54.4	-53.3	-46.8	-21.45	25.4
	HT/VHT40 STBC, M0 to M7	2	4	-54.4	-53.3	-46.8	-21.45	25.4

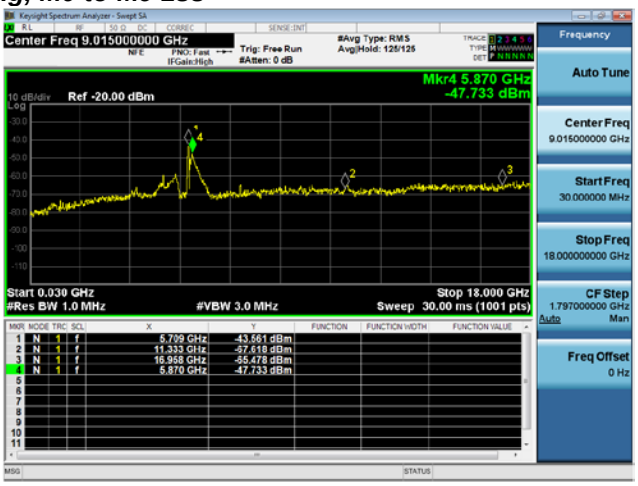
5560	Non HT/VHT20, 6 to 54 Mbps	1	4	-53.9		-49.9	-21.45	28.5
	Non HT/VHT20, 6 to 54 Mbps	2	4	-53.9	-55.2	-47.5	-21.45	26.0
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-53.9	-55.2	-44.5	-21.45	23.0
	HT/VHT20, M0 to M7	1	4	-54.1		-50.1	-21.45	28.7
	HT/VHT20, M0 to M7	2	4	-54.1	-55.2	-47.6	-21.45	26.2
	HT/VHT20, M8 to M15	2	4	-54.1	-55.2	-47.6	-21.45	26.2
	HT/VHT20 Beam Forming, M0 to M7	2	7	-54.1	-55.2	-44.6	-21.45	23.2
	HT/VHT20 Beam Forming, M8 to M15	2	4	-54.1	-55.2	-47.6	-21.45	26.2
	HT/VHT20 STBC, M0 to M7	2	4	-54.1	-55.2	-47.6	-21.45	26.2
5690	Non VHT80, 6 to 54 Mbps	1	4	-46.7		-42.7	-22.10	20.6
5610	Non VHT80, 6 to 54 Mbps	1	4	-53.8		-49.8	-22.10	27.7
	Non VHT80, 6 to 54 Mbps	2	4	-53.8	-54.0	-46.9	-22.10	24.8
	VHT80, M0 to M9 1ss	1	4	-52.8		-48.8	-22.10	26.7
	VHT80, M0 to M9 1ss	2	4	-52.8	-54.4	-46.5	-22.10	24.4
	VHT80, M0 to M9 2ss	2	4	-52.8	-54.4	-46.5	-22.10	24.4
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-52.8	-54.4	-43.5	-22.10	21.4
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-52.8	-54.4	-46.5	-22.10	24.4
	VHT80 STBC, M0 to M9 1ss	2	4	-52.8	-54.4	-46.5	-22.10	24.4
5690	Non VHT80, 6 to 54 Mbps	2	4	-46.7	-48.4	-40.5	-22.10	18.4
	VHT80, M0 to M9 1ss	1	4	-45.6		-41.6	-22.10	19.5
	VHT80, M0 to M9 1ss	2	4	-45.6	-47.7	-39.5	-22.10	17.4
	VHT80, M0 to M9 2ss	2	4	-45.6	-47.7	-39.5	-22.10	17.4
	VHT80 Beam Forming, M0 to M9 1ss	**2**	**7**	**-45.6**	**-47.7**	**-36.5**	**-22.10**	**14.4**
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-45.6	-47.7	-39.5	-22.10	17.4
	VHT80 STBC, M0 to M9 1ss	2	4	-45.6	-47.7	-39.5	-22.10	17.4
5710	Non HT/VHT40, 6 to 54 Mbps	1	4	-52.3		-48.3	-21.45	26.9
	Non HT/VHT40, 6 to 54 Mbps	2	4	-52.3	-51.9	-45.1	-21.45	23.6
	HT/VHT40, M0 to M7	1	4	-50.1		-46.1	-21.45	24.7
	HT/VHT40, M0 to M7	2	4	-50.1	-50.7	-43.4	-21.45	21.9
	HT/VHT40, M8 to M15	2	4	-50.1	-50.7	-43.4	-21.45	21.9
	HT/VHT40 Beam Forming, M0 to M7	2	7	-50.1	-50.7	-40.4	-21.45	18.9
	HT/VHT40 Beam Forming, M8 to M15	2	4	-50.1	-50.7	-43.4	-21.45	21.9
	HT/VHT40 STBC, M0 to M7	2	4	-50.1	-50.7	-43.4	-21.45	21.9

5720	Non HT/VHT20, 6 to 54 Mbps	1	4	-52.3		-48.3	-21.45	26.9
	Non HT/VHT20, 6 to 54 Mbps	2	4	-52.3	-52.0	-45.1	-21.45	23.7
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-52.3	-52.0	-42.1	-21.45	20.7
	HT/VHT20, M0 to M7	1	4	-52.7		-48.7	-21.45	27.3
	HT/VHT20, M0 to M7	2	4	-52.7	-52.6	-45.6	-21.45	24.2
	HT/VHT20, M8 to M15	2	4	-52.7	-52.6	-45.6	-21.45	24.2
	HT/VHT20 Beam Forming, M0 to M7	2	7	-52.7	-52.6	-42.6	-21.45	21.2
	HT/VHT20 Beam Forming, M8 to M15	2	4	-52.7	-52.6	-45.6	-21.45	24.2
	HT/VHT20 STBC, M0 to M7	2	4	-52.7	-52.6	-45.6	-21.45	24.2

Conducted Spurs Peak, 5690 MHz, VHT80 Beam Forming, M0 to M9 1ss



Antenna A



Antenna B

A.4 Conducted Bandedge

15.205 / 15.209 - 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 formula below to substitute conducted measurements in place of radiated measurements

E[dBµV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and d = 3 meter

1) Average Plot, Limit= -41.25 dBm eirp
2) Peak plot, Limit = -21.25 dBm eirp

Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01r03
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:**
Chris Blair	21-Dec-17 - 05-Jan-18
Test Result : PASS	

See Appendix C for list of test equipment

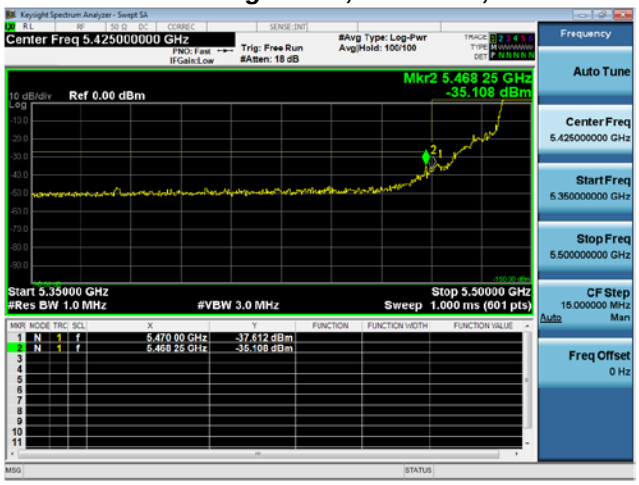
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
5500	Non HT/VHT20, 6 to 54 Mbps	1	4	-46.9		-42.9	-41.45	1.4
	Non HT/VHT20, 6 to 54 Mbps	2	4	-49.8	-51.7	-43.6	-41.45	2.2
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-52.3	-54.0	-43.1	-41.45	1.6
	HT/VHT20, M0 to M7	1	4	-46.2		-42.2	-41.45	0.8
	HT/VHT20, M0 to M7	2	4	-48.8	-50.5	-42.6	-41.45	1.1
	HT/VHT20, M8 to M15	2	4	-48.8	-50.5	-42.6	-41.45	1.1
	HT/VHT20 Beam Forming, M0 to M7	2	7	-51.6	-53.6	-42.5	-41.45	1.0
	HT/VHT20 Beam Forming, M8 to M15	2	4	-48.8	-50.5	-42.6	-41.45	1.1
	HT/VHT20 STBC, M0 to M7	2	4	-48.8	-50.5	-42.6	-41.45	1.1
5510	Non HT/VHT40, 6 to 54 Mbps	1	4	-47.9		-43.9	-41.45	2.5
	Non HT/VHT40, 6 to 54 Mbps	2	4	-47.9	-52.7	-42.7	-41.45	1.2
	HT/VHT40, M0 to M7	1	4	-47.2		-43.2	-41.45	1.8
	HT/VHT40, M0 to M7	2	4	-47.2	-52.0	-42.0	-41.45	0.5
	HT/VHT40, M8 to M15	2	4	-47.2	-52.0	-42.0	-41.45	0.5
	HT/VHT40 Beam Forming, M0 to M7	2	7	-51.4	-54.6	-42.7	-41.45	1.3
	HT/VHT40 Beam Forming, M8 to M15	2	4	-47.2	-52.0	-42.0	-41.45	0.5
	HT/VHT40 STBC, M0 to M7	2	4	-47.2	-52.0	-42.0	-41.45	0.5
5530	Non VHT80, 6 to 54 Mbps	1	4	-46.8		-42.8	-42.10	0.7
	Non VHT80, 6 to 54 Mbps	2	4	-52.0	-53.8	-45.8	-42.10	3.7
	VHT80, M0 to M9 1ss	**1**	**4**	**-46.3**		**-42.3**	**-42.10**	**0.2**
	VHT80, M0 to M9 1ss	2	4	-50.7	-54.1	-45.1	-42.10	3.0
	VHT80, M0 to M9 2ss	2	4	-50.7	-54.1	-45.1	-42.10	3.0
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-53.1	-54.5	-43.7	-42.10	1.6
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-50.7	-54.1	-45.1	-42.10	3.0
	VHT80 STBC, M0 to M9 1ss	2	4	-50.7	-54.1	-45.1	-42.10	3.0

Conducted Bandedge Average, 5530 MHz, VHT80, M0 to M9 1ss

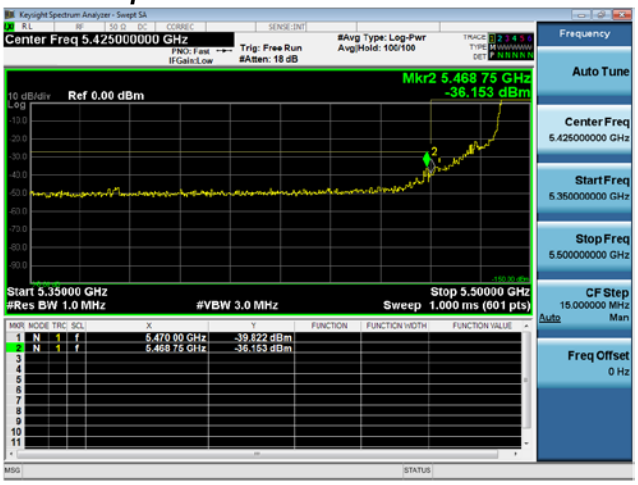
Antenna A

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)
5500	Non HT/VHT20, 6 to 54 Mbps	1	4	-35.8		-31.8	-21.45	10.4
	Non HT/VHT20, 6 to 54 Mbps	**2**	**4**	**-35.1**	**-36.2**	**-28.6**	**-21.45**	**7.2**
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-37.3	-43.9	-29.4	-21.45	8.0
	HT/VHT20, M0 to M7	1	4	-33.5		-29.5	-21.45	8.1
	HT/VHT20, M0 to M7	2	4	-35.4	-36.6	-28.9	-21.45	7.5
	HT/VHT20, M8 to M15	2	4	-35.4	-36.6	-28.9	-21.45	7.5
	HT/VHT20 Beam Forming, M0 to M7	2	7	-38.9	-40.4	-29.6	-21.45	8.1
	HT/VHT20 Beam Forming, M8 to M15	2	4	-35.4	-36.6	-28.9	-21.45	7.5
	HT/VHT20 STBC, M0 to M7	2	4	-35.4	-36.6	-28.9	-21.45	7.5
5510	Non HT/VHT40, 6 to 54 Mbps	1	4	-39.4		-35.4	-21.45	14.0
	Non HT/VHT40, 6 to 54 Mbps	2	4	-39.4	-39.8	-32.6	-21.45	11.1
	HT/VHT40, M0 to M7	1	4	-34.3		-30.3	-21.45	8.9
	HT/VHT40, M0 to M7	2	4	-34.3	-38.2	-28.8	-21.45	7.4
	HT/VHT40, M8 to M15	2	4	-34.3	-38.2	-28.8	-21.45	7.4
	HT/VHT40 Beam Forming, M0 to M7	2	7	-40.2	-44.2	-31.7	-21.45	10.3
	HT/VHT40 Beam Forming, M8 to M15	2	4	-34.3	-38.2	-28.8	-21.45	7.4
	HT/VHT40 STBC, M0 to M7	2	4	-34.3	-38.2	-28.8	-21.45	7.4
5530	Non VHT80, 6 to 54 Mbps	1	4	-34.6		-30.6	-22.10	8.5
	Non VHT80, 6 to 54 Mbps	2	4	-40.7	-47.5	-35.9	-22.10	13.8
	VHT80, M0 to M9 1ss	1	4	-37.7		-33.7	-22.10	11.6
	VHT80, M0 to M9 1ss	2	4	-40.0	-46.3	-35.1	-22.10	13.0
	VHT80, M0 to M9 2ss	2	4	-40.0	-46.3	-35.1	-22.10	13.0
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-45.0	-45.2	-35.1	-22.10	13.0
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-40.0	-46.3	-35.1	-22.10	13.0
	VHT80 STBC, M0 to M9 1ss	2	4	-40.0	-46.3	-35.1	-22.10	13.0

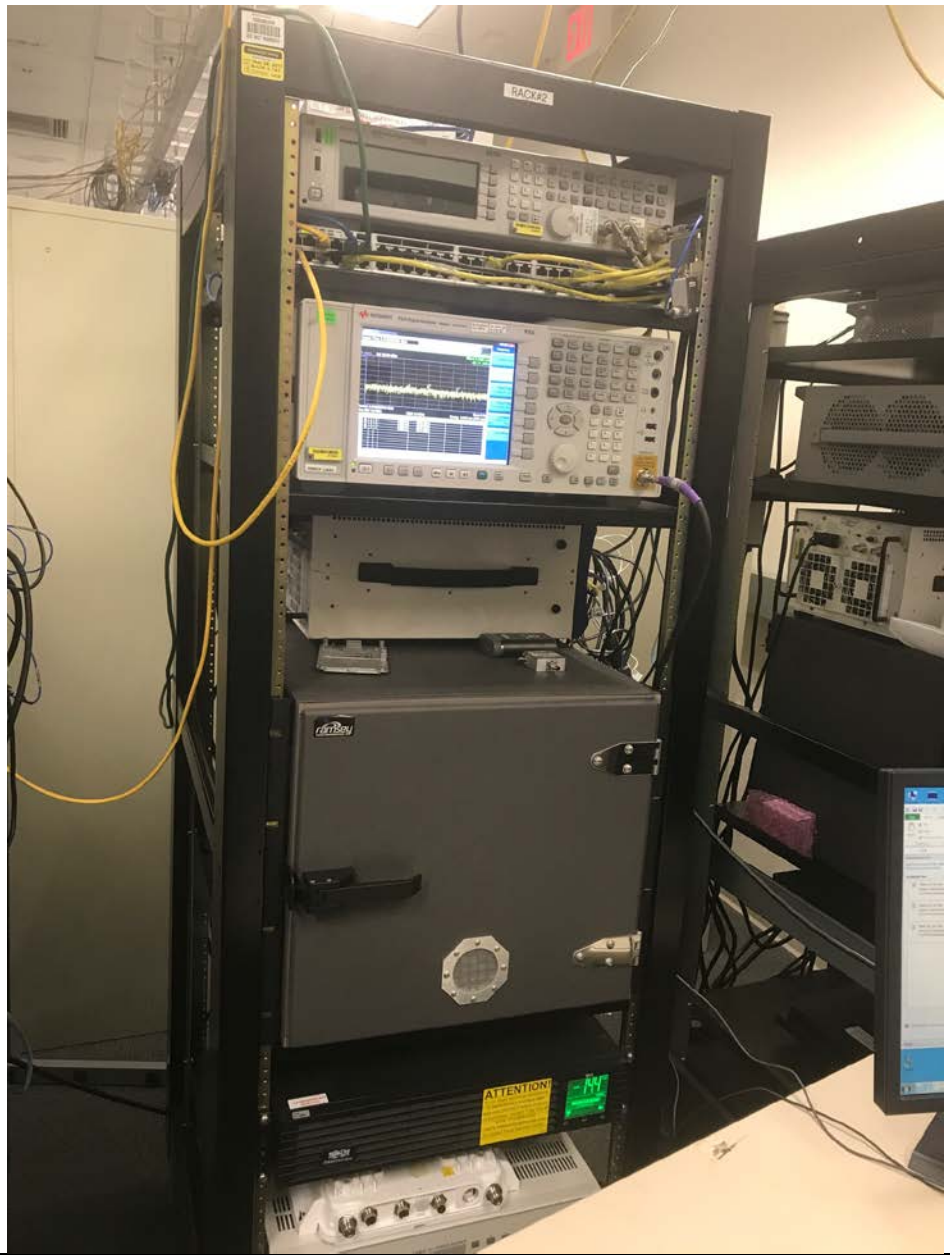
Conducted Bandedge Peak, 5500 MHz, Non HT/VHT20, 6 to 54 Mbps



Antenna A



Antenna B



Title: Physical Test Arrangement Photograph

This is a dual band 2.4GHz / 5GHz device. All ports in this test set up photo are connected as all testing is automated. Section 2.6 of this test report given an overview of the different Tx antenna combinations used by this device.

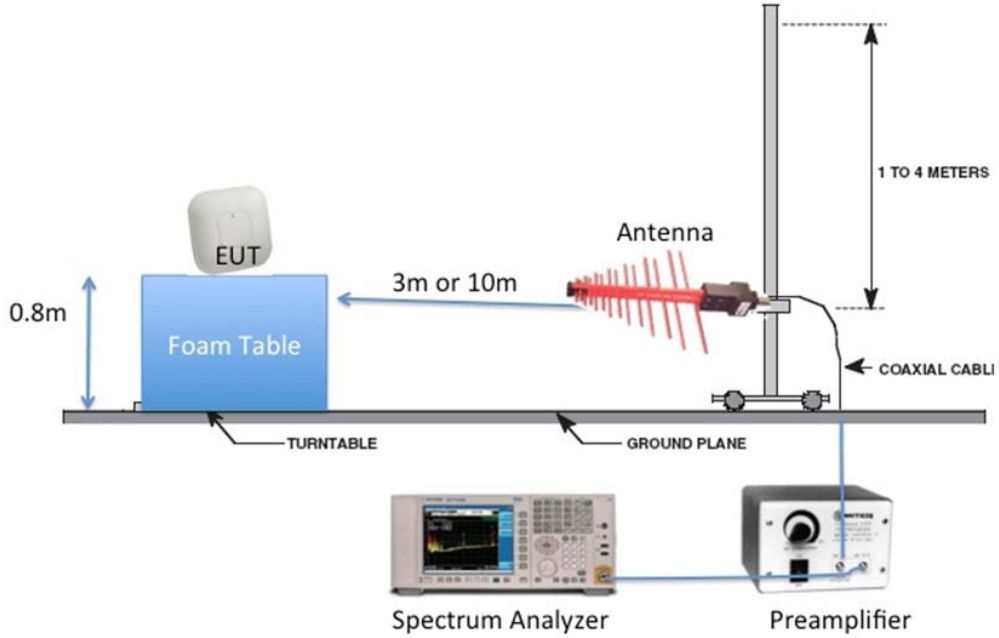
Title: Physical Test Arrangement Photograph

This is a dual band 2.4GHz / 5GHz device. All ports in this test set up photo are connected as all testing is automated. Section 2.6 of this test report given an overview of the different Tx antenna combinations used by this device.

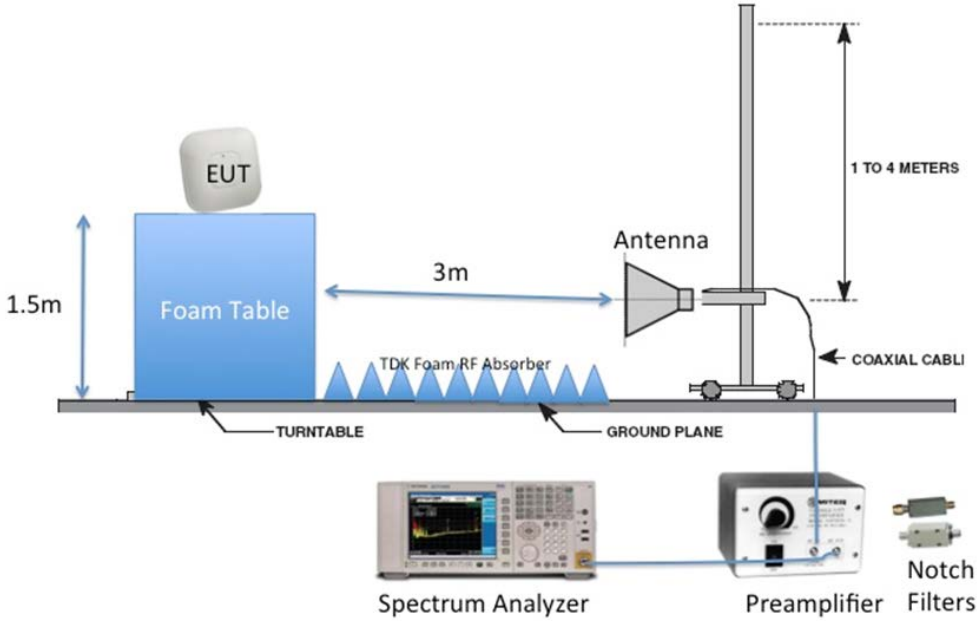
Appendix B: Emission Test Results

Testing Laboratory: Cisco Systems, Inc., 125 West Tasman Drive, San Jose, CA 95134, USA

Radiated Emission Setup Diagram-Below 1G



Radiated Emission Setup Diagram-Above 1G



B.1 Radiated Spurious Emissions

15.407 (b) *Undesirable emission limits.* Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

15.205 / 15.209

(7) The provisions of 15.205 apply to intentional radiators operating under this section.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 15.209.

Ref. ANSI C63.10: 2013 section 12.7.6 (peak) & 12.7.7.3 (average)

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/18GHz-26G/26GHz-40GHz
Reference Level:	80 dBuV
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	3 MHz
Detector:	Peak, Average
Trace:	Max Hold, Average

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.

System Number	Description	Samples	System under test	Support equipment
2	EUT	S03	☑	☐
	Support	S04, S05	☐	☑

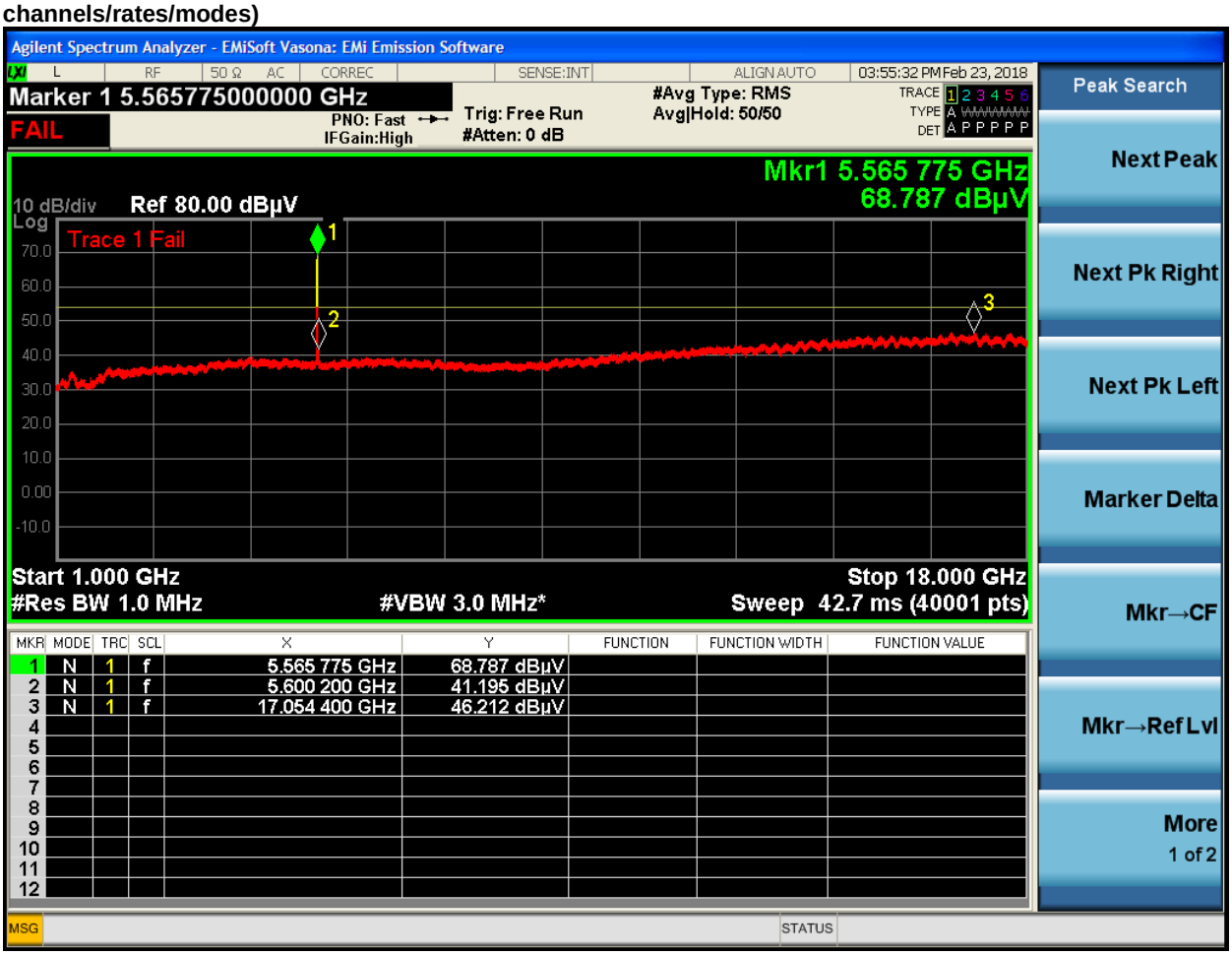
Tested By :	Date of testing:
Chris Blair	14-Feb-18 to 15-Feb-18 & 21-Feb-18 to 23-Feb-18 & 13-Mar-18 to 16-Mar-18.
Test Result : PASS	

See Appendix C for list of test equipment

B.1.A Transmitter Radiated Spurious Emissions-Average Worst Case

Frequency (MHz)	Mode	Data Rate	Spurious Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (MHz)
5560	Non-HT20	6.0Mbps	46.212	54	7.788

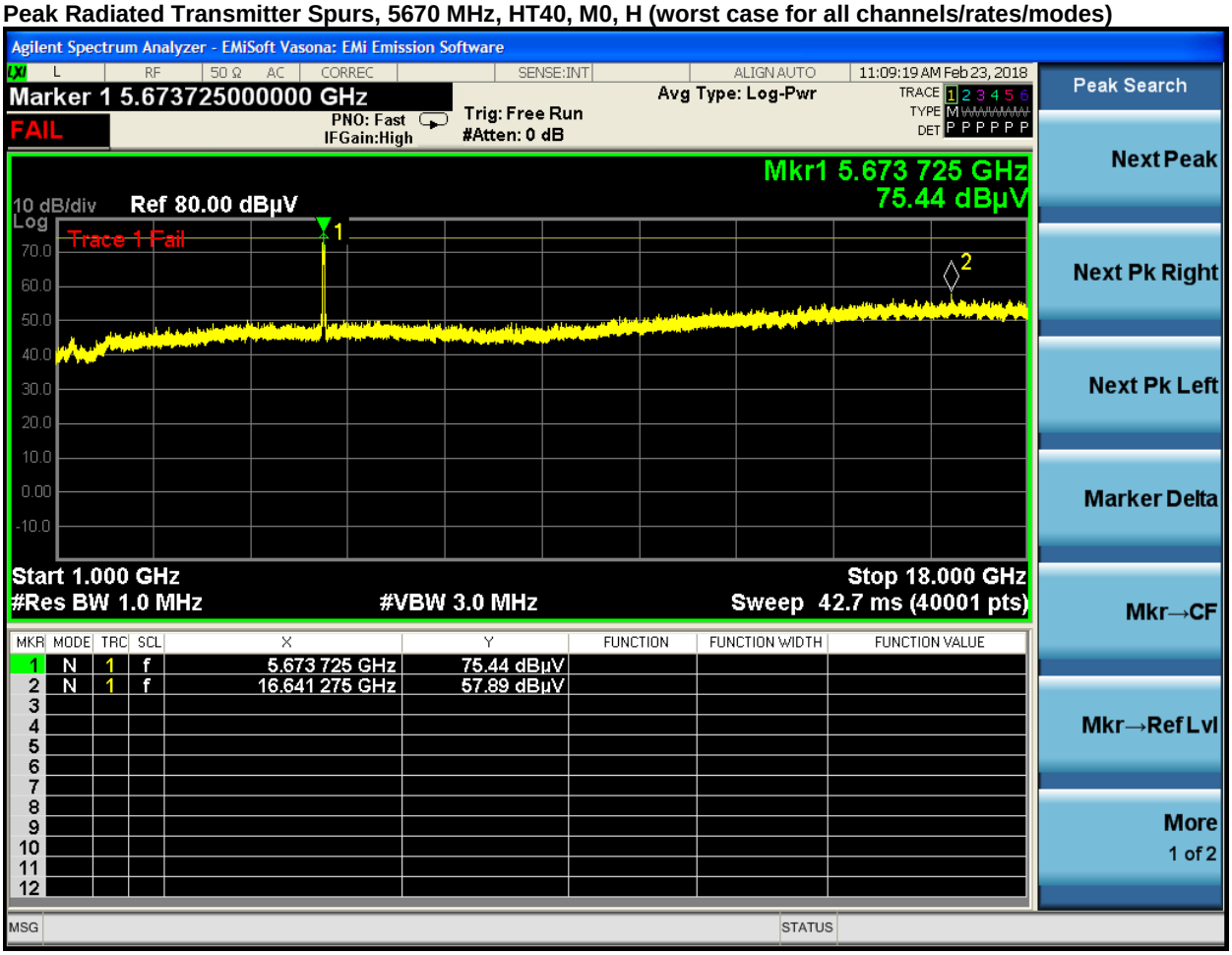
Average Radiated Transmitter Spurs, 5560 MHz, Non-HT20, 6 Mbps, H (worst case for all channels/rates/modes)

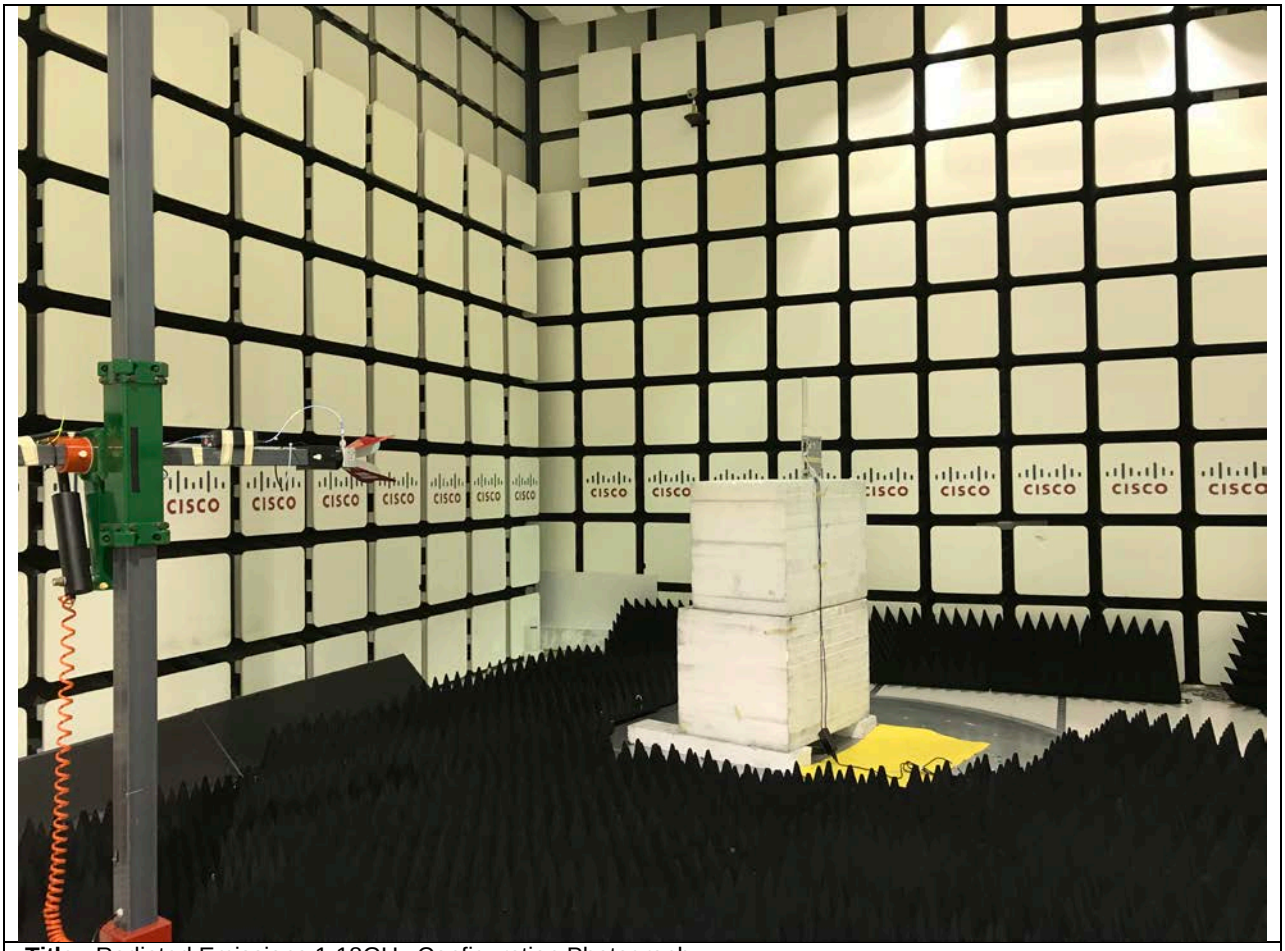


B.1.P Transmitter Radiated Spurious Emissions-Peak Worst Case

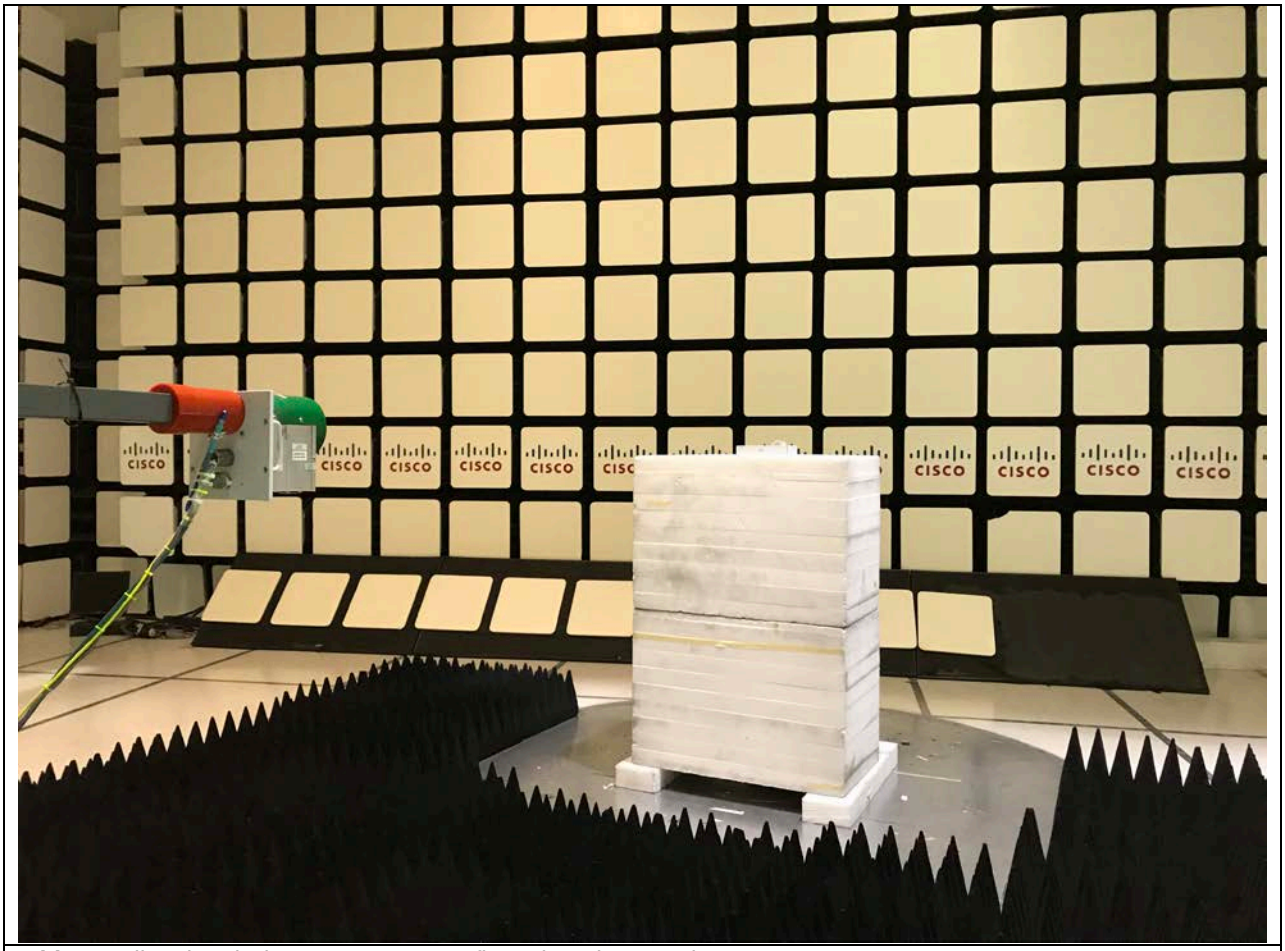
Frequency (MHz)	Mode	Data Rate (Mbps)	Spurious Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (MHz)
5670	HT40	M0	**57.89**	74	16.11

Peak Radiated Transmitter Spurs, 5670 MHz, HT40, M0, H (worst case for all channels/rates/modes)





Title: Radiated Emissions 1-18GHz Configuration Photograph



Title: Radiated Emissions 18-40GHz Configuration Photograph

B.2 Radiated Emissions 30MHz to 1GHz

FCC 15.205 / 15.209

(7) The provisions of 15.205 apply to intentional radiators operating under this section.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 15.209.

Ref. ANSI C63.10: 2013 section 6.5

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:	30MHz – 1GHz
Reference Level:	80 dBuV
Sweep Time:	Coupled
Resolution Bandwidth:	100kHz
Video Bandwidth:	300kHz
Detector:	Peak for Pre-scan, Quasi-Peak Compliance shall be determined using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

Terminate the access Point RF ports with 50 ohm loads.

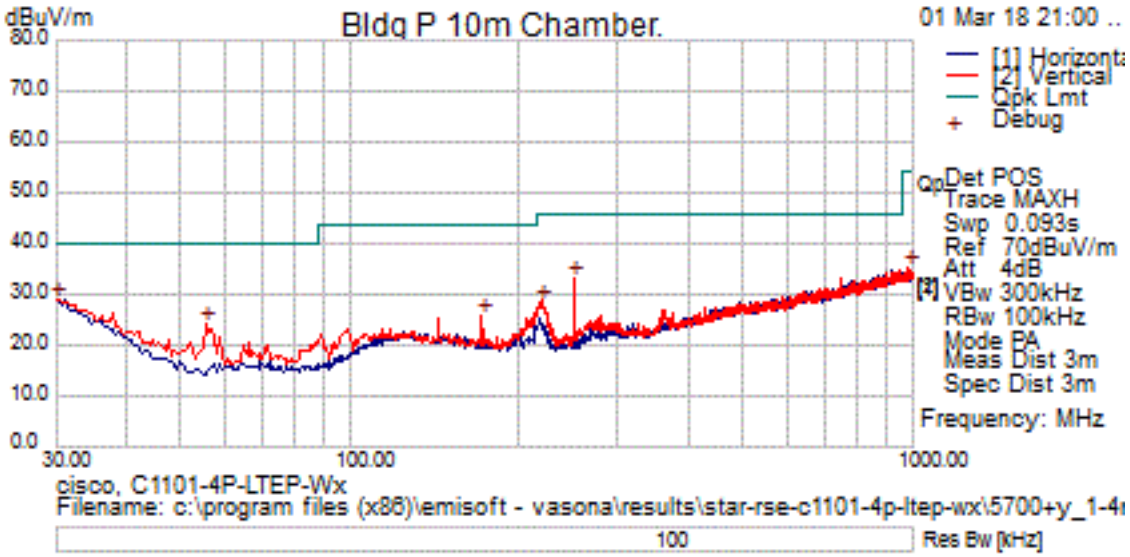
Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

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

System Number	Description	Samples	System under test	Support equipment
2	EUT	S03	☑	☐
	Support	S04, S05	☐	☑

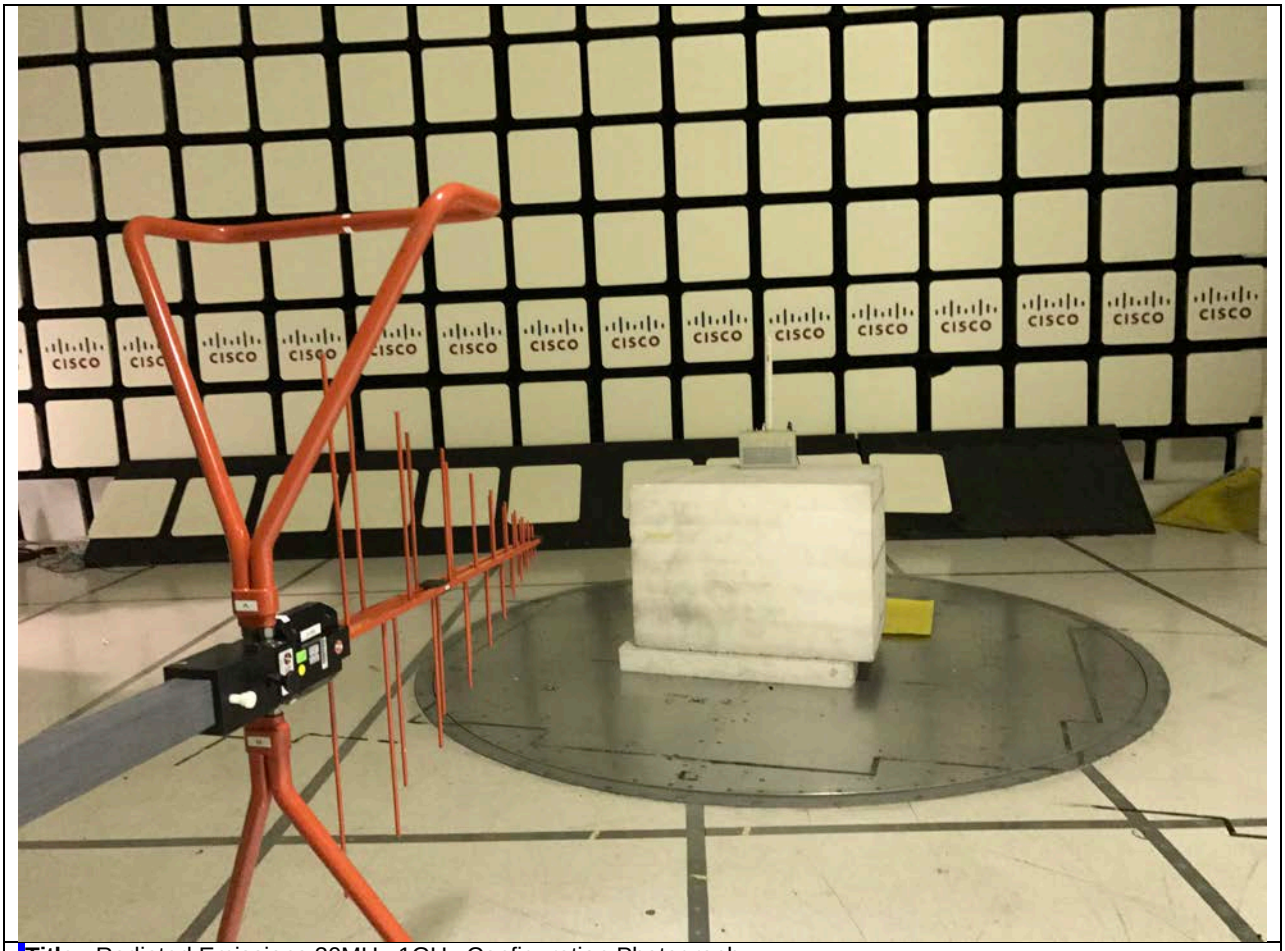
Tested By :	Date of testing:
Chris Blair	01-Mar-18
Test Result : PASS	

See Appendix C for list of test equipment



Test Results Table, Tx

Frequency (MHz)	Raw (dBuV)	Cable Loss	AF (dB)	Level (dBuV/m)	Measurement Type	Pol	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass/ Fail	Comments
30.000	7.1	.5	21.5	29.1	Peak [Scan]	V	350	299	40.0	-10.9	Pass	
250.069	20.3	1.3	11.6	33.2	Peak [Scan]	V	100	289	46.0	-12.8	Pass	
55.463	16.1	.6	7.4	24.1	Peak [Scan]	V	150	322	40.0	-15.9	Pass	
219.150	16.6	1.2	10.8	28.6	Peak [Scan]	V	100	133	46.0	-17.4	Pass	
171.863	12.8	1.1	11.8	25.6	Peak [Scan]	V	150	354	43.5	-17.9	Pass	
984.238	9.2	2.7	23.3	35.1	Peak [Scan]	V	100	235	54.0	-18.9	Pass	



Title: Radiated Emissions 30MHz-1GHz Configuration Photograph

B.3 AC Conducted Emissions

FCC 15.207 (a) & RSS-Gen 8.8 / LP0002:2.3 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.

Measurement Procedure
Accordance with ANSI C63.10:2013 section 6.2

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	150 KHz – 30 MHz
Sweep Time:	Coupled
Resolution Bandwidth:	9 KHz
Video Bandwidth:	30 KHz
Detector:	Quasi-Peak / Average

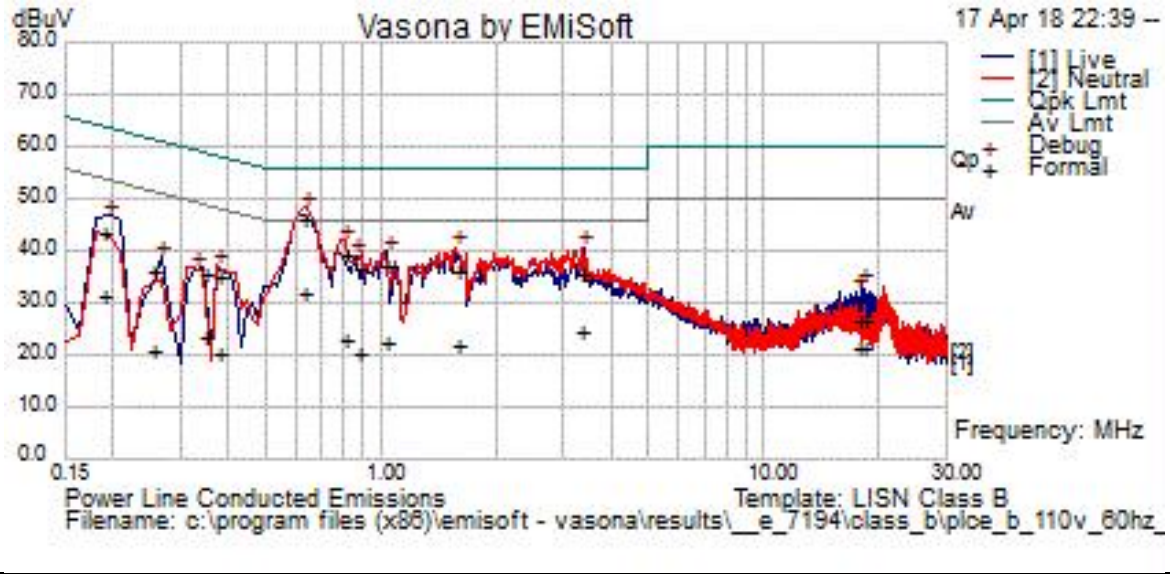
System Number	Description	Samples	System under test	Support equipment
3	EUT	S06, S07, S08	☑	☐
	Support	S09, S10, S11, S12	☐	☑

Tested By :	**Date of testing:**
Marie Higa	17-Apr-2018
Test Result : PASS	

See Appendix C for list of test equipment

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Conducted Emissions - AC Power

Test Results Table

Frequency (MHz)	Raw (dBuV)	Cable Loss	Factors (dB)	Level (dBuV/m)	Measurement Type	Line	Limit (dBuV/m)	Margin (dB)	Pass/ Fail	Comments
1.04	17	19.9	0	37	Qp	L	56	-19	Pass	
0.87839	16.5	19.9	0	36.5	Qp	L	56	-19.5	Pass	
1.575	16.3	19.9	0	36.3	Qp	N	56	-19.7	Pass	
0.190203	22.9	20.8	0.1	43.8	Qp	L	64	-20.2	Pass	
3.356	15.6	20	0.1	35.7	Qp	N	56	-20.3	Pass	
3.356	4.5	20	0.1	24.5	Av	N	46	-21.5	Pass	
0.190203	10.4	20.8	0.1	31.2	Av	L	54	-22.8	Pass	
0.379198	15.2	20.1	0	35.4	Qp	N	58.3	-22.9	Pass	
0.801426	3	19.9	0	23	Av	N	46	-23	Pass	
0.347604	15.6	20.2	0	35.8	Qp	N	59	-23.2	Pass	
1.04	2.3	19.9	0	22.3	Av	L	46	-23.7	Pass	
1.575	2.2	19.9	0	22.1	Av	N	46	-23.9	Pass	
0.253034	15.7	20.5	0	36.3	Qp	L	61.7	-25.4	Pass	
0.347604	3.4	20.2	0	23.6	Av	N	49	-25.4	Pass	
0.87839	0.2	19.9	0	20.2	Av	L	46	-25.8	Pass	

Frequency (MHz)	Raw (dBuV)	Cable Loss	Factors (dB)	Level (dBuV/m)	Measurement Type	Line	Limit (dBuV/m)	Margin (dB)	Pass/ Fail	Comments
0.379198	0	20.1	0	20.2	Av	N	48.3	-28.1	Pass	
18.11	0.7	20.4	0.2	21.3	Av	L	50	-28.7	Pass	
17.536	0.6	20.4	0.2	21.2	Av	L	50	-28.8	Pass	
0.253034	0.5	20.5	0	21	Av	L	51.7	-30.6	Pass	
17.536	6.3	20.4	0.2	26.9	Qp	L	60	-33.1	Pass	
18.11	6	20.4	0.2	26.7	Qp	L	60	-33.3	Pass	

Title: Conducted Emissions Configuration Photograph

Appendix C: List of Test Equipment Used to perform the test

Test Equipment used for Radiated Emissions					
Equip#	**Manufacturer/ Model**	**Description**	**Last Cal**	**Next Cal**	**Test Item**
CIS008447	NSA 10m Chamber Cisco	NSA 10m Chamber	17-Oct-17	17-Oct-18	B.2
CIS047410	Keysight N9038A	MXE EMI Receiver	31 Mar 2017	31 Mar 2018	B.2
CIS054013	JB1 Sunol Sciences	Combination Antenna, 30MHz-2GHz	15 Jun 2017	15 Jun 2018	B.2
CIS055936	H+S Sucoflex 106PA	RF Type N Antenna Cable 18 GHz 8.5m	19 Oct 2017	19 Oct 2018	B.2
CIS020975	UFB311A-0-1344-520520 Micro-Coax	RF Coaxial Cable, to 18GHz, 134.4 in	19-Feb-18	19-Feb-19	B.2
CIS056154	H+S Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	18 Jan 2018	18 Jan 2019	B.2
CIS041929	iBTHP-5-DB9 Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28-Dec-17	28-Dec-18	B.2
CIS056037	Stanley 33-428	26' tape measure	NA	NA	B.2
CIS033041	Fluke 175	True RMS DMM	01 Jun 2017	01 Jun 2018	B.2
CIS027233	York CNE V	Comparison Noise Emitter	NA	NA	B.2
CIS051688	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	29 Jun 2017	29 Jun 2018	B.2
CIS051690	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	02 Feb 2018	02 Feb 2019	B.2
CIS032544	ETS Lindgren 3117	Double Ridged Horn Antenna	12 Jul 2017	12 Jul 2018	B.1
CIS047286	H+S Sucoflex 102E	40GHz Cable K Connector	08 Sep 2017	08 Sep 2018	B.1
CIS056054	Miteq TTA1800-30-HG	SMA 18GHz Pre Amplifier	09 Feb 2018	09 Feb 2019	B.1
CIS054393	H+S Sucoflex 102	RF Cable 2.4mm - N Type 18GHz	27 Apr 2017	27 Apr 2018	B.1
CIS055936	H+S Sucoflex 106PA	RF Type N Antenna Cable 18 GHz 8.5m	19 Oct 2017	19 Oct 2018	B.1
CIS020975	Micro-coax UFB311A-0-1344-520520	Coaxial Cable-18Ghz	19 Feb 2018	19 Feb 2019	B.1
CIS056154	H+S Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	18 Jan 2018	18 Jan 2019	B.1
CIS047410	Keysight N9038A	MXE EMI Receiver	31 Mar 2017	31 Mar 2018	B.1
CIS043124	Above 1GHz Site Cal Cisco	Above 1GHz Cispr Site Verification	15 Jan 2018	15 Jan 2019	B.1
CIS08447	Cisco NSA 10m Chamber	NSA 10m Chamber	17 Oct 2017	17 Oct 2018	B.1
CIS041929	iBTHP-5-DB9 Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28-Dec-17	28-Dec-18	B.1

CIS054647	Stanley 33-605	10m tape measure	NA	NA	B.1
CIS037570	Keysight 8710-1765	PRESET TORQUE WRENCH, 8lb-in	10 May 2017	10 May 2018	B.1
CIS037019	Fluke 175	True RMS Multimeter	19 Oct 2017	19 Oct 2018	B.1
CIS04883	Emco 3115	Horn antenna	NA	NA	B.1
CIS08171	Keysight 8491B Opt 010	Attenuator	26 Apr 2017	26 Apr 2018	B.1
CIS034075	RSG 2000 Schaffner	Reference Spectrum Generator, 1-18GHz	NA	NA	B.1
CIS040597	Above 1GHz Site Cal Cisco	Above 1GHz Cispr Site Verification	26 Sep 2017	26 Sep 2018	B.1
CIS08448	Cisco NSA Cal	NSA Chamber	06 Oct 2017	06 Oct 2018	B.1
CIS047300	Keysight N9038A	EMI Receiver	28 Mar 2017	28 Mar 2018	B.1
CIS049563	H+S Sucoflex 106A	Coaxial Cable, 8m	21 Aug 2017	21 Aug 2018	B.1
CIS021117	Micro-coax UFB311A-0-2484-520520	Coaxial Cable-18Ghz	16 Aug 2017	16 Aug 2018	B.1
CIS056158	H+S Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	18 Jan 2018	18 Jan 2019	B.1
CIS054230	Newport iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	09 Feb 2018	09 Feb 2019	B.1
CIS045166	Stanley 33-428	26' tape measure	NA	NA	B.1
CIS020490	Keysight 8710-1765	PRESET TORQUE WRENCH, 8lb-in	09 Feb 2018	09 Feb 2019	B.1
CIS051688	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	29 Jun 2017	29 Jun 2018	B.1
CIS051690	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	02 Feb 2018	02 Feb 2019	B.1
CIS033041	Fluke 175	True RMS DMM	01 Jun 2017	01 Jun 2018	B.1
CIS043124	Above 1GHz Site Cal Cisco	Above 1GHz Cispr Site Verification	15 Jan 2018	15 Jan 2019	B.1
CIS08447	Cisco NSA 10m Chamber	NSA 10m Chamber	17 Oct 2017	17 Oct 2018	B.1
CIS041929	iBTHP-5-DB9 Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28-Dec-17	28-Dec-18	B.1
45167	Stanley 33-428	26' Tape Measure	NA	NA	B.1
56327	Pasternack PE5019-1	Torque Wrench	28 Feb 2018	28 Feb 2019	B.1
CIS037019	Fluke 175	True RMS Multimeter	19 Oct 2017	19 Oct 2018	B.1
CIS051688	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	29 Jun 2017	29 Jun 2018	B.1
CIS051690	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	02 Feb 2018	02 Feb 2019	B.1

38392	Keysignt E8257D	PSG Analog Signal Generator	01 Aug 2017	01 Aug 2018	B.1
47299	Keysight N9030A-544	PXA Signal Analyzer	12 Oct 2018	12 Oct 2018	B.1
CIS041979	1840 Cisco	18-40GHz EMI Test Head/ Verification Fixture	30 Aug 2017	30 Aug 2018	B.1

Test Equipment used for AC Mains Conducted Emissions					
Equip#	**Manufacturer/ Model**	**Description**	**Last Cal**	**Next Cal**	**Test Item**
CIS008496	Fischer Custom Communications FCC-450B-2.4-N	Instrumentation Limiter	16-MAY-17	16-MAY-18	B.3
CIS018963	York CNE V	Comparison Noise Emitter, 30 - 1000MHz	Cal Not Required	N/A	B.3
CIS035235	Lufkin HY1035CME	5 Meter Tape Measure	Cal Not Required	N/A	B.3
CIS037229	Coleman RG-223	25ft BNC cable	13-APR-18	13-APR-19	B.3
CIS037239	Rohde & Schwarz ESCI	ESCI EMI Test Receiver	02-MAY-17	02-MAY-18	B.3
CIS044023	Fischer Custom Communications FCC-801-M2-32A	Power Line Coupling Decoupling Network	09-NOV-17	09-NOV-18	B.3
CIS045990	Fischer Custom Communications F-090527-1009-1	Line Impedance Stabilization Network	15-JUN-17	15-JUN-18	B.3
CIS045991	Fischer Custom Communications F-090527-1009-2	Lisn Adapter	15-JUN-17	15-JUN-18	B.3
CIS049479	Coleman RG223	BNC 2ft Cable	05-MAR-18	05-MAR-19	B.3
CIS049531	TTE H785-150K-50-21378	High Pass Filter	03-MAY-17	03-MAY-18	B.3
CIS049558	Bird 5-T-MB	5W 50 Ohm BNC Termination 4GHz	10-AUG-17	10-AUG-18	B.3
CIS054231	Newport iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	09-FEB-18	09-FEB-19	B.3

Test Equipment used for RF Conducted Tests.					
Equip#	**Manufacturer/ Model**	**Description**	**Last Cal**	**Next Cal**	**Test Item**
CIS055094	PXI-1042 National Instruments	Chassis	Cal Not Required		A1 thru A4
CIS055562	MEGAPHASE F120-S1S1-48	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS055565	MEGAPHASE F120-S1S1-36	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054623	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054624	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054620	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054610	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS055112	Microtronics BRM50702-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054621	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054619	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS055353	Microtronics BRC50703-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054618	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054617	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054691	Microtronics BRC50704-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054616	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054614	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054693	Microtronics BRC50705-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS054615	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A4
CIS055368	Pulsar PS4-09-452/4S	4 Way Divider	12 Apr 2017	12 Apr 2018	A1 thru A4
CIS054686	NI PXI-2796 National Instruments	Multiplexer, 40 GHz 50 Ohm	NA	NA	A1 thru A4
CIS053615	N9030A-550 Keysight	PXA Signal Analyzer	04 Apr 2017	04 Apr 2018	A1 thru A4

CIS056329	Pasternack PE5019-1	Torque wrench	01 Mar 2017	01 Mar 2018	A1 thru A4

Appendix E: 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