Radio Test Report

ISR-AP1101AC-I-B, ISR-AP1101AC-I-A
with host router
C1109-4PLTE2PWB, C1109-4PLTE2PWA

FCC ID: LDKC11011757

IC: 2461N-11011757

2400-2483.5 MHz

Against the following Specifications:

CFR47 Part 15.247
RSS-247
RSS-Gen

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

Author: Julian Land	**Approved By:** Diana Canafoglia
Tested By: Julian Land, Nima Ardestani	**Title:** Compliance Manager
	Revision: 1.5

This report replaces any previously entered test report under EDCS –12316909. This test report has been electronically authorized and archived using the CISCO Engineering Document Control system. Test Report Template EDCS# 703456

Section 1: Overview

1.1 Test Summary

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

Specifications
CFR47 Part 15.247 RSS-247 Issue 2: Feb 2017 RSS-Gen Issue 4: Nov 2014

Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Radio 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*%

1.All AC testing was performed at one or more of the following supply voltages:

110V 60 Hz (+/-20%)

2.2 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.

2.3 Date of testing (initial sample receipt date to last date of testing)

07-Feb-2018 to 17-Aug-2018

2.4 Report Issue Date

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

2.5 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.
125 West Tasman Drive (Building P)
San Jose, CA 95134
USA

Headquarters

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

Registration Numbers for ISED (Innovation, Science and Economic Development Canada)

Cisco System Site	Address	Site Identifier
Building P, 10m Chamber	125 West Tasman Dr San Jose, CA 95134 United States	Company #: 2461N-2
Building P, 5m Chamber	125 West Tasman Dr San Jose, CA 95134 United States	Company #: 2461N-1
Building I, 5m Chamber	285 W. Tasman Drive San Jose, California 95134 United States	Company #: 2461M-1
Building 7, 5m Chamber	425 E. Tasman Drive San Jose, California 95134 United States	Company #: 2461N-3

Test Engineers

Julian Land, Nima Ardestani

2.6 Equipment Assessed (EUT)

C1109-4PLTE2PWB with ISR-AP1101AC-I-B WiFi module

2.7 EUT Description

The C1109 is an Enterprise/MSP/M2M next generation low end router with the unified platform idea GE WAN, next generation Wave 2 802.11a/g/n/ac WLAN and LTE WWAN on Polaris IOS XE.

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)
2.4GHz / 5GHz	07-100495-01	Dipole	2.14 / 4
2.4GHz / 5GHz	07-100497-01	Ceiling Mount Omni Directional	2.14 / 4
2.4GHz / 5GHz	07-100496-01	Roof Mount	2.14 / 4

Section 3: Result Summary

3.1 Results Summary Table

3.1.1 Radio Port Results

Basic Standard	Technical Requirements / Details	Result
FCC 15.247 RSS-247	**6dB Bandwidth** Systems using digital modulation techniques may operate in the 2400-2483.5MHz band. The minimum 6dB bandwidth shall be at least 500 kHz	Pass
FCC 15.247 RSS-247	**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 15.247 RSS-247	**Output Power**: **15.247** The maximum conducted output power of the intentional radiator for systems using digital modulation in the 2400-2483.5 MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. **RSS-247** For DTSs employing digital modulation techniques operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(e), the e.i.r.p. shall not exceed 4 W.	Pass
FCC 15.247 RSS-247	**Power Spectral Density** For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	Pass

FCC 15.247 RSS-247	**Conducted Spurious Emissions / Band-Edge**: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.	Pass
FCC 15.247 RSS-247 FCC 15.205 RSS-Gen	**Restricted band**: Unwanted emissions falling within the restricted bands, as defined in FCC 15.205 (a) and RSS-Gen 8.10 must also comply with the radiated emission limits specified in FCC 15.209 (a) and RSS-Gen 8.9	Pass

3.1.2 Radiated Emissions (General requirements)

Basic Standard	Technical Requirements / Details	Result
FCC 15.209 RSS-Gen	**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. Unwanted emissions falling within the restricted bands, as defined in FCC 15.205 (a) and RSS-Gen 8.10 must also comply with the radiated emission limits specified in FCC 15.209 (a) and RSS-Gen 8.9	Pass
RSS-Gen	**RX Spurious Emissions:** **RSS-Gen 8.9** Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 and Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission. **RSS-Gen 8.10 Restricted Bands** Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and (c) Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.	Pass
FCC 15.207 RSS-Gen	**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

Section 4: Sample Details

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

4.1 Sample Details

Sample No.	Equipment Details	Manufacturer	Hardware Revision	Firmware Revision	Software Revision	Serial Number
S01	C1109-4PLTE2PWB Router	Cisco Systems, Inc.	P1B	C1100-ROMMON-20171109	16.8.20180109	FOC214664N4
S02	ISR-AP1101AC-I-B WiFi Module	Cisco Systems, Inc.	2.2	e1c63a0bb171f78c5800c1478007abc1	8.4.1.10	FOC21454CEU
S03	AC/DC Power Supply	Delta Electronics, Inc.	02	NA	NA	DAB2142G1A3
S04	ISR-AP1101AC-I-B WiFi Module	Cisco Systems, Inc.	2.2	f1e77cf8ab1e497b17ad53633866ea42	8.5.1.10	FOC22120Z5C
S05	AC/DC Adapter	Delta Electronics	02	NA	NA	DTH1749D08Z
S06	C1109-4PLTE2PWE (EUT used for radiated and AC emissions)	Cisco Systems, Inc.	P2	16.8<1r>	16.08.01	FGL221793KW

4.2 System Details

System #	Description	Samples
1	Host router with embedded WiFi module and power supply	S01, S02, S03
2	Host router with embedded WiFi module (radiated and AC emissions) and power supply	S04, S06, S05

4.3 Mode of Operation Details

Mode#	Description	Comments
1	802.11b CCK	Receive and Transmit
2	802.11g OFDM	Receive and Transmit
3	802.11n20 OFDM	Receive and Transmit

Section 5: Radio Port Results

5.1 Duty Cycle

5.1.1 Duty Cycle Test Requirement

From KDB 558074:

> 6.0 Duty cycle, transmission duration and maximum power control level
>
> Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (*i.e.*, with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be utilized to ensure that measurements are made only during transmissions at the maximum power control level. … When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternate procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle. Within this guidance document, the duty cycle refers to the fraction of time over which the transmitter is on and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ± 2 percent, otherwise the duty cycle is considered to be non-constant.

5.1.2 Duty Cycle Test Method

From KDB 558074, Section 6:

> The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

5.1.3 Duty Cycle Test Information

Tested By : Julian Land	**Date of testing:** February 7th 2018
Test Result : Pass	

Test Equipment

See Appendix A for list of test equipment

Samples, Systems, and Modes

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

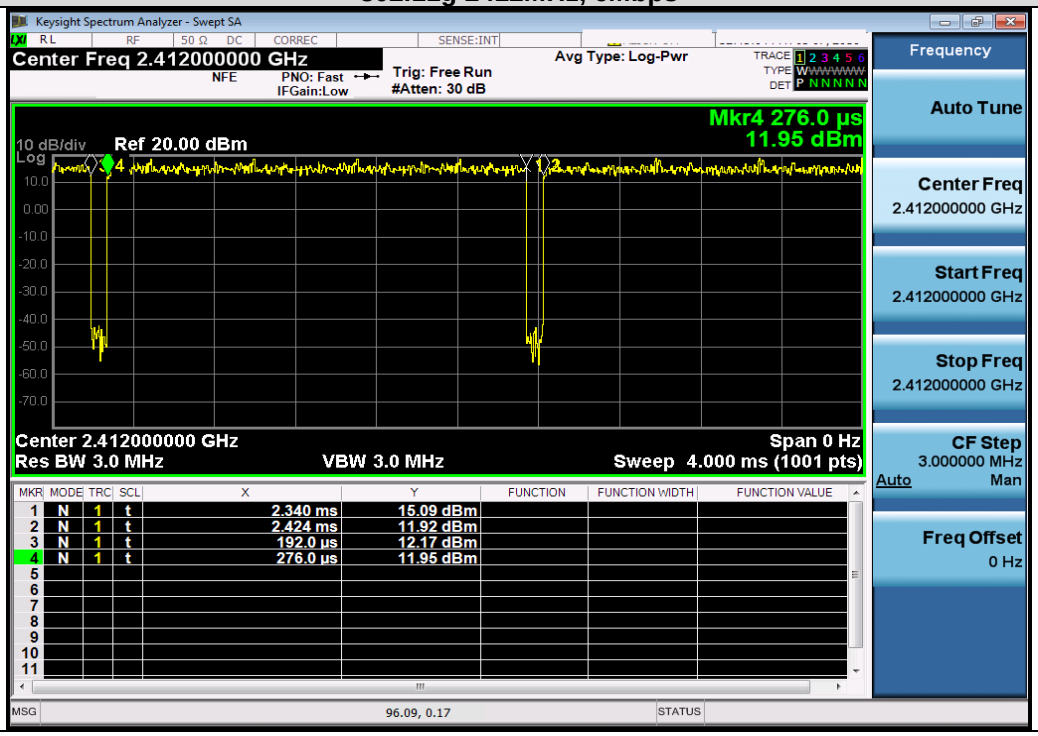
5.1.4 Duty Cycle Data Table

Duty Cycle table and screen captures are shown below for power / psd modes.

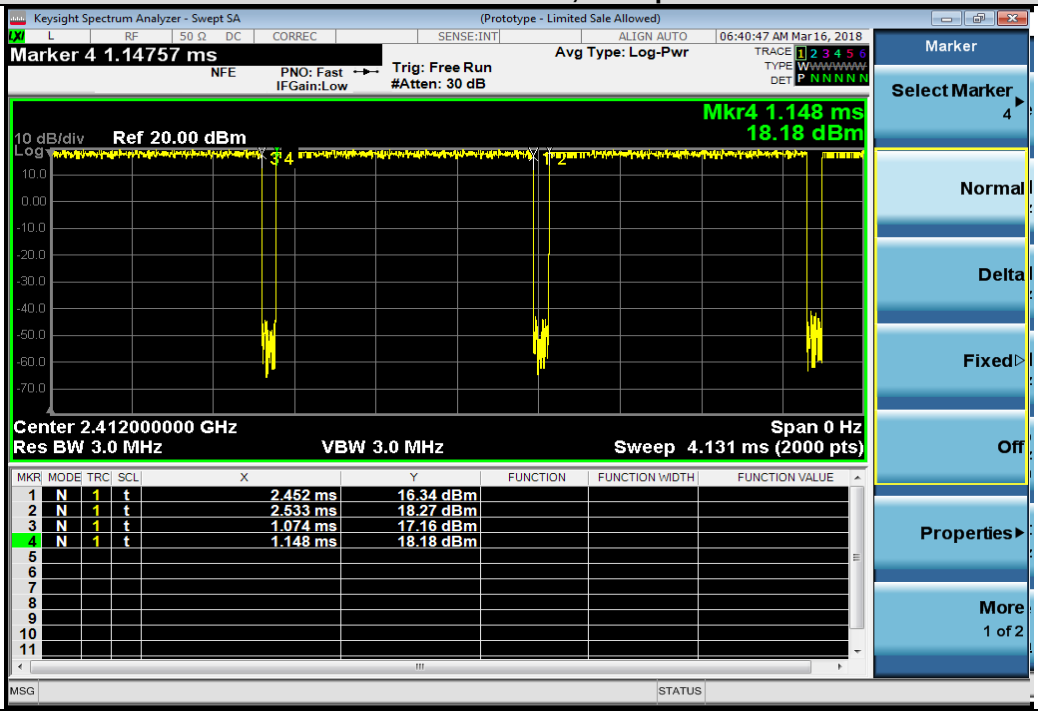
Mode	Data Rate	On-time (ms)	Total Time (ms)	Duty Cycle (%)	Correction Factor (dB)
NonHT20	6Mbps	2.064	2.148	96.09	0.17
CCK	11Mbps	1.304	1.378	94.63	0.24
HT20	M0	5.008	5.104	98.12	0.08

5.1.5 Duty Cycle Data Screenshots

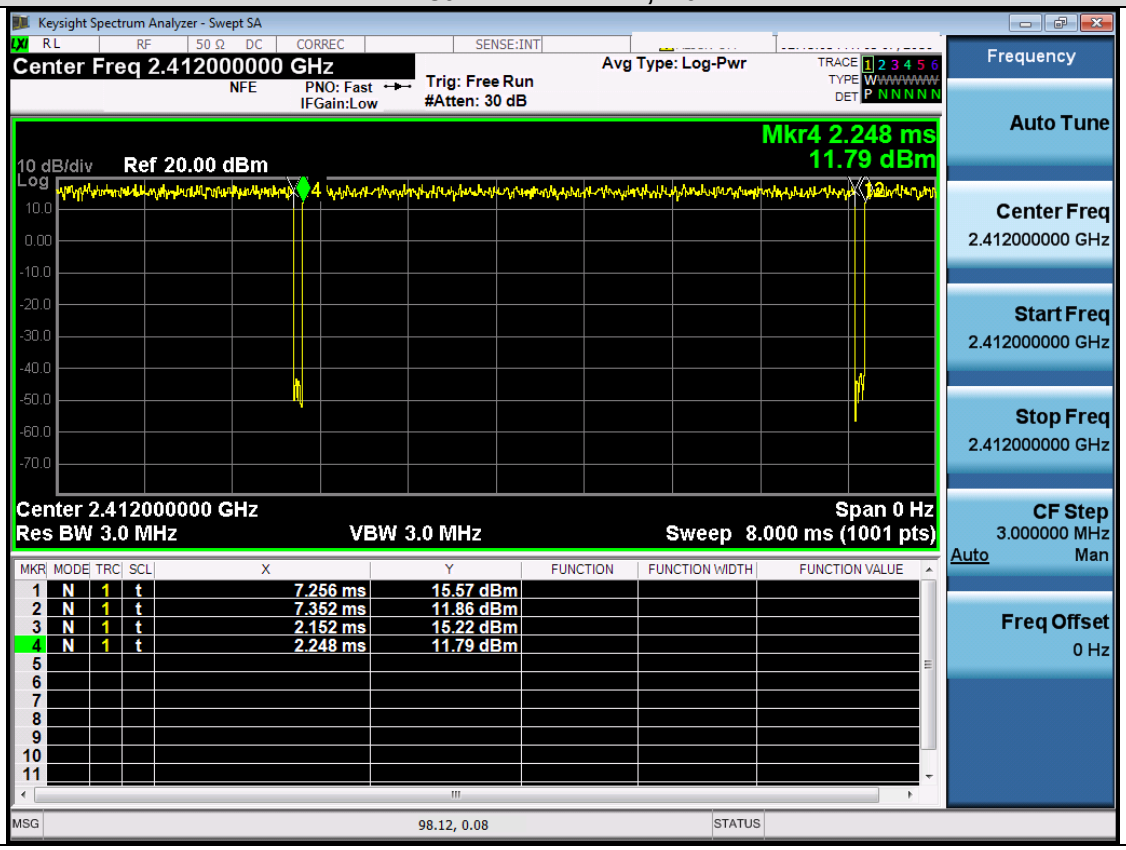
802.11g 2412MHz, 6Mbps



802.11b 2412MHz, 11Mbps



802.11n 2412MHz, M0



5.2 6dB Bandwidth

5.2.1 6dB Bandwidth Test Requirement

For the FCC:

15.247 (2)

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

For Industry Canada:

RSS-247 5.2 (a)

5.2 Digital transmission systems

DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400-2483.5 MHz:
a) The minimum 6 dB bandwidth shall be 500 kHz.

5.2.2 6dB Bandwidth Test Procedure

Ref. KDB 558074 D01 DTS Meas Guidance v04, 8.2 Option 2
ANSI C63.10: 2013

6dB BW 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 -6dB 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. KDB 558074 D01 DTS Meas Guidance v04, 8.2 Option 2
ANSI C63.10: 2013 section 11.8.2 Option 2

6dB BW
Test parameters

8.0 DTS bandwidth

One of the following procedures may be used to determine the modulated *DTS bandwidth*.

8.1 Option 1

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum 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 6 dB relative to the maximum level measured in the fundamental emission.

8.2 Option 2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (*i.e.*, RBW = 100 kHz, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

5.2.3 6dB Bandwidth Test Information

Tested By : Julian Land	**Date of testing:** February 7th 2018
Test Result : PASS	

Test Equipment

See Appendix A for list of test equipment

Samples, Systems, and Modes

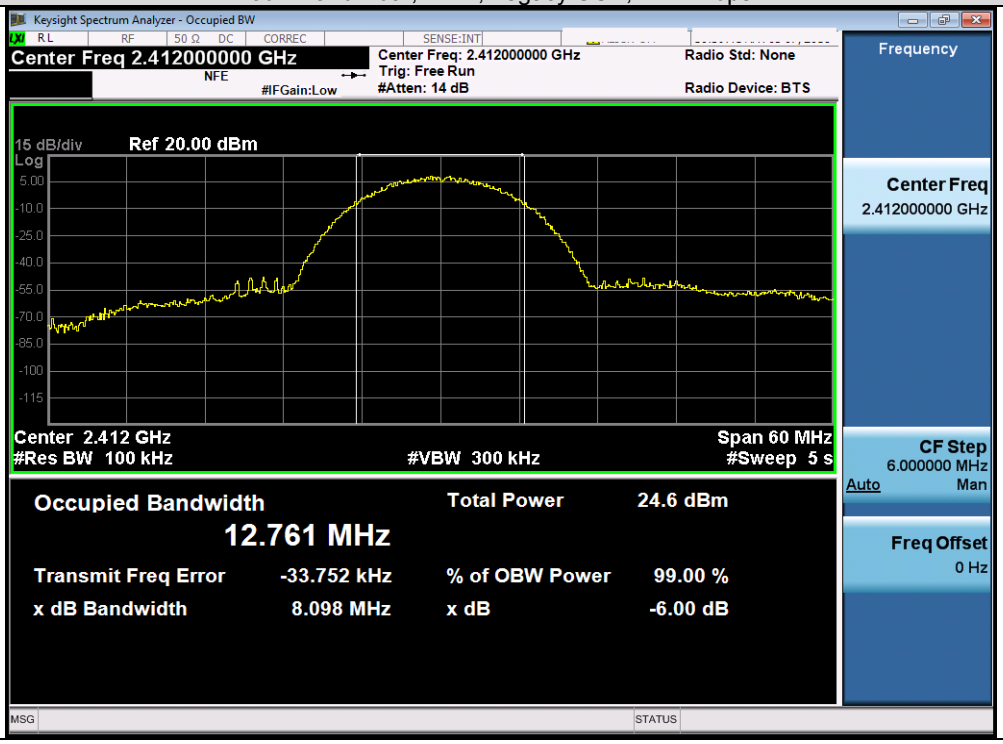
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

5.2.4 6dB Bandwidth Data Table

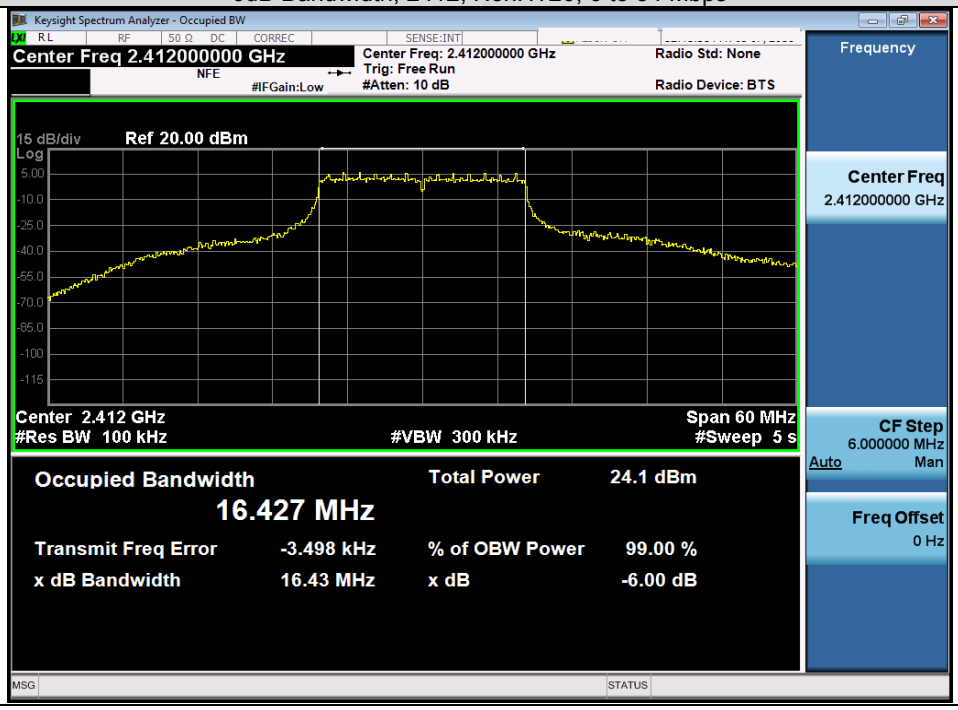
Frequency (MHz)	Mode	Data Rate (Mbps)	6dB BW (MHz)	Limit (kHz)	Margin (MHz)
2412	**CCK, 1 to 11 Mbps**	**11**	**8.1**	**>500**	**7.6**
	Non HT20, 6 to 54 Mbps	6	16.4	>500	15.9
	HT/VHT20, M0 to M15	m0	17.6	>500	17.1
2437	CCK, 1 to 11 Mbps	11	8.1	>500	7.6
	Non HT20, 6 to 54 Mbps	6	16.4	>500	15.9
	HT/VHT20, M0 to M15	m0	17.3	>500	16.8
2462	CCK, 1 to 11 Mbps	11	8.1	>500	7.6
	Non HT20, 6 to 54 Mbps	6	16.5	>500	16.0
	HT/VHT20, M0 to M15	m0	17.7	>500	17.2

5.2.5 6dB Bandwidth Screenshots

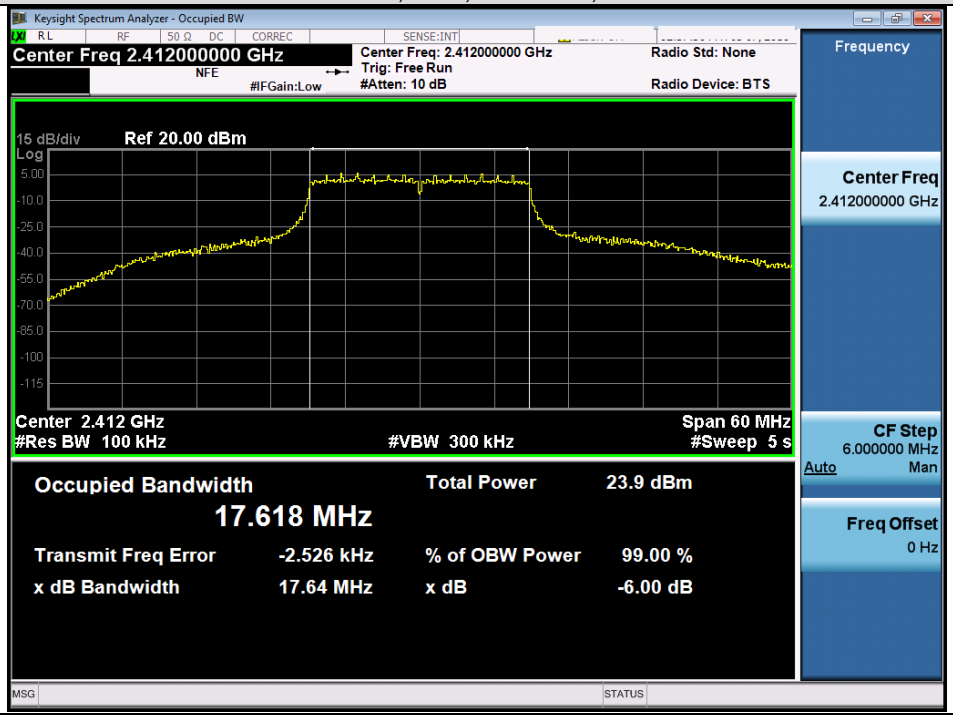
6dB Bandwidth, 2412, Legacy CCK, 1-11 Mbps



6dB Bandwidth, 2412, NonHT20, 6 to 54 Mbps



6dB Bandwidth, 2412, HT/VHT20, M0 to M15



5.3 Occupied Bandwidth

5.3.1 Occupied Bandwidth Test Requirement

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.

5.3.2 Occupied Bandwidth Test Method

Ref**.** ANSI C63.10: 2013

26 BW & 99% BW 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 & OBW 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

26 BW & 99% BW
Test parameters

6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure

The 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. The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

5.3.3 Occupied Bandwidth Test Information

Tested By : Julian Land	**Date of testing:** February 8th 2018
Test Result : PASS	

Test Equipment

See Appendix A for list of test equipment

Samples, Systems, and Modes

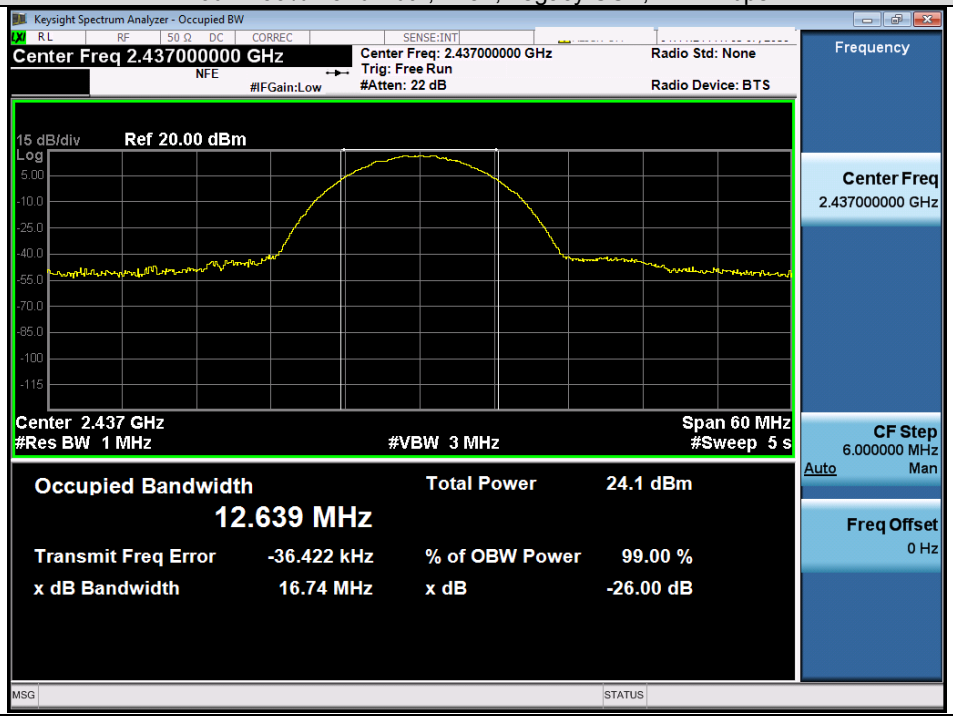
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

5.3.4 Occupied Bandwidth Data Table

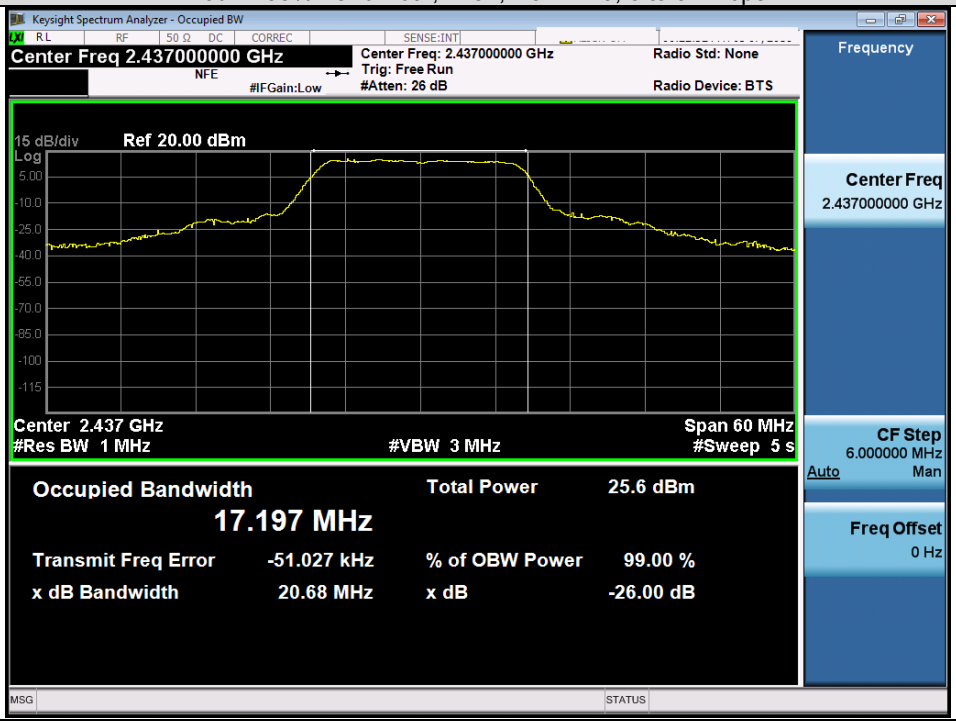
Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
2412	CCK, 1 to 11 Mbps	11	16.9	12.804
	Non HT20, 6 to 54 Mbps	6	20.7	17.250
	HT/VHT20, M0 to M15	m0	21.6	18.225
2437	**CCK, 1 to 11 Mbps**	**11**	**16.7**	**12.639**
	Non HT20, 6 to 54 Mbps	6	20.7	17.197
	HT/VHT20, M0 to M15	m0	21.5	18.185
2462	CCK, 1 to 11 Mbps	11	17.1	12.948
	Non HT20, 6 to 54 Mbps	6	20.9	17.320
	HT/VHT20, M0 to M15	m0	21.7	18.284

5.3.5 Occupied Bandwidth Screenshots

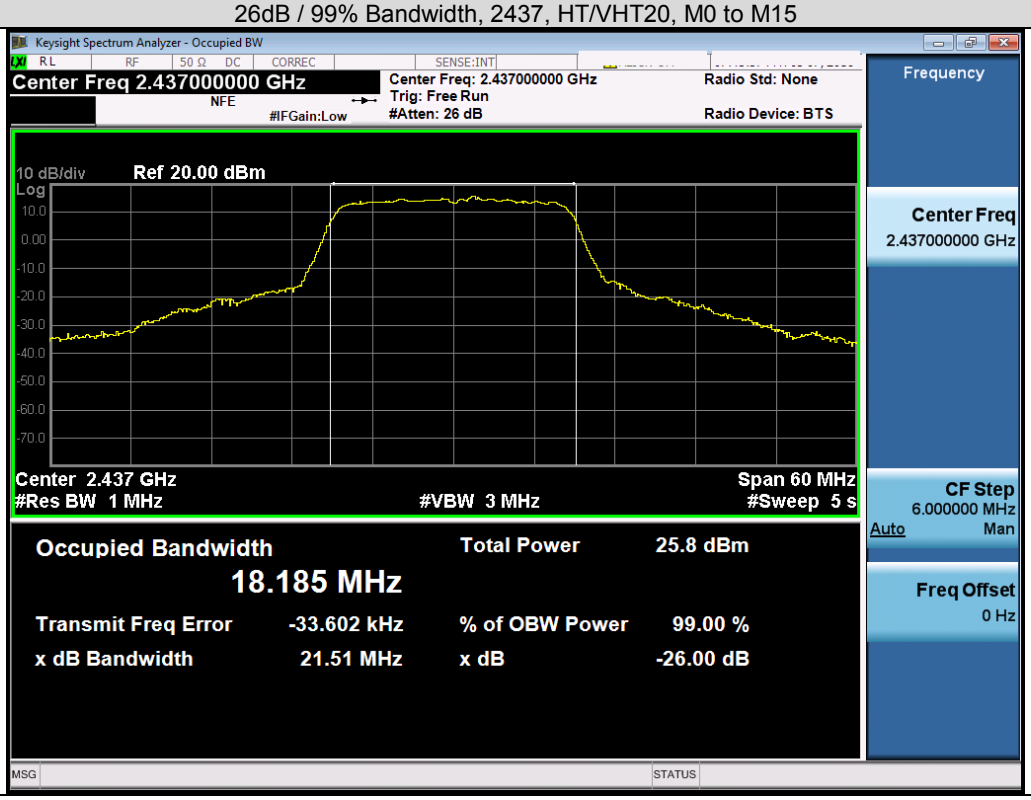
26dB / 99% Bandwidth, 2437, Legacy CCK, 1-11 Mbps



26dB / 99% Bandwidth, 2437, NonHT20, 6 to 54 Mbps



26dB / 99% Bandwidth, 2437, HT/VHT20, M0 to M15



5.4 Maximum Conducted Output Power

5.4.1 Maximum Conducted Output Power Test Requirement

FCC, 15.247:

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Industry Canada, RSS-247:

5.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.) requirements

d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

5.4.2 Maximum Conducted Output Power Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v04
ANSI C63.10: 2013

Maximum Conducted 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. 558074 D01 DTS Meas Guidance v04, section 9.2.2.4 Method AVGSA-2
ANSI C63.10: 2013, section 11.9.2.2.4 Method AVGSA-2

Maximum Conducted Output power
Test parameters

9.2.2.4 Method AVGSA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction)

a) Measure the duty cycle, x, of the transmitter output signal as described in 6.0.
b) Set span to at least 1.5 times the OBW.
c) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
d) Set VBW ≥ 3 x RBW.
e) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
f) Sweep time = auto.
g) Detector = RMS (*i.e.*, power averaging), if available. Otherwise, use sample detector mode.
h) Do not use sweep triggering. Allow the sweep to "free run".
i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
j) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
k) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.

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 for Guidance)

5.4.3 Test Information

Tested By : Julian Land	**Date of testing:** February 7th 2018
Test Result : PASS	

Test Equipment

See Appendix A for list of test equipment

Samples, Systems, and Modes

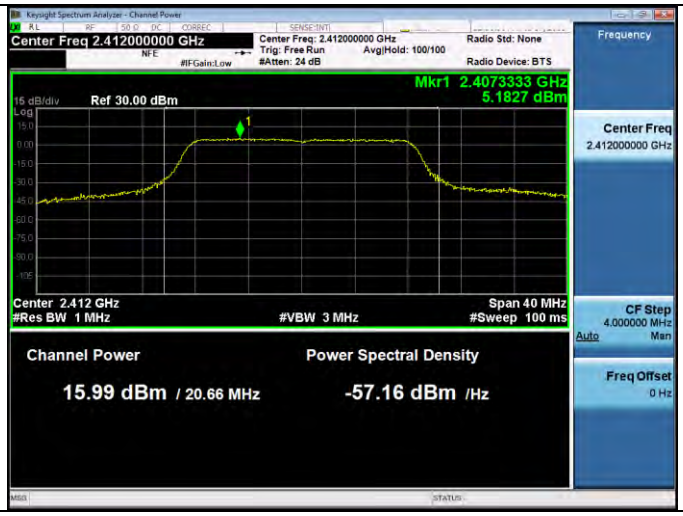
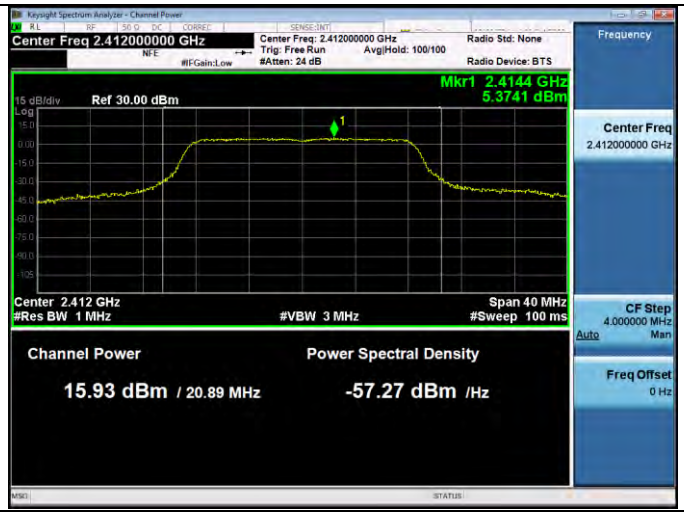
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

5.4.4 Maximum Conducted Output Power Data Table

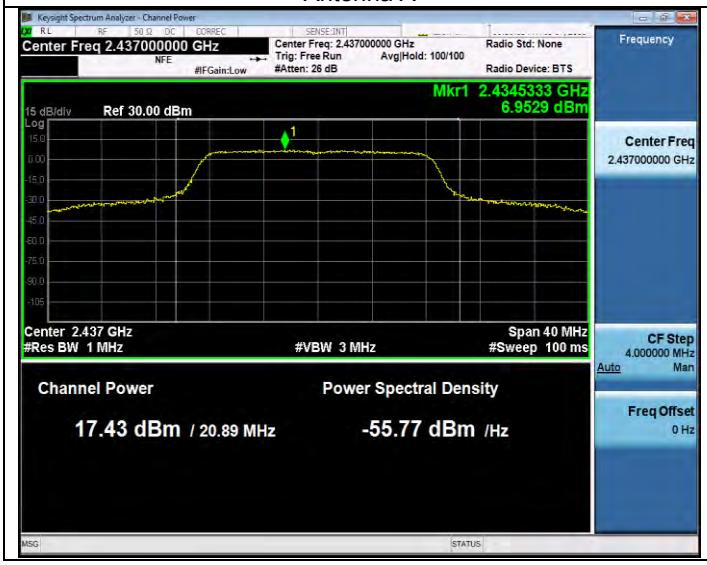
Frequency (MHz)	Mode	Tx Paths	Index Power (dBm)	Correlated Antenna Gain (dBi)	Duty Cycle	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Total Tx Channel Power (dBm)	Total TX Channel Power - corrected for duty cycle	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	17	3	94.63		16.9	16.9	17.14	30.0	12.86
	CCK, 1 to 11 Mbps	2	17	3	94.63	16.8	16.9	19.9	20.10	30.0	9.9
	Non HT20, 6 to 54 Mbps	1	16	3	96.09	16.0		16.0	16.17	30.0	13.83
	Non HT20, 6 to 54 Mbps	2	16	3	96.09	16.0	15.9	19.0	19.13	30.0	10.87
	Non HT20 Beam Forming, 6 to 54 Mbps	2	15	6	96.09	14.9	15.1	18.0	18.18	30.0	11.82
	HT/VHT20, M0-M7	1	17	3	98.12	16.9		16.9	16.98	30.0	13.02
	HT/VHT20, M0-M7	2	16	3	98.12	15.9	15.9	18.9	18.99	30.0	11.01
	HT/VHT20, M8-M15	2	16	3	98.12	15.9	15.9	18.9	18.99	30.0	11.01
	HT/VHT20, Beam Forming, M0 to M7	2	16	6	98.12	15.9	15.9	18.9	18.99	30.0	11.01
	HT/VHT20, Beam Forming, M8 to M15	2	16	3	98.12	15.9	15.9	18.9	18.99	30.0	11.01
	HT/VHT20, STBC, M0 to M7	2	16	3	98.12	15.9	15.9	18.9	18.99	30.0	11.01
2437	CCK, 1 to 11 Mbps	1	17	3	94.63	17.5		17.5	17.74	30.0	12.26
	CCK, 1 to 11 Mbps	**2**	**17**	**3**	**94.63**	**17.5**	**17.3**	**20.41**	**20.65**	**30.0**	**9.35**
	Non HT20, 6 to 54 Mbps	1	17	3	96.09	17.4		17.4	17.57	30.0	12.43
	Non HT20, 6 to 54 Mbps	2	17	3	96.09	17.4	17.3	20.36	20.53	30.0	9.47
	Non HT20 Beam Forming, 6 to 54 Mbps	2	17	6	96.09	17.4	17.3	20.36	20.53	30.0	9.47
	HT/VHT20, M0-M7	1	17	3	98.12	17.4		17.4	17.48	30.0	12.52
	HT/VHT20, M0-M7	2	17	3	98.12	17.4	17.3	20.36	20.44	30.0	9.56
	HT/VHT20, M8-M15	2	17	3	98.12	17.4	17.3	20.36	20.44	30.0	9.56
	HT/VHT20, Beam Forming, M0 to M7	2	17	6	98.12	17.4	17.3	20.36	20.44	30.0	9.56
	HT/VHT20, Beam Forming, M8 to M15	2	17	3	98.12	17.4	17.3	20.36	20.44	30.0	9.56
	HT/VHT20, STBC, M0 to M7	2	17	3	98.12	17.4	17.3	20.36	20.44	30.0	9.56

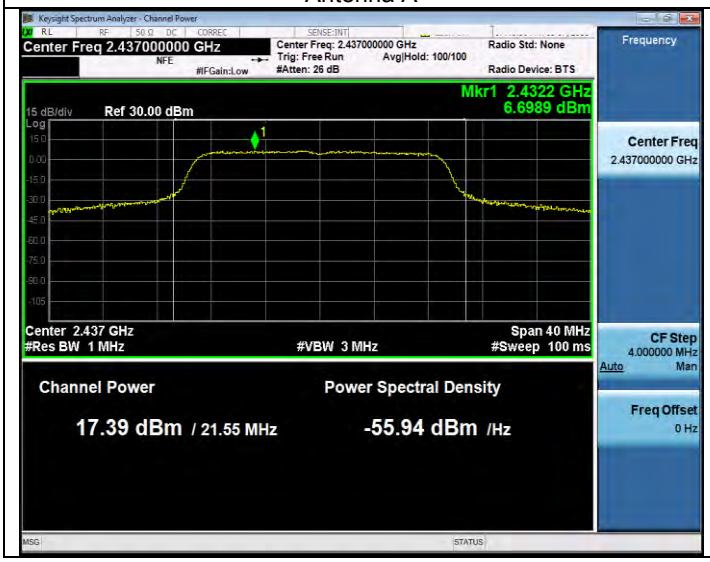
2462	CCK, 1 to 11 Mbps	1	17	3	94.63	16.5		16.5	16.74	30.0	13.26
	CCK, 1 to 11 Mbps	2	17	3	94.63	16.5	16.5	19.51	19.75	30.0	10.25
	Non HT20, 6 to 54 Mbps	1	16	3	96.09	15.5		15.5	15.67	30.0	14.33
	Non HT20, 6 to 54 Mbps	2	15	3	96.09	14.5	14.8	17.66	17.84	30.0	12.16
	Non HT20 Beam Forming, 6 to 54 Mbps	2	14	6	96.09	13.7	13.8	16.76	16.93	30.0	13.07
	HT/VHT20, M0-M7	1	15	3	98.12	14.5		14.5	14.58	30.0	15.42
	HT/VHT20, M0-M7	2	14	3	98.12	13.7	13.8	16.76	16.84	30.0	13.16
	HT/VHT20, M8-M15	2	14	3	98.12	13.7	13.8	16.76	16.84	30.0	13.16
	HT/VHT20, Beam Forming, M0 to M7	2	13	6	98.12	12.7	12.9	15.81	15.89	30.0	14.11
	HT/VHT20, Beam Forming, M8 to M15	2	14	3	98.12	13.7	13.8	16.76	16.84	30.0	13.16
	HT/VHT20, STBC, M0 to M7	2	14	3	98.12	13.7	13.8	16.76	16.84	30.0	13.16

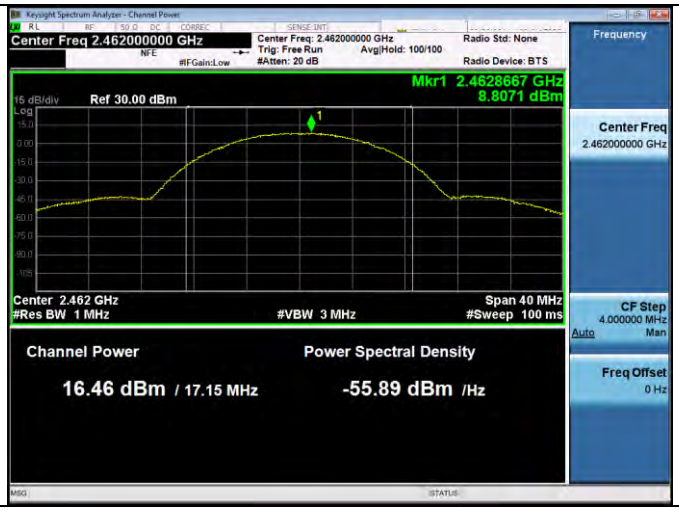
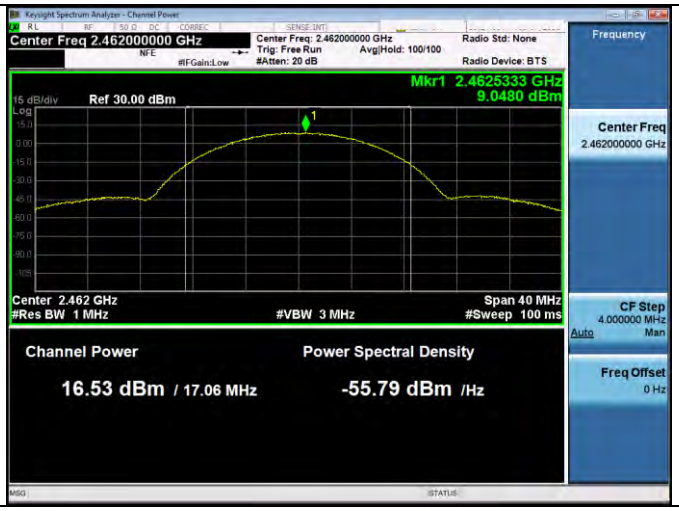
5.4.5 Maximum Conducted Output Power Screenshots

Maximum Conducted Output Power, 2412, NonHT20, 6-54 Mbps	
Antenna A	Antenna B
	

Maximum Conducted Output Power, 2437, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

Maximum Conducted Output Power, 2437, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

Maximum Conducted Output Power, 2437, HT/VHT20, M0 to M15	
Antenna A	Antenna B
	

Maximum Conducted Output Power, 2462, Legacy CCK, 1-11Mbps	
Antenna A	Antenna B
	

5.5 Power Spectral Density

5.5.1 Power Spectral Density Test Requirement

15.247 (e) / RSS-247 5.2 (b)

5.2 Digital transmission systems

DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400-2483.5 MHz:

b) The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

5.5.2 Power Spectral Density Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v04
ANSI C63.10: 2013

Power Spectral Density Test Procedure
1. Set the radio in the continuous transmitting mode at full power 2.Configure Spectrum analyzer as per test parameters below and Peak search marker 3. Capture graphs and record pertinent measurement data.

Ref. 558074 D01 DTS Meas Guidance v04, section 10.2 Peak PSD
ANSI C63.10: 2013, section 11.10.2 Peak PSD

Power Spectral Density Test parameters
10.2 Method PKPSD (peak PSD) This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance. a) Set analyzer center frequency to DTS channel center frequency. b) Set the span to 1.5 times the *DTS bandwidth*. c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. d) Set the VBW ≥ 3 × RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum amplitude level within the RBW. j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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. (See ANSI C63.10 section 14.3.2.3)

5.5.3 Power Spectral Density Test Information

Tested By : Julian Land	**Date of testing:** February 8th 2018
Test Result : PASS	

Test Equipment

See Appendix A for list of test equipment

Samples, Systems, and Modes

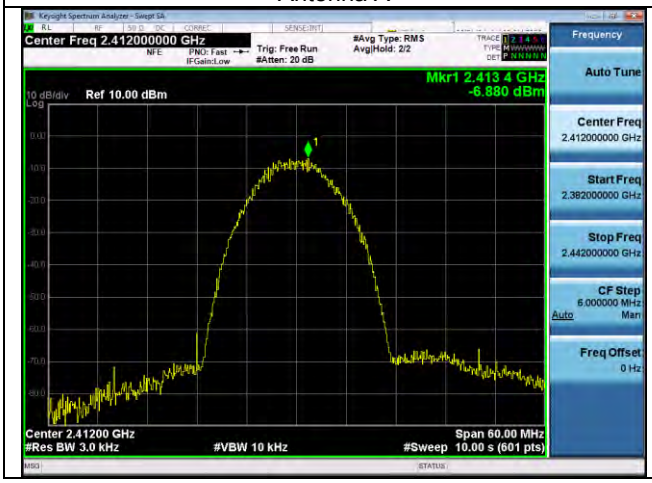
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

5.5.4 Power Spectral Density Data Table

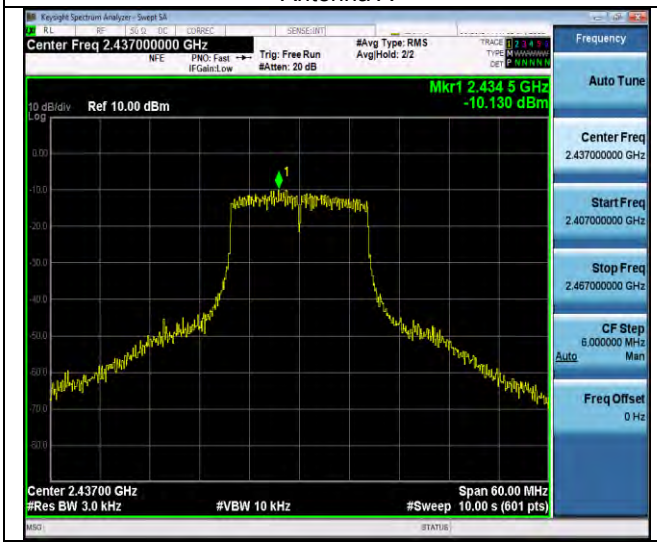
Frequency (MHz)	Mode	Tx Paths	Index Power (dBm)	Correlated Antenna Gain (dBi)	Duty Cycle	Tx 1 PSD (dBm/3kHz)	Tx 2 PSD (dBm/3kHz)	Total PSD (dBm/3kHz)	Total PSD - corrected for duty cycle (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	17	3	94.15		-5.9	-5.9	-5.64	8.0	13.64
	CCK, 1 to 11 Mbps	2	17	3	94.15	-6.9	-5.9	-3.36	-3.1	8.0	11.1
	Non HT20, 6 to 54 Mbps	1	16	3	96.09	-10.9		-10.9	-10.73	8.0	18.73
	Non HT20, 6 to 54 Mbps	2	16	3	96.09	-10.9	-12.2	-8.49	-8.32	8.0	16.32
	Non HT20 Beam Forming, 6 to 54 Mbps	2	15	6	96.09	-12.7	-11.5	-9.05	-8.88	8.0	16.88
	HT/VHT20, M0-M7	1	17	3	98.12	-8.8		-8.8	-8.72	8.0	16.72
	HT/VHT20, M0-M7	2	16	3	98.12	-11.7	-11.3	-8.49	-8.4	8.0	16.4
	HT/VHT20, Beam Forming, M0 to M7	2	16	6	98.12	-11.7	-11.3	-8.49	-8.4	8.0	16.4
2437	CCK, 1 to 11 Mbps	1	17	3	94.15		-5.36	-5.36	-5.1	8.0	13.1
	CCK, 1 to 11 Mbps	**2**	**17**	**3**	**94.15**	**-5.38**	**-5.36**	**-2.36**	**-2.1**	**8.0**	**10.1**
	Non HT20, 6 to 54 Mbps	1	17	3	96.09		-9.28	-9.28	-9.11	8.0	17.11
	Non HT20, 6 to 54 Mbps	2	17	3	96.09	-10.13	-9.28	-6.67	-6.5	8.0	14.5
	Non HT20 Beam Forming, 6 to 54 Mbps	2	17	6	96.09	-10.13	-9.28	-6.67	-6.5	8.0	14.5
	HT/VHT20, M0-M7	1	17	3	98.12	-10.31		-10.31	-10.23	8.0	18.23
	HT/VHT20, M0-M7	2	17	3	98.12	-10.31	-10.56	-7.42	-7.34	8.0	15.34
	HT/VHT20, Beam Forming, M0 to M7	2	17	6	98.12	-10.31	-10.56	-7.42	-7.34	8.0	15.34

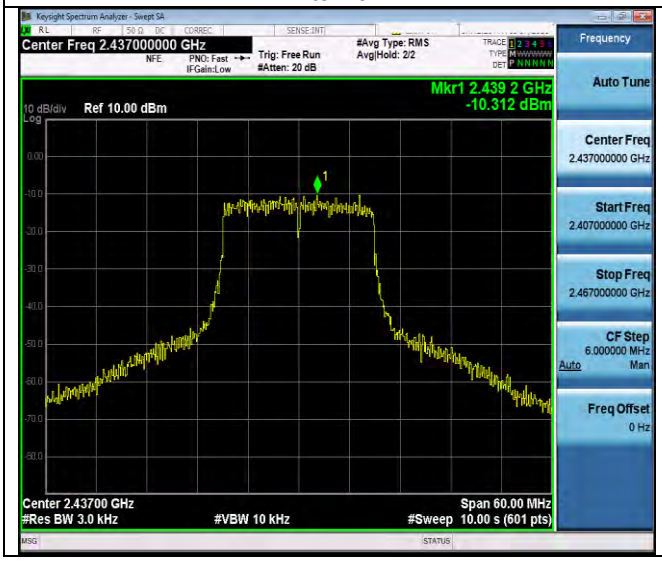
2462	CCK, 1 to 11 Mbps	1	17	3	94.15		-6.209	-6.21	-5.95	8.0	13.95
	CCK, 1 to 11 Mbps	2	17	3	94.15	-6.287	-6.209	-3.24	-2.98	8.0	10.98
	Non HT20, 6 to 54 Mbps	1	16	3	96.09		-11.44	-11.44	-11.27	8.0	19.27
	Non HT20, 6 to 54 Mbps	2	15	3	96.09	-13.34	-13.45	-10.38	-10.21	8.0	18.21
	Non HT20 Beam Forming, 6 to 54 Mbps	2	14	6	96.09	-12.95	-14.37	-10.59	-10.42	8.0	18.42
	HT/VHT20, M0-M7	1	15	3	98.12	-13.59		-13.59	-13.51	8.0	21.51
	HT/VHT20, M0-M7	2	14	3	98.12	-12.11	-14.56	-10.15	-10.07	8.0	18.07
	HT/VHT20, Beam Forming, M0 to M7	2	13	6	98.12	-13.09	-15.72	-11.2	-11.12	8.0	19.12

5.5.5 Power Spectral Density Screenshots

Power Spectral Density, 2412, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

Power Spectral Density, 2437, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

Power Spectral Density, 2437, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

Power Spectral Density, 2437, HT/VHT20, M0 to M15	
Antenna A	Antenna B
	

Power Spectral Density, 2462, Legacy CCK, 1-11Mbps	
Antenna A	Antenna B
	

5.6 Conducted Spurious Emissions

5.6.1 Conducted Spurious Emissions Test Requirement

15.205 / RSS-Gen

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) and RSS-GEN section 8.10, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)) and RSS-Gen section 8.9

RSS-Gen 8.9

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 and Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

RSS-Gen 8.10□□b□□

Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and (c) Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

5.6.2 Conducted Spurious Emissions Test Method

Ref. KDB 558074 D01 DTS Meas. Guidance v04
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 3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer). 4. Use the marker function to determine the maximum spurs amplitude level. 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. (see ANSI C63.10 2013 section 14.3.2.2) 6. Capture graphs and record pertinent measurement data.

Ref. 558074 D01 DTS Meas. Guidance v04 section 11.1b, 11.2-3, 12.2.4 & 12.2.5.3
ANSI C63.10: 2013 section 11.12.2.4 (Peak) & 11.12.2.5.2 (Average)

Conducted Spurious Emissions Test parameters	
Peak	**Average**
Span = 30MHz to 12GHz / 12GHz to 40GHz RBW = 1 MHz VBW ≥ 3 MHz Sweep = Auto Detector = Peak Trace = Max Hold.	Span = 30MHz to 12GHz / 12GHz to 40GHz RBW = 1 MHz VBW ≥ 3 MHz Sweep = Auto Detector = RMS Power Averaging

KDB 558074 D01 DTS Meas. Guidance v04 section 12.2.2 © add the max antenna gain + ground reflection factor (4.7 dB for frequencies between 30 MHz and 1000 MHz, and 0 dB for frequencies > 1000 MHz).

5.6.3 Conducted Spurious Emissions Test Information

Tested By : Julian Land	**Date of testing:** February 7th 2018
Test Result : PASS	

Test Equipment

See Appendix A for list of test equipment

Samples, Systems, and Modes

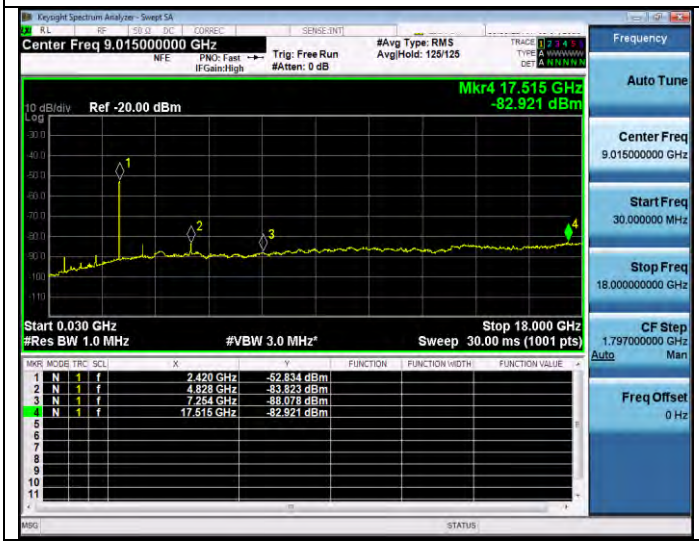
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

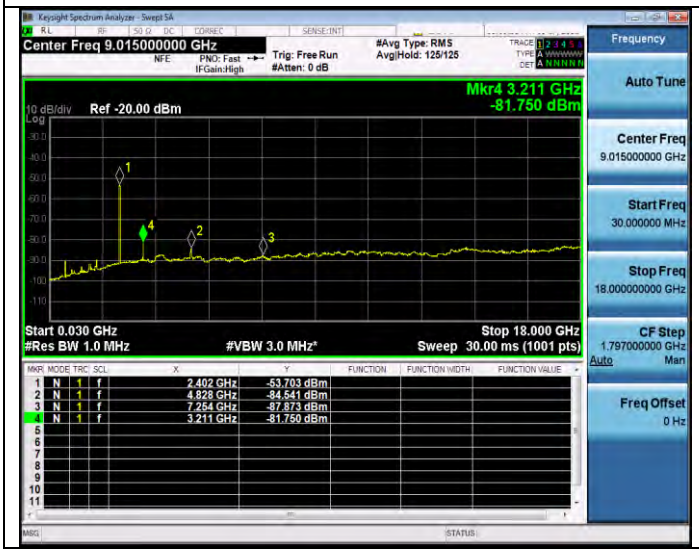
5.6.4 Conducted Spurious Emissions Data Table - Average

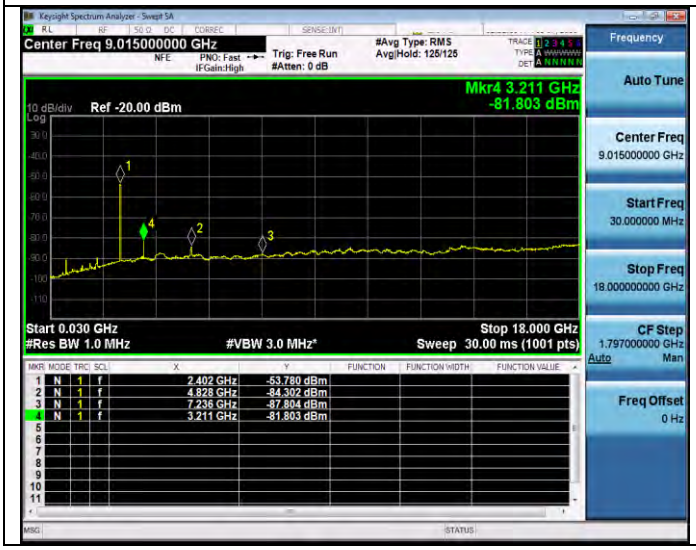
Frequency (MHz)	Mode	Tx Paths	Index Power (dBm)	Duty Cycle	Correlated Antenna Gain (dBi)	Conducted Spur TX path 1 (dBm/MHz)	Conducted Spur TX path 2 (dBm/MHz)	Total Conducted Spur - corrected for duty cycle EIRP (dBm/MHz)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	17	94.15	3	-82.9		-79.64	-41.25	38.39
	CCK, 1 to 11 Mbps	2	17	94.15	3	-82.9	-83.2	-76.74	-41.25	35.49
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-81.8		-78.63	-41.25	37.38
	Non HT20, 6 to 54 Mbps	2	16	96.09	3	-81.8	-83.3	-76.33	-41.25	35.08
	Non HT20 Beam Forming, 6 to 54 Mbps	2	15	96.09	6	-82.0	-83.4	-73.43	-41.25	32.18
	HT/VHT20, M0 to M7	1	17	98.12	3	-80.6		-77.52	-41.25	36.27
	HT/VHT20, M0 to M7	2	16	98.12	3	-81.8	-83.0	-76.22	-41.25	34.97
	HT/VHT20, M8 to M15	2	16	98.12	3	-81.8	-83.0	-76.22	-41.25	34.97
	HT/VHT20 Beam Forming, M0 to M7	**2**	**16**	**98.12**	**6**	**-81.8**	**-83.0**	**-73.22**	**-41.25**	**31.97**
	HT/VHT20 Beam Forming, M8 to M15	2	16	98.12	3	-81.8	-83.0	-76.22	-41.25	34.97
	HT/VHT20 STBC, M0 to M7	2	16	98.12	3	-81.8	-83.0	-76.22	-41.25	34.97
2437	CCK, 1 to 11 Mbps	1	17	94.15	3	-83.3		-80.04	-41.25	38.79
	CCK, 1 to 11 Mbps	**2**	**17**	94.15	3	-83.3	-83.1	-76.94	-41.25	35.69
	Non HT20, 6 to 54 Mbps	1	17	96.09	3	-83.2		-80.03	-41.25	38.78
	Non HT20, 6 to 54 Mbps	2	17	96.09	3	-83.2	-82.8	-76.83	-41.25	35.58
	Non HT20 Beam Forming, 6 to 54 Mbps	2	17	96.09	6	-83.2	-82.8	-73.83	-41.25	32.58
	HT/VHT20, M0 to M7	1	17	98.12	3	-82.9		-79.82	-41.25	38.57
	HT/VHT20, M0 to M7	2	17	98.12	3	-82.9	-83.0	-76.82	-41.25	35.57
	HT/VHT20, M8 to M15	2	17	98.12	3	-82.9	-83.0	-76.82	-41.25	35.57
	HT/VHT20 Beam Forming, M0 to M7	2	17	98.12	6	-82.9	-83.0	-73.82	-41.25	32.57
	HT/VHT20 Beam Forming, M8 to M15	2	17	98.12	3	-82.9	-83.0	-76.82	-41.25	35.57
	HT/VHT20 STBC, M0 to M7	2	17	98.12	3	-82.9	-83.0	-76.82	-41.25	35.57
2462	CCK, 1 to 11 Mbps	1	17	94.15	3	-83.1		-79.84	-41.25	38.59
	CCK, 1 to 11 Mbps	2	17	94.15	3	-83.1	-83.3	-76.94	-41.25	35.69
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-83.0		-79.83	-41.25	38.58
	Non HT20, 6 to 54 Mbps	2	15	96.09	3	-83.3	-83.2	-77.03	-41.25	35.78

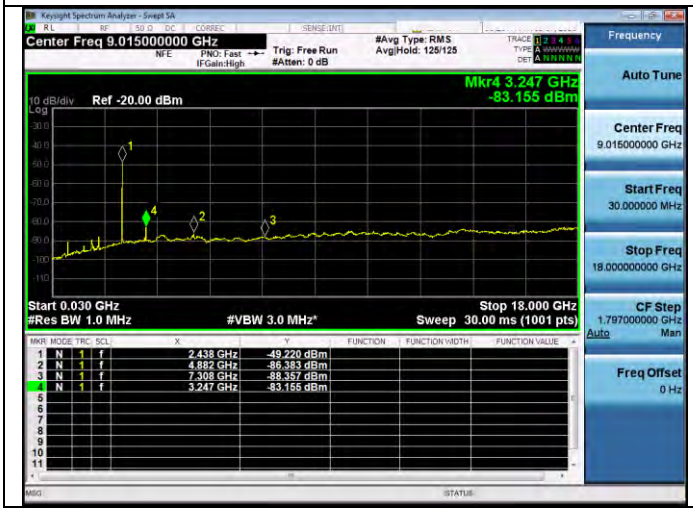
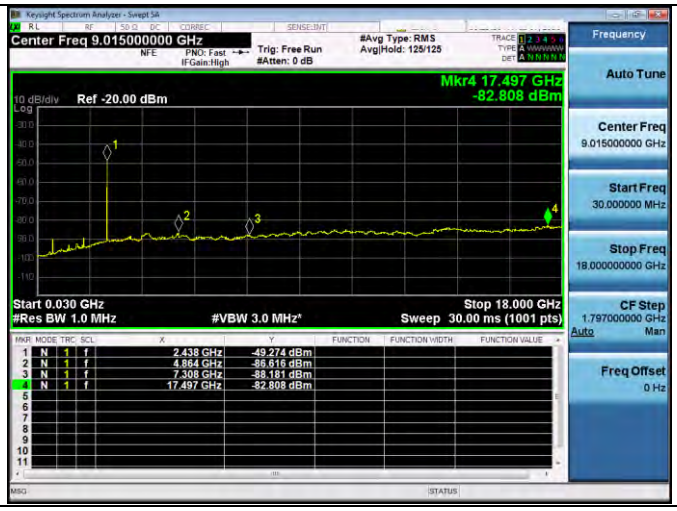
	Non HT20 Beam Forming, 6 to 54 Mbps	2	14	96.09	6	-83.3	-83.1	-74.03	-41.25	32.78
	HT/VHT20, M0 to M7	1	15	98.12	3	-83.4		-80.32	-41.25	39.07
	HT/VHT20, M0 to M7	2	14	98.12	3	-82.9	-83.1	-76.92	-41.25	35.67
	HT/VHT20, M8 to M15	2	14	98.12	3	-82.9	-83.1	-76.92	-41.25	35.67
	HT/VHT20 Beam Forming, M0 to M7	2	13	98.12	6	-83.3	-83.1	-74.12	-41.25	32.87
	HT/VHT20 Beam Forming, M8 to M15	2	14	98.12	3	-82.9	-83.1	-76.92	-41.25	35.67
	HT/VHT20 STBC, M0 to M7	2	14	98.12	3	-82.9	-83.1	-76.92	-41.25	35.67

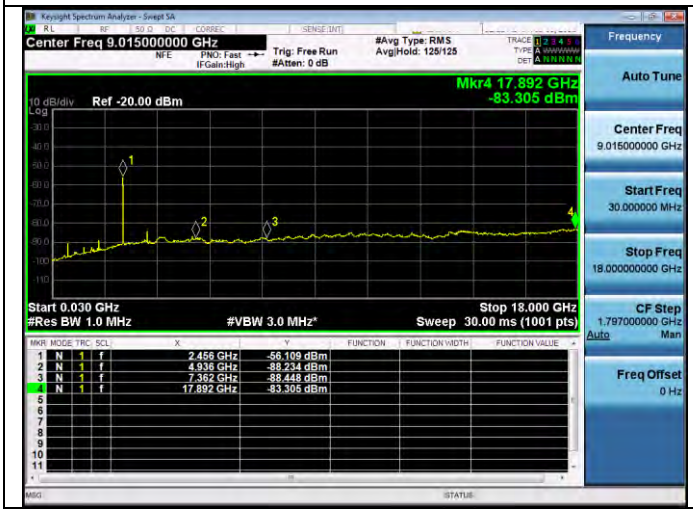
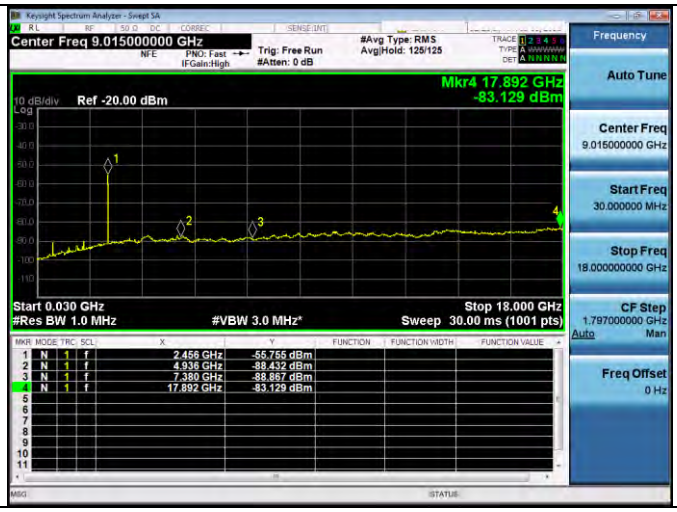
5.6.5 Conducted Spurious Average Screenshots 1GHz-18GHz

Conducted Spurious Average, 2412, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

Conducted Spurious Average, 2412, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

Conducted Spurious Average, 2412, HT/VHT20, M0 to M15	
Antenna A	Antenna B
	

Conducted Spurious Average, 2437, NonHT20, 6-54Mbps	
Antenna A	Antenna B
	

Conducted Spurious Average, 2462, NonHT20, 6-54Mbps	
Antenna A	Antenna B
	

5.6.6 Conducted Spurious Average Screenshots 18GHz-26GHz

Plots representative of all modes

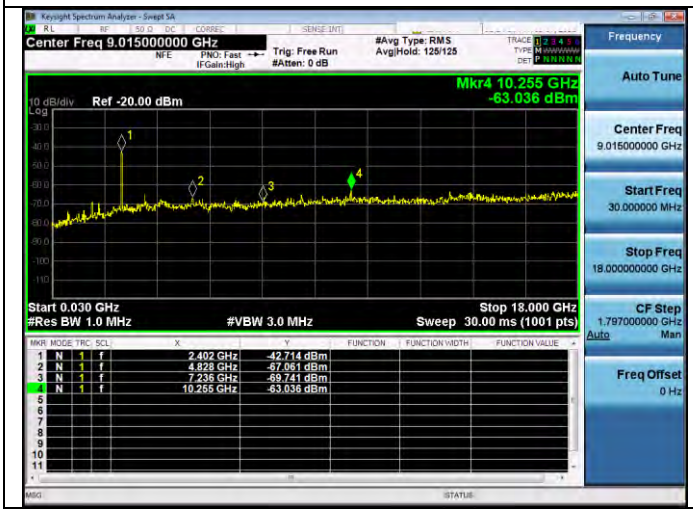
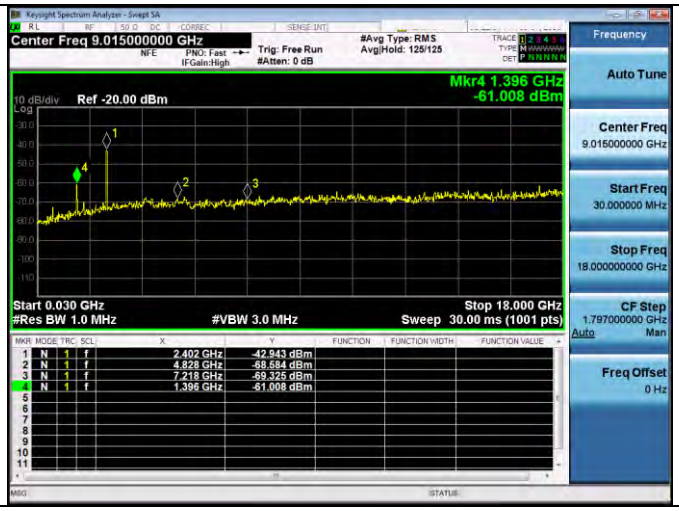
Conducted Spurious Average 18GHz-26GHz index power 17dBm	
Antenna A	Antenna B
	

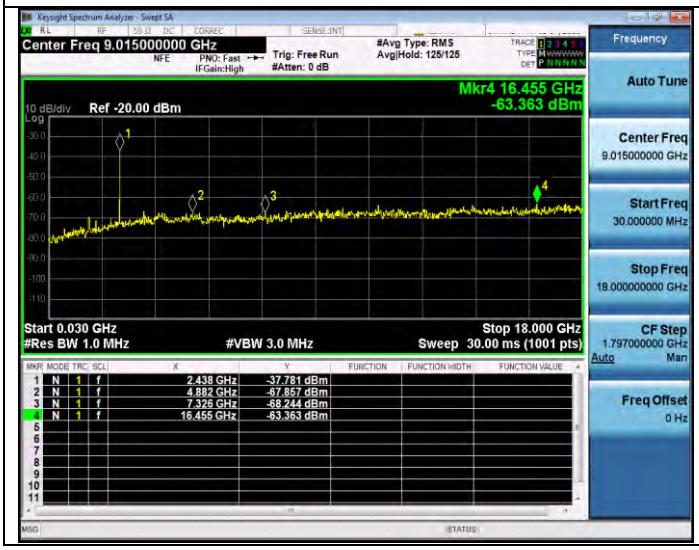
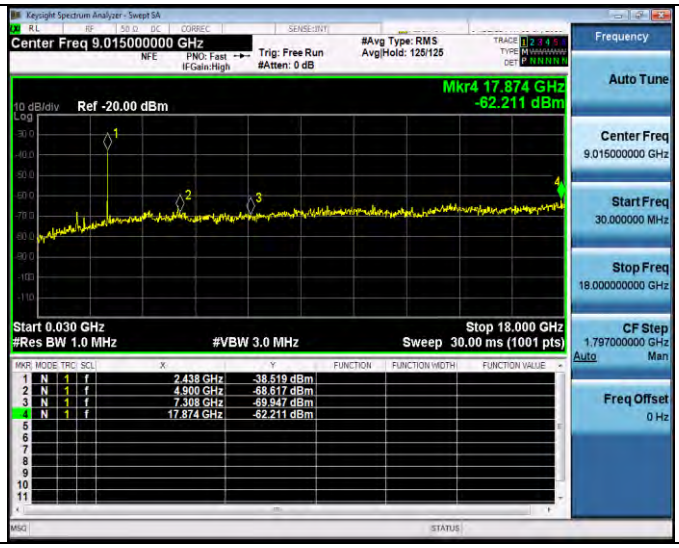
5.6.7 Conducted Spurious Emissions Data Table – Peak

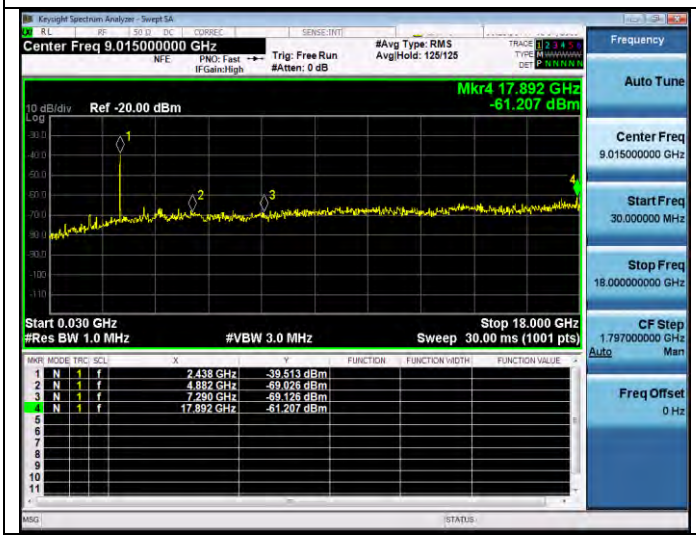
Frequency (MHz)	Mode	Tx Paths	Index Power (dBm)	Duty Cycle	Correlated Antenna Gain (dBi)	Conducted Spur TX path 1 (dBm/MHz)	Conducted Spur TX path 2 (dBm/MHz)	Total Conducted Spur - corrected for duty cycle EIRP (dBm/MHz)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	17	94.15	3	-63.2		-59.94	-21.25	38.69
	CCK, 1 to 11 Mbps	2	17	94.15	3	-63.2	-62.1	-56.34	-21.25	35.09
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-63.3		-60.13	-21.25	38.88
	Non HT20, 6 to 54 Mbps	2	16	96.09	3	-63.3	-61.8	-56.33	-21.25	35.08
	Non HT20 Beam Forming, 6 to 54 Mbps	2	15	96.09	6	-63.0	-61.0	-52.73	-21.25	31.48
	HT/VHT20, M0 to M7	1	17	98.12	3	-62.1		-59.02	-21.25	37.77
	HT/VHT20, M0 to M7	2	16	98.12	3	-63.4	-62.7	-56.92	-21.25	35.67
	HT/VHT20, M8 to M15	2	16	98.12	3	-63.4	-62.7	-56.92	-21.25	35.67
	HT/VHT20 Beam Forming, M0 to M7	2	16	98.12	6	-63.4	-62.7	-53.92	-21.25	32.67
	HT/VHT20 Beam Forming, M8 to M15	2	16	98.12	3	-63.4	-62.7	-56.92	-21.25	35.67
	HT/VHT20 STBC, M0 to M7	2	16	98.12	3	-63.4	-62.7	-56.92	-21.25	35.67
2437	CCK, 1 to 11 Mbps	1	17	94.15	3	-63.4		-60.14	-21.25	38.89
	CCK, 1 to 11 Mbps	2	17	94.15	3	-63.4	-62.2	-56.44	-21.25	35.19
	Non HT20, 6 to 54 Mbps	1	17	96.09	3	-61.2		-58.03	-21.25	36.78
	Non HT20, 6 to 54 Mbps	2	17	96.09	3	-61.2	-62.3	-55.53	-21.25	34.28
	Non HT20 Beam Forming, 6 to 54 Mbps	**2**	**17**	**96.09**	**6**	**-61.2**	**-62.3**	**-52.53**	**-21.25**	**31.28**
	HT/VHT20, M0 to M7	1	17	98.12	3	-62.1		-59.02	-21.25	37.77
	HT/VHT20, M0 to M7	2	17	98.12	3	-62.1	-63.3	-56.52	-21.25	35.27
	HT/VHT20, M8 to M15	2	17	98.12	3	-62.1	-63.3	-56.52	-21.25	35.27
	HT/VHT20 Beam Forming, M0 to M7	2	17	98.12	6	-62.1	-63.3	-53.52	-21.25	32.27
	HT/VHT20 Beam Forming, M8 to M15	2	17	98.12	3	-62.1	-63.3	-56.52	-21.25	35.27
	HT/VHT20 STBC, M0 to M7	2	17	98.12	3	-62.1	-63.3	-56.52	-21.25	35.27
2462	CCK, 1 to 11 Mbps	1	17	94.15	3	-62.7		-59.44	-21.25	38.19
	CCK, 1 to 11 Mbps	2	17	94.15	3	-62.7	-63.2	-56.64	-21.25	35.39
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-62.8		-59.63	-21.25	38.38
	Non HT20, 6 to 54 Mbps	2	15	96.09	3	-62.5	-61.2	-55.63	-21.25	34.38

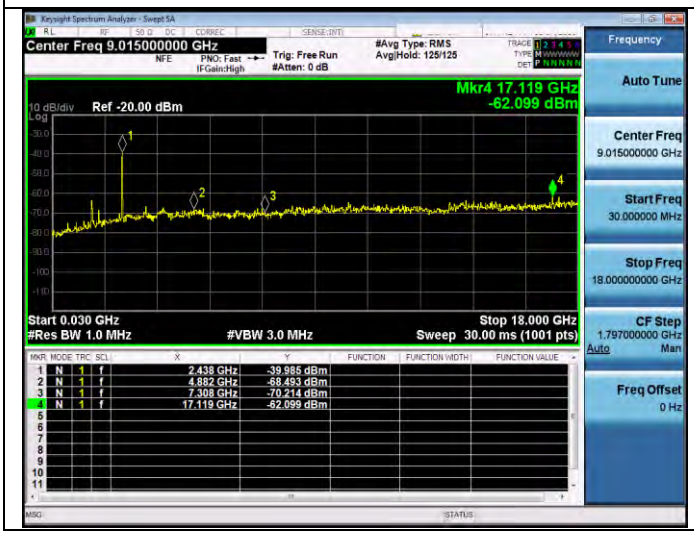
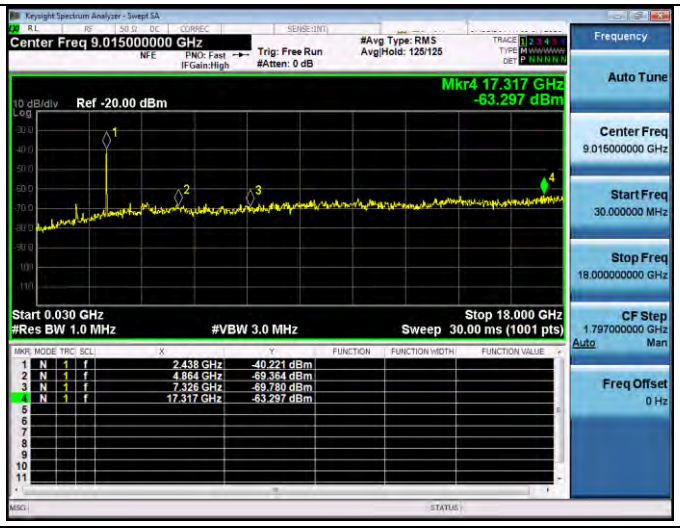
	Non HT20 Beam Forming, 6 to 54 Mbps	2	14	96.09	6	-62.2	-63.4	-53.53	-21.25	32.28
	HT/VHT20, M0 to M7	1	15	98.12	3	-63.2		-60.12	-21.25	38.87
	HT/VHT20, M0 to M7	2	14	98.12	3	-63.1	-63.2	-57.02	-21.25	35.77
	HT/VHT20, M8 to M15	2	14	98.12	3	-63.1	-63.2	-57.02	-21.25	35.77
	HT/VHT20 Beam Forming, M0 to M7	2	13	98.12	6	-63.3	-62.9	-54.02	-21.25	32.77
	HT/VHT20 Beam Forming, M8 to M15	2	14	98.12	3	-63.1	-63.2	-57.02	-21.25	35.77
	HT/VHT20 STBC, M0 to M7	2	14	98.12	3	-63.1	-63.2	-57.02	-21.25	35.77

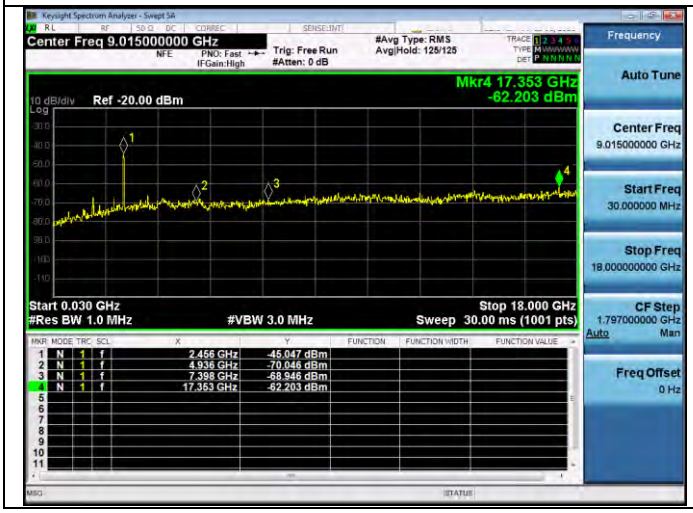
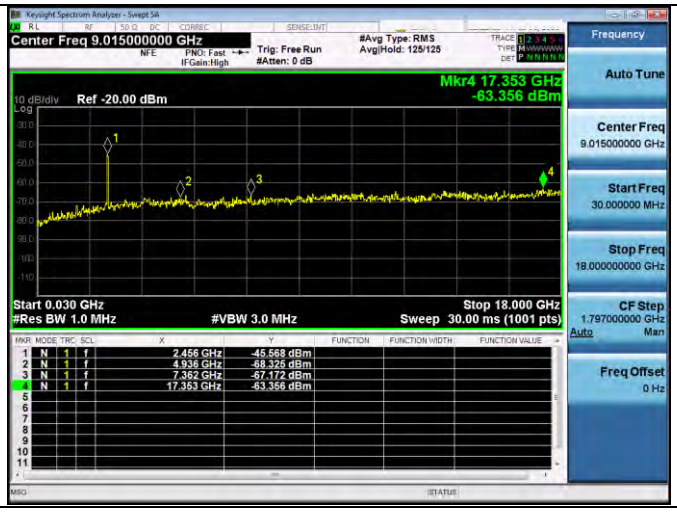
5.6.8 Conducted Spurious Peak Screenshots 1GHz – 18GHz

Conducted Spurious Average, 2412, NonHT20, 6-54Mbps	
Antenna A	Antenna B
	

Conducted Spurious Average, 2437, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

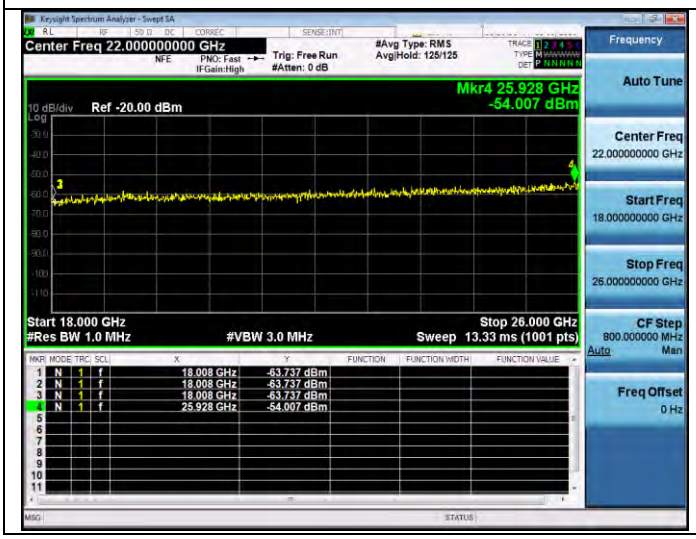
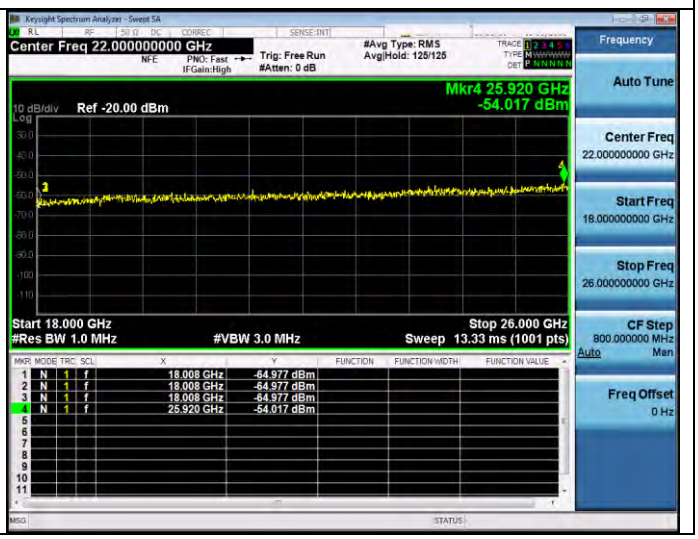
Conducted Spurious Average, 2437, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

Conducted Spurious Average, 2437, HT/VHT20, M0 to M15	
Antenna A	Antenna B
	

Conducted Spurious Average, 2462, NonHT20, 6-54Mbps	
Antenna A	Antenna B
	

5.6.9 Conducted Spurious Peak Screenshots 18GHz-26GHz

Plots representative of all modes

Conducted Spurious Peak 18GHz-26GHz index power 17dBm	
Antenna A	Antenna B
	

5.7 Conducted Band Edge (Restricted Band)

5.7.1 Conducted Band Edge Test Requirement

15.247

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

RSS-247

5.5 Unwanted emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

15.205 / RSS-Gen

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), and RSS-Gen 8.10 must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)) and RSS-Gen 8.9.

5.7.2 Conducted Bandedge Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v04
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 KDB 558074 D01 DTS Meas Guidance v04 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.

ANSI C63.10: 2013 section 11.12.2.4 (Peak) & 11.12.2.5.2 (Average)

Conducted Band Edge Test parameters	
Peak RBW = 1 MHz VBW ≥ 3 MHz Sweep = Auto Detector = Peak Trace = Max Hold.	**Average** RBW = 1 MHz VBW ≥ 3 MHz Sweep = Auto Detector = RMS Power Averaging

5.7.3 Conducted Bandedge Test Information

Tested By : Julian Land	**Date of testing:** February 9th 2018
Test Result : PASS	

Test Equipment

See Appendix A for list of test equipment

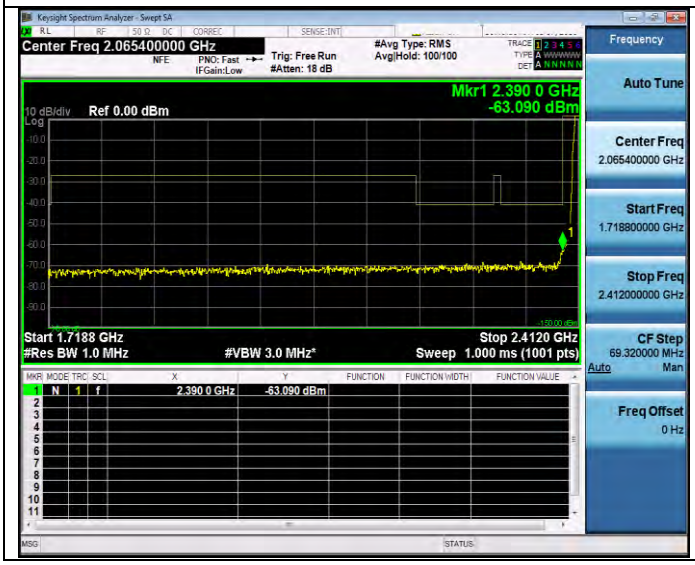
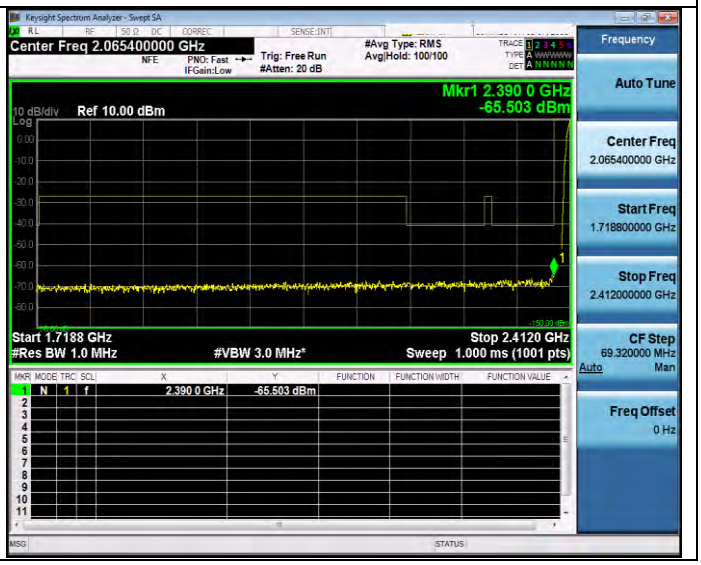
Samples, Systems, and Modes

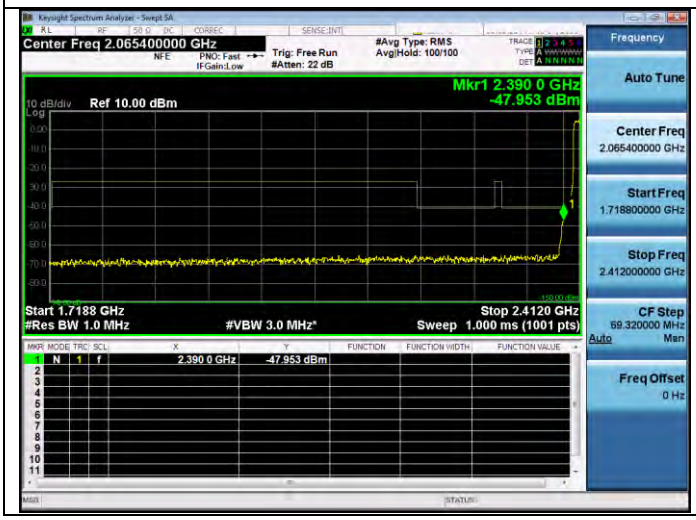
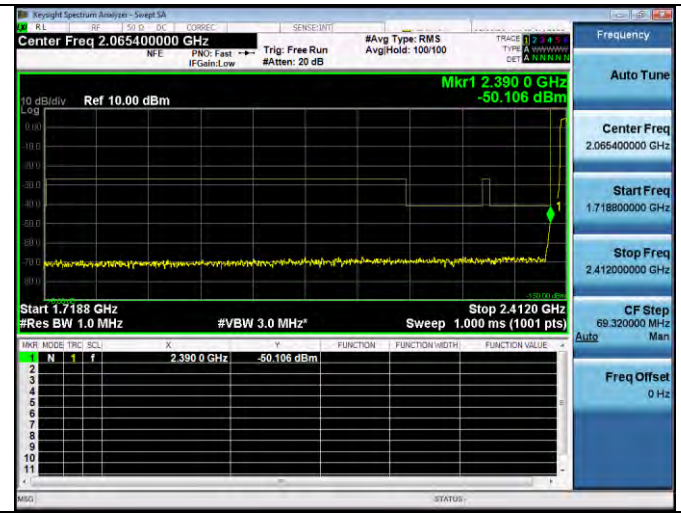
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

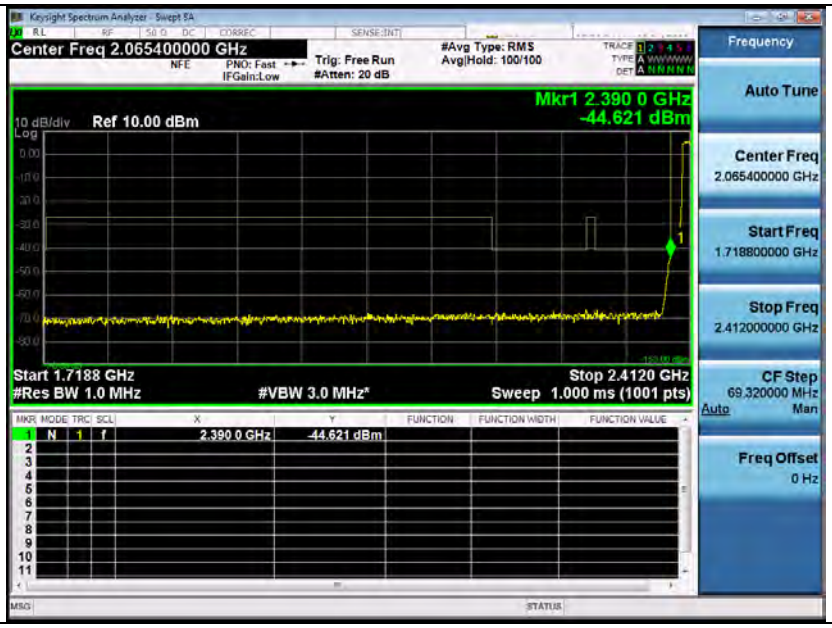
5.7.4 Conducted Band Edge (Restricted Band) Data Table Average

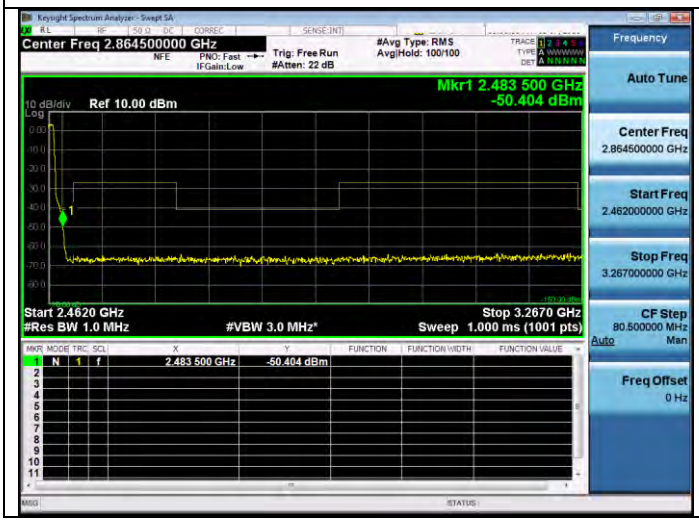
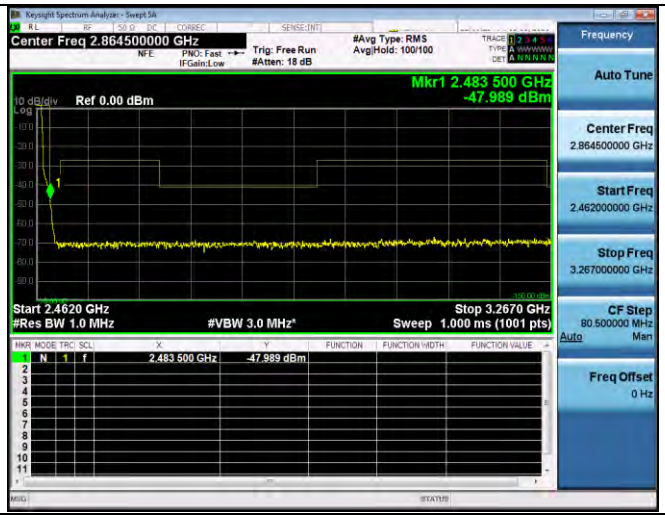
Frequency (MHz)	Mode	Tx Paths	Index Power (dBm)	Duty Cycle	Correlated Antenna Gain (dBi)	Conducted Spur TX path 1 (dBm/MHz)	Conducted Spur TX path 2 (dBm/MHz)	Total Conducted Spur (dBm/MHz)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	17	94.15	3	-63.1		-59.84	-41.25	18.59
	CCK, 1 to 11 Mbps	2	17	94.15	3	-63.1	-65.5	-57.84	-41.25	16.59
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-48.0		-44.83	-41.25	3.58
	Non HT20, 6 to 54 Mbps	2	16	96.09	3	-48.0	-50.1	-42.73	-41.25	1.48
	Non HT20 Beam Forming, 6 to 54 Mbps	2	15	96.09	6	-52.9	-53.4	-43.93	-41.25	2.68
	HT/VHT20, M0 to M7	**1**	**17**	**98.12**	**3**	**-44.6**		**-41.52**	**-41.25**	**0.27**
	HT/VHT20, M0 to M7	2	16	98.12	3	-49.7	-51.8	-44.52	-41.25	3.27
	HT/VHT20, M8 to M15	2	16	98.12	3	-49.7	-51.8	-44.52	-41.25	3.27
	HT/VHT20 Beam Forming, M0 to M7	2	16	98.12	6	-49.7	-51.8	-41.52	-41.25	0.27
	HT/VHT20 Beam Forming, M8 to M15	2	16	98.12	3	-49.7	-51.8	-44.52	-41.25	3.27
	HT/VHT20 STBC, M0 to M7	2	16	98.12	3	-49.7	-51.8	-44.52	-41.25	3.27
2462	CCK, 1 to 11 Mbps	1	17	94.15	3	-61.8		-58.54	-41.25	17.29
	CCK, 1 to 11 Mbps	2	17	94.15	3	-61.8	-59.3	-54.14	-41.25	12.89
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-46.9		-43.73	-41.25	2.48
	Non HT20, 6 to 54 Mbps	2	15	96.09	3	-50.4	-48.0	-42.87	-41.25	1.62
	Non HT20 Beam Forming, 6 to 54 Mbps	2	14	96.09	6	-52.7	-51.5	-42.89	-41.25	1.64
	HT/VHT20, M0 to M7	1	15	98.12	3	-48.4		-45.32	-41.25	4.07
	HT/VHT20, M0 to M7	2	14	98.12	3	-51.5	-49.6	-44.32	-41.25	3.07
	HT/VHT20, M8 to M15	2	14	98.12	3	-51.5	-49.6	-44.32	-41.25	3.07
	HT/VHT20 Beam Forming, M0 to M7	2	13	98.12	6	-53.8	-50.8	-42.92	-41.25	1.67
	HT/VHT20 Beam Forming, M8 to M15	2	14	98.12	3	-51.5	-49.6	-44.32	-41.25	3.07
	HT/VHT20 STBC, M0 to M7	2	14	98.12	3	-51.5	-49.6	-44.32	-41.25	3.07

5.7.5 Conducted Band Edge (Restricted Band) Screenshots Average

Conducted Band Edge Restricted Band Average, 2412, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

Conducted Band Edge Restricted Band Average, 2412, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

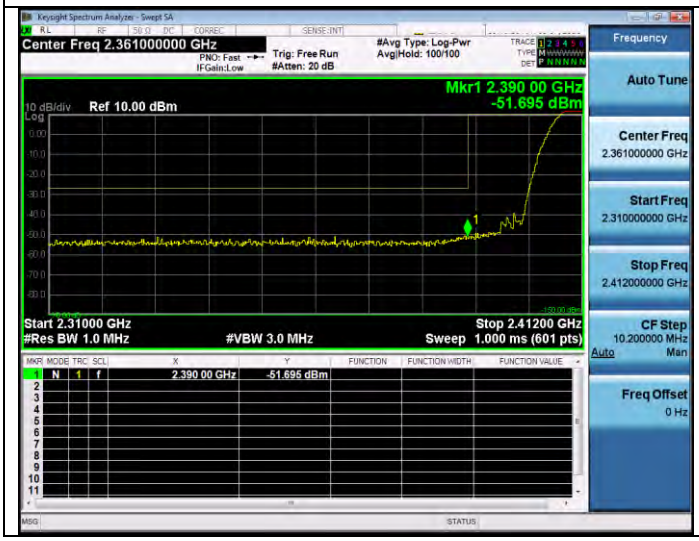
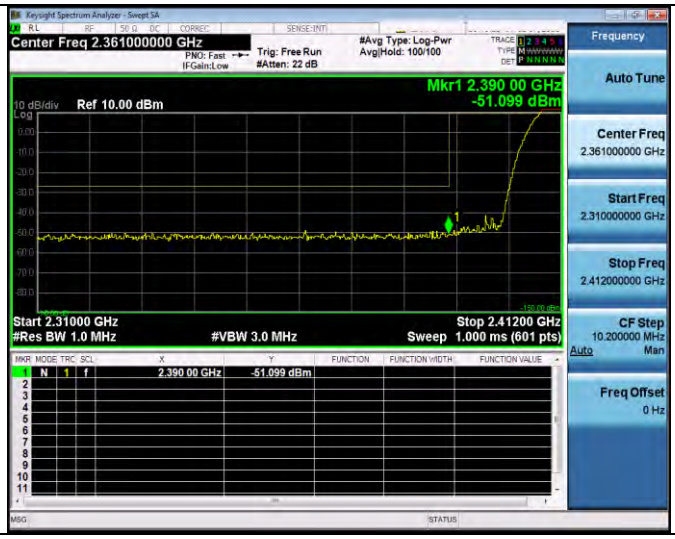
Conducted Band Edge Restricted Band Average, 2412, HT/VHT20, M0 to M15
Antenna A


Conducted Band Edge Restricted Band Average, 2462, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

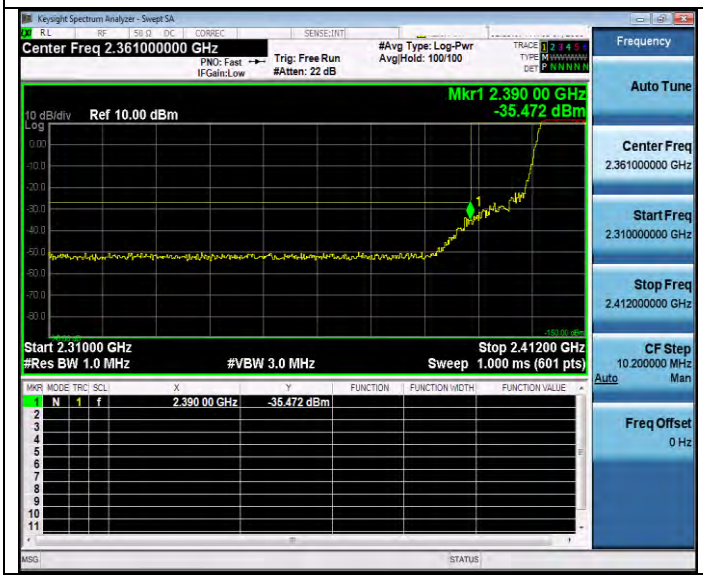
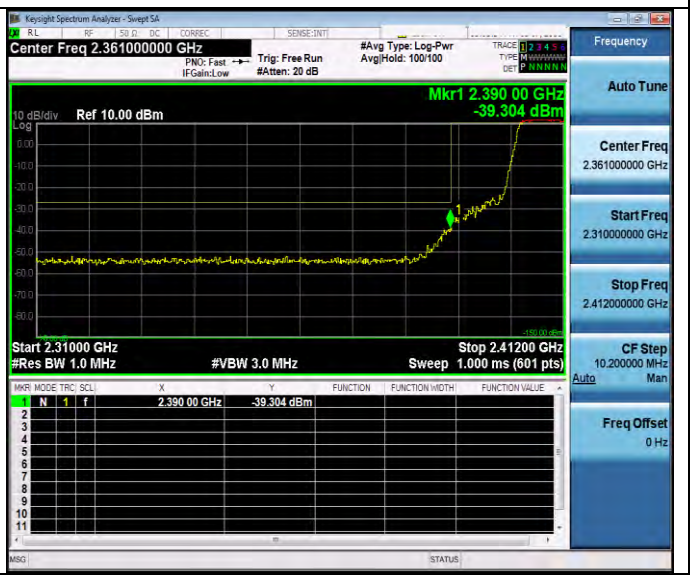
5.7.6 Conducted Band Edge (Restricted Band) Data Table Peak

Frequency (MHz)	Mode	Tx Paths	Index Power (dBm)	Duty Cycle	Correlated Antenna Gain (dBi)	Conducted Spur TX path 1 (dBm/MHz)	Conducted Spur TX path 2 (dBm/MHz)	Total Conducted Spur (dBm/MHz)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	17	94.15	3	-51.7		-48.44	-21.25	27.19
	CCK, 1 to 11 Mbps	2	17	94.15	3	-51.7	-51.1	-45.14	-21.25	23.89
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-35.3		-32.13	-21.25	10.88
	Non HT20, 6 to 54 Mbps	2	16	96.09	3	-35.3	-36.4	-29.63	-21.25	8.38
	Non HT20 Beam Forming, 6 to 54 Mbps	2	15	96.09	6	-38.2	-41.3	-30.33	-21.25	9.08
	HT/VHT20, M0 to M7	1	17	98.12	3	-31.2		-28.12	-21.25	6.87
	HT/VHT20, M0 to M7	2	16	98.12	3	-35.5	-39.3	-30.92	-21.25	9.67
	HT/VHT20, M8 to M15	2	16	98.12	3	-35.5	-39.3	-30.92	-21.25	9.67
	HT/VHT20 Beam Forming, M0 to M7	**2**	**16**	**98.12**	**6**	**-35.5**	**-39.3**	-27.92	**-21.25**	**6.67**
	HT/VHT20 Beam Forming, M8 to M15	2	16	98.12	3	-35.5	-39.3	-30.92	-21.25	9.67
	HT/VHT20 STBC, M0 to M7	2	16	98.12	3	-35.5	-39.3	-30.92	-21.25	9.67
2462	CCK, 1 to 11 Mbps	1	17	94.15	3	-50.1		-46.84	-21.25	25.59
	CCK, 1 to 11 Mbps	2	17	94.15	3	-50.1	-48.0	-42.64	-21.25	21.39
	Non HT20, 6 to 54 Mbps	1	16	96.09	3	-34.0		-30.83	-21.25	9.58
	Non HT20, 6 to 54 Mbps	2	15	96.09	3	-38.5	-37.7	-31.93	-21.25	10.68
	Non HT20 Beam Forming, 6 to 54 Mbps	2	14	96.09	6	-38.6	-40.0	-30.03	-21.25	8.78
	HT/VHT20, M0 to M7	1	15	98.12	3	-38.2		-35.12	-21.25	13.87
	HT/VHT20, M0 to M7	2	14	98.12	3	-39.4	-38.6	-32.92	-21.25	11.67
	HT/VHT20, M8 to M15	2	14	98.12	3	-39.4	-38.6	-32.92	-21.25	11.67
	HT/VHT20 Beam Forming, M0 to M7	2	13	98.12	6	-43.7	-40.1	-32.42	-21.25	11.17
	HT/VHT20 Beam Forming, M8 to M15	2	14	98.12	3	-39.4	-38.6	-32.92	-21.25	11.67
	HT/VHT20 STBC, M0 to M7	2	14	98.12	3	-39.4	-38.6	-32.92	-21.25	11.67

5.7.7 Conducted Band Edge (Restricted Band) Screenshots Peak

Conducted Band Edge Restricted Band Peak, 2412, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

Conducted Band Edge Restricted Band Peak, 2412, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

Conducted Band Edge Restricted Band Peak, 2412, HT/VHT20, M0 to M15	
Antenna A	Antenna B
	

Conducted Band Edge Restricted Band Peak, 2462, NonHT20, 6-54Mbps	
Antenna A	Antenna B
	

5.8 Conducted Bandedge (Non-Restricted Band)

5.8.1 Emissions in non-restricted frequency bands - Test Requirement

KDB 558074

11.0 Emissions in non-restricted frequency bands

11.1 General

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:
b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

RSS-Gen 8.9

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 and Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

RSS-Gen 8.10□□b□□

Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and (c) Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

5.8.2 Emissions in non-restricted frequency bands - Test Method

Ref**.** KDB 558074 D01 DTS Meas Guidance v04
ANSI C63.10: 2013

Emissions in non-restricted frequency bands - Conducted Test Procedure
1. Connect the antenna port(s) to the spectrum analyzer input. 2. Place the radio in continuous transmit mode 3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer). 4. Use the marker function to determine the maximum spurs amplitude level. 5. Capture graphs and record pertinent measurement data.

Ref**.** 558074 D01 DTS Meas Guidance v04 section 11.1b, 11.2, 11.3
ANSI C63.10: 2013 section 11.11.1b, 11.11.12, 11.11.13

Emissions in non-restricted frequency bands - Conducted Test parameters	
11.2 Reference Level measurement Establish a reference level by using the following procedure: a) Set instrument center frequency to DTS channel center frequency. b) Set the span to ≥ 1.5 x *DTS bandwidth*. c) Set the RBW = 100 kHz. d) Set the VBW ≥ 3 x RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum PSD level.	**11.3 Emission Level Measurement** a) Set the center frequency and span to encompass frequency range to be measured. b) Set the RBW = 100 kHz. c) Set the VBW ≥ 3 x RBW. d) Detector = peak. e) Sweep time = auto couple. f) Trace mode = max hold. g) Allow trace to fully stabilize. h) Use the peak marker function to determine the maximum amplitude level.

5.8.3 Emissions in non-restricted frequency bands – Test Information

Tested By : Julian Land	**Date of testing:** February 7th, 2018
Test Result : PASS	

Test Equipment

See Appendix A for list of test equipment

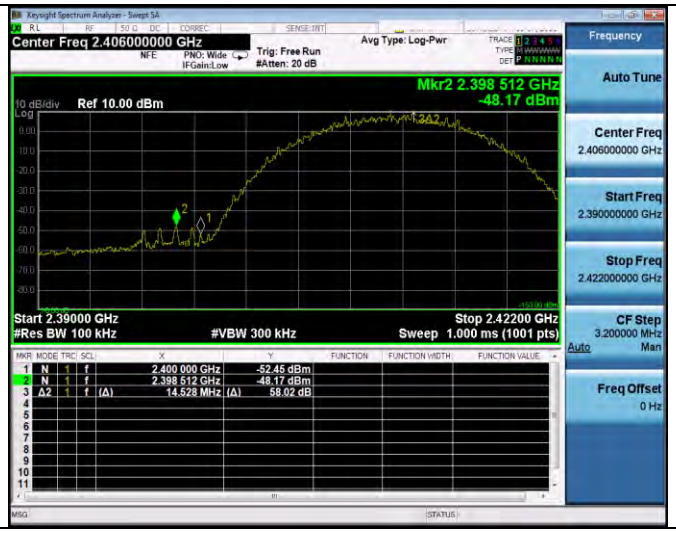
Samples, Systems, and Modes

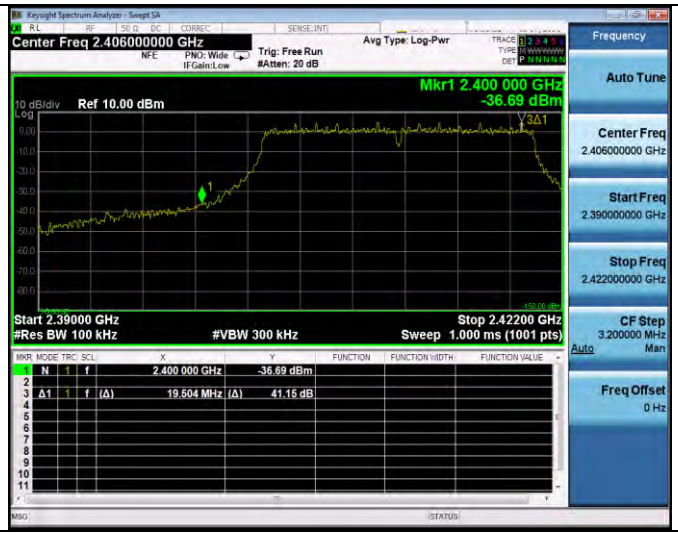
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02	☑	☐
	Support	S03	☐	☑

5.8.4 Emissions in non-restricted frequency bands – Data Tables

Frequency (MHz)	Mode	Tx Paths	Index Power (dBm)	Duty Cycle	Conducted Spur TX path 1 (dBm/100kHz)	Fundamental TX level path 1 (dBm/100kHz)	Conducted Spur TX path 2 (dBm/100kHz)	Fundamental TX level path 2 (dBm/100kHz)	Worst Case Conducted Spur Delta (dB)	Limit (dBc)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	17	94.15	-48.17	9.85			58.02	>30	28.02
	CCK, 1 to 11 Mbps	2	17	94.15	-48.17	9.85	-50.60	10.07	58.02	>30	28.02
	Non HT20, 6 to 54 Mbps	1	16	96.09	-36.15	4.62			40.8	>30	10.8
	Non HT20, 6 to 54 Mbps	2	16	96.09	-36.15	4.62	-36.69	4.46	40.8	>30	10.8
	Non HT20 Beam Forming, 6 to 54 Mbps	2	15	96.09	-39.34	3.61	-40.15	3.96	42.95	>30	12.95
	HT/VHT20, M0 to M7	**1**	**17**	**98.12**	**-33.32**	**5.6**			**38.92**	**>30**	**8.92**
	HT/VHT20, M0 to M7	2	16	98.12	-39.53	4.53	-40.25	4.91	44.06	>30	14.06
	HT/VHT20 Beam Forming, M0 to M7	2	16	98.12	-39.53	4.53	-40.25	4.91	44.06	>30	14.06
	HT/VHT20 STBC, M0 to M7	2	16	98.12	-39.53	4.53	-40.25	4.91	44.06	>30	14.06

5.8.5 Emissions in non-restricted frequency bands – Screenshots

Conducted Band Edge Non-Restricted Band Peak, 2412, Legacy CCK, 1-11 Mbps	
Antenna A	Antenna B
	

Conducted Band Edge Non-Restricted Band Peak, 2412, NonHT20, 6 to 54 Mbps	
Antenna A	Antenna B
	

Conducted Band Edge Non-Restricted Band Peak, 2412, HT/VHT20, M0 to M15
Antenna A

Section 6: System Test Results

Testing Laboratory: Cisco Systems, Inc., 285 West Tasman Drive, San Jose, CA 95134, USA

6.1 Radiated Transmitter Spurious Emissions

6.1.1 Radiated Transmitter Spurious Emissions - Test Requirement

15.205 / RSS-Gen:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) and RSS-Gen 8.10, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)) and RSS-Gen 8.9.

6.1.2 Radiated Transmitter Spurious Emissions - Test Method

Ref. ANSI C63.10: 2013 section 4.1.4.2.2, 4.1.4.2.3, 6.6.4 & 11.12.2

Radiated Spurious Emissions Test parameters	
Peak	**Average**
Span = 1-18GHz /18GHz-26.5GHz	Span = 1-18GHz /18GHz-26.5GHz
RBW = 1 MHz	RBW = 1 MHz
VBW ≥ 3 MHz	VBW ≥ 3 MHz
Sweep = Auto couple	Sweep = Auto couple
Detector = Peak	Detector = RMS
Trace = Max Hold.	Power Averaging

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

6.1.3 Radiated Transmitter Spurious Emissions – Test Information

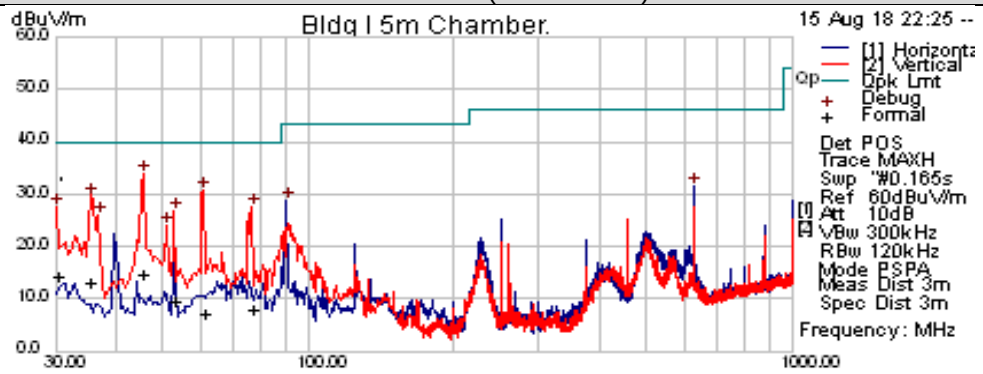
Tested By : Nima Ardestani	**Date of testing:** 03 Jul 2018 - 15 Aug 2018
Test Result : PASS	

See Appendix A for list of test equipment

System Number	Description	Samples	System under test	Support equipment
2	EUT	S04, S06	☑	☐
	Support	S05	☐	☑

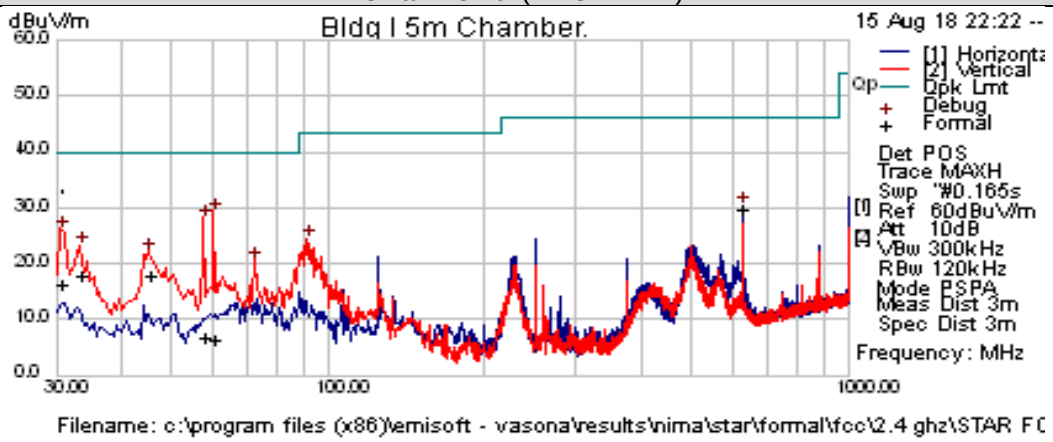
6.1.4 Radiated Transmitter Spurious Emissions 30MHz-1GHz

Transmitter Radiated Spurious Emissions 30MHz to 1GHz, 802.11b 1-11Mbps Channel 1 (2412MHz)



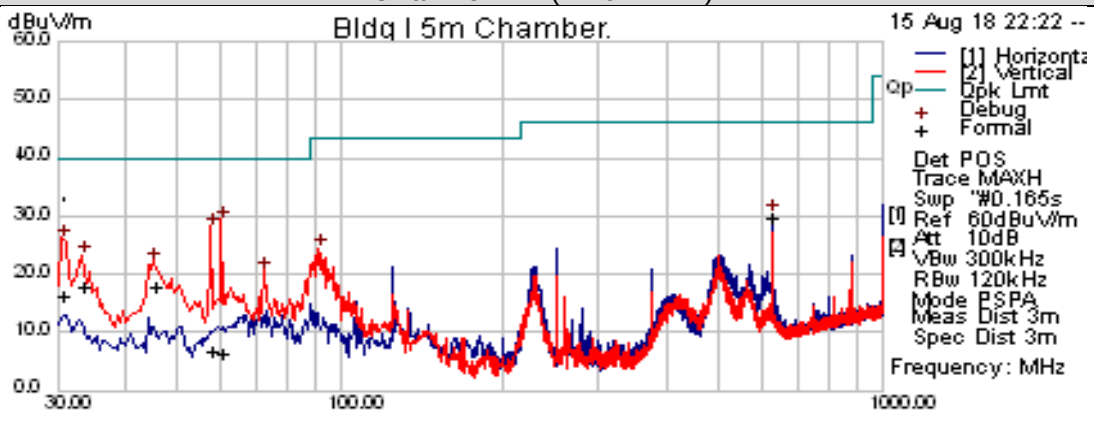
Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
45.423	41.73	0.58	-27.49	14.82	Quasi Max	V	127	201	40	-25.18	Pass	
30.18688	30.21	0.48	-16.19	14.5	Quasi Max	V	128	92	40	-25.5	Pass	
35.2805	32.61	0.52	-19.96	13.17	Quasi Max	V	101	331	40	-26.83	Pass	
53.189	39.6	0.65	-30.39	9.85	Quasi Max	V	124	211	40	-30.15	Pass	
76.3155	36.69	0.76	-29.39	8.07	Quasi Max	V	185	349	40	-31.93	Pass	
60.8445	36.37	0.68	-29.9	7.15	Quasi Max	V	131	254	40	-32.85	Pass	

Transmitter Radiated Spurious Emissions 30MHz to 1GHz, 802.11b 1-11Mbps Channel 6 (2437MHz)



Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
624.9895	46.65	2.35	-19.12	29.88	Quasi Max	H	163	309	46	-16.12	Pass	
44.235	43.46	0.57	-26.69	17.33	Quasi Max	V	123	215	40	-22.67	Pass	
45.65775	42.06	0.58	-27.62	15.02	Quasi Max	V	167	9	40	-24.98	Pass	
47.79825	40.7	0.59	-28.83	12.46	Quasi Max	V	120	176	40	-27.54	Pass	
50.34475	41.37	0.63	-29.79	12.21	Quasi Max	V	101	57	40	-27.79	Pass	
52.41775	39.07	0.64	-30.28	9.43	Quasi Max	V	110	187	40	-30.57	Pass	

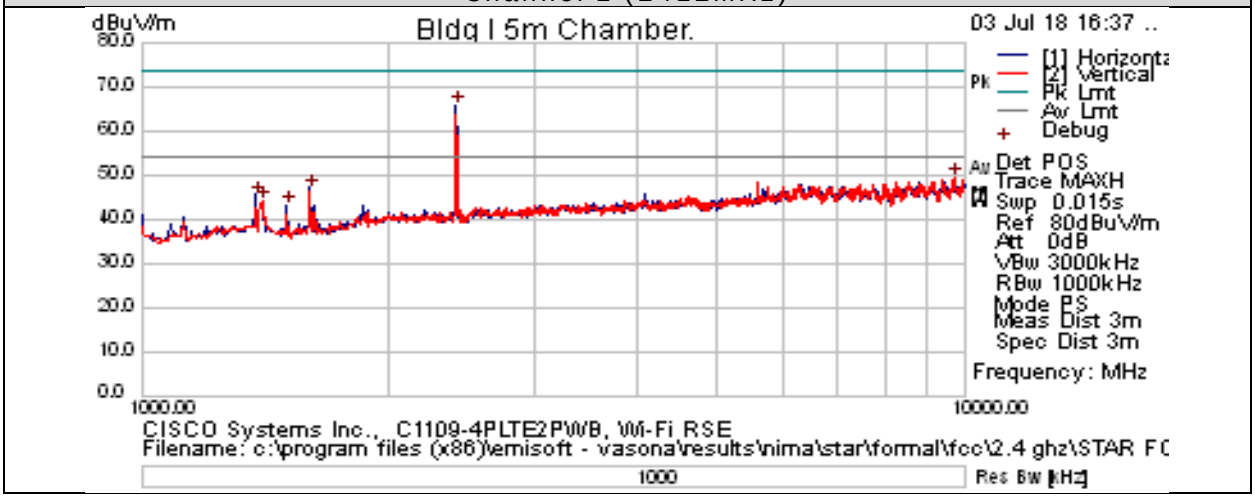
Transmitter Radiated Spurious Emissions 30MHz to 1GHz, 802.11b 1-11Mbps Channel 11 (2462MHz)



Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
625.0053	46.53	2.35	-19.11	29.76	Quasi Max	H	128	351	46	-16.24	Pass	
45.17625	44.85	0.58	-27.34	18.08	Quasi Max	V	105	45	40	-21.92	Pass	
33.61425	36.33	0.51	-18.83	18	Quasi Max	V	119	169	40	-22	Pass	
30.7535	32.47	0.49	-16.65	16.31	Quasi Max	V	101	42	40	-23.69	Pass	
57.99375	36.69	0.67	-30.29	7.07	Quasi Max	V	127	360	40	-32.93	Pass	
60.08175	35.73	0.68	-29.98	6.43	Quasi Max	V	142	270	40	-33.57	Pass	

6.1.5 Radiated Transmitter Spurious Emissions – 1-10GHz

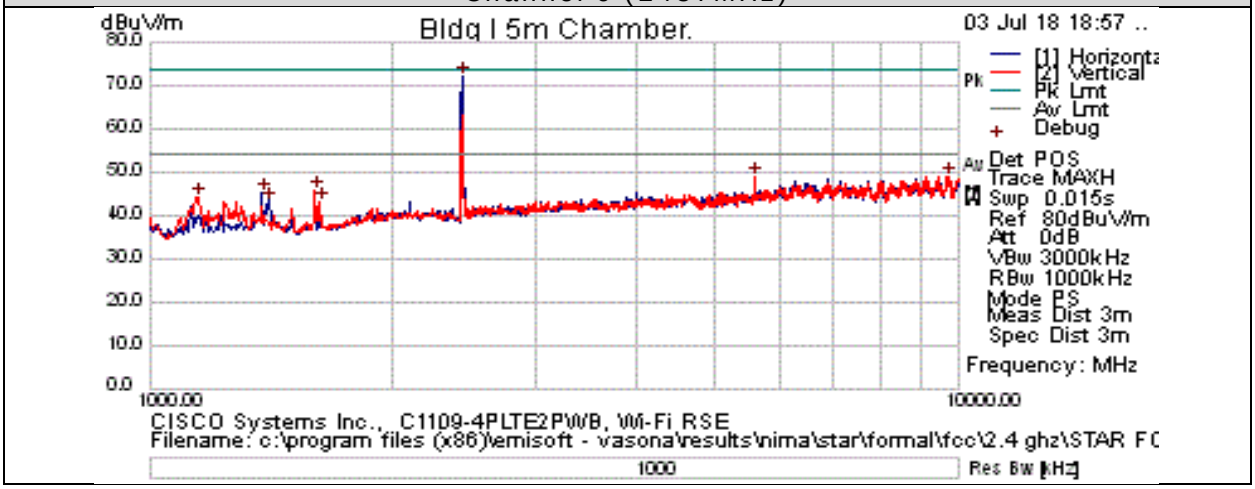
Transmitter Radiated Spurious Emissions 1GHz to 10GHz, 802.11b 1-11Mbps Channel 1 (2412MHz)



Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
2411.875	68.93	4.89	-8.02	65.8	Peak [Scan]	H	125	118	54	11.8	NA	Fundamental
9707.5	39.65	11.12	-1.22	49.55	Peak [Scan]	H	100	203	54	-4.45	Pass	
1601.875	55.75	3.88	-12.42	47.21	Peak [Scan]	H	100	214	54	-6.79	Pass	
1376.875	53.84	3.59	-11.77	45.65	Peak [Scan]	H	175	211	54	-8.35	Pass	
1399.375	52.4	3.62	-11.86	44.16	Peak [Scan]	V	125	60	54	-9.84	Pass	
1500.625	52.23	3.75	-12.92	43.06	Peak [Scan]	H	100	201	54	-10.94	Pass	

Note: *Where limits are specified by regulations for both average and peak detection, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.*

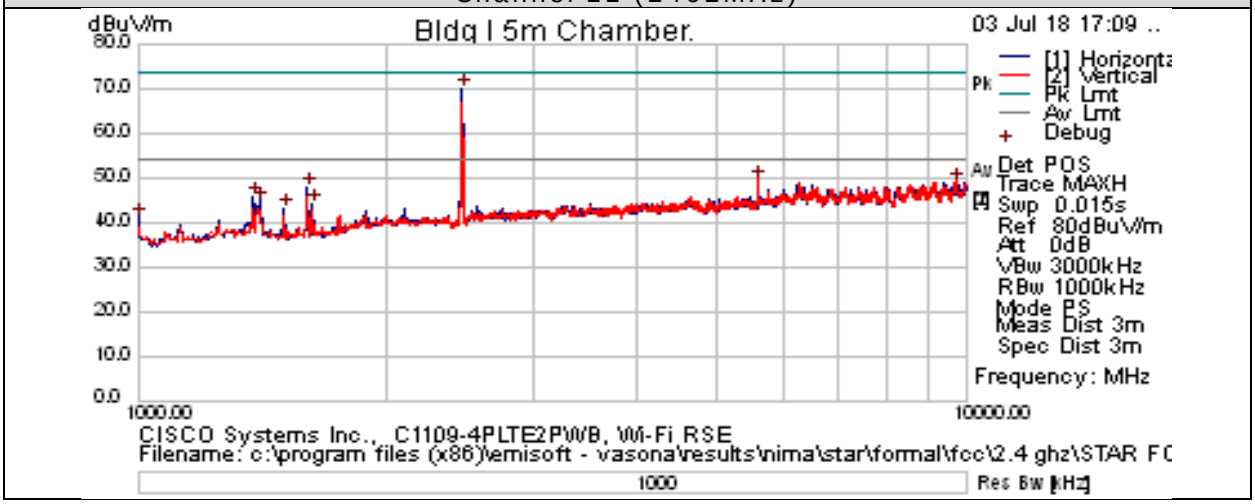
Transmitter Radiated Spurious Emissions 1Hz to 10GHz, 802.11b 1-11Mbps Channel 6 (2437MHz)



Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
2434.375	74.8	4.9	-7.6	72.1	Peak [Scan]	H	125	240	54	18.1	NA	Fundamental
5601.25	45.8	8.1	-4.8	49.1	Peak [Scan]	V	125	70	54	-4.9	Pass	
9713.125	39.2	11.1	-1.2	49.1	Peak [Scan]	H	125	226	54	-4.9	Pass	
1601.875	54.3	3.9	-12.4	45.7	Peak [Scan]	V	150	92	54	-8.3	Pass	
1376.875	53.5	3.6	-11.8	45.3	Peak [Scan]	H	200	132	54	-8.7	Pass	
1146.25	54.3	3.2	-13.2	44.4	Peak [Scan]	V	125	96	54	-9.6	Pass	
1405	51.7	3.6	-11.9	43.5	Peak [Scan]	H	200	108	54	-10.5	Pass	
1624.375	51.1	3.9	-11.8	43.3	Peak [Scan]	V	150	164	54	-10.7	Pass	

Note: *Where limits are specified by regulations for both average and peak detection, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.*

Transmitter Radiated Spurious Emissions 1GHz to 10GHz, 802.11b 1-11Mbps Channel 11 (2462MHz)

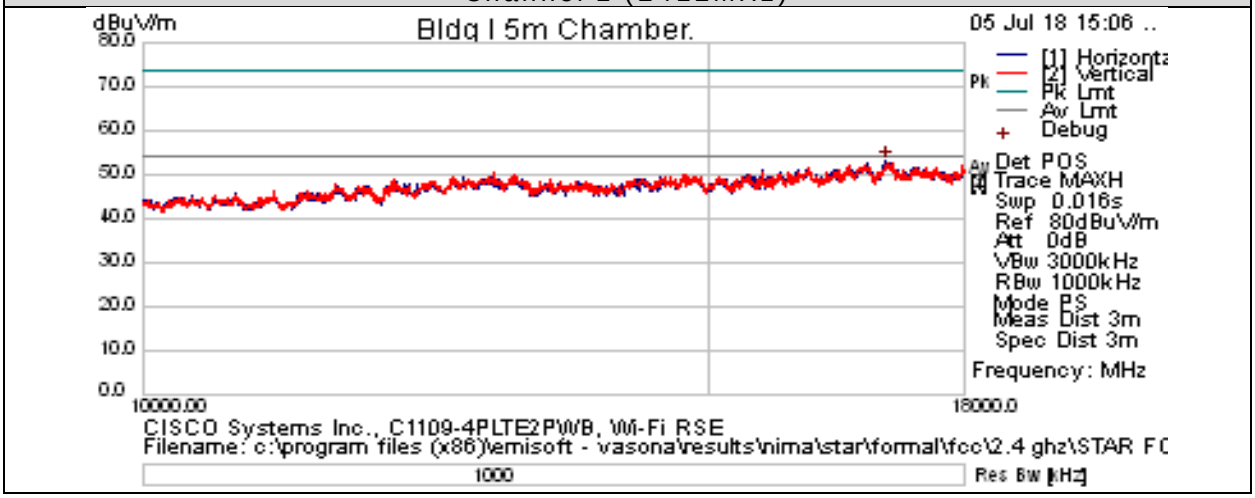


Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
2462.5	72.98	4.96	-7.66	70.29	Peak [Scan]	H	125	256	54	16.29	NA	Fundamental
5601.25	46.44	8.11	-4.81	49.74	Peak [Scan]	V	100	144	54	-4.26	Pass	
9718.75	39.48	11.12	-1.22	49.38	Peak [Scan]	V	350	151	54	-4.62	Pass	
1601.875	56.4	3.88	-12.42	47.86	Peak [Scan]	H	100	214	54	-6.14	Pass	
1376.875	53.99	3.59	-11.77	45.8	Peak [Scan]	H	175	207	54	-8.2	Pass	
1399.375	53.24	3.62	-11.86	44.99	Peak [Scan]	H	200	205	54	-9.01	Pass	
1624.375	52.25	3.94	-11.81	44.37	Peak [Scan]	H	100	214	54	-9.63	Pass	
1500.625	52.38	3.75	-12.92	43.22	Peak [Scan]	H	100	216	54	-10.78	Pass	
1000	51.21	3.01	-12.77	41.46	Peak [Scan]	H	125	212	54	-12.54	Pass	

Note: *Where limits are specified by regulations for both average and peak detection, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.*

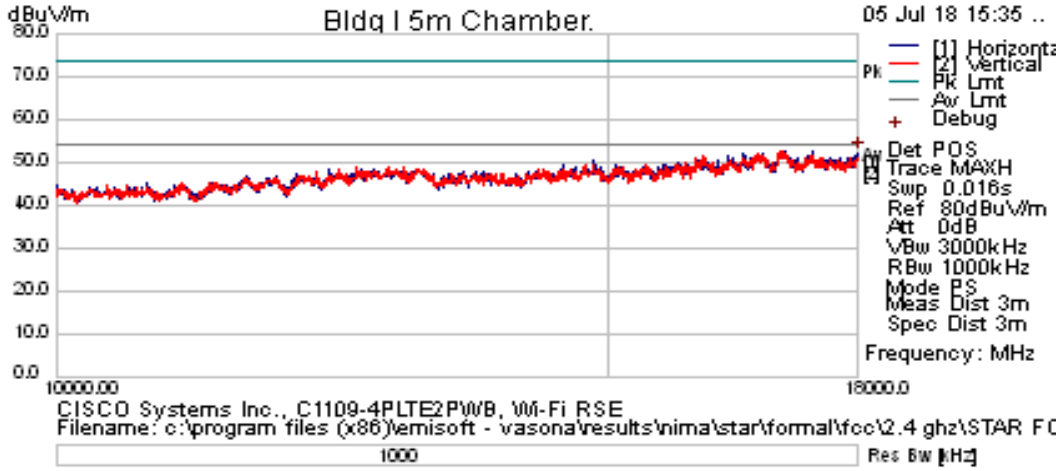
6.1.6 Radiated Transmitter Spurious Emissions – 10-18GHz

Transmitter Radiated Spurious Emissions 10GHz to 18GHz, 802.11b 1-11Mbps Channel 1 (2412MHz)



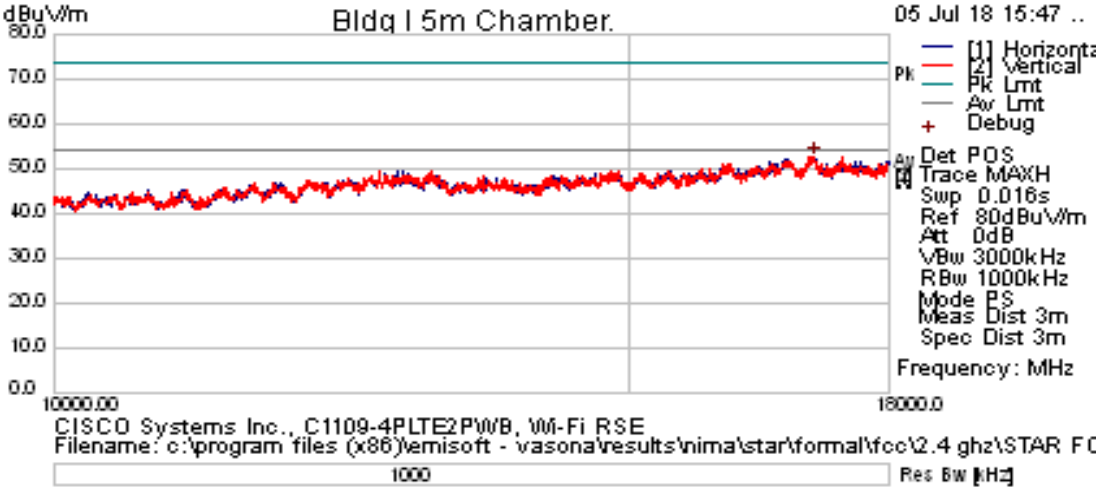
Note: No emissions were found in this range.

Transmitter Radiated Spurious Emissions 10Hz to 18GHz, 802.11b 1-11Mbps Channel 6 (2437MHz)



Note: No emissions were found in this range.

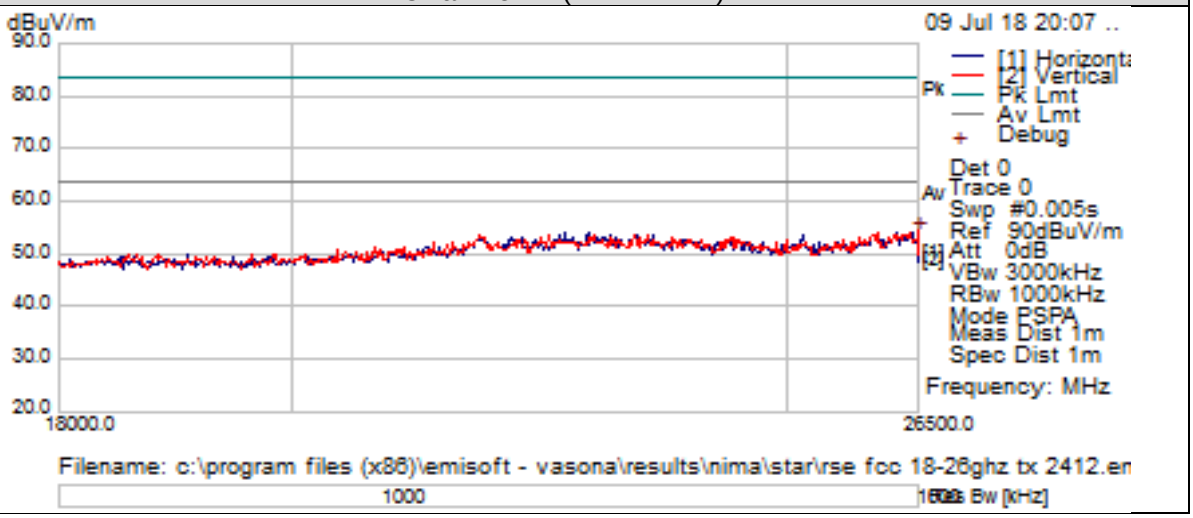
Transmitter Radiated Spurious Emissions 10GHz to 18GHz, 802.11b 1-11Mbps Channel 11 (2462MHz)



Note: No emissions were found in this range.

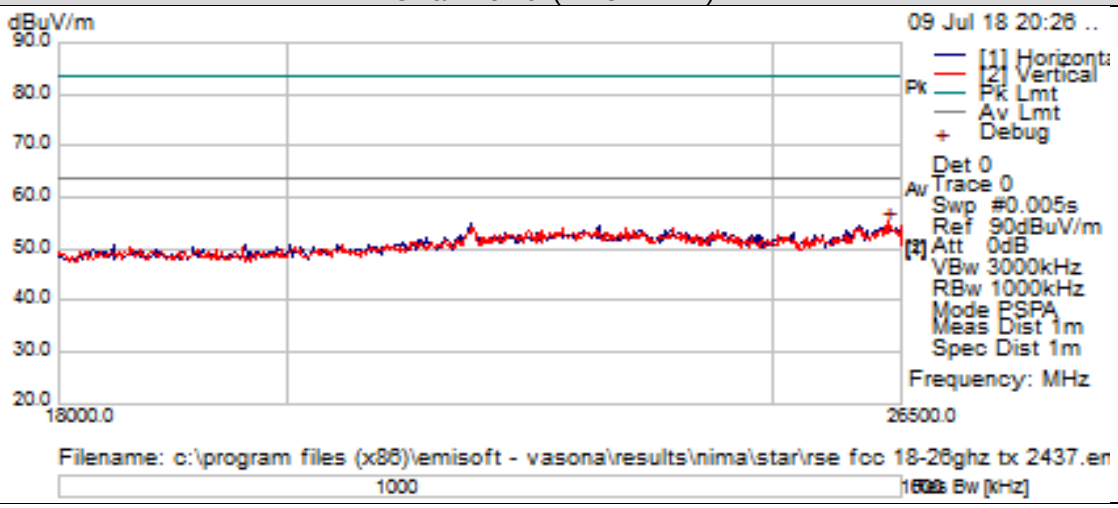
6.1.7 Radiated Transmitter Spurious Emissions – 18-26GHz

Transmitter Radiated Spurious Emissions 18GHz to 26GHz, 802.11a 6-54Mbps, Channel 1 (2412MHz)



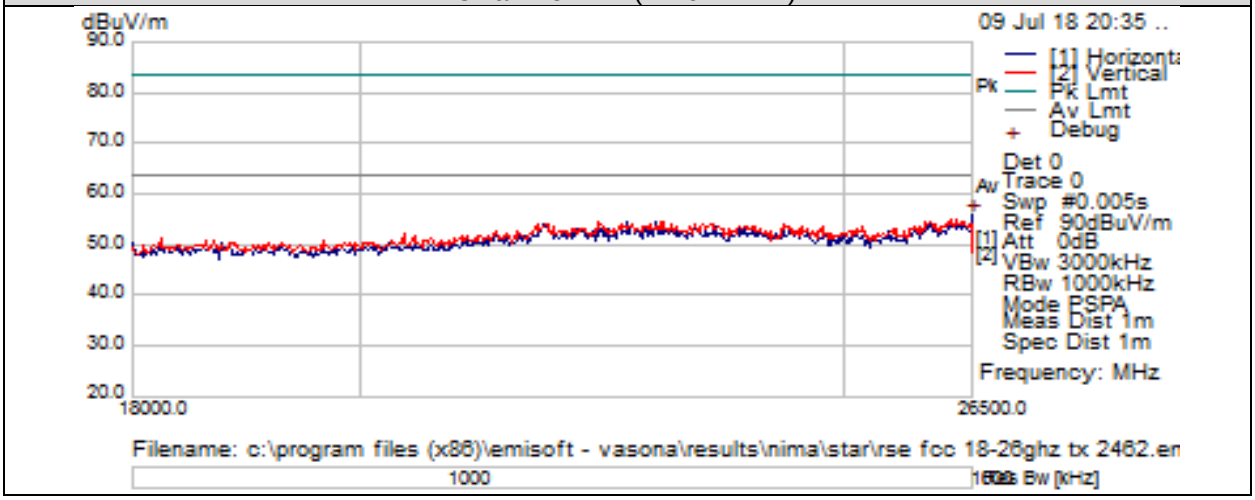
Note: No emissions were found in this range.

Transmitter Radiated Spurious Emissions 18Hz to 26GHz, 802.11a 6-54Mbps, Channel 6 (2437MHz)



Note: No emissions were found in this range.

Transmitter Radiated Spurious Emissions 18GHz to 26GHz, 802.11a 6-54Mbps, Channel 11 (2462MHz)



Note: No emissions were found in this range.

6.2 Receiver Spurious Emissions

6.2.1 Receiver Spurious Emissions – Test Requirement

RSS-GEN:

Receivers are required to comply with the limits of spurious emissions as set out in this section. Receiver emission measurements are to be performed as per the normative test method referenced in section 3.

Radiated emissions which fall in the restricted bands, as defined in RSS-Gen section 8.10, must also comply with the radiated emission limits specified in RSS-Gen section 8.9.

For emissions at frequencies below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. At frequencies above 1 GHz, measurements shall be performed using a linear average detector with a minimum resolution bandwidth of 1 MHz.

6.2.2 Receiver Spurious Emissions – Test Method

Ref. ANSI C63.10: 2013 section 4.1.4.2.2, 4.1.4.2.3, 6.6.4 & 11.12.2

Radiated Spurious Emissions Test parameters	
Peak Span = 1-18GHz /18GHz-26.5GHz RBW = 1 MHz VBW ≥ 3 MHz Sweep = Auto couple Detector = Peak Trace = Max Hold.	**Average** Span = 1-18GHz /18GHz-26.5GHz RBW = 1 MHz VBW ≥ 3 MHz Sweep = Auto couple Detector = RMS Power Averaging

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

6.2.3 Receiver Spurious Emissions – Test Information

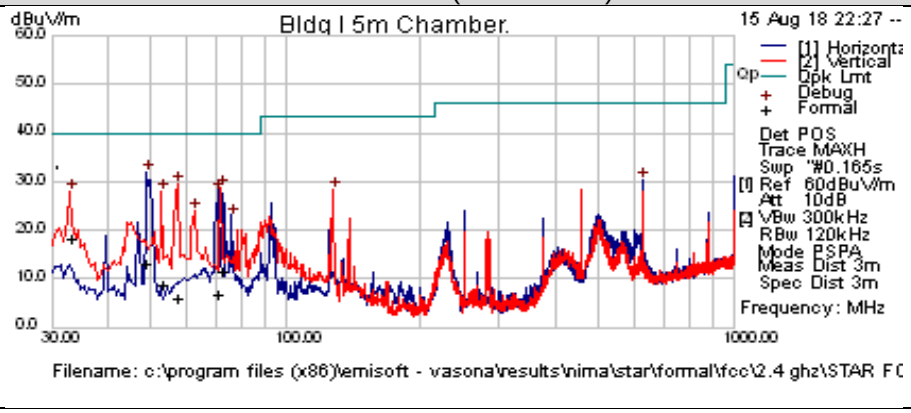
Tested By :	**Date of testing:**
Nima Ardestani	03 Jul 2018 - 15 Aug 2018
Test Result : PASS	

See Appendix A for list of test equipment

System Number	Description	Samples	System under test	Support equipment
2	EUT	S04, S06	☑	☐
	Support	S05	☐	☑

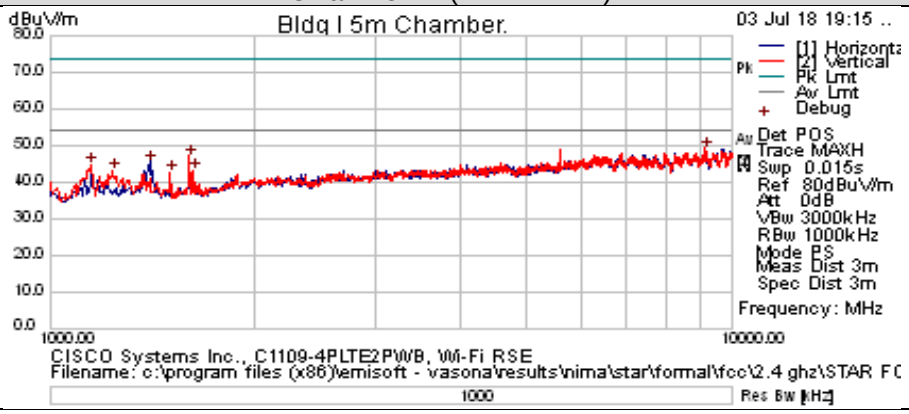
6.2.4 Receiver Spurious Emissions – 30MHz-1GHz

Receiver Radiated Spurious Emissions 30MHz to 1GHz, 802.11a 6-54Mbps, Channel 1 (2412MHz)



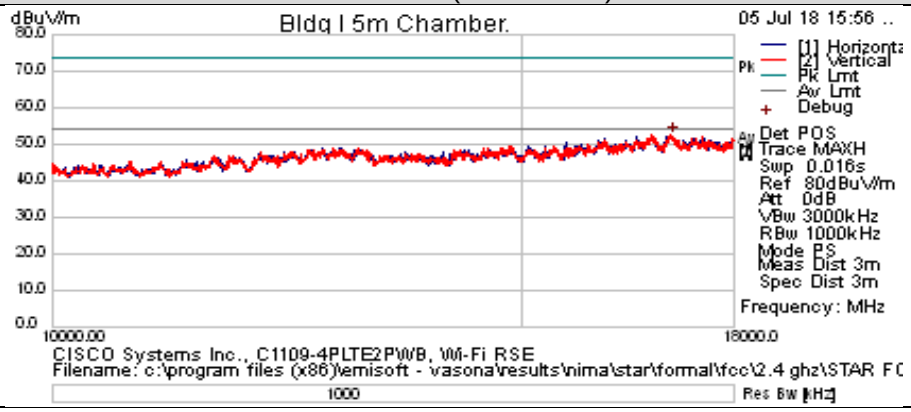
Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
33.0515	36.14	0.5	-18.38	18.27	Quasi Max	V	110	295	40	-21.73	Pass	
48.6245	41.96	0.6	-29.18	13.38	Quasi Max	V	137	205	40	-26.62	Pass	
71.51825	40.09	0.73	-29.26	11.56	Quasi Max	V	193	166	40	-28.44	Pass	
53.02475	38.83	0.65	-30.39	9.09	Quasi Max	V	112	254	40	-30.91	Pass	
70.491	35.4	0.73	-29.22	6.91	Quasi Max	V	218	13	40	-33.09	Pass	
56.997	35.92	0.67	-30.39	6.19	Quasi Max	V	101	69	40	-33.81	Pass	

Receiver Radiated Spurious Emissions 1GHz to 10GHz, 802.11a 6-54Mbps, Channel 1 (2412MHz)



Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
9150.625	40.5	10.8	-2.04	49.26	Peak [Scan]	V	175	142	54	-4.74	Pass	
1601.875	55.64	3.88	-12.42	47.1	Peak [Scan]	V	150	98	54	-6.9	Pass	
1399.375	53.92	3.62	-11.86	45.67	Peak [Scan]	H	100	182	54	-8.33	Pass	
1146.25	54.72	3.25	-13.16	44.81	Peak [Scan]	V	100	147	54	-9.19	Pass	
1624.375	51.05	3.94	-11.81	43.17	Peak [Scan]	V	175	160	54	-10.83	Pass	
1236.25	51.55	3.37	-11.76	43.15	Peak [Scan]	V	150	26	54	-10.85	Pass	
1500.625	51.78	3.75	-12.92	42.62	Peak [Scan]	V	125	158	54	-11.38	Pass	

Note: *Where limits are specified by regulations for both average and peak detection, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.*

Receiver Radiated Spurious Emissions 10GHz to 18GHz, 802.11a 6-54Mbps, Channel 1 (2412MHz)


Note: No emissions were found in this range.

6.3 AC Conducted Emissions

6.3.1 AC Conducted Emissions – Test Requirement

FCC 15.207 (a) & RSS-Gen 8.8

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.

6.3.2 AC Conducted Emissions – Test Method

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). Place the radio in continuous transmit mode.

Span:	150KHz – 30MHz
Attenuation:	10dB
Sweep Time:	Coupled
Resolution Bandwidth:	9kHz
Video Bandwidth:	30kHz
Detector:	Quasi-Peak / Average

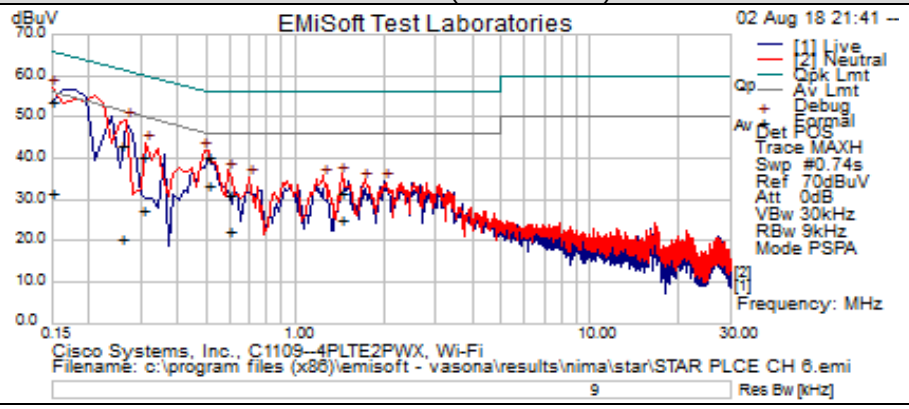
6.3.3 AC Conducted Emissions – Test Information

Tested By : Nima Ardestani	**Date of testing:** 03 Jul 2018 - 15 Aug 2018
Test Result : PASS	

System Number	Description	Samples	System under test	Support equipment
2	EUT	S04, S06	☑	☐
	Support	S05	☐	☑

6.3.4 AC Conducted Emissions – Transmit mode

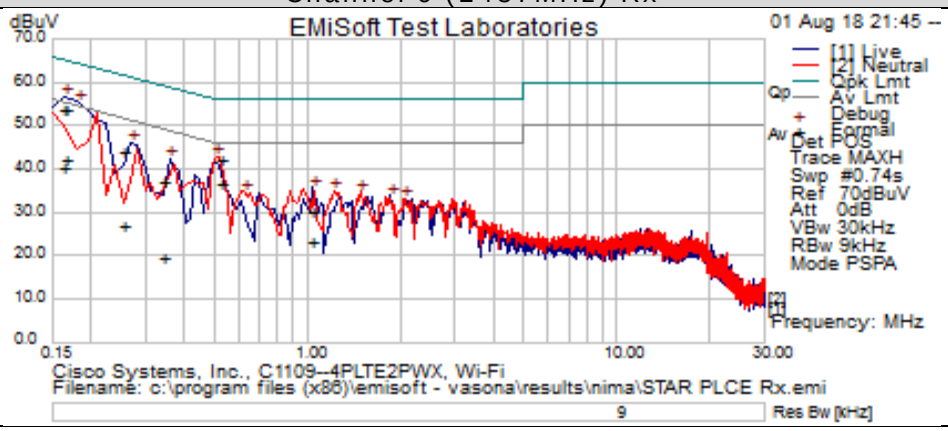
AC Conducted Emissions 30MHz to 1GHz,
Channel 6 (2437MHz)



Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.150082	32.27	21.34	0.07	53.68	Quasi Peak	Neutral	66	-12.31	Pass	
0.505947	13.32	20	0.04	33.36	Average	Neutral	46	-12.64	Pass	
0.505947	20.27	20	0.04	40.3	Quasi Peak	Neutral	56	-15.7	Pass	
0.256314	22.68	20.69	0.05	43.42	Quasi Peak	Neutral	61.55	-18.13	Pass	
0.302331	19.78	20.49	0.04	40.31	Quasi Peak	Neutral	60.18	-19.87	Pass	
1.439205	5.1	19.97	0.04	25.12	Average	Neutral	46	-20.88	Pass	
0.302331	6.81	20.49	0.04	27.34	Average	Neutral	50.18	-22.84	Pass	
0.596796	2.31	20	0.04	22.34	Average	Neutral	46	-23.66	Pass	
1.439205	11.88	19.97	0.04	31.89	Quasi Peak	Neutral	56	-24.11	Pass	
0.150082	10.25	21.34	0.07	31.66	Average	Neutral	56	-24.34	Pass	
0.596796	11.32	20	0.04	31.36	Quasi Peak	Neutral	56	-24.64	Pass	
0.256314	-0.14	20.69	0.05	20.59	Average	Neutral	51.55	-30.96	Pass	

6.3.5 AC Conducted Emissions – Receive mode

AC Conducted Emissions 30MHz to 1GHz,
Channel 6 (2437MHz) Rx



Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.523302	16.55	20	0.04	36.59	Average	Neutral	46	-9.41	Pass	
0.163845	32.64	21.23	0.06	53.93	Quasi Peak	Live	65.27	-11.33	Pass	
0.165656	32.55	21.22	0.06	53.83	Quasi Peak	Neutral	65.18	-11.35	Pass	
0.165656	20.93	21.22	0.06	42.21	Average	Neutral	55.18	-12.97	Pass	
0.523302	22.27	20	0.04	42.31	Quasi Peak	Neutral	56	-13.69	Pass	
0.163845	19.35	21.23	0.06	40.64	Average	Live	55.27	-14.62	Pass	
0.252264	23.32	20.71	0.04	44.07	Quasi Peak	Live	61.68	-17.61	Pass	
0.344496	17	20.33	0.04	37.37	Quasi Peak	Live	59.09	-21.72	Pass	
1.038948	3.45	19.97	0.04	23.46	Average	Live	46	-22.54	Pass	
0.252264	6.45	20.71	0.04	27.2	Average	Live	51.68	-24.49	Pass	
1.038948	10.05	19.97	0.04	30.06	Quasi Peak	Live	56	-25.94	Pass	
0.344496	-0.51	20.33	0.04	19.86	Average	Live	49.09	-29.23	Pass	

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

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
Test Equipment used for Radiated Emissions 30MHz to 1GHz				
45588	JB1 / Sunol Sciences	Combination Antenna	31 May 2018	31 May 2019
01066 *	34401A / HP	Multimeter	16 Aug 2018	16 Aug 2019
40507	SF26-S1S1-36 / Megaphase	RF Cable 26.5 GHz	12 Oct 2017	12 Oct 2018
56139	CMW500 / ROHDE & SCHWARZ	Wideband Radio Communication Tester	9 Nov 2017	9 Nov 2018
55937	Sucoflex 106PA / Huber + Suhner	N-Type 8m 18GHz Antenna Cable	10 Nov 2017	10 Nov 2018
30443	UFB311A-0-1560-520520 / Micro-Coax	RF Coaxial Cable, to 18GHz, 156 In.	10 Nov 2017	10 Nov 2018
08024	SF106A / Huber + Suhner	3 meter Sucoflex cable	10 Nov 2017	10 Nov 2018
45051	ESCI / Rohde & Schwarz	EMI Test Receiver	17 Nov 2017	17 Nov 2018
49413	iBTHP-5-DB9 / Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28 Dec 2017	28 Dec 2018
06088	8447D / HP	PreAmplifier (.1-1GHz)	25 Jan 2018	25 Jan 2019
01937	NSA 5m Chamber / Cisco	NSA 5m Chamber	6 Feb 2018	6 Feb 2019
37235	50CB-015 / JFW	GPIB Control Box	Calibration not required	Calibration not required
35244	926-8ME / Klein Tools	8 Meter Tape Measure	Calibration not required	Calibration not required
27235	CNE V / York	Comparison Noise Emitter	Calibration not required	Calibration not required
Test Equipment used for Radiated Emissions 1GHz to 26GHz				
42000	E4440A / Agilent	Spectrum Analyzer	22 Aug 2017	22 Aug 2018
45098	TH0118 / Cisco	Mast Mount Preamplifier Array, 1-18GHz	1 Nov 2017	1 Nov 2018
56139	CMW500 / ROHDE & SCHWARZ	Wideband Radio Communication Tester	9 Nov 2017	9 Nov 2018
55937	Sucoflex 106PA / Huber + Suhner	N-Type 8m 18GHz Antenna Cable	10 Nov 2017	10 Nov 2018
30443	UFB311A-0-1560-520520 / Micro-Coax	RF Coaxial Cable, to 18GHz, 156 In.	10 Nov 2017	10 Nov 2018
40507	SF26-S1S1-36 / Megaphase	RF Cable 26.5 GHz	12 Oct 2017	12 Oct 2018
37581	3117 / ETS-Lindgren	Double Ridged Waveguide Horn Antenna	7 Dec 2017	7 Dec 2018
49413	iBTHP-5-DB9 / Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28 Dec 2017	28 Dec 2018
01937	NSA 5m Chamber / Cisco	NSA 5m Chamber	6 Feb 2018	6 Feb 2019
49535	Above 1GHz Site Cal / Cisco	Above 1GHz CISPR Site Validation	7 Feb 2018	7 Feb 2019
37235	50CB-015 / JFW	GPIB Control Box	Cal. not required	Cal. not required
35244	926-8ME / Klein Tools	8 Meter Tape Measure	Cal. not required	Cal. not required

34074	RSG 2000 / Schaffner	Reference Spectrum Generator, 1-18GHz	Cal. not required	Cal. not required
18314	3115 / EMC Test Systems	Double Ridged Guide Horn Antenna	Cal. not required	Cal. not required
24201	ROHDE & SCHWARZ / FSEK30	Spectrum analyzer 20Hz-40GHz	30 Nov 2017	30 Nov. 2018
Test Equipment used for AC Mains Conducted Emissions				
19336	FCC-LISN-50/250-50-2-01/FCC	LISN	22 Aug 2017	22 Aug 2018
23873	FCC-LISN-PA-NEMA-5-15/FCC	AC ADAPTOR	22 Aug 2017	22 Aug 2018
40523	ESCI/ROHDE & SCHWARZ	EMI Test Receiver	02 Feb 2018	02 Feb 2019
08477	5-T-MB/BIRD	TERMINATION	15 Nov 2017	15 Nov 2018
08196	H613-150K-50-21378/ TTE	Hi Pass Filter - 150KHz cutoff	04 Jan 2018	04 Jan 2019
08131	RG-223/SAXTON	RG-223 Cable	01 Nov 2017	01 Nov 2018
44554	FCC-801-M2-50A/FCC	CDN	20 Mar 2018	20 Mar 2019
18960	CNE V/YORK	COMPARISON NOISE EMITTER	Cal Not Required	Cal Not Required
47403	RG223/COLEMAN	BNC cable	15 May 2018	15 May 2019
08509	FCC-450B-2.4-N/ FCC	PULSE LIMITER	27 Jul 2018	27 Jul 2019
RF Conducted at output antenna port				
055094	PXI-1042 National Instruments	Chassis	Cal. not required	Cal. not required
055562	MEGAPHASE F120-S1S1-48	SMA cable	27 Jul 2017	27 Jul 2018
055565	MEGAPHASE F120-S1S1-36	SMA cable	27 Jul 2017	27 Jul 2018
054623	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018
054624	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018
054620	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018
054610	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018
055112	Microtronics BRM50702-02	Band Reject Filter	27 Jul 2017	27 Jul 2018
054621	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018
054619	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018
055353	Microtronics BRC50703-02	Band Reject Filter	27 Jul 2017	27 Jul 2018
054618	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018
054617	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018
054691	Microtronics BRC50704-02	Band Reject Filter	27 Jul 2017	27 Jull2018
054616	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jull2018
054614	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018
054693	Microtronics BRC50705-02	Band Reject Filter	27 Jul 2017	27 Jul 2018
054615	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018
055368	Pulsar PS4-09-452/4S	4 Way Divider	12 Apr 2017	12 Apr 2018
054686	NI PXI-2796 National Instruments	Multiplexer, 40 GHz 50 Ohm	Verified Before Use	Verified Before Use
053615	N9030A-550 Keysight	PXA Signal Analyzer	04 Apr 2017	04 Apr 2018

056329	Pasternack PE5019-1	Torque wrench	01 Mar 2017	01 Mar 2018

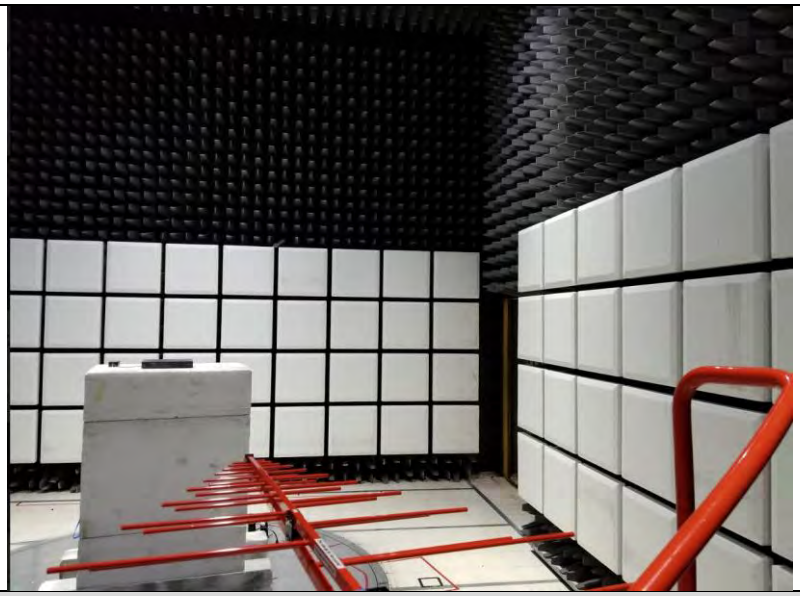
***** The calibration dates listed for the multimeter are the most recent calibration dates, since the multimeter calibration cycle fell in between the test dates. The multimeteter was used to check the wall supply voltage before the start of the test, and was covered under the previous calibration when used on August 14, 2018.

Appendix B: Abbreviation Key and Definitions

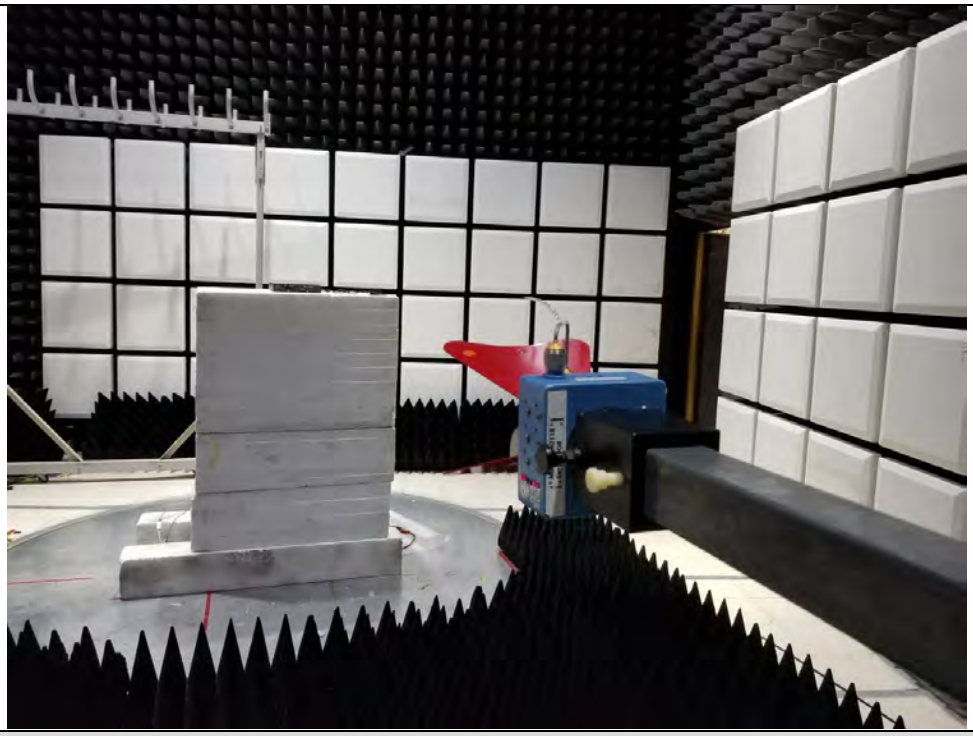
The following table defines abbreviations used within this test report.

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

Appendix C: Photographs of Test Setups



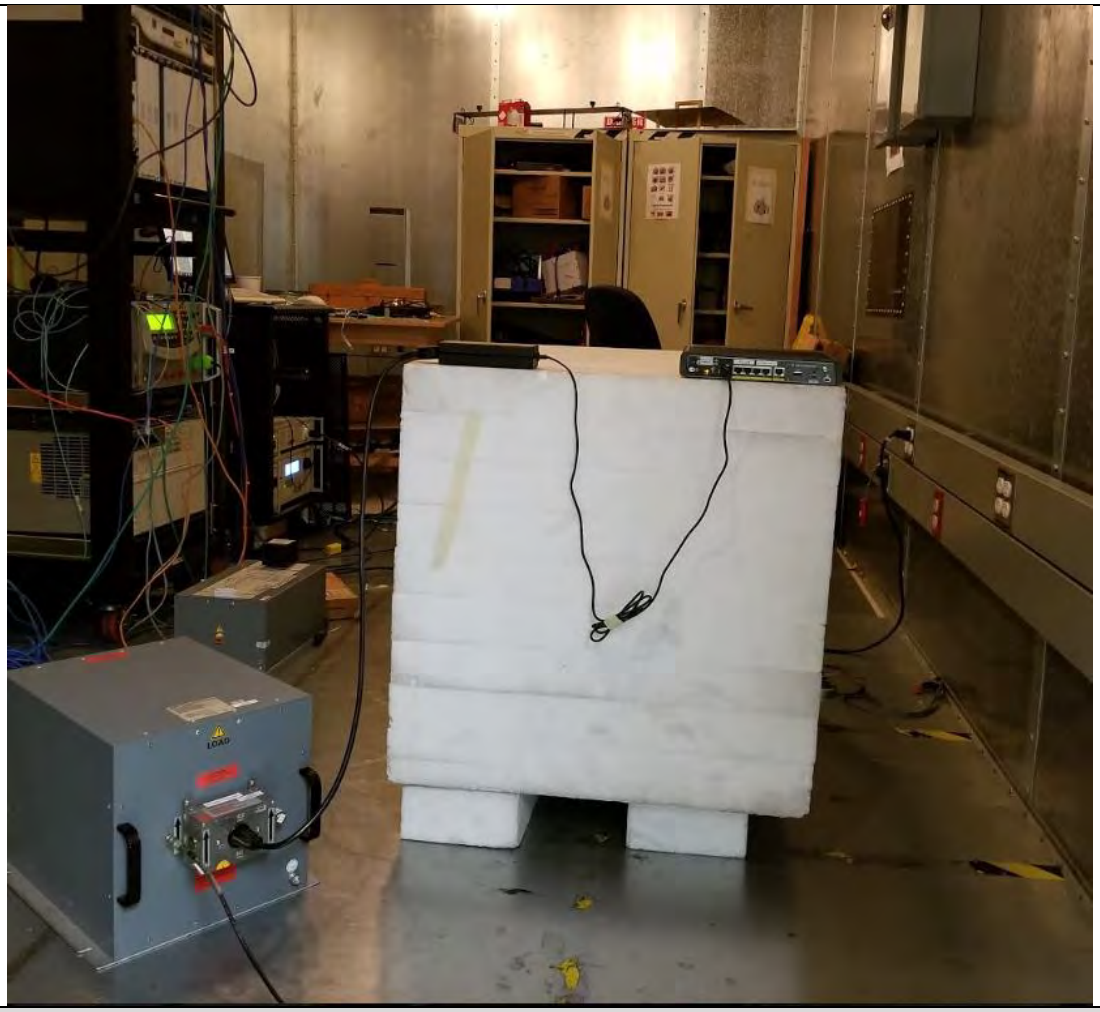
Radiated Spurious Emissions Test Configuration 30MHz – 1GHz



Radiated Spurious Emissions Test Configuration 1GHz - 18GHz

Radiated Spurious Emissions Test Configuration 18GHz – 26.5GHz

Conducted Radio Test Setup



AC Conducted Emissions Test Setup

Appendix D: Software Used to Perform Testing

EMIsoft Vasona, version 6.054
RF_Automation_Main.vi, version1.1.0.6

Appendix E: Test Procedures

Measurements were made in accordance with

- KDB 558074 - D01 DTS Meas Guidance v04
- KDB 662911 - MIMO
- ANSI C63.4 2014 Unintentional Radiators
- ANSI C63.10 2013 Intentional Radiators

Test procedures are summarized below

FCC 2.4GHz Test Procedures	EDCS # 1445042
FCC 2.4GHz RSE Test Procedures	EDCS # 1480386

Appendix F: Scope of Accreditation (A2LA certificate number 1178-01)

The scope of accreditation of Cisco Systems, Inc. can be found on the A2LA web page at:

http://www.a2la.org/scopepdf/1178-01.pdf

Appendix G: Test Assessment Plan

Test Assessment Plan EDCS# 11764739
Target Power Tables EDCS# 11883126