

Test Report

IW-6300H Series Access Point

Cisco Industrial Wireless Hazardous Location Access Point

2.4 GHz / 5 GHz 802.11 a/ac/b/g/n Wi-Fi radio

FCC ID: LDKESW6300

IC ID: 2461D-ESW6300

2400-2483.5 MHz

IW-6300H-AC-T-K9, IW-6300H-DC-T-K9, IW-6300H-DCW-T-K9, ESW-6300-CON-T-K9

Against the following Specifications:

47 CFR 15.247

47 CFR 15.209

47 CFR 15.205

RSS-247 Issue 2

RSS-Gen Issue 5

LP0002 (2018-01-10)

AS/NZ 4268: 2017

GSR No. 45(E)



Cisco Systems

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Tested By: Julian Land	Title: MGR. IoT Compliance Revision: 1.0
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This report replaces any previously entered test report under EDCS –**18731613**. This test report has been electronically authorized and archived using the CISCO Engineering Document Control system. Test Report Template EDCS# 11644121

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Section 1: Overview

The samples were assessed against the tests under the requirements of the following specifications:

Emission
CFR47 Part 15.247 RSS-247 Issue 2: Feb 2017 RSS-Gen Issue 5: Apr 2018 LP0002 (2018-01-10) AS/NZ 4268:2017

Section 2: Assessment Information

2.1 General

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

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

- a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.
- b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.
- c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).
- d) All testing was performed under the following environmental conditions:

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

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.
- e) All AC testing was performed at one or more of the following supply voltages:
110V 60 Hz (+/-20%)

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:

$$\text{Emission level [dBuV]} = \text{Indicated voltage level [dBuV]} + \text{Cable Loss [dB]} + \text{Other correction factors [dB]}$$

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:-

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(X \text{ dBuV/m})/20] = Y \text{ uV/m}$$

Measurement Uncertainty Values

voltage and power measurements	± 2 dB
conducted EIRP measurements	± 1.4 dB
radiated measurements	± 3.2 dB
frequency measurements	$\pm 2.4 \cdot 10^{-7}$
temperature measurements	$\pm 0.54^{\circ}$
humidity measurements	$\pm 2.3\%$
DC and low frequency measurements	$\pm 2.5\%$

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
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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.

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2.2 Date of testing

25-Sep-19 - 25-Sep-19

2.3 Report Issue Date

10/23/2019

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

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

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

USA

Headquarters

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

Registration Numbers for Industry Canada

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

Test Engineers

Julian Land

2.5 Equipment Assessed (EUT)

IW-6300H-DC-T-K9

2.6 EUT Description

Theradiosupports the following modes of operation. The modes are further defined in the radio Theory of Operation. The modes included in this report represent the worst-case data for all modes. Data is recorded at the lowest supported data rate for each mode. This report covers operation on channel 1-11.

802.11b - Legacy CCK, Two Antennas, 1 to 11 Mbps

802.11g - Non HT20, One Antenna, 6 to 54 Mbps, 1ss

802.11g - Non HT20, Two Antennas, 6 to 54 Mbps, 1ss

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

802.11n/ac - HT/VHT20, One Antenna, M0 to M7, 1ss

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

802.11n/ac - HT/VHT20, Two Antennas, M8 to M15, 2ss

802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M0 to M7, 1ss

802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M8 to M15, 2ss

802.11n/ac - HT/VHT20 STBC, Two Antennas, M0 to M7, 2ss

802.11n/ac - HT/VHT40, One Antenna, M0 to M7, 1ss

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

802.11n/ac - HT/VHT40, Two Antennas, M8 to M15, 2ss

802.11n/ac - HT/VHT40 Beam Forming, Two Antennas, M0 to M7, 1ss

802.11n/ac - HT/VHT40 Beam Forming, Two Antennas, M8 to M15, 2ss

802.11n/ac - HT/VHT40 STBC, Two Antennas, M0 to M7, 2ss

802.11b - Legacy CCK, One Antenna, 1 to 11 Mbps

Model / PID Differences

IW-6300H-AC-x-K9, IW-6300H-DC-x-K9, IW-6300-DCW-x-K9 and ESW-6300-CON-x-K9, all have the same identical components, electronics circuitries, PCB layout and enclosure.

The only differences are listed as below:

IW-6300H-AC-x-K9
IW-6300H-DC-x-K9
IW-6300-DCW-x-K9
ESW-6300-CON-x-K9

Where “x” can be replaced with another letter to indicate country domain.
Domain letters: A, B, C, D, E, F, H, I, L, M, N, Q, R, S, T, Z

Where “AC” is Alternating Current (AC power supply)
Where “DC” is Direct Current (DC power supply), 54V native input
Where “DCW” is Direct Current; wide range 10-36VDC
Where “K9” is encryption software.

Note: Because the three models only differ in the way they are powered up, and the wireless features are exactly the same, only one set of data is collected and documented in this report. All the formal compliance testing was performed using IW6300H-DC-T-K9

The following antennas are tested by this product.

The data included in this report represent the worst case data for all antennas.

Frequency	Part Number	Antenna Type	Antenna Gain (dBi)	>30 degree 5 GHz Antenna Gain (dBi)
2.4/5 GHz	AIR-ANT2547V-N	Dual-band Omni	4 / 7	-6
	AIR-ANT2513P4M-N	Dual-band Polarization Diverse Patch Array	13 / 13	-5

Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Technical Requirements / Details	Result
FCC 15.247 RSS-247 LP0002:3.10.1(6.2.1)	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 LP0002:3.10.1(2.3)	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 LP0002:3.10.1(6.2.2)	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 LP0002:3.10.1(5)/2.8	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

Radiated Emissions (General requirements)

Basic Standard	Technical Requirements / Details	Result
FCC 15.209 RSS-Gen LP0002:3.10.1(5)/2.8	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 LP0002:3.10.1(5)2.8	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 LP0002:2.3	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.

4.1 Sample Details

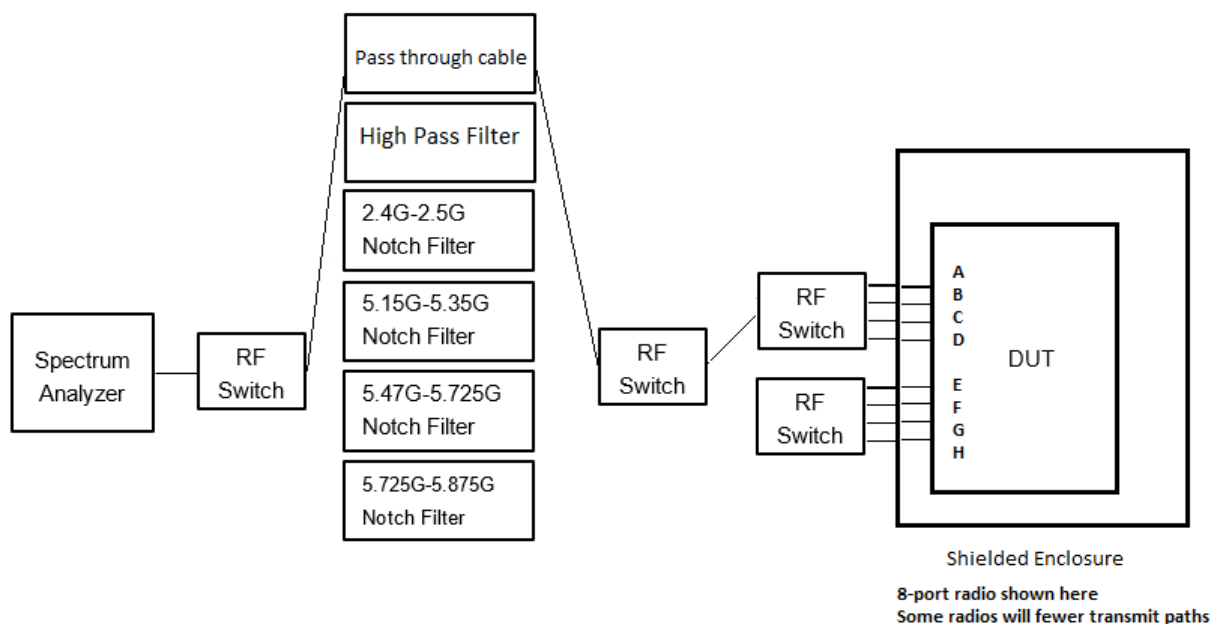
Sample No.	Equipment Details	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	IW-6300H-DC-T-K9	Cisco Systems, Inc.	11	9.1.8.1	9.0.5.5-W8964	FOC23241G16
S02	FSP150-AWAN3	FSP Group Inc.	-	-	-	H00000063

4.2 System Details

System #	Description	Samples
1	EUT and Power Supply	S01, S02

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting ≥98% duty cycle

Appendix A: Emission Test Results**Conducted Test Setup Diagram****Target Maximum Channel Power**

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

Antenna Gain : 4dBi	Maximum Channel Power (dBm)		
	Frequency (MHz)		
	2412	2437	2462
Operating Mode			
Legacy CCK, 1 to 11 Mbps	25	25	25
Non HT20, 6 to 54 Mbps	22	25	20
Non HT20 Beam Forming, 6 to 54 Mbps	21	25	15
HT/VHT20, M0 to M15	23	26	19
HT/VHT20 Beam Forming, M0 to M15	23	26	19
HT/VHT20 STBC, M0 to M7	23	26	19
	2422	2437	2452
HT/VHT40, M0 to M15	20	25	26
HT/VHT40 Beam Forming, M0 to M15	20	25	26
HT/VHT40 STBC, M0 to M7	20	25	26

Antenna Gain : 13dBi	Maximum Channel Power (dBm)		
Operating Mode	Frequency (MHz)		
	2412	2437	2462
Legacy CCK, 1 to 11 Mbps	22	22	21
Non HT20, 6 to 54 Mbps	17	22	11
Non HT20 Beam Forming, 6 to 54 Mbps	17	22	11
HT20, M0 to M15	17	22	13
HT20 Beam Forming, M0 to M15	17	22	13
HT20 STBC, M0 to M7	17	22	13
	2422	2437	2452
HT40, M0 to M15	13	22	22
HT40 Beam Forming, M0 to M15	12	22	22
HT40 STBC, M0 to M7	12	22	22

A.1 Duty Cycle

Duty Cycle Test Requirement

From KDB 558074, Section 6

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.

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 $\geq$ OBW if possible; otherwise, set RBW to the largest available value. Set VBW $\geq$ 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 $T \leq 16.7$ microseconds.)

Duty Cycle Test Information

Samples, Systems, and Modes

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

Tested By : Julian Land	Date of testing: 25-Sep-19 - 25-Sep-19
Test Result : PASS	

Test Equipment

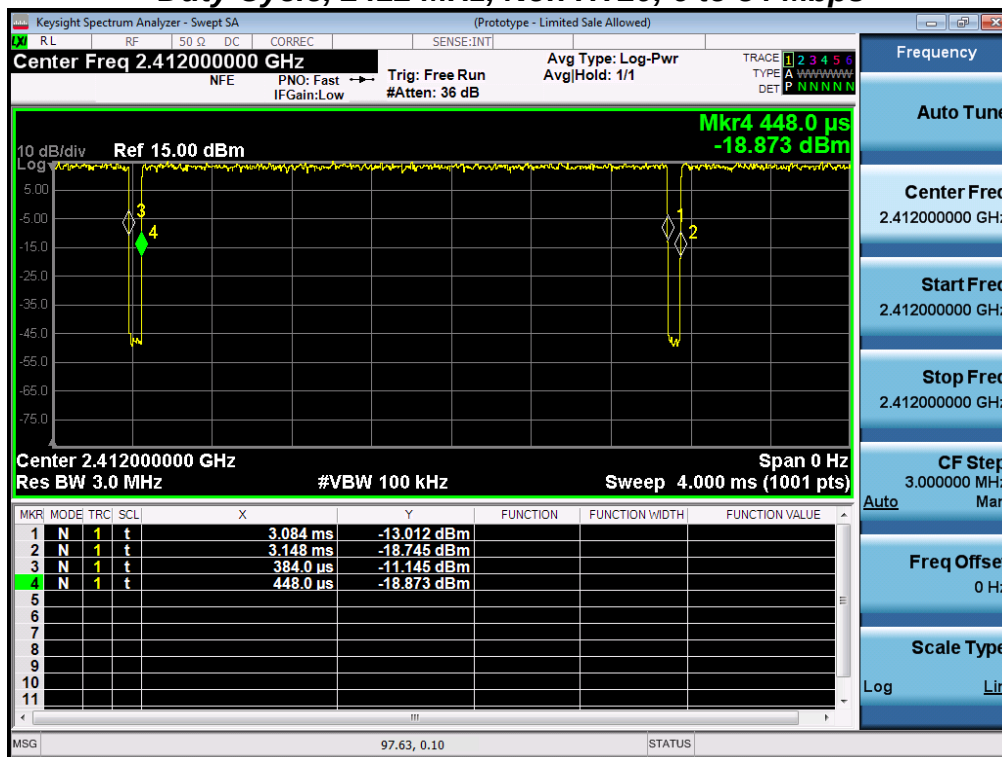
See Appendix B for list of test equipment

Duty Cycle Data Table

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

Frequency	Mode	Data Rate	Duty Cycle correction (dB)
2412	CCK, 1 to 11 Mbps	11	0.2
	Non HT20, 6 to 54 Mbps	6	0.1
	HT/VHT20, M0 to M15	m0	0.1
2422	HT/VHT40, M0 to M15	m0	0.2
2437	HT/VHT40, M0 to M15	m0	0.2
2437	CCK, 1 to 11 Mbps	11	0.2
	Non HT20, 6 to 54 Mbps	6	0.1
	HT/VHT20, M0 to M15	m0	0.1
2452	HT/VHT40, M0 to M15	m0	0.2
2462	CCK, 1 to 11 Mbps	11	0.2
	Non HT20, 6 to 54 Mbps	6	0.1
	HT/VHT20, M0 to M15	m0	0.1

Duty Cycle Data Screenshots

Duty Cycle, 2412 MHz, Non HT20, 6 to 54 Mbps

A.2DTS Bandwidth (6dB Bandwidth)

DTS Bandwidth Test Requirement

For the FCC/ LP0002:3.10.1.6(2)(A):

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.

DTS Bandwidth/ 6dB Bandwidth Test Procedure

Ref. KDB 558074 D01 DTS Meas Guidance v05, Section 8.2

ANSI C63.10: 2013, Clause 11.8.2 Option 2

6 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 v05, Section 8.2

ANSI C63.10: 2013, Clause 11.8.2 Option 2

6 BW

Test parameters

11.8 DTS bandwidth

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

11.8.1 Option 1

The steps for the first option are as follows:

- a) Set RBW = 100 kHz.
- b) Set the VBW $\geq [3 \times \text{RBW}]$.
- 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.

11.8.2 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 in 11.8.1 (i.e., RBW = 100 kHz, VBW $\geq 3 \times \text{RBW}$, and 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.

Samples, Systems, and Modes

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

Tested By : Julian Land	Date of testing: 25-Sep-19 - 25-Sep-19
Test Result : PASS	

Test Equipment

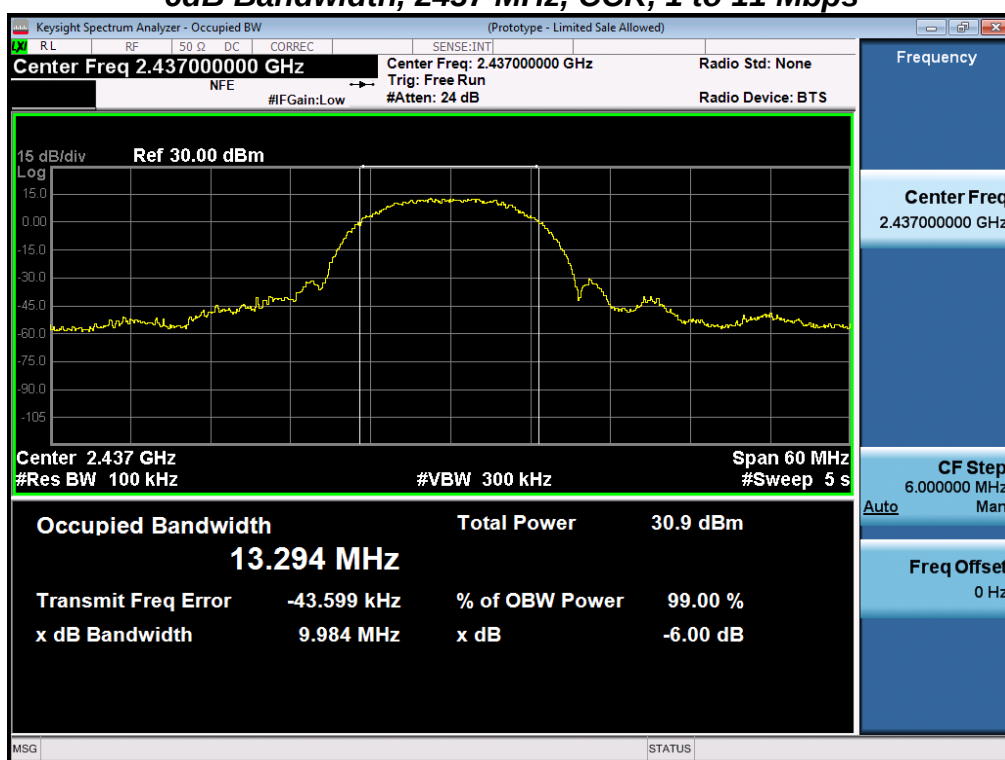
See Appendix B for list of test equipment

DTS BW Table

Frequency (MHz)	Mode	Data Rate	6dB BW (MHz)	Limit	Margin
-----------------	------	-----------	--------------	-------	--------

		(Mbps)		(kHz)	(MHz)
2412	CCK, 1 to 11 Mbps	11	10.3	>50 0	9.80
	Non HT20, 6 to 54 Mbps	6	16.2	>50 0	15.70
	HT/VHT20, M0 to M15	m0	17.3	>50 0	16.80
2422	HT/VHT40, M0 to M15	m0	35.6	>50 0	35.10
2437	HT/VHT40, M0 to M15	m0	35.7	>50 0	35.20
2437	CCK, 1 to 11 Mbps	11	10.0	>50 0	9.50
	Non HT20, 6 to 54 Mbps	6	16.5	>50 0	16.00
	HT/VHT20, M0 to M15	m0	17.6	>50 0	17.10
2452	HT/VHT40, M0 to M15	m0	35.6	>50 0	35.10
2462	CCK, 1 to 11 Mbps	11	10.1	>50 0	9.60
	Non HT20, 6 to 54 Mbps	6	16.4	>50 0	15.90
	HT/VHT20, M0 to M15	m0	17.3	>50 0	16.80

DTS Bandwidth Screenshots

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

A.3 Occupied Bandwidth

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.

Occupied Bandwidth Test Method

Ref. ANSI C63.10: 2013

Occupied Bandwidth

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

Occupied Bandwidth

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).

Samples, Systems, and Modes

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

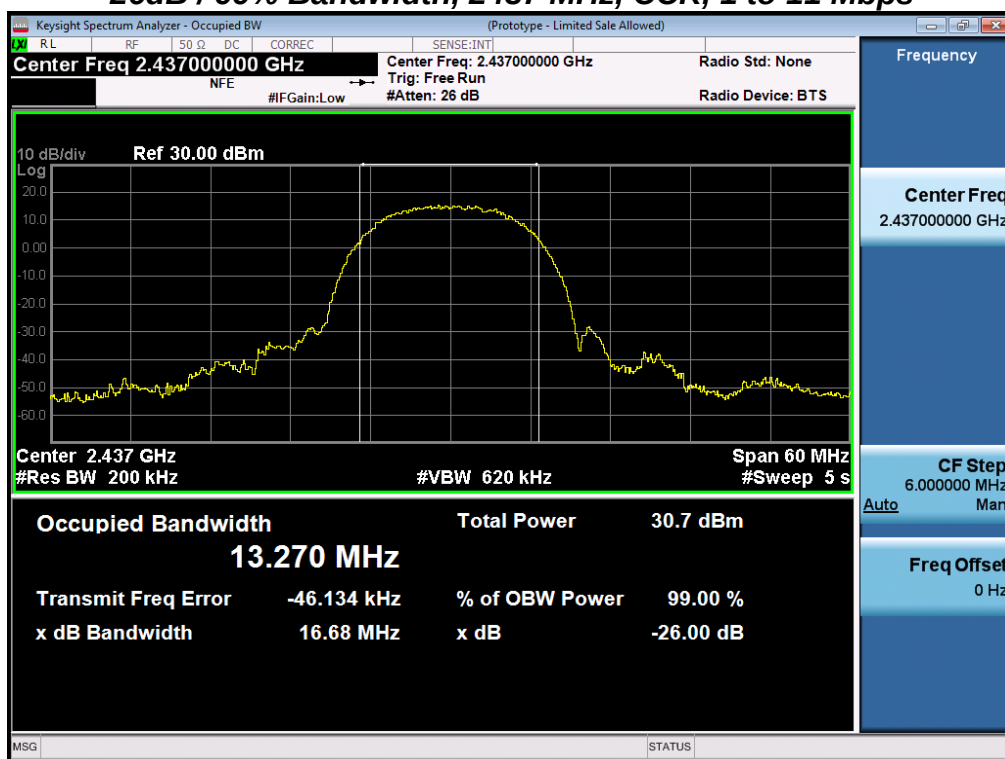
Tested By : Julian Land	Date of testing: 25-Sep-19 - 25-Sep-19
Test Result : PASS	

Test Equipment

See Appendix B for list of test equipment

Occupied Bandwidth

Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
2412	CCK, 1 to 11 Mbps	11	16.7	13.325
	Non HT20, 6 to 54 Mbps	6	19.6	16.590
	HT/VHT20, M0 to M15	m0	20.0	17.628
2422	HT/VHT40, M0 to M15	m0	40.7	36.170
2437	HT/VHT40, M0 to M15	m0	40.8	36.143
2437	CCK, 1 to 11 Mbps	11	16.7	13.270
	Non HT20, 6 to 54 Mbps	6	19.8	16.588
	HT/VHT20, M0 to M15	m0	20.1	17.615
2452	HT/VHT40, M0 to M15	m0	40.3	36.123
2462	CCK, 1 to 11 Mbps	11	16.7	13.342
	Non HT20, 6 to 54 Mbps	6	19.8	16.575
	HT/VHT20, M0 to M15	m0	20.0	17.615

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

A.4 Maximum Conducted Output Power

Maximum Conducted Output Power Test Requirement

FCC, 15.247/ LP0002:3.10.1.2(1)(C):

(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 signalling 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.

The maximum supported antenna gain is 13dBi. The peak correlated gain for each mode is listed in the table below.

Maximum Conducted Output Power Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v05

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 v05, 8.3.2.2 Measurement using a spectrum analyzer (SA)

ANSI C63.10: 2013, section 11.9.2.2.4 Method AVGSA-2

Maximum Conducted Output power

Test parameters

11.9.2.2.4 Method AVGSA-2

Method AVGSA-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction. The procedure for this method is as follows:

- a) Measure the duty cycle D of the transmitter output signal as described in 11.6.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- d) Set VBW $\geq [3 \times \text{RBW}]$.
- e) Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing $\leq \text{RBW} / 2$, 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 the 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 (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, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- k) Add $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power 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 $[10 \log (1/0.25)] = 6 \text{ dB}$ 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)

Samples, Systems, and Modes

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

Tested By : Julian Land	Date of testing: 25-Sep-19 - 25-Sep-19
Test Result : PASS	

Test Equipment

See Appendix B for list of test equipment

Note: Limit is modified to ensure complying with both conducted power limit of 30dBm and eirp limit of 36 dBm

Maximum Output Power

Maximum Conducted Power: Antenna Gain 4dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Duty Cycle Correction (dB)	Total Tx Channel Power (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	4	21.7		0.2	21.9	30.0	8.11
	CCK, 1 to 11 Mbps	2	4	21.7	21.1	0.2	24.6	30.0	5.39
	Non HT20, 6 to 54 Mbps	1	4	20.5		0.1	20.6	30.0	9.40
	Non HT20, 6 to 54 Mbps	2	4	19.5	19.0	0.1	22.4	30.0	7.63
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	18.4	18.3	0.1	21.5	29.0	7.54
	HT/VHT20, M0 to M7	1	4	19.7		0.1	19.8	30.0	10.17
	HT/VHT20, M0 to M7	2	4	19.7	19.2	0.1	22.6	30.0	7.41
	HT/VHT20, M8 to M15	2	4	19.7	19.2	0.1	22.6	30.0	7.41
	HT/VHT20 Beam Forming, M0 to M7	2	7	18.0	17.5	0.1	20.9	29.0	8.11
	HT/VHT20 Beam Forming, M8 to M15	2	4	19.7	19.2	0.1	22.6	30.0	7.41
	HT/VHT20 STBC, M0 to M7	2	4	19.7	19.2	0.1	22.6	30.0	7.41
2422	HT/VHT40, M0 to M7	1	4	18.7		0.2	18.9	30.0	11.10
	HT/VHT40, M0 to M7	2	4	17.1	17.4	0.2	20.5	30.0	9.53
	HT/VHT40, M8 to M15	2	4	17.1	17.4	0.2	20.5	30.0	9.53
	HT/VHT40 Beam Forming, M0 to M7	2	7	15.4	15.7	0.2	18.8	29.0	10.23
	HT/VHT40 Beam Forming, M8 to M15	2	4	17.1	17.4	0.2	20.5	30.0	9.53
	HT/VHT40 STBC, M0 to M7	2	4	17.1	17.4	0.2	20.5	30.0	9.53
2437	HT/VHT40, M0 to M7	1	4	22.2		0.2	22.4	30.0	7.60
	HT/VHT40, M0 to M7	2	4	22.2	22.3	0.2	25.5	30.0	4.53
	HT/VHT40, M8 to M15	2	4	22.2	22.3	0.2	25.5	30.0	4.53

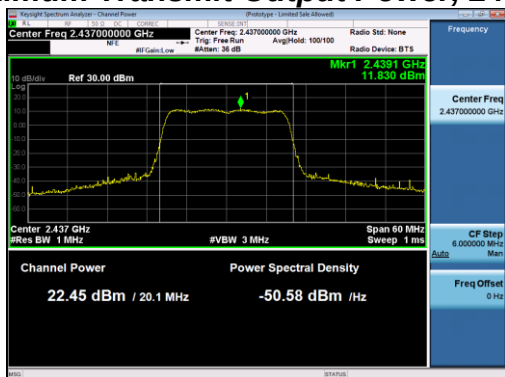
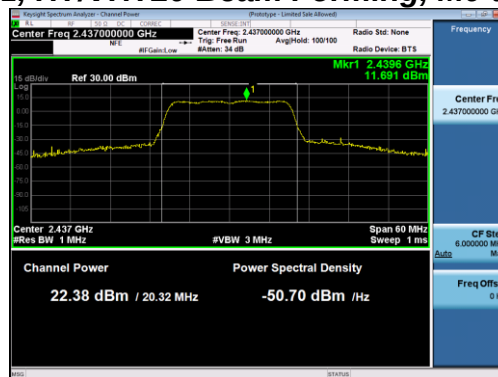
	HT/VHT40 Beam Forming, M0 to M7	2	7	22.2	22.3	0.2	25.5	29.0	3.53
	HT/VHT40 Beam Forming, M8 to M15	2	4	22.2	22.3	0.2	25.5	30.0	4.53
	HT/VHT40 STBC, M0 to M7	2	4	22.2	22.3	0.2	25.5	30.0	4.53
2437	CCK, 1 to 11 Mbps	1	4	22.3		0.2	22.5	30.0	7.51
	CCK, 1 to 11 Mbps	2	4	22.3	22.3	0.2	25.5	30.0	4.50
	Non HT20, 6 to 54 Mbps	1	4	22.4		0.1	22.5	30.0	7.50
	Non HT20, 6 to 54 Mbps	2	4	22.4	22.2	0.1	25.4	30.0	4.58
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	22.4	22.2	0.1	25.4	29.0	3.58
	HT/VHT20, M0 to M7	1	4	22.4		0.1	22.5	30.0	7.47
	HT/VHT20, M0 to M7	2	4	22.4	22.4	0.1	25.5	30.0	4.46
	HT/VHT20, M8 to M15	2	4	22.4	22.4	0.1	25.5	30.0	4.46
	HT/VHT20 Beam Forming, M0 to M7	2	7	22.4	22.4	0.1	25.5	29.0	3.46
	HT/VHT20 Beam Forming, M8 to M15	2	4	22.4	22.4	0.1	25.5	30.0	4.46
	HT/VHT20 STBC, M0 to M7	2	4	22.4	22.4	0.1	25.5	30.0	4.46
2452	HT/VHT40, M0 to M7	1	4	22.2		0.2	22.4	30.0	7.60
	HT/VHT40, M0 to M7	2	4	22.2	22.4	0.2	25.5	30.0	4.48
	HT/VHT40, M8 to M15	2	4	22.2	22.4	0.2	25.5	30.0	4.48
	HT/VHT40 Beam Forming, M0 to M7	2	7	22.2	22.4	0.2	25.5	29.0	3.48
	HT/VHT40 Beam Forming, M8 to M15	2	4	22.2	22.4	0.2	25.5	30.0	4.48
	HT/VHT40 STBC, M0 to M7	2	4	22.2	22.4	0.2	25.5	30.0	4.48
2462	CCK, 1 to 11 Mbps	1	4	21.6		0.2	21.8	30.0	8.21
	CCK, 1 to 11 Mbps	2	4	21.6	21.7	0.2	24.9	30.0	5.15
	Non HT20, 6 to 54 Mbps	1	4	18.1		0.1	18.2	30.0	11.80
	Non HT20, 6 to 54 Mbps	2	4	17.0	17.0	0.1	20.1	30.0	9.89
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	12.5	12.0	0.1	15.4	29.0	13.63
	HT/VHT20, M0 to M7	1	4	17.2		0.1	17.3	30.0	12.67
	HT/VHT20, M0 to M7	2	4	15.6	16.1	0.1	19.0	30.0	11.01
	HT/VHT20, M8 to M15	2	4	15.6	16.1	0.1	19.0	30.0	11.0

									1
HT/VHT20 Beam Forming, M0 to M7	2	7	13.7	14.2	0.1	17.1	29.0	11.9	1
HT/VHT20 Beam Forming, M8 to M15	2	4	15.6	16.1	0.1	19.0	30.0	11.0	1
HT/VHT20 STBC, M0 to M7	2	4	15.6	16.1	0.1	19.0	30.0	11.0	1

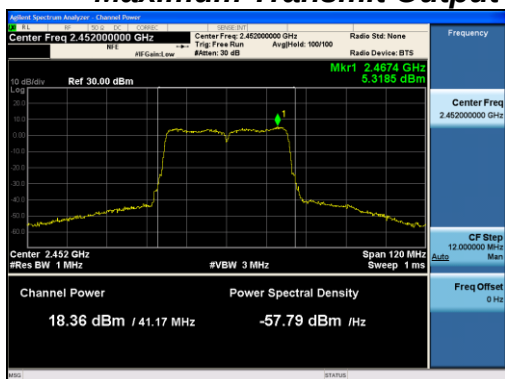
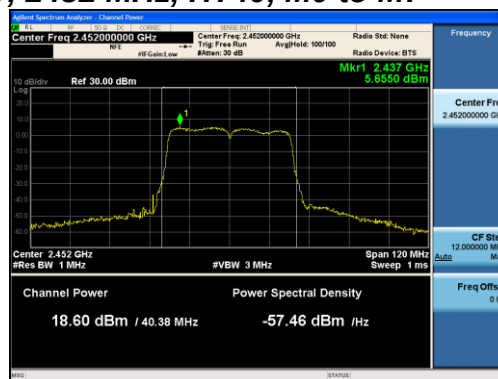
Maximum Conducted Power: Antenna Gain 13dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Duty Cycle Correction (dB)	Total Tx Channel Power (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	13	20.8		0.2	21.0	23.0	2.01
	CCK, 1 to 11 Mbps	2	13	18.8	18.2	0.2	21.7	23.0	1.29
	Non HT20, 6 to 54 Mbps	1	13	15.8		0.1	15.9	23.0	7.10
	Non HT20, 6 to 54 Mbps	2	13	13.9	13.3	0.1	16.7	23.0	6.28
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	13.9	13.3	0.1	16.7	23.0	6.28
	HT20, M0 to M7	1	13	16.0		0.1	16.1	23.0	6.87
	HT20, M0 to M7	2	13	14.1	13.5	0.1	16.9	23.0	6.05
	HT20, M8 to M15	2	13	14.1	13.5	0.1	16.9	23.0	6.05
	HT20 Beam Forming, M0 to M7	2	13	14.1	13.5	0.1	16.9	23.0	6.05
	HT20 Beam Forming, M8 to M15	2	13	14.1	13.5	0.1	16.9	23.0	6.05
	HT20 STBC, M0 to M7	2	13	14.1	13.5	0.1	16.9	23.0	6.05
2422	HT40, M0 to M7	1	13	12.5		0.2	12.7	23.0	10.30
	HT40, M0 to M7	2	13	8.4	8.7	0.2	11.8	23.0	11.23
	HT40, M8 to M15	2	13	8.4	8.7	0.2	11.8	23.0	11.23
	HT40 Beam Forming, M0 to M7	2	13	8.4	8.7	0.2	11.8	23.0	11.23
	HT40 Beam Forming, M8 to M15	2	13	8.4	8.7	0.2	11.8	23.0	11.23
	HT40 STBC, M0 to M7	2	13	8.4	8.7	0.2	11.8	23.0	11.23
2437	HT40, M0 to M7	1	13	20.1		0.2	20.3	23.0	2.70
	HT40, M0 to M7	2	13	18.4	18.4	0.2	21.6	23.0	1.39
	HT40, M8 to M15	2	13	18.4	18.4	0.2	21.6	23.0	1.39
	HT40 Beam Forming, M0 to M7	2	13	18.4	18.4	0.2	21.6	23.0	1.39
	HT40 Beam Forming, M8 to M15	2	13	18.4	18.4	0.2	21.6	23.0	1.39

	HT40 STBC, M0 to M7	2	13	18.4	18.4	0.2	21.6	23.0	1.39
2437	CCK, 1 to 11 Mbps	1	13	20.2		0.2	20.4	23.0	2.61
	CCK, 1 to 11 Mbps	2	13	18.3	18.5	0.2	21.6	23.0	1.40
	Non HT20, 6 to 54 Mbps	1	13	20.2		0.1	20.3	23.0	2.70
	Non HT20, 6 to 54 Mbps	2	13	18.6	18.4	0.1	21.6	23.0	1.38
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	18.6	18.4	0.1	21.6	23.0	1.38
	HT20, M0 to M7	1	13	20.3		0.1	20.4	23.0	2.57
	HT20, M0 to M7	2	13	18.7	18.4	0.1	21.7	23.0	1.31
	HT20, M8 to M15	2	13	18.7	18.4	0.1	21.7	23.0	1.31
	HT20 Beam Forming, M0 to M7	2	13	18.7	18.4	0.1	21.7	23.0	1.31
	HT20 Beam Forming, M8 to M15	2	13	18.7	18.4	0.1	21.7	23.0	1.31
	HT20 STBC, M0 to M7	2	13	18.7	18.4	0.1	21.7	23.0	1.31
2452	HT40, M0 to M7	1	13	20.0		0.2	20.2	23.0	2.80
	HT40, M0 to M7	2	13	18.4	18.6	0.2	21.7	23.0	1.28
	HT40, M8 to M15	2	13	18.4	18.6	0.2	21.7	23.0	1.28
	HT40 Beam Forming, M0 to M7	2	13	18.4	18.6	0.2	21.7	23.0	1.28
	HT40 Beam Forming, M8 to M15	2	13	18.4	18.6	0.2	21.7	23.0	1.28
	HT40 STBC, M0 to M7	2	13	18.4	18.6	0.2	21.7	23.0	1.28
2462	CCK, 1 to 11 Mbps	1	13	19.4		0.2	19.6	23.0	3.41
	CCK, 1 to 11 Mbps	2	13	17.6	17.9	0.2	21.0	23.0	2.05
	Non HT20, 6 to 54 Mbps	1	13	11.3		0.1	11.4	23.0	11.60
	Non HT20, 6 to 54 Mbps	2	13	8.6	7.9	0.1	11.4	23.0	11.62
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	8.6	7.9	0.1	11.4	23.0	11.62
	HT20, M0 to M7	1	13	10.5		0.1	10.6	23.0	12.37
	HT20, M0 to M7	2	13	9.7	10.2	0.1	13.1	23.0	9.91
	HT20, M8 to M15	2	13	9.7	10.2	0.1	13.1	23.0	9.91
	HT20 Beam Forming, M0 to M7	2	13	9.7	10.2	0.1	13.1	23.0	9.91
	HT20 Beam Forming, M8 to M15	2	13	9.7	10.2	0.1	13.1	23.0	9.91
	HT20 STBC, M0 to M7	2	13	9.7	10.2	0.1	13.1	23.0	9.91

Antenna Gain 4dBi
Maximum Transmit Output Power, 2437 MHz, HT/VHT20 Beam Forming, M0 to M7

**Antenna A****Antenna B**

Antenna Gain: 13dBi
Maximum Transmit Output Power, 2452 MHz, HT40, M0 to M7

**Antenna A****Antenna B**

A.5 Power Spectral Density

Power Spectral Density Test Requirement

15.247 (e) / RSS-247 5.2 (b) / LP0002:3.10.1.6(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).

Power Spectral Density Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v05 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. KDB 558074 D01 DTS Meas Guidance v05, section 8.4 DTS maximum power spectral density level in the fundamental emission ANSI C63.10: 2013, section 11.10.5 Average PSD

Power Spectral Density

Test parameters

11.10.5 Method AVGPSD-2

Method AVGPSD-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction.

The following procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., $D < 98\%$), when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than $\pm 2\%$):

- a) Measure the duty cycle (D) of the transmitter output signal as described in 11.6.
- b) Set instrument center frequency to DTS channel center frequency.
- c) Set span to at least 1.5 times the OBW.
- d) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- e) Set VBW $\geq [3 \times \text{RBW}]$.
- f) Detector = power averaging (rms) or sample detector (when rms not available).
- g) Ensure that the number of measurement points in the sweep $\geq [2 \times \text{span} / \text{RBW}]$.
- h) Sweep time = auto couple.
- i) Do not use sweep triggering; allow sweep to "free run."
- j) Employ trace averaging (rms) mode over a minimum of 100 traces.
- k) Use the peak marker function to determine the maximum amplitude level.
- l) Add $[10 \log (1 / D)]$, where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time.
- m) If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

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. (See ANSI C63.10 section 14.3.2.3)

Samples, Systems, and Modes

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

Tested By : Julian Land	Date of testing: 25-Sep-19 - 25-Sep-19
Test Result : PASS	

Test Equipment

See Appendix B for list of test equipment

Power Spectral Density

Maximum Conducted Power: Antenna Gain 4dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 PSD (dBm/3kHz)	Tx 2 PSD (dBm/3kHz)	Duty Cycle Correction (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	4	-3.3		0.2	-3.1	8.0	11.1 1
	CCK, 1 to 11 Mbps	2	7	-3.3	-2.3	0.2	0.4	7.0	6.57
	Non HT20, 6 to 54 Mbps	1	4	-5.7		0.1	-5.6	8.0	13.6 0
	Non HT20, 6 to 54 Mbps	2	7	-6.4	-6.4	0.1	-3.3	7.0	10.2 9
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-6.8	-6.3	0.1	-3.4	7.0	10.4 3
	HT/VHT20, M0 to M7	1	4	-5.8		0.1	-5.7	8.0	13.6 7
	HT/VHT20, M0 to M7	2	7	-5.8	-5.0	0.1	-2.2	7.0	9.25
	HT/VHT20, M8 to M15	2	4	-5.8	-5.0	0.1	-2.2	8.0	10.2 5
	HT/VHT20 Beam Forming, M0 to M7	2	7	-7.0	-7.7	0.1	-4.2	7.0	11.2 0
	HT/VHT20 Beam Forming, M8 to M15	2	4	-5.8	-5.0	0.1	-2.2	8.0	10.2 5
	HT/VHT20 STBC, M0 to M7	2	4	-5.8	-5.0	0.1	-2.2	8.0	10.2 5
2422	HT/VHT40, M0 to M7	1	4	-8.1		0.2	-7.9	8.0	15.9 0
	HT/VHT40, M0 to M7	2	7	-11.8	-10.9	0.2	-8.1	7.0	15.1 1
	HT/VHT40, M8 to M15	2	4	-11.8	-10.9	0.2	-8.1	8.0	16.1 1
	HT/VHT40 Beam Forming, M0 to M7	2	7	-12.7	-12.5	0.2	-9.4	7.0	16.3 8
	HT/VHT40 Beam Forming, M8 to	2	4	-11.	-10.	0.2	-8.1	8.0	16.1

	M15			8	9				1
	HT/VHT40 STBC, M0 to M7	2	4	-11.8	-10.9	0.2	-8.1	8.0	16.11
2437	HT/VHT40, M0 to M7	1	4	-5.7		0.2	-5.5	8.0	13.50
	HT/VHT40, M0 to M7	2	7	-5.7	-6.1	0.2	-2.7	7.0	9.68
	HT/VHT40, M8 to M15	2	4	-5.7	-6.1	0.2	-2.7	8.0	10.68
	HT/VHT40 Beam Forming, M0 to M7	2	7	-5.7	-6.1	0.2	-2.7	7.0	9.68
	HT/VHT40 Beam Forming, M8 to M15	2	4	-5.7	-6.1	0.2	-2.7	8.0	10.68
	HT/VHT40 STBC, M0 to M7	2	4	-5.7	-6.1	0.2	-2.7	8.0	10.68
2437	CCK, 1 to 11 Mbps	1	4	-2.0		0.2	-1.8	8.0	9.81
	CCK, 1 to 11 Mbps	2	7	-2.0	-2.2	0.2	1.1	7.0	5.90
	Non HT20, 6 to 54 Mbps	1	4	-3.4		0.1	-3.3	8.0	11.30
	Non HT20, 6 to 54 Mbps	2	7	-3.4	-3.1	0.1	-0.1	7.0	7.13
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-3.4	-3.1	0.1	-0.1	7.0	7.13
	HT/VHT20, M0 to M7	1	4	-2.9		0.1	-2.8	8.0	10.77
	HT/VHT20, M0 to M7	2	7	-2.9	-3.2	0.1	0.1	7.0	6.91
	HT/VHT20, M8 to M15	2	4	-2.9	-3.2	0.1	0.1	8.0	7.91
	HT/VHT20 Beam Forming, M0 to M7	2	7	-2.9	-3.2	0.1	0.1	7.0	6.91
	HT/VHT20 Beam Forming, M8 to M15	2	4	-2.9	-3.2	0.1	0.1	8.0	7.91
	HT/VHT20 STBC, M0 to M7	2	4	-2.9	-3.2	0.1	0.1	8.0	7.91
2452	HT/VHT40, M0 to M7	1	4	-6.1		0.2	-5.9	8.0	13.90
	HT/VHT40, M0 to M7	2	7	-6.1	-4.9	0.2	-2.2	7.0	9.24
	HT/VHT40, M8 to M15	2	4	-6.1	-4.9	0.2	-2.2	8.0	10.24
	HT/VHT40 Beam Forming, M0 to M7	2	7	-6.1	-4.9	0.2	-2.2	7.0	9.24
	HT/VHT40 Beam Forming, M8 to M15	2	4	-6.1	-4.9	0.2	-2.2	8.0	10.24

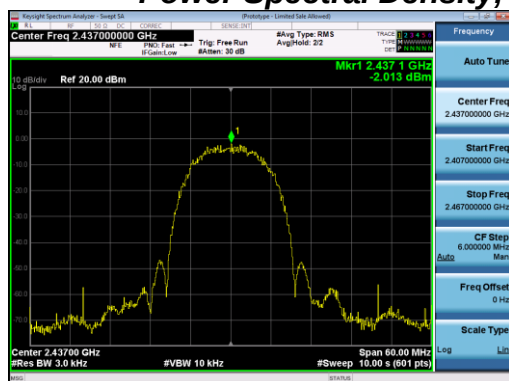
	HT/VHT40 STBC, M0 to M7	2	4	-6.1	-4.9	0.2	-2.2	8.0	10.2 4
2462	CCK, 1 to 11 Mbps	1	4	-3.1		0.2	-2.9	8.0	10.9 1
	CCK, 1 to 11 Mbps	2	7	-3.1	-2.9	0.2	0.2	7.0	6.80
	Non HT20, 6 to 54 Mbps	1	4	-7.2		0.1	-7.1	8.0	15.1 0
	Non HT20, 6 to 54 Mbps	2	7	-8.9	-8.8	0.1	-5.7	7.0	12.7 4
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-13.2	-14.0	0.1	-10.5	7.0	17.4 7
	HT/VHT20, M0 to M7	1	4	-7.9		0.1	-7.8	8.0	15.7 7
	HT/VHT20, M0 to M7	2	7	-10.3	-9.4	0.1	-6.7	7.0	13.6 9
	HT/VHT20, M8 to M15	2	4	-10.3	-9.4	0.1	-6.7	8.0	14.6 9
	HT/VHT20 Beam Forming, M0 to M7	2	7	-11.1	-10.9	0.1	-7.9	7.0	14.8 6
	HT/VHT20 Beam Forming, M8 to M15	2	4	-10.3	-9.4	0.1	-6.7	8.0	14.6 9
	HT/VHT20 STBC, M0 to M7	2	4	-10.3	-9.4	0.1	-6.7	8.0	14.6 9

Maximum Conducted Power: Antenna Gain 13dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 PSD (dBm/3kHz)	Tx 2 PSD (dBm/3kHz)	Duty Cycle Correction (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	13	-4.3		0.2	-4.1	1.0	5.11
	CCK, 1 to 11 Mbps	2	13	-5.8	-6.1	0.2	-2.7	1.0	3.75
	Non HT20, 6 to 54 Mbps	1	13	-10.0		0.1	-9.9	1.0	10.90
	Non HT20, 6 to 54 Mbps	2	13	-11.7	-10.5	0.1	-7.9	1.0	8.94
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-11.7	-10.5	0.1	-7.9	1.0	8.94
	HT20, M0 to M7	1	13	-9.7		0.1	-9.6	1.0	10.57
	HT20, M0 to M7	2	13	-9.8	-12.4	0.1	-7.8	1.0	8.77
	HT20, M8 to M15	2	13	-9.8	-12.4	0.1	-7.8	1.0	8.77
	HT20 Beam Forming, M0 to M7	2	13	-9.8	-12.4	0.1	-7.8	1.0	8.77
	HT20 Beam Forming, M8 to M15	2	13	-9.8	-12.4	0.1	-7.8	1.0	8.77
	HT20 STBC, M0 to M7	2	13	-9.8	-12.4	0.1	-7.8	1.0	8.77
2422	HT40, M0 to M7	1	13	-15.9		0.2	-15.7	1.0	16.70
	HT40, M0 to M7	2	13	-18.2	-18.7	0.2	-15.2	1.0	16.23
	HT40, M8 to M15	2	13	-18.2	-18.7	0.2	-15.2	1.0	16.23
	HT40 Beam Forming, M0 to M7	2	13	-18.2	-18.7	0.2	-15.2	1.0	16.23
	HT40 Beam Forming, M8 to M15	2	13	-18.2	-18.7	0.2	-15.2	1.0	16.23

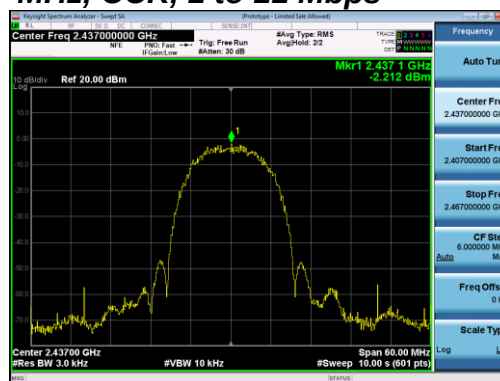
	HT40 STBC, M0 to M7	2	13	-18.2	-18.7	0.2	-15.2	1.0	16.23
2437	HT40, M0 to M7	1	13	-7.9		0.2	-7.7	1.0	8.70
	HT40, M0 to M7	2	13	-9.8	-9.1	0.2	-6.2	1.0	7.22
	HT40, M8 to M15	2	13	-9.8	-9.1	0.2	-6.2	1.0	7.22
	HT40 Beam Forming, M0 to M7	2	13	-9.8	-9.1	0.2	-6.2	1.0	7.22
	HT40 Beam Forming, M8 to M15	2	13	-9.8	-9.1	0.2	-6.2	1.0	7.22
	HT40 STBC, M0 to M7	2	13	-9.8	-9.1	0.2	-6.2	1.0	7.22
2437	CCK, 1 to 11 Mbps	1	13	-3.4		0.2	-3.2	1.0	4.21
	CCK, 1 to 11 Mbps	2	13	-6.6	-5.3	0.2	-2.7	1.0	3.70
	Non HT20, 6 to 54 Mbps	1	13	-5.8		0.1	-5.7	1.0	6.70
	Non HT20, 6 to 54 Mbps	2	13	-5.9	-6.7	0.1	-3.2	1.0	4.17
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-5.9	-6.7	0.1	-3.2	1.0	4.17
	HT20, M0 to M7	1	13	-5.7		0.1	-5.6	1.0	6.57
	HT20, M0 to M7	2	13	-7.2	-7.3	0.1	-4.1	1.0	5.11
	HT20, M8 to M15	2	13	-7.2	-7.3	0.1	-4.1	1.0	5.11
	HT20 Beam Forming, M0 to M7	2	13	-7.2	-7.3	0.1	-4.1	1.0	5.11
	HT20 Beam Forming, M8 to M15	2	13	-7.2	-7.3	0.1	-4.1	1.0	5.11
	HT20 STBC, M0 to M7	2	13	-7.2	-7.3	0.1	-4.1	1.0	5.11
2452	HT40, M0 to M7	1	13	-8.0		0.2	-7.8	1.0	8.80
	HT40, M0 to M7	2	13	-9.3	-8.8	0.2	-5.8	1.0	6.83
	HT40, M8 to M15	2	13	-9.3	-8.8	0.2	-5.8	1.0	6.83
	HT40 Beam Forming, M0 to M7	2	13	-9.3	-8.8	0.2	-5.8	1.0	6.83
	HT40 Beam Forming, M8 to M15	2	13	-9.3	-8.8	0.2	-5.8	1.0	6.83
	HT40 STBC, M0 to M7	2	13	-9.3	-8.8	0.2	-5.8	1.0	6.83
2462	CCK, 1 to 11 Mbps	1	13	-5.0		0.2	-4.8	1.0	5.81
	CCK, 1 to 11 Mbps	2	13	-6.8	-6.9	0.2	-3.6	1.0	4.65
	Non HT20, 6 to 54 Mbps	1	13	-13.9		0.1	-13.8	1.0	14.80
	Non HT20, 6 to 54 Mbps	2	13	-16.8	-17.4	0.1	-14.0	1.0	14.98
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-16.8	-17.4	0.1	-14.0	1.0	14.98
	HT20, M0 to M7	1	13	-14.7		0.1	-14.6	1.0	15.57
	HT20, M0 to M7	2	13	-15.3	-14.1	0.1	-11.5	1.0	12.52
	HT20, M0 to M7	2	13	-15.3	-14.1	0.1	-11.5	1.0	12.52

	HT20, M8 to M15	2	13	-15. 3	-14. 1	0.1	-11. 5	1.0	12.5 2
	HT20 Beam Forming, M0 to M7	2	13	-15. 3	-14. 1	0.1	-11. 5	1.0	12.5 2
	HT20 Beam Forming, M8 to M15	2	13	-15. 3	-14. 1	0.1	-11. 5	1.0	12.5 2
	HT20 STBC, M0 to M7	2	13	-15. 3	-14. 1	0.1	-11. 5	1.0	12.5 2

Antenna Gain: 4dBi
Power Spectral Density, 2437 MHz, CCK, 1 to 11 Mbps

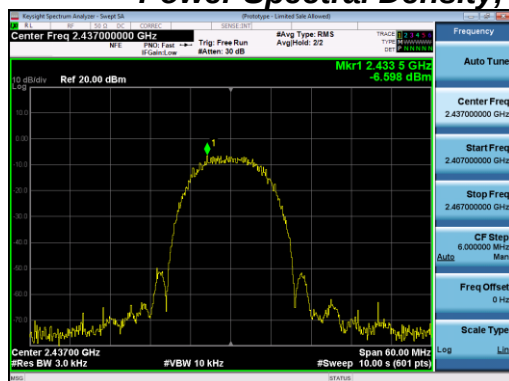


Antenna A

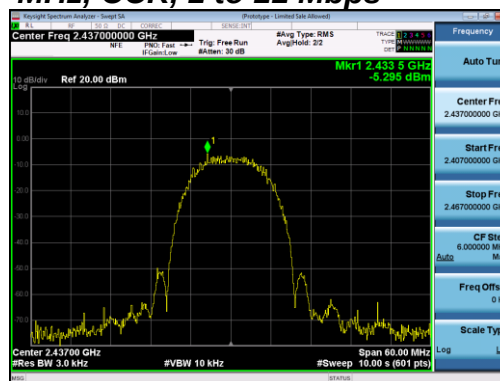


Antenna B

Antenna Gain: 13dBi
Power Spectral Density, 2437 MHz, CCK, 1 to 11 Mbps



Antenna A



Antenna B

A.6 Conducted Spurious Emissions

Conducted Spurious Emissions Test Requirement

15.205 / RSS-Gen / LP00023.10.1.5(1)(2)

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.

Use formula below to substitute conducted measurements in place of radiated measurements

$$E[\text{dB}\mu\text{V/m}] = \text{EIRP}[\text{dBm}] - 20 \log(d[\text{meters}]) + 104.77, \text{ where } E = \text{field strength and } d = 3 \text{ meter}$$

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

Conducted Spurious Emissions Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v05

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 peak 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. KDB 558074 D01 DTS Meas Guidance v05, section 8.1 c) 3, section 8.6 DTS emissions in restricted frequency bands

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 26.5GHz / 26.5GHz to 40GHz	Span = 30MHz to 26.5GHz / 26.5GHz to 40GHz
RBW = 1 MHz	RBW = 1 MHz
VBW ≥ 3 MHz	VBW ≥ 3 MHz

Sweep = Auto Detector = Peak Trace = Max Hold.	Sweep = Auto Detector = RMS Power Averaging
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ANSI C63.10: 2013 section 11.12.2.2 c) 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).

Samples, Systems, and Modes

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

Tested By : Julian Land	Date of testing: 25-Sep-19 - 25-Sep-19
Test Result : PASS	

Test Equipment

See Appendix B for list of test equipment

Conducted Spurious Average Table

Antenna Gain: 4dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Duty Cycle Correction (dB)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	4	-70.7		0.2	-66.5	-41.25	25.26
	CCK, 1 to 11 Mbps	2	4	-70.7	-71.2	0.2	-63.7	-41.25	22.49
	Non HT20, 6 to 54 Mbps	1	4	-71.2		0.1	-67.1	-41.25	25.85
	Non HT20, 6 to 54 Mbps	2	4	-71.5	-71.7	0.1	-64.5	-41.25	23.23
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-71.6	-71.7	0.1	-61.5	-41.25	20.29
	HT/VHT20, M0 to M7	1	4	-71.5		0.1	-67.4	-41.25	26.12
	HT/VHT20, M0 to M7	2	4	-71.5	-71.9	0.1	-64.6	-41.25	23.31
	HT/VHT20, M8 to M15	2	4	-71.5	-71.9	0.1	-64.6	-41.25	23.31
	HT/VHT20 Beam Forming, M0 to M7	2	7	-72.0	-72.0	0.1	-61.9	-41.25	20.61
	HT/VHT20 Beam Forming, M8 to M15	2	4	-71.5	-71.9	0.1	-64.6	-41.25	23.31
	HT/VHT20 STBC, M0 to M7	2	4	-71.5	-71.9	0.1	-64.6	-41.25	23.31
2422	HT/VHT40, M0 to M7	1	4	-75.4		0.2	-71.2	-41.25	29.95
	HT/VHT40, M0 to M7	2	4	-76.1	-79.7	0.2	-70.3	-41.25	29.07
	HT/VHT40, M8 to M15	2	4	-76.1	-79.7	0.2	-70.3	-41.25	29.07
	HT/VHT40 Beam Forming, M0 to	2	7	-77.1	-79.7	0.2	-68.1	-41.25	26.71

	M7			0	8		0	5	1
	HT/VHT40 Beam Forming, M8 to M15	2	4	-76.1	-79.7	0.2	-70.3	-41.25	29.07
	HT/VHT40 STBC, M0 to M7	2	4	-76.1	-79.7	0.2	-70.3	-41.25	29.07
2437	HT/VHT40, M0 to M7	1	4	-74.6		0.2	-70.4	-41.25	29.15
	HT/VHT40, M0 to M7	2	4	-74.6	-72.1	0.2	-66.0	-41.25	24.71
	HT/VHT40, M8 to M15	2	4	-74.6	-72.1	0.2	-66.0	-41.25	24.71
	HT/VHT40 Beam Forming, M0 to M7	2	7	-74.6	-72.1	0.2	-63.0	-41.25	21.71
	HT/VHT40 Beam Forming, M8 to M15	2	4	-74.6	-72.1	0.2	-66.0	-41.25	24.71
	HT/VHT40 STBC, M0 to M7	2	4	-74.6	-72.1	0.2	-66.0	-41.25	24.71
2437	CCK, 1 to 11 Mbps	1	4	-70.6		0.2	-66.4	-41.25	25.16
	CCK, 1 to 11 Mbps	2	4	-70.6	-71.3	0.2	-63.7	-41.25	22.49
	Non HT20, 6 to 54 Mbps	1	4	-70.2		0.1	-66.1	-41.25	24.85
	Non HT20, 6 to 54 Mbps	2	4	-70.2	-70.8	0.1	-63.4	-41.25	22.13
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-70.2	-70.8	0.1	-60.4	-41.25	19.13
	HT/VHT20, M0 to M7	1	4	-70.2		0.1	-66.1	-41.25	24.82
	HT/VHT20, M0 to M7	2	4	-70.2	-71.0	0.1	-63.4	-41.25	22.20
	HT/VHT20, M8 to M15	2	4	-70.2	-71.0	0.1	-63.4	-41.25	22.20
	HT/VHT20 Beam Forming, M0 to M7	2	7	-70.2	-71.0	0.1	-60.4	-41.25	19.20
	HT/VHT20 Beam Forming, M8 to M15	2	4	-70.2	-71.0	0.1	-63.4	-41.25	22.20
	HT/VHT20 STBC, M0 to M7	2	4	-70.2	-71.0	0.1	-63.4	-41.25	22.20
45	HT/VHT40, M0 to M7	1	4	-73.		0.2	-69.	-41.2	28.4

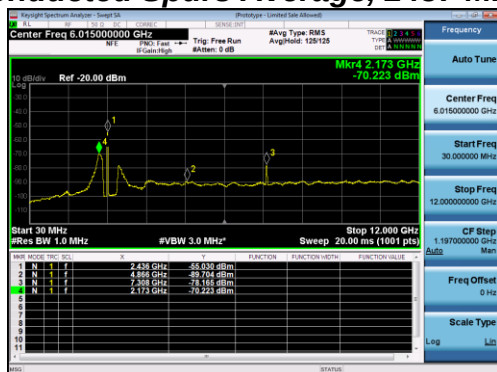
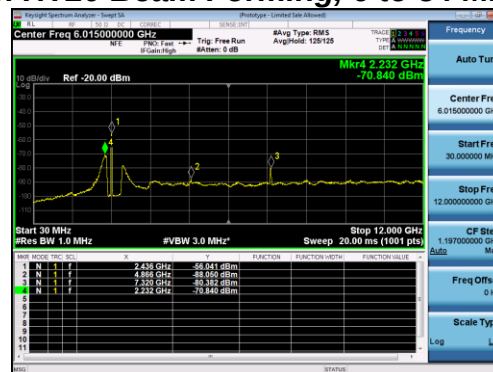
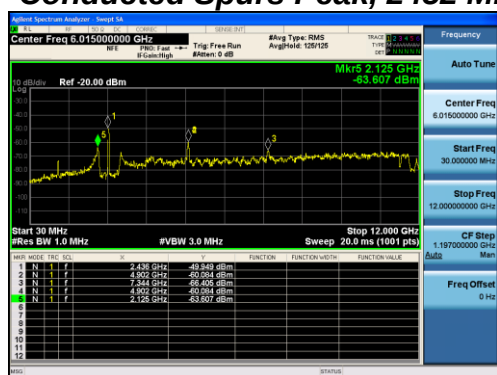
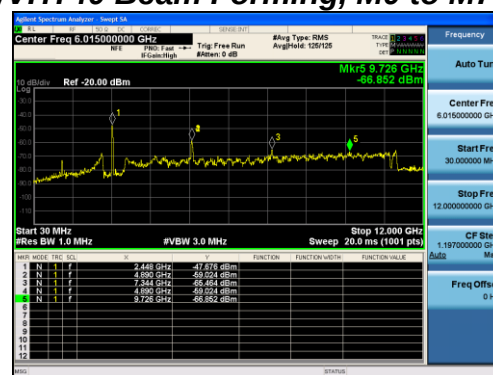
				9			7	5	5
	HT/VHT40, M0 to M7	2	4	-73.9	-71.2	0.2	-65.1	-41.25	23.88
	HT/VHT40, M8 to M15	2	4	-73.9	-71.2	0.2	-65.1	-41.25	23.88
	HT/VHT40 Beam Forming, M0 to M7	2	7	-73.9	-71.2	0.2	-62.1	-41.25	20.88
	HT/VHT40 Beam Forming, M8 to M15	2	4	-73.9	-71.2	0.2	-65.1	-41.25	23.88
	HT/VHT40 STBC, M0 to M7	2	4	-73.9	-71.2	0.2	-65.1	-41.25	23.88
2462	CCK, 1 to 11 Mbps	1	4	-67.8		0.2	-63.6	-41.25	22.36
	CCK, 1 to 11 Mbps	2	4	-67.8	-70.8	0.2	-61.8	-41.25	20.60
	Non HT20, 6 to 54 Mbps	1	4	-77.2		0.1	-73.1	-41.25	31.85
	Non HT20, 6 to 54 Mbps	2	4	-77.6	-71.9	0.1	-66.8	-41.25	25.51
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-78.1	-72.5	0.1	-64.3	-41.25	23.09
	HT/VHT20, M0 to M7	1	4	-77.5		0.1	-73.4	-41.25	32.12
	HT/VHT20, M0 to M7	2	4	-77.8	-80.5	0.1	-71.8	-41.25	30.56
	HT/VHT20, M8 to M15	2	4	-77.8	-80.5	0.1	-71.8	-41.25	30.56
	HT/VHT20 Beam Forming, M0 to M7	2	7	-77.9	-80.2	0.1	-68.8	-41.25	27.51
	HT/VHT20 Beam Forming, M8 to M15	2	4	-77.8	-80.5	0.1	-71.8	-41.25	30.56
	HT/VHT20 STBC, M0 to M7	2	4	-77.8	-80.5	0.1	-71.8	-41.25	30.56

Conducted Spurious Peak Table

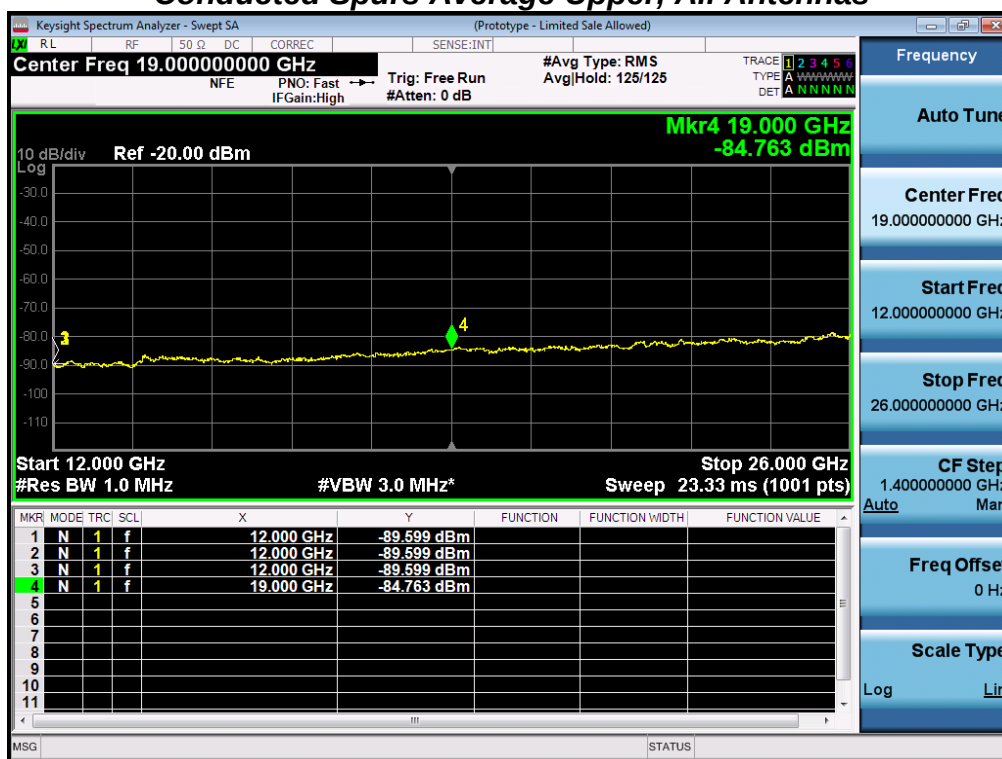
Antenna Gain: 4dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Duty Cycle Correction (dB)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	4	-68.8		0.2	-64.6	-21.25	43.36
	CCK, 1 to 11 Mbps	2	4	-68.8	-69.2	0.2	-61.8	-21.25	40.55
	Non HT20, 6 to 54 Mbps	1	4	-68.7		0.1	-64.6	-21.25	43.35
	Non HT20, 6 to 54 Mbps	2	4	-68.3	-68.9	0.1	-61.5	-21.25	40.23
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-68.3	-67.6	0.1	-57.8	-21.25	36.57
	HT/VHT20, M0 to M7	1	4	-68.9		0.1	-64.8	-21.25	43.52
	HT/VHT20, M0 to M7	2	4	-68.9	-68.0	0.1	-61.3	-21.25	40.04
	HT/VHT20, M8 to M15	2	4	-68.9	-68.0	0.1	-61.3	-21.25	40.04
	HT/VHT20 Beam Forming, M0 to M7	2	7	-69.0	-68.7	0.1	-58.7	-21.25	37.46
	HT/VHT20 Beam Forming, M8 to M15	2	4	-68.9	-68.0	0.1	-61.3	-21.25	40.04
2422	HT/VHT20 STBC, M0 to M7	2	4	-68.9	-68.0	0.1	-61.3	-21.25	40.04
	HT/VHT40, M0 to M7	1	4	-66.3		0.2	-62.1	-21.25	40.85
	HT/VHT40, M0 to M7	2	4	-66.8	-66.7	0.2	-59.5	-21.25	38.28
	HT/VHT40, M8 to M15	2	4	-66.8	-66.7	0.2	-59.5	-21.25	38.28
	HT/VHT40 Beam Forming, M0 to	2	7	-66.	-66.	0.2	-56.	-21.2	35.1

	M7			5	7		4	5	3
	HT/VHT40 Beam Forming, M8 to M15	2	4	-66.8	-66.7	0.2	-59.5	-21.25	38.28
	HT/VHT40 STBC, M0 to M7	2	4	-66.8	-66.7	0.2	-59.5	-21.25	38.28
2437	HT/VHT40, M0 to M7	1	4	-61.1		0.2	-56.9	-21.25	35.65
	HT/VHT40, M0 to M7	2	4	-61.1	-60.0	0.2	-53.3	-21.25	32.05
	HT/VHT40, M8 to M15	2	4	-61.1	-60.0	0.2	-53.3	-21.25	32.05
	HT/VHT40 Beam Forming, M0 to M7	2	7	-61.1	-60.0	0.2	-50.3	-21.25	29.05
	HT/VHT40 Beam Forming, M8 to M15	2	4	-61.1	-60.0	0.2	-53.3	-21.25	32.05
	HT/VHT40 STBC, M0 to M7	2	4	-61.1	-60.0	0.2	-53.3	-21.25	32.05
2437	CCK, 1 to 11 Mbps	1	4	-66.4		0.2	-62.2	-21.25	40.96
	CCK, 1 to 11 Mbps	2	4	-66.4	-67.8	0.2	-59.8	-21.25	38.59
	Non HT20, 6 to 54 Mbps	1	4	-61.9		0.1	-57.8	-21.25	36.55
	Non HT20, 6 to 54 Mbps	2	4	-61.9	-66.5	0.1	-56.5	-21.25	35.25
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-61.9	-66.5	0.1	-53.5	-21.25	32.25
	HT/VHT20, M0 to M7	1	4	-62.1		0.1	-58.0	-21.25	36.72
	HT/VHT20, M0 to M7	2	4	-62.1	-66.3	0.1	-56.6	-21.25	35.32
	HT/VHT20, M8 to M15	2	4	-62.1	-66.3	0.1	-56.6	-21.25	35.32
	HT/VHT20 Beam Forming, M0 to M7	2	7	-62.1	-66.3	0.1	-53.6	-21.25	32.32
	HT/VHT20 Beam Forming, M8 to M15	2	4	-62.1	-66.3	0.1	-56.6	-21.25	35.32
	HT/VHT20 STBC, M0 to M7	2	4	-62.1	-66.3	0.1	-56.6	-21.25	35.32
45	HT/VHT40, M0 to M7	1	4	-60.		0.2	-55.	-21.2	34.6

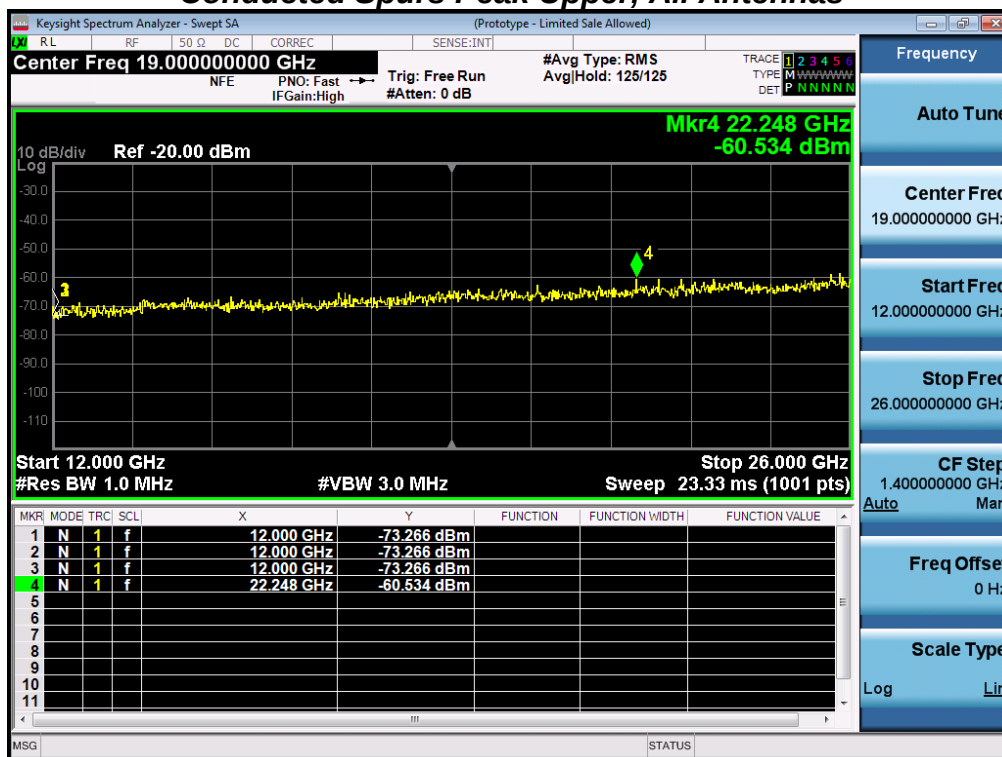
				1			9	5	5
	HT/VHT40, M0 to M7	2	4	-60.1	-59.0	0.2	-52.3	-21.25	31.05
	HT/VHT40, M8 to M15	2	4	-60.1	-59.0	0.2	-52.3	-21.25	31.05
	HT/VHT40 Beam Forming, M0 to M7	2	7	-60.1	-59.0	0.2	-49.3	-21.25	28.05
	HT/VHT40 Beam Forming, M8 to M15	2	4	-60.1	-59.0	0.2	-52.3	-21.25	31.05
	HT/VHT40 STBC, M0 to M7	2	4	-60.1	-59.0	0.2	-52.3	-21.25	31.05
2462	CCK, 1 to 11 Mbps	1	4	-65.9		0.2	-61.7	-21.25	40.46
	CCK, 1 to 11 Mbps	2	4	-65.9	-65.8	0.2	-58.6	-21.25	37.40
	Non HT20, 6 to 54 Mbps	1	4	-67.1		0.1	-63.0	-21.25	41.75
	Non HT20, 6 to 54 Mbps	2	4	-64.8	-66.8	0.1	-58.6	-21.25	37.32
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-66.9	-68.9	0.1	-57.7	-21.25	36.42
	HT/VHT20, M0 to M7	1	4	-66.1		0.1	-62.0	-21.25	40.72
	HT/VHT20, M0 to M7	2	4	-66.3	-65.9	0.1	-59.0	-21.25	37.71
	HT/VHT20, M8 to M15	2	4	-66.3	-65.9	0.1	-59.0	-21.25	37.71
	HT/VHT20 Beam Forming, M0 to M7	2	7	-65.5	-66.2	0.1	-55.7	-21.25	34.45
	HT/VHT20 Beam Forming, M8 to M15	2	4	-66.3	-65.9	0.1	-59.0	-21.25	37.71
	HT/VHT20 STBC, M0 to M7	2	4	-66.3	-65.9	0.1	-59.0	-21.25	37.71

Conducted Spurs Average, 2437 MHz, Non HT20 Beam Forming, 6 to 54 Mbps**Antenna A****Antenna B****Conducted Spurs Peak, 2452 MHz, HT/VHT40 Beam Forming, M0 to M7****Antenna A****Antenna B**

Conducted Spurs Average Upper, All Antennas



Conducted Spurs Peak Upper, All Antennas



Conducted Spurious Average Table

Antenna Gain: 13dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Duty Cycle Correction (dB)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	13	-71. 0		0.2	-57. 8	-41.2 5	16.5 6
	CCK, 1 to 11 Mbps	2	13	-71. 5	-71. 8	0.2	-55. 4	-41.2 5	14.2 0
	Non HT20, 6 to 54 Mbps	1	13	-72. 4		0.1	-59. 3	-41.2 5	18.0 5
	Non HT20, 6 to 54 Mbps	2	13	-72. 7	-72. 5	0.1	-56. 5	-41.2 5	15.2 3
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-72. 7	-72. 5	0.1	-56. 5	-41.2 5	15.2 3
	HT20, M0 to M7	1	13	-72. 2		0.1	-59. 1	-41.2 5	17.8 2
	HT20, M0 to M7	2	13	-72. 6	-72. 6	0.1	-56. 5	-41.2 5	15.2 1
	HT20, M8 to M15	2	13	-72. 6	-72. 6	0.1	-56. 5	-41.2 5	15.2 1
	HT20 Beam Forming, M0 to M7	2	13	-72. 6	-72. 6	0.1	-56. 5	-41.2 5	15.2 1
	HT20 Beam Forming, M8 to M15	2	13	-72. 6	-72. 6	0.1	-56. 5	-41.2 5	15.2 1
	HT20 STBC, M0 to M7	2	13	-72. 6	-72. 6	0.1	-56. 5	-41.2 5	15.2 1
2422	HT40, M0 to M7	1	13	-77. 7		0.2	-64. 5	-41.2 5	23.2 5
	HT40, M0 to M7	2	13	-77. 9	-80. 4	0.2	-62. 8	-41.2 5	21.5 1
	HT40, M8 to M15	2	13	-77. 9	-80. 4	0.2	-62. 8	-41.2 5	21.5 1

	HT40 Beam Forming, M0 to M7	2	13	-77. 9	-80. 4	0.2	-62. 8	-41.2 5	21.5 1
	HT40 Beam Forming, M8 to M15	2	13	-77. 9	-80. 4	0.2	-62. 8	-41.2 5	21.5 1
	HT40 STBC, M0 to M7	2	13	-77. 9	-80. 4	0.2	-62. 8	-41.2 5	21.5 1
2437	HT40, M0 to M7	1	13	-75. 5		0.2	-62. 3	-41.2 5	21.0 5
	HT40, M0 to M7	2	13	-76. 4	-79. 6	0.2	-61. 5	-41.2 5	20.2 5
	HT40, M8 to M15	2	13	-76. 4	-79. 6	0.2	-61. 5	-41.2 5	20.2 5
	HT40 Beam Forming, M0 to M7	2	13	-76. 4	-79. 6	0.2	-61. 5	-41.2 5	20.2 5
	HT40 Beam Forming, M8 to M15	2	13	-76. 4	-79. 6	0.2	-61. 5	-41.2 5	20.2 5
	HT40 STBC, M0 to M7	2	13	-76. 4	-79. 6	0.2	-61. 5	-41.2 5	20.2 5

2437	CCK, 1 to 11 Mbps	1	13	-71. 4		0.2	-58. 2	-41.2 5	16.9 6
	CCK, 1 to 11 Mbps	2	13	-71. 8	-71. 9	0.2	-55. 6	-41.2 5	14.4 0
	Non HT20, 6 to 54 Mbps	1	13	-71. 2		0.1	-58. 1	-41.2 5	16.8 5
	Non HT20, 6 to 54 Mbps	2	13	-71. 6	-71. 9	0.1	-55. 6	-41.2 5	14.3 8
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-71. 6	-71. 9	0.1	-55. 6	-41.2 5	14.3 8
	HT20, M0 to M7	1	13	-71. 1		0.1	-58. 0	-41.2 5	16.7 2
	HT20, M0 to M7	2	13	-71. 6	-71. 9	0.1	-55. 6	-41.2 5	14.3 6
	HT20, M8 to M15	2	13	-71. 6	-71. 9	0.1	-55. 6	-41.2 5	14.3 6
	HT20 Beam Forming, M0 to M7	2	13	-71. 6	-71. 9	0.1	-55. 6	-41.2 5	14.3 6
	HT20 Beam Forming, M8 to M15	2	13	-71. 6	-71. 9	0.1	-55. 6	-41.2 5	14.3 6
	HT20 STBC, M0 to M7	2	13	-71. 6	-71. 9	0.1	-55. 6	-41.2 5	14.3 6

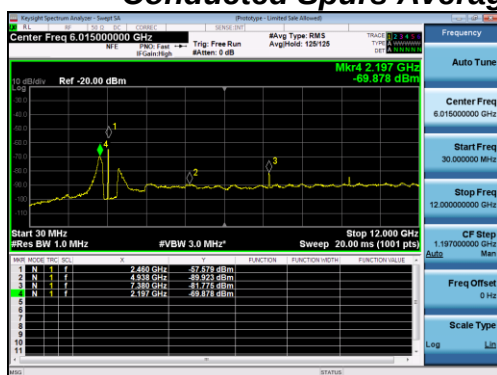
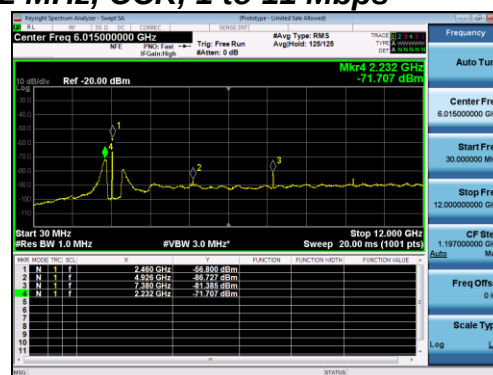
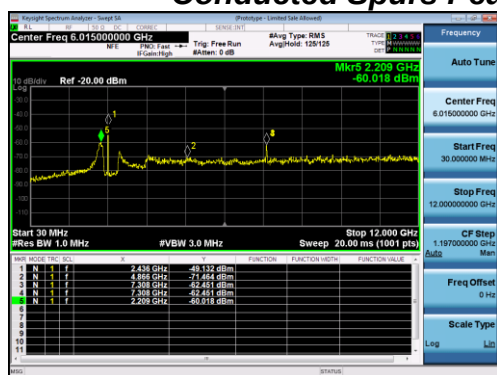
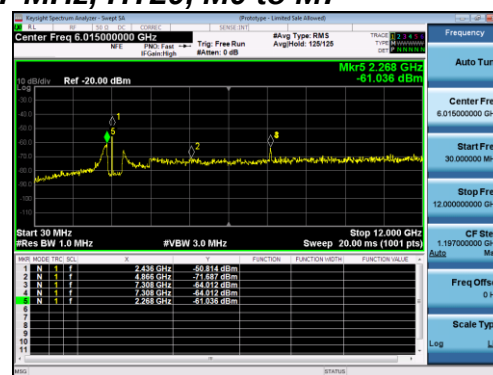
2452	HT40, M0 to M7	1	13	-75. 9		0.2	-62. 7	-41.2 5	21.4 5
	HT40, M0 to M7	2	13	-76. 9	-78. 5	0.2	-61. 4	-41.2 5	20.1 6
	HT40, M8 to M15	2	13	-76. 9	-78. 5	0.2	-61. 4	-41.2 5	20.1 6
	HT40 Beam Forming, M0 to M7	2	13	-76. 9	-78. 5	0.2	-61. 4	-41.2 5	20.1 6
	HT40 Beam Forming, M8 to M15	2	13	-76. 9	-78. 5	0.2	-61. 4	-41.2 5	20.1 6
	HT40 STBC, M0 to M7	2	13	-76. 9	-78. 5	0.2	-61. 4	-41.2 5	20.1 6
2462	CCK, 1 to 11 Mbps	1	13	-69. 0		0.2	-55. 8	-41.2 5	14.5 6
	CCK, 1 to 11 Mbps	2	13	-69. 9	-71. 7	0.2	-54. 5	-41.2 5	13.2 6
	Non HT20, 6 to 54 Mbps	1	13	-78. 0		0.1	-64. 9	-41.2 5	23.6 5
	Non HT20, 6 to 54 Mbps	2	13	-78. 1	-72. 7	0.1	-58. 5	-41.2 5	17.2 5
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-78. 1	-72. 7	0.1	-58. 5	-41.2 5	17.2 5
	HT20, M0 to M7	1	13	-78. 0		0.1	-64. 9	-41.2 5	23.6 2
	HT20, M0 to M7	2	13	-78. 2	-80. 3	0.1	-63. 0	-41.2 5	21.7 4
	HT20, M8 to M15	2	13	-78. 2	-80. 3	0.1	-63. 0	-41.2 5	21.7 4
	HT20 Beam Forming, M0 to M7	2	13	-78. 2	-80. 3	0.1	-63. 0	-41.2 5	21.7 4
	HT20 Beam Forming, M8 to M15	2	13	-78. 2	-80. 3	0.1	-63. 0	-41.2 5	21.7 4
	HT20 STBC, M0 to M7	2	13	-78. 2	-80. 3	0.1	-63. 0	-41.2 5	21.7 4

Conducted Spurious Peak Table:

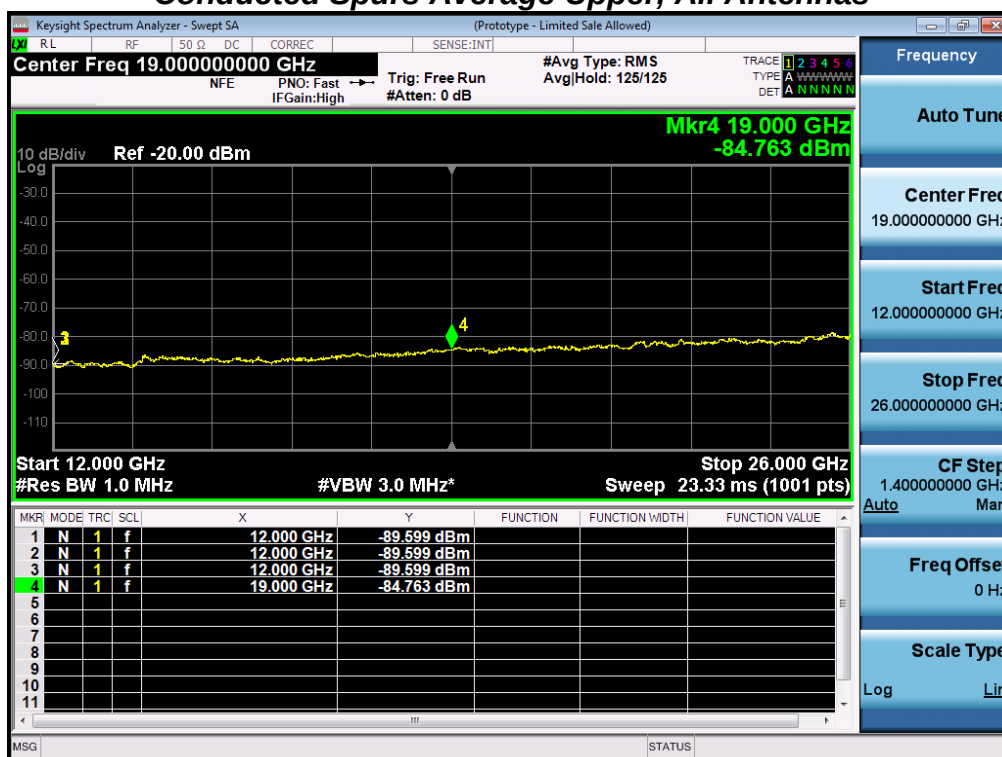
Antenna Gain: 13dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Duty Cycle Correction (dB)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	13	-69. 1		0.2	-55. 9	-21.2 5	34.6 6
	CCK, 1 to 11 Mbps	2	13	-69. 9	-69. 5	0.2	-53. 5	-21.2 5	32.2 5
	Non HT20, 6 to 54 Mbps	1	13	-68. 0		0.1	-54. 9	-21.2 5	33.6 5
	Non HT20, 6 to 54 Mbps	2	13	-68. 4	-69. 1	0.1	-52. 6	-21.2 5	31.3 7
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-68. 4	-69. 1	0.1	-52. 6	-21.2 5	31.3 7
	HT20, M0 to M7	1	13	-68. 5		0.1	-55. 4	-21.2 5	34.1 2
	HT20, M0 to M7	2	13	-68. 7	-68. 7	0.1	-52. 6	-21.2 5	31.3 1
	HT20, M8 to M15	2	13	-68. 7	-68. 7	0.1	-52. 6	-21.2 5	31.3 1
	HT20 Beam Forming, M0 to M7	2	13	-68. 7	-68. 7	0.1	-52. 6	-21.2 5	31.3 1
	HT20 Beam Forming, M8 to M15	2	13	-68. 7	-68. 7	0.1	-52. 6	-21.2 5	31.3 1
	HT20 STBC, M0 to M7	2	13	-68. 7	-68. 7	0.1	-52. 6	-21.2 5	31.3 1
2422	HT40, M0 to M7	1	13	-66. 0		0.2	-52. 8	-21.2 5	31.5 5
	HT40, M0 to M7	2	13	-67. 0	-66. 3	0.2	-50. 4	-21.2 5	29.1 7
	HT40, M8 to M15	2	13	-67. 0	-66. 3	0.2	-50. 4	-21.2 5	29.1 7
	HT40 Beam Forming, M0 to M7	2	13	-67. 0	-66. 3	0.2	-50. 4	-21.2 5	29.1 7

				0	3		4	5	7
	HT40 Beam Forming, M8 to M15	2	13	-67. 0	-66. 3	0.2	-50. 4	-21.2 5	29.1 7
	HT40 STBC, M0 to M7	2	13	-67. 0	-66. 3	0.2	-50. 4	-21.2 5	29.1 7
2437	HT40, M0 to M7	1	13	-64. 6		0.2	-51. 4	-21.2 5	30.1 5
	HT40, M0 to M7	2	13	-66. 0	-66. 5	0.2	-50. 0	-21.2 5	28.7 8
	HT40, M8 to M15	2	13	-66. 0	-66. 5	0.2	-50. 0	-21.2 5	28.7 8
	HT40 Beam Forming, M0 to M7	2	13	-66. 0	-66. 5	0.2	-50. 0	-21.2 5	28.7 8
	HT40 Beam Forming, M8 to M15	2	13	-66. 0	-66. 5	0.2	-50. 0	-21.2 5	28.7 8
	HT40 STBC, M0 to M7	2	13	-66. 0	-66. 5	0.2	-50. 0	-21.2 5	28.7 8
2437	CCK, 1 to 11 Mbps	1	13	-65. 9		0.2	-52. 7	-21.2 5	31.4 6
	CCK, 1 to 11 Mbps	2	13	-66. 8	-68. 7	0.2	-51. 4	-21.2 5	30.2 0
	Non HT20, 6 to 54 Mbps	1	13	-62. 0		0.1	-48. 9	-21.2 5	27.6 5
	Non HT20, 6 to 54 Mbps	2	13	-62. 5	-66. 5	0.1	-47. 9	-21.2 5	26.6 9
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-62. 5	-66. 5	0.1	-47. 9	-21.2 5	26.6 9
	HT20, M0 to M7	1	13	-63. 7		0.1	-50. 6	-21.2 5	29.3 2
	HT20, M0 to M7	2	13	-62. 5	-64. 0	0.1	-47. 0	-21.2 5	25.8 0
	HT20, M8 to M15	2	13	-62. 5	-64. 0	0.1	-47. 0	-21.2 5	25.8 0
	HT20 Beam Forming, M0 to M7	2	13	-62. 5	-64. 0	0.1	-47. 0	-21.2 5	25.8 0
	HT20 Beam Forming, M8 to M15	2	13	-62. 5	-64. 0	0.1	-47. 0	-21.2 5	25.8 0
	HT20 STBC, M0 to M7	2	13	-62. 5	-64. 0	0.1	-47. 0	-21.2 5	25.8 0
4 5	HT40, M0 to M7	1	13	-65.		0.2	-52.	-21.2	31.3

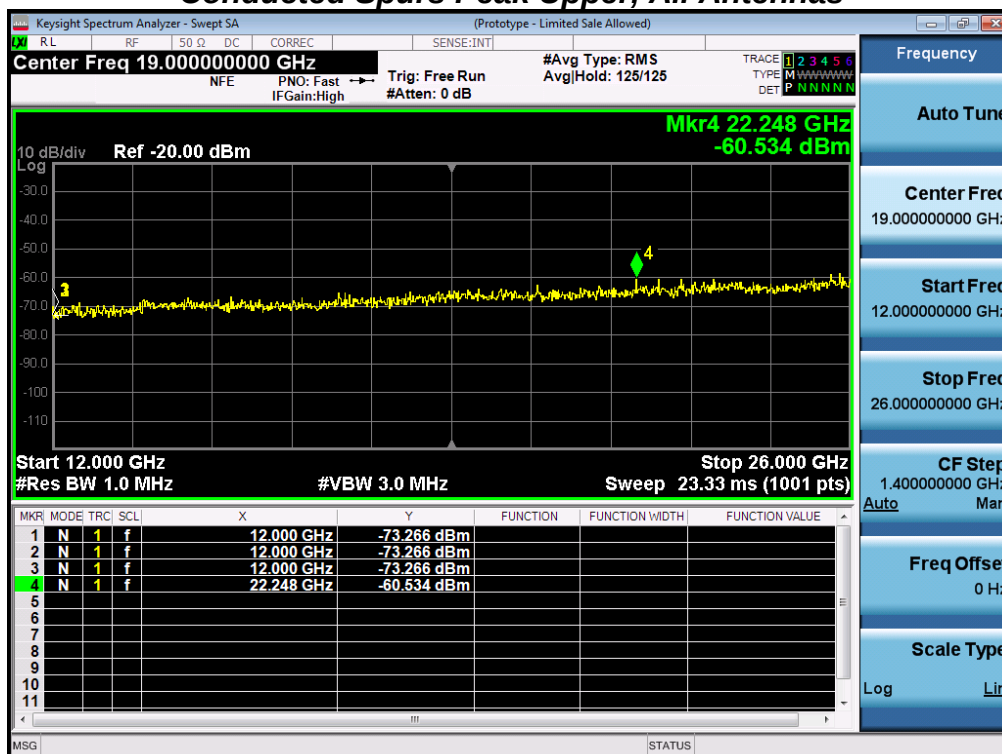
				8			6	5	5
	HT40, M0 to M7	2	13	-65.9	-65.1	0.2	-49.3	-21.25	28.02
	HT40, M8 to M15	2	13	-65.9	-65.1	0.2	-49.3	-21.25	28.02
	HT40 Beam Forming, M0 to M7	2	13	-65.9	-65.1	0.2	-49.3	-21.25	28.02
	HT40 Beam Forming, M8 to M15	2	13	-65.9	-65.1	0.2	-49.3	-21.25	28.02
	HT40 STBC, M0 to M7	2	13	-65.9	-65.1	0.2	-49.3	-21.25	28.02
2462	CCK, 1 to 11 Mbps	1	13	-66.6		0.2	-53.4	-21.25	32.16
	CCK, 1 to 11 Mbps	2	13	-68.0	-68.6	0.2	-52.1	-21.25	30.84
	Non HT20, 6 to 54 Mbps	1	13	-66.5		0.1	-53.4	-21.25	32.15
	Non HT20, 6 to 54 Mbps	2	13	-65.6	-68.4	0.1	-50.7	-21.25	29.41
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-65.6	-68.4	0.1	-50.7	-21.25	29.41
	HT20, M0 to M7	1	13	-66.7		0.1	-53.6	-21.25	32.32
	HT20, M0 to M7	2	13	-67.3	-66.8	0.1	-50.9	-21.25	29.66
	HT20, M8 to M15	2	13	-67.3	-66.8	0.1	-50.9	-21.25	29.66
	HT20 Beam Forming, M0 to M7	2	13	-67.3	-66.8	0.1	-50.9	-21.25	29.66
	HT20 Beam Forming, M8 to M15	2	13	-67.3	-66.8	0.1	-50.9	-21.25	29.66
	HT20 STBC, M0 to M7	2	13	-67.3	-66.8	0.1	-50.9	-21.25	29.66

Conducted Spurs Average, 2462 MHz, CCK, 1 to 11 Mbps**Antenna A****Antenna B****Conducted Spurs Peak, 2437 MHz, HT20, M0 to M7****Antenna A****Antenna B**

Conducted Spurs Average Upper, All Antennas



Conducted Spurs Peak Upper, All Antennas



A.7 Conducted Bandedge (Restricted Band)

Conducted Band Edge Test Requirement

15.247 / LP0002:3.10.1(5), 2.7 & 2.8

(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.

Conducted Bandedge Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v05

ANSI C63.10: 2013

Conducted Band edge

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.

Ref. KDB 558074 D01 DTS Meas Guidance v05, section 8.1 c) 3, section 8.6 DTS emissions in restricted frequency bands
ANSI C63.10: 2013 section 11.12.2.4 (Peak) & 11.12.2.5.2 (Average)

Conducted Spurious Emissions

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

Samples, Systems, and Modes

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

Tested By :

Julian Land

Date of testing:

25-Sep-19 - 25-Sep-19

Test Result : PASS**Test Equipment**

See Appendix B for list of test equipment

Note: Data with Highest and Lowest Antenna gain readings were recorded as worst case

Restricted Band

Conducted Band edge Average Table

Antenna Gain: 4dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Tx 3 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	4	-56.1		0.2	-51.9	-41.25	10.66
	CCK, 1 to 11 Mbps	2	4	-56.8	-56.8	0.2	-49.6	-41.25	8.38
	Non HT20, 6 to 54 Mbps	1	4	-49.4		8	-45.3	-41.25	4.05
	Non HT20, 6 to 54 Mbps	2	4	-50.8	-51.2	0.1	-43.9	-41.25	2.63
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-53.2	-52.6	0.1	-42.8	-41.25	1.53
	HT/VHT20, M0 to M7	1	4	-51.9		0.1	-47.8	-41.25	6.52
	HT/VHT20, M0 to M7	2	4	-51.9	-50.5	0.1	-44.0	-41.25	2.76
	HT/VHT20, M8 to M15	2	4	-51.9	-50.5	0.1	-44.0	-41.25	2.76
	HT/VHT20 Beam Forming, M0 to M7	2	7	-55.5	-55.1	0.1	-45.2	-41.25	3.91
	HT/VHT20 Beam Forming, M8 to M15	2	4	-51.9	-50.5	0.1	-44.0	-41.25	2.76
	HT/VHT20 STBC, M0 to M7	2	4	-51.9	-50.5	0.1	-44.0	-41.25	2.76
2422	HT/VHT40, M0 to M7	1	4	-48.2		0.2	-44.0	-41.25	2.75
	HT/VHT40, M0 to M7	2	4	-51.6	-47.7	0.2	-42.0	-41.25	0.76
	HT/VHT40, M8 to M15	2	4	-51.6	-47.7	0.2	-42.0	-41.25	0.76
	HT/VHT40 Beam Forming, M0 to M7	2	7	-55.5	-52.2	0.2	-43.0	-41.25	2.01

				1	3		3	5	
	HT/VHT40 Beam Forming, M8 to M15	2	4	-51. 6	-47. 7	0.2	-42. 0	-41.2 5	0.76
	HT/VHT40 STBC, M0 to M7	2	4	-51. 6	-47. 7	0.2	-42. 0	-41.2 5	0.76
2462	CCK, 1 to 11 Mbps	1	4	-53. 0		0.2	-48. 8	-41.2 5	7.56
	CCK, 1 to 11 Mbps	2	4	-57. 9	-58. 6	0.2	-51. 0	-41.2 5	9.78
	Non HT20, 6 to 54 Mbps	1	4	-46. 3		0.1	-42. 2	-41.2 5	0.95
	Non HT20, 6 to 54 Mbps	2	4	-47. 6	-53. 5	0.1	-42. 5	-41.2 5	1.25
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-55. 9	-61. 7	0.1	-47. 8	-41.2 5	6.53
	HT/VHT20, M0 to M7	1	4	-45. 5		0.1	-41. 4	-41.2 5	0.12
	HT/VHT20, M0 to M7	2	4	-49. 1	-52. 4	0.1	-43. 3	-41.2 5	2.06
	HT/VHT20, M8 to M15	2	4	-49. 1	-52. 4	0.1	-43. 3	-41.2 5	2.06
	HT/VHT20 Beam Forming, M0 to M7	2	7	-53. 0	-56. 2	0.1	-44. 2	-41.2 5	2.93
	HT/VHT20 Beam Forming, M8 to M15	2	4	-49. 1	-52. 4	0.1	-43. 3	-41.2 5	2.06
	HT/VHT20 STBC, M0 to M7	2	4	-49. 1	-52. 4	0.1	-43. 3	-41.2 5	2.06

Conducted Band edge Peak Table

Antenna Gain: 4dBi								
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Band edge Level (dBm)	Tx 2 Band edge Level (dBm)	Total Tx Band edge Level (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	4	-40. 5		-36. 3	-21.2 5	15.0 6

	CCK, 1 to 11 Mbps	2	4	-40.5	-39.3	-32.7	-21.25	11.41
	Non HT20, 6 to 54 Mbps	1	4	-36.2		-32.1	-21.25	10.85
	Non HT20, 6 to 54 Mbps	2	4	-40.1	-32.6	-27.8	-21.25	6.54
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-37.5	-40.3	-28.6	-21.25	7.31
	HT/VHT20, M0 to M7	1	4	-37.6		-33.5	-21.25	12.22
	HT/VHT20, M0 to M7	2	4	-37.6	-35.9	-29.5	-21.25	8.28
	HT/VHT20, M8 to M15	2	4	-37.6	-35.9	-29.5	-21.25	8.28
	HT/VHT20 Beam Forming, M0 to M7	2	7	-39.0	-37.0	-27.7	-21.25	6.50
	HT/VHT20 Beam Forming, M8 to M15	2	4	-37.6	-35.9	-29.5	-21.25	8.28
	HT/VHT20 STBC, M0 to M7	2	4	-37.6	-35.9	-29.5	-21.25	8.28
2422	HT/VHT40, M0 to M7	1	4	-32.6		-28.4	-21.25	7.15
	HT/VHT40, M0 to M7	2	4	-31.0	-32.9	-24.6	-21.25	3.38
	HT/VHT40, M8 to M15	2	4	-31.0	-32.9	-24.6	-21.25	3.38
	HT/VHT40 Beam Forming, M0 to M7	2	7	-38.8	-39.0	-28.7	-21.25	7.43
	HT/VHT40 Beam Forming, M8 to M15	2	4	-31.0	-32.9	-24.6	-21.25	3.38
	HT/VHT40 STBC, M0 to M7	2	4	-31.0	-32.9	-24.6	-21.25	3.38
2462	CCK, 1 to 11 Mbps	1	4	-41.2		-37.0	-21.25	15.76
	CCK, 1 to 11 Mbps	2	4	-41.2	-42.7	-34.7	-21.25	13.44
	Non HT20, 6 to 54 Mbps	1	4	-28.3		-24.2	-21.25	2.95
	Non HT20, 6 to 54 Mbps	2	4	-30.3	-33.3	-24.3	-21.25	3.09
	Non HT20 Beam Forming, 6 to 54 Mbps	2	7	-42.	-38.	-29.	-21.2	8.47

			0	4	7	5	
HT/VHT20, M0 to M7	1	4	-32.5		-28.4	-21.25	7.12
HT/VHT20, M0 to M7	2	4	-33.2	-33.9	-26.4	-21.25	5.15
HT/VHT20, M8 to M15	2	4	-33.2	-33.9	-26.4	-21.25	5.15
HT/VHT20 Beam Forming, M0 to M7	2	7	-37.6	-33.3	-24.8	-21.25	3.55
HT/VHT20 Beam Forming, M8 to M15	2	4	-33.2	-33.9	-26.4	-21.25	5.15
HT/VHT20 STBC, M0 to M7	2	4	-33.2	-33.9	-26.4	-21.25	5.15

Conducted Band edge Average Table

Antenna Gain: 13dBi									
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Band edge Level (dBm)	Tx 2 Band edge Level (dBm)	Tx 3 Band edge Level (dBm)	Total Tx Band edge Level (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	13	-56.8		0.2	-43.6	-41.25	2.36
	CCK, 1 to 11 Mbps	2	13	-58.8	-58.3	0.2	-42.3	-41.25	1.08
	Non HT20, 6 to 54 Mbps	1	13	-57.5		0.1	-44.4	-41.25	3.15
	Non HT20, 6 to 54 Mbps	2	13	-59.1	-60.9	0.1	-43.8	-41.25	2.54
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-59.1	-60.9	0.1	-43.8	-41.25	2.54
	HT20, M0 to M7	1	13	-58.8		0.1	-45.7	-41.25	4.42
	HT20, M0 to M7	2	13	-60.2	-61.9	0.1	-44.8	-41.25	3.58
	HT20, M8 to M15	2	13	-60.2	-61.9	0.1	-44.8	-41.25	3.58
	HT20 Beam Forming, M0 to M7	2	13	-60.2	-61.9	0.1	-44.8	-41.25	3.58

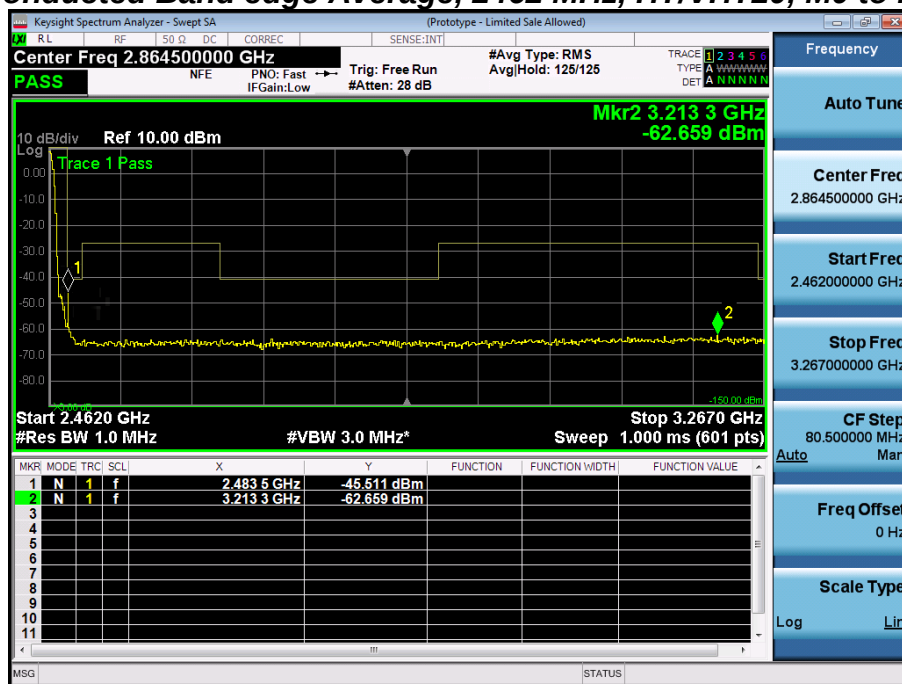
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	HT20 Beam Forming, M8 to M15	2	13	-60. 2	-61. 9	0.1	-44. 8	-41.2 5	3.58
	HT20 STBC, M0 to M7	2	13	-60. 2	-61. 9	0.1	-44. 8	-41.2 5	3.58
2422	HT40, M0 to M7	1	13	-60. 4		0.2	-47. 2	-41.2 5	5.95
	HT40, M0 to M7	2	13	-65. 3	-63. 1	0.2	-47. 8	-41.2 5	6.60
	HT40, M8 to M15	2	13	-65. 3	-63. 1	0.2	-47. 8	-41.2 5	6.60
	HT40 Beam Forming, M0 to M7	2	13	-65. 3	-63. 1	0.2	-47. 8	-41.2 5	6.60
	HT40 Beam Forming, M8 to M15	2	13	-65. 3	-63. 1	0.2	-47. 8	-41.2 5	6.60
	HT40 STBC, M0 to M7	2	13	-65. 3	-63. 1	0.2	-47. 8	-41.2 5	6.60
2462	CCK, 1 to 11 Mbps	1	13	-57. 6		0.2	-44. 4	-41.2 5	3.16
	CCK, 1 to 11 Mbps	2	13	-57. 9	-58. 6	0.2	-42. 0	-41.2 5	0.79
	Non HT20, 6 to 54 Mbps	1	13	-57. 8		0.1	-44. 7	-41.2 5	3.45
	Non HT20, 6 to 54 Mbps	2	13	-63. 7	-63. 8	0.1	-47. 6	-41.2 5	6.39
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-63. 7	-63. 8	0.1	-47. 6	-41.2 5	6.39
	HT20, M0 to M7	1	13	-58. 2		0.1	-45. 1	-41.2 5	3.82
	HT20, M0 to M7	2	13	-60. 3	-62. 3	0.1	-45. 0	-41.2 5	3.80
	HT20, M8 to M15	2	13	-60. 3	-62. 3	0.1	-45. 0	-41.2 5	3.80
	HT20 Beam Forming, M0 to M7	2	13	-60. 3	-62. 3	0.1	-45. 0	-41.2 5	3.80
	HT20 Beam Forming, M8 to M15	2	13	-60. 3	-62. 3	0.1	-45. 0	-41.2 5	3.80
	HT20 STBC, M0 to M7	2	13	-60. 3	-62. 3	0.1	-45. 0	-41.2 5	3.80

Conducted Band edge Peak Table

Antenna Gain: 13dBi								
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Band edge Level (dBm)	Tx 2 Band edge Level (dBm)	Total Tx Band edge Level (dBm)	Limit (dBm)	Margin (dB)
2412	CCK, 1 to 11 Mbps	1	13	-43.8		-30.6	-21.25	9.36
	CCK, 1 to 11 Mbps	2	13	-43.7	-48.0	-29.1	-21.25	7.89
	Non HT20, 6 to 54 Mbps	1	13	-42.2		-29.1	-21.25	7.85
	Non HT20, 6 to 54 Mbps	2	13	-46.9	-37.8	-24.2	-21.25	2.94
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-46.9	-37.8	-24.2	-21.25	2.94
	HT20, M0 to M7	1	13	-44.2		-31.1	-21.25	9.82
	HT20, M0 to M7	2	13	-45.5	-40.1	-25.9	-21.25	4.62
	HT20, M8 to M15	2	13	-45.5	-40.1	-25.9	-21.25	4.62
	HT20 Beam Forming, M0 to M7	2	13	-45.5	-40.1	-25.9	-21.25	4.62
	HT20 Beam Forming, M8 to M15	2	13	-45.5	-40.1	-25.9	-21.25	4.62
	HT20 STBC, M0 to M7	2	13	-45.5	-40.1	-25.9	-21.25	4.62
2422	HT40, M0 to M7	1	13	-42.2		-29.0	-21.25	7.75
	HT40, M0 to M7	2	13	-44.9	-42.6	-27.4	-21.25	6.13
	HT40, M8 to M15	2	13	-44.9	-42.6	-27.4	-21.25	6.13
	HT40 Beam Forming, M0 to M7	2	13	-44.9	-42.6	-27.4	-21.25	6.13

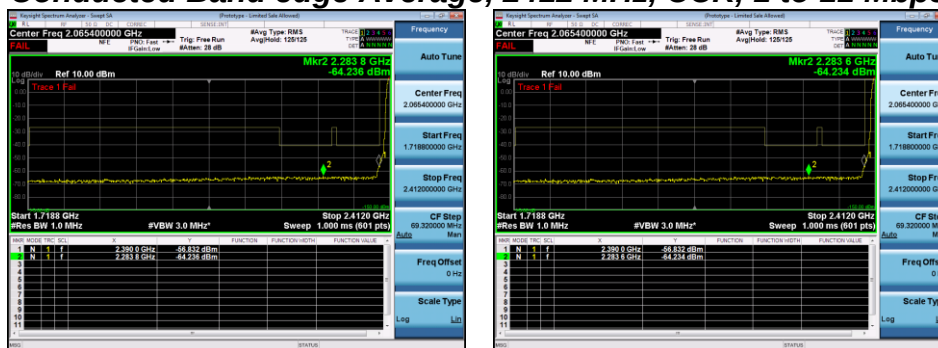
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	HT40 Beam Forming, M8 to M15	2	13	-44. 9	-42. 6	-27. 4	-21.2 5	6.13
	HT40 STBC, M0 to M7	2	13	-44. 9	-42. 6	-27. 4	-21.2 5	6.13
2462	CCK, 1 to 11 Mbps	1	13	-42. 7		-29. 5	-21.2 5	8.26
	CCK, 1 to 11 Mbps	2	13	-46. 5	-46. 0	-30. 0	-21.2 5	8.79
	Non HT20, 6 to 54 Mbps	1	13	-42. 0		-28. 9	-21.2 5	7.65
	Non HT20, 6 to 54 Mbps	2	13	-47. 7	-45. 0	-30. 0	-21.2 5	8.78
	Non HT20 Beam Forming, 6 to 54 Mbps	2	13	-47. 7	-45. 0	-30. 0	-21.2 5	8.78
	HT20, M0 to M7	1	13	-45. 9		-32. 8	-21.2 5	11.5 2
	HT20, M0 to M7	2	13	-46. 6	-37. 9	-24. 2	-21.2 5	2.97
	HT20, M8 to M15	2	13	-46. 6	-37. 9	-24. 2	-21.2 5	2.97
	HT20 Beam Forming, M0 to M7	2	13	-46. 6	-37. 9	-24. 2	-21.2 5	2.97
	HT20 Beam Forming, M8 to M15	2	13	-46. 6	-37. 9	-24. 2	-21.2 5	2.97
	HT20 STBC, M0 to M7	2	13	-46. 6	-37. 9	-24. 2	-21.2 5	2.97

Antenna Gain: 4dBi
Conducted Band edge Average, 2462 MHz, HT/VHT20, M0 to M7



Antenna A

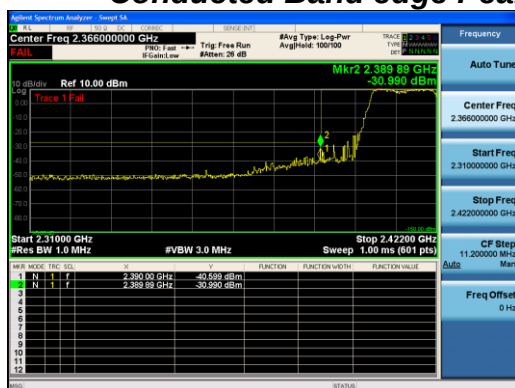
Antenna Gain: 4dBi
Conducted Band edge Average, 2412 MHz, CCK, 1 to 11 Mbps



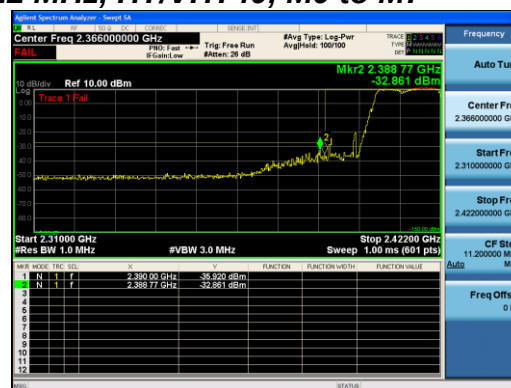
Antenna A

Antenna B

Antenna Gain: 4dBi
Conducted Band edge Peak, 2422 MHz, HT/VHT40, M0 to M7

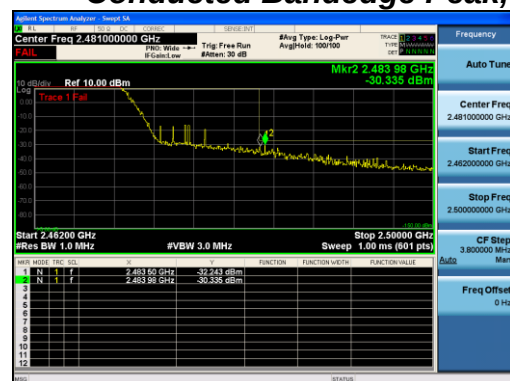


Antenna A

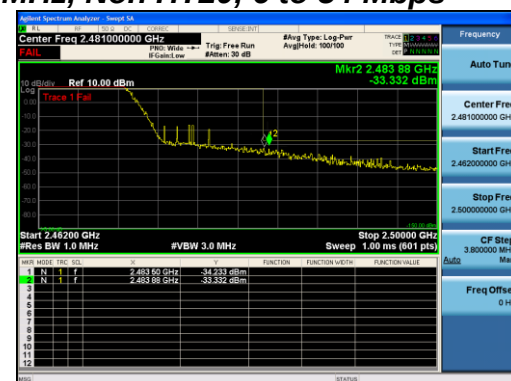


Antenna B

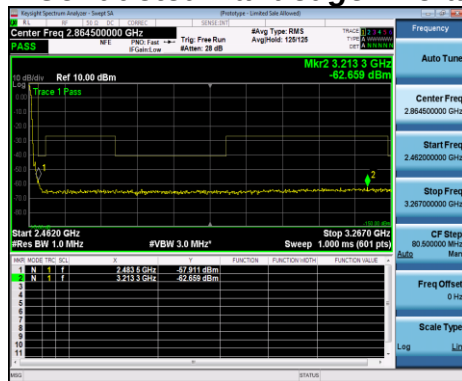
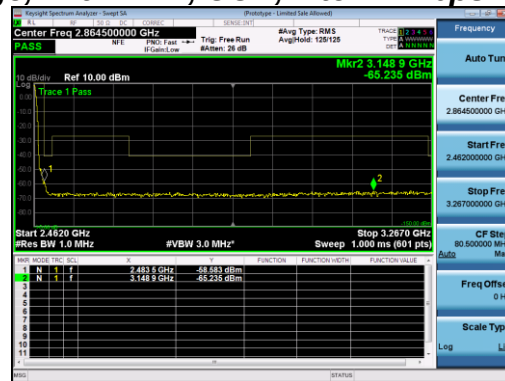
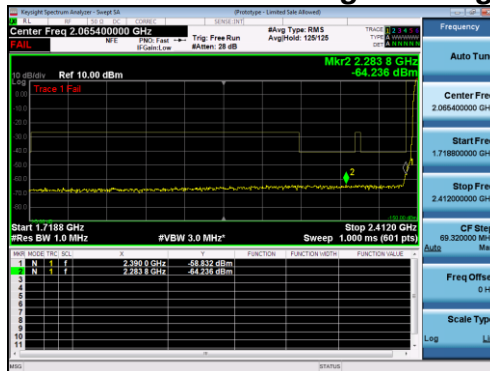
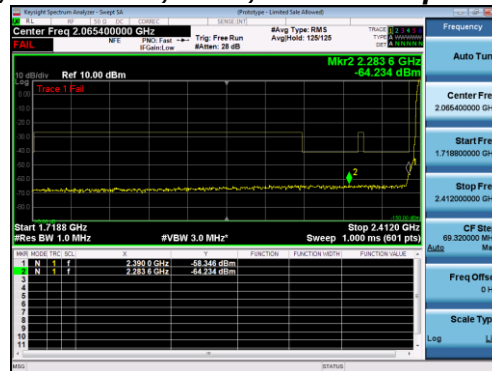
Antenna Gain: 4dBi
Conducted Bandedge Peak, 2462 MHz, Non HT20, 6 to 54 Mbps



Antenna A



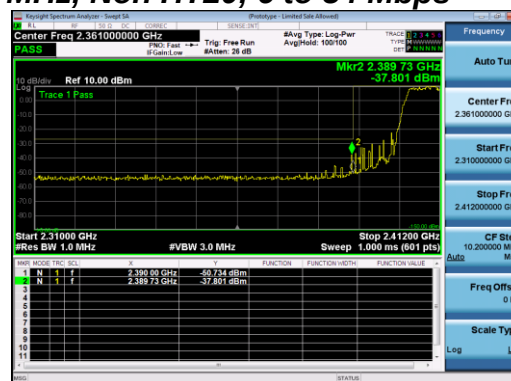
Antenna B

Antenna Gain: 13dBi**Conducted Bandedge Average, 2462 MHz, CCK, 1 to 11 Mbps****Antenna A****Antenna B****Antenna Gain: 13dBi****Conducted Bandedge Average, 2412 MHz, CCK, 1 to 11 Mbps****Antenna A****Antenna B**

Antenna Gain: 13dBi
Conducted Band edge Peak, 2412 MHz, Non HT20, 6 to 54 Mbps

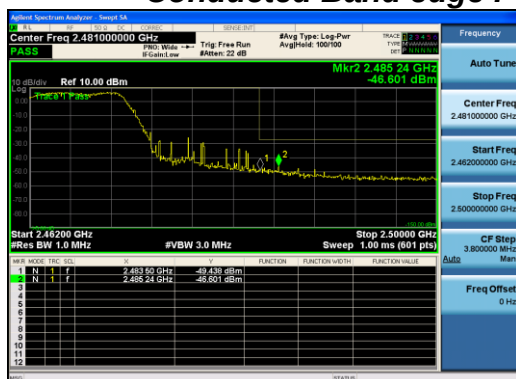


Antenna A

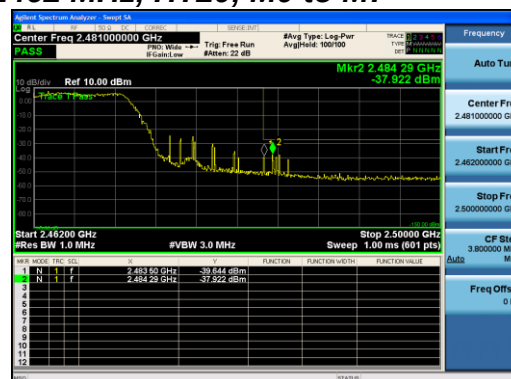


Antenna B

Antenna Gain: 13dBi
Conducted Band edge Peak, 2462 MHz, HT20, M0 to M7



Antenna A



Antenna B

A.8 Conducted Band edge (Non-Restricted Band)

Emissions in non-restricted frequency bands - Test Requirement

15.247 / LP0002:3.10.1(5) & 2.8

(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-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.

Emissions in non-restricted frequency bands - Test Method

Ref. KDB 558074 D01 DTS Meas Guidance v05

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. KDB 558074 D01 DTS Meas Guidance v05 section, 8.5 DTS emissions in non-restricted frequency bands, 8.7 DTS band-edge measurements

ANSI C63.10: 2013 section 11.11.2, 11.11.3

Emissions in non-restricted frequency bands - Conducted Test parameters

11.11.2 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 $\geq 1.5 \times \text{DTS bandwidth}$.
- c) Set the RBW = 100 kHz.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- 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.

11.11.3 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 $\geq 3 \times \text{RBW}$.
- 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.

Samples, Systems, and Modes

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

Tested By : Julian Land	Date of testing: 25-Sep-19 - 25-Sep-19
Test Result : PASS	

Test Equipment

See Appendix B for list of test equipment

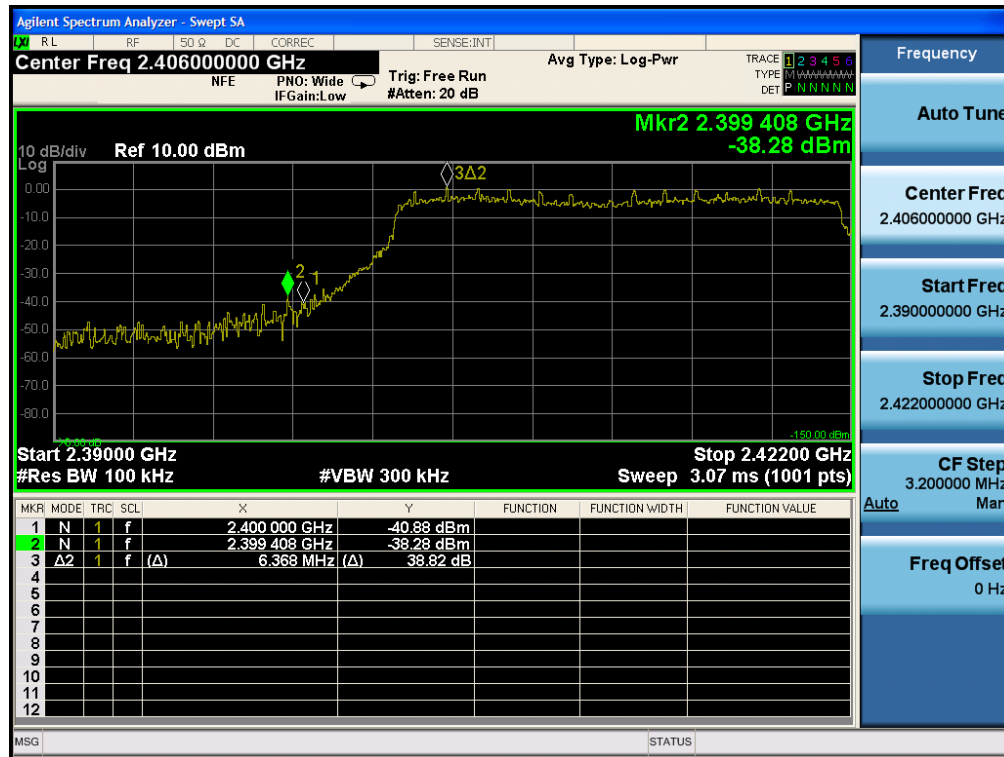
Note:Data with Highest and Lowest Antenna gain readings were recorded as worst case

Non-Restricted Band

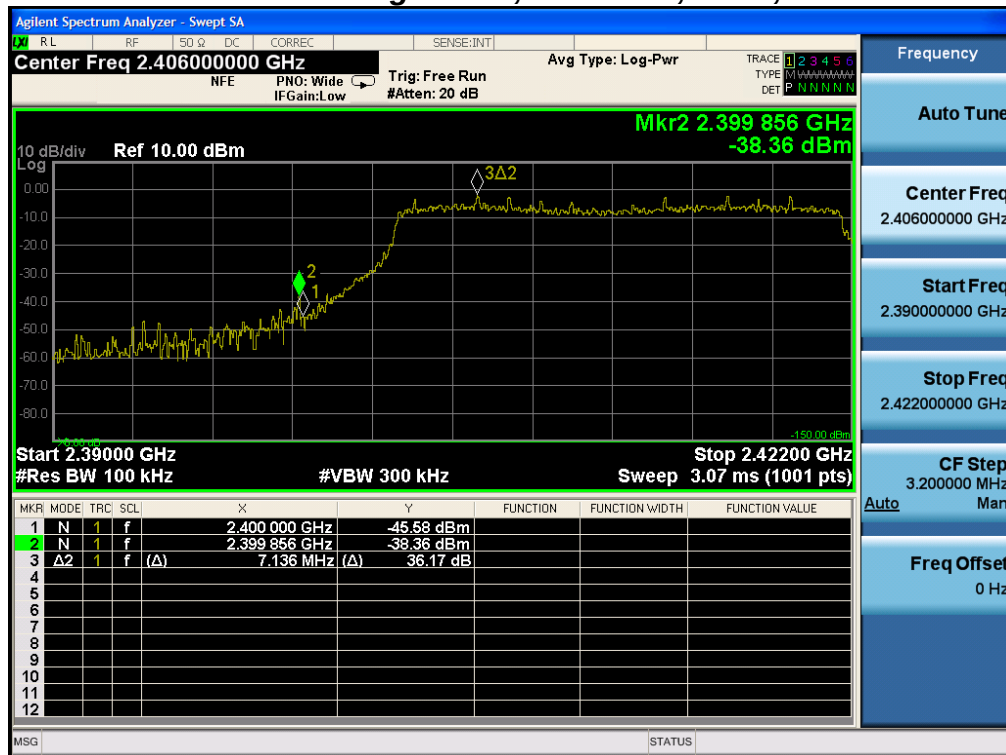
Antenna Gain: 4dBi						
Frequency (MHz)	Mode	Data Rate (Mbps)	Conducted Bandedge Delta (dB)	Limit (dBc)	Duty Cycle Correction (dB)	Margin (dB)
2412	CCK, 1 to 11 Mbps	11	52.3	>30	0.2	22.11
	Non HT20, 6 to 54 Mbps	6	41.5	>30	0.1	11.40
	HT/VHT20, M0 to M15	m0	42.6	>30	0.1	12.47
2422	HT/VHT40, M0 to M15	m0	40.5	>30	0.2	10.30
2462	CCK, 1 to 11 Mbps	11	60.9	>30	0.2	30.71
	Non HT20, 6 to 54 Mbps	6	54.1	>30	0.1	24.00
	HT/VHT20, M0 to M15	m0	46.0	>30	0.1	15.87

Antenna Gain: 13dBi						
Frequency (MHz)	Mode	Data Rate (Mbps)	Conducted Bandedge Delta (dB)	Limit (dBc)	Duty Cycle Correction (dB)	Margin (dB)
2412	CCK, 1 to 11 Mbps	11	52.5	>30	0.2	22.31
	Non HT20, 6 to 54 Mbps	6	43.1	>30	0.1	13.00
	HT20, M0 to M15	m0	42.2	>30	0.1	12.07
2422	HT40, M0 to M15	m0	36.2	>30	0.2	6.00
2462	CCK, 1 to 11 Mbps	11	65.4	>30	0.2	35.21
	Non HT20, 6 to 54 Mbps	6	53.8	>30	0.1	23.70
	HT20, M0 to M15	m0	40.0	>30	0.1	9.87

Antenna Gain: 4dBi
Conducted Band edge Delta, 2422 MHz, HT/VHT40 Beam Forming, M0 to M7



Antenna Gain: 13dBi
Conducted Bandedge Delta, 2422 MHz, HT40, M0 to M7



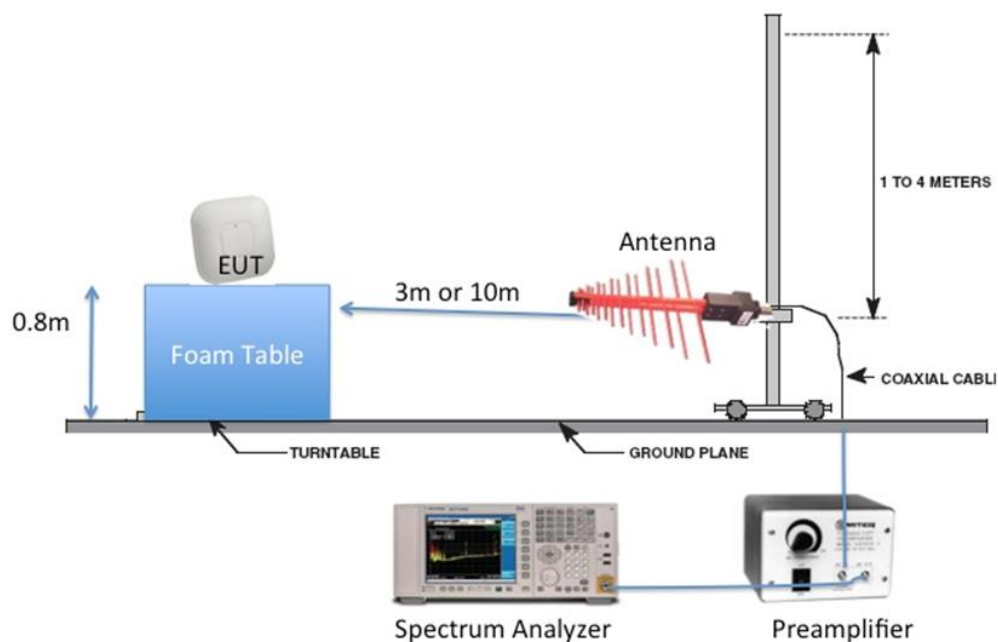
Appendix B: Radiated Spurious and AC Conducted Emissions

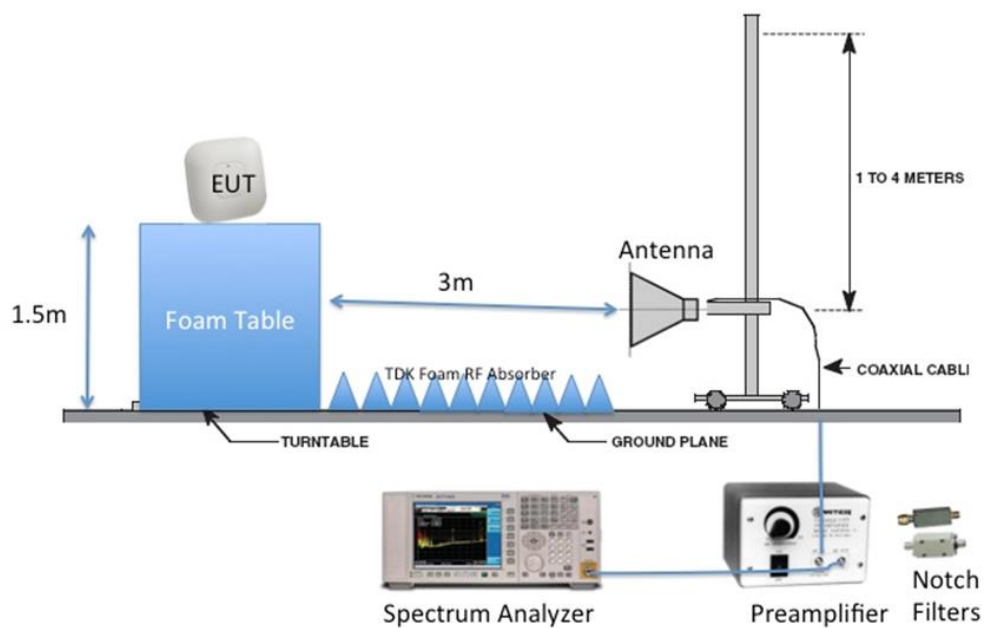
Testing Laboratory: Cisco Systems, Inc., 425 East Tasman Drive, San Jose, CA 95134, USA

B.1 Radiated Spurious Emissions

B1.1 Setup Diagram

Below 1G (Preamp used is optional)



Above 1G

Samples, Systems, and Modes

Mode Setting#	Wi-Fi Worst Case Mode	Modulation	Data Rate
1 (single antenna)	802.11b	CCK	1 Mbps
6 (dual antenna)	802.11n (HT40)	OFDM	27.0 Mbps (MCS0)

Tested By: Test Engineer(s): Farida Rahmanzai, Jose Huamani	Date of testing: Date of testing: 18-Sept-2019 - 02-Oct-2019
Test Result: PASS	

B1.2**Restricted Bands****15.247 / LP0002:3.10.1(5), 2.7 & 2.8**

Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. Refer to limit section for detailed limits.

頻率 (MHz)	頻率 (MHz)
0.090～0.110	1660.0～1785.0
0.490～0.510	1805.0～1880.0
2.172～2.198	1885.0～1900.0
3.013～3.033	1905.0～1985.0
4.115～4.198	2010.0～2025.0
5.670～5.690	2110.0～2170.0
6.200～6.300	2200.0～2300.0
8.230～8.400	2310.0～2390.0
12.265～12.600	2483.5～2900.0
13.340～13.430	3260.0～3267.0
14.965～15.020	3332.0～3339.0
16.700～16.755	3345.8～3358.0
19.965～20.020	3500.0～4400.0
25.500～25.700	4500.0～5250.0
37.475～38.275	5350.0～5460.0
73.500～75.400	7250.0～7750.0
108.00～138.00	8025.0～8500.0
149.90～150.05	9000.0～9200.0
156.70～156.90	9300.0～9500.0
162.01～167.17	10600～12700
167.72～173.20	13250～13400
240.00～285.00	14470～14500
322.00～335.40	15350～16200
399.90～410.00	17700～21400
485.00～510.00	22010～23120
608.00～614.00	23600～24000
703.00～748.00	31200～31800
758.00～803.00	36430～36500
825.00～915.00	38600 以上
930.00～1240.0	
1300.0～1427.0	
1435.0～1626.5	

RSS-Gen 8.10

(b) Unwanted emissions that fall into restricted bands of [Table 6](#) shall comply with the limits specified in RSS-Gen.

Table 6 Restricted Bands

MHz	MHz	GHz
0.090-0.110	74.8-75.2	9.0-9.2
2.1735-2.1905	108-138	9.3-9.5
3.020-3.026	156.52475-156.52525	10.6-12.7
4.125-4.128	156.7-156.9	13.25-13.4
4.17725-4.17775	240-285	14.47-14.5
4.20725-4.20775	322-335.4	15.35-16.2
5.677-5.683	399.9-410	17.7-21.4
6.215-6.218	608-614	22.01-23.12
6.26775-6.26825	960-1427	23.6-24.0
6.31175-6.31225	1435-1626.5	31.2-31.8
8.291-8.294	1645.5-1646.5	36.43-36.5
8.362-8.366	1660-1710	Above 38.6
8.37625-8.38675	1718.8-1722.2	*
8.41425-8.41475	2200-2300	
12.29-12.293	2310-2390	
12.51975-12.52025	2655-2900	
12.57675-12.57725	3260-3267	
13.36-13.41	3332-3339	
16.42-16.423	3345.8-3358	
16.69475-16.69525	3500-4400	
16.80425-16.80475	4500-5150	
25.5-25.67	5350-5460	
37.5-38.25	7250-7750	
73-74.6	8025-8500	

B1.3**Limits****FCC 15.209, 15.247 / LP0002:3.10.1(5), 2.7 & 2.8**

The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the table specified in the table in FCC§15.209(a).

RSS-Gen 8.9:

Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

RSS-Gen 8.10:

(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.

General Field Strength Limits Table			
Frequency (MHz)	Field strength (uV/meter)	Field strength (dBuV/meter)	Measurement distance (meters)
30-88	100**	40 Qp	3
88-216	150**	43.5 Qp	3
216-960	200**	46 Qp	3
Above 960	500	54 Av / 74 Pk	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector

B1.4 Test Procedure**Ref.** ANSIC63.10-2013 section 6.5 & 6.6, Cisp16-1-1

ANSI C63.10: 2013 section 4.1.4 / section 12.7.5 (Quasi-Peak), section 12.7.6 (peak), section 12.7.7.3 (average)

Test parameters

- (i) Span = Entire frequency range or segment if necessary.
- (ii) Reference Level = 80 dBuV
- (iii) RBW = 100 kHz (less than or equal to 1 GHz); 1 MHz (above 1 GHz)
- (iv) VBW $\geq 3 \times$ RBW
- (v) Detector = Peak & Quasi-Peak (frequency range 30 MHz to 1 GHz);
Peak & Average (frequency range above 1 GHz); Change VBW to 10 Hz for average measurement
- (vi) Sweep Time = Couple

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.

Terminate the access Point RF ports with 50 ohm loads.

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

30MHz – 18GHz,

Save plots: Peak plot (Vertical and Horizontal) @3m

Above 18 GHz,

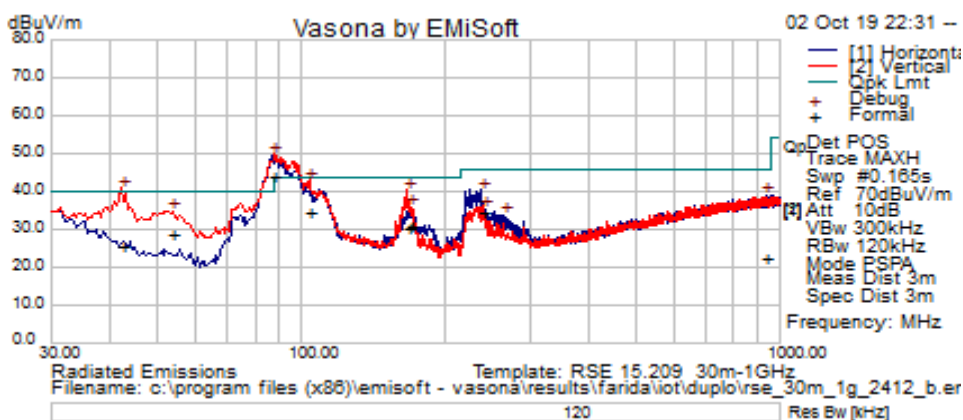
Save plots: Peak plot (Vertical and Horizontal) @1m

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.

Note: The data displayed on the plots detailed in the graphical test results section were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements.

B1.5 Tx Radiated Spurious Emissions Graphical Data Results

Subtest Date:	02-Oct-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	30MHz - 1GHz
Comments on the above Test Results	802.11b, Tx Channel 1 (2412 MHz)

**Title: TX Spurious Emissions from 30MHz-1GHz – Ch1 (2412 MHz)**

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
87.7775	35.4	0.98	7.5	43.88	Quasi Max	H	201	129	50*	-6.12	Pass	See notes
42.4095	13.05	0.67	12.17	25.9	Quasi Max	V	225	133	40	-14.1	Pass	Tx/Ch1
103.9508	22.45	1.06	10.99	34.5	Quasi Max	H	164	135	43.5	-9	Pass	Tx/Ch1
166.364	17.45	1.37	11.66	30.48	Quasi Max	V	198	170	43.5	-13.02	Pass	Tx/Ch1
53.53525	20.83	0.8	7.25	28.88	Quasi Max	V	142	215	40	-11.12	Pass	Tx/Ch1
237.6725	21.22	1.61	11.6	34.43	Quasi Max	H	103	231	46	-11.57	Pass	Tx/Ch1
935.0443	-3.03	3.19	22.4	22.56	Quasi Max	H	221	125	46	-23.44	Pass	Tx/Ch1
169.6078	17.97	1.38	11.44	30.78	Quasi Max	V	107	157	43.5	-12.72	Pass	Tx/Ch1

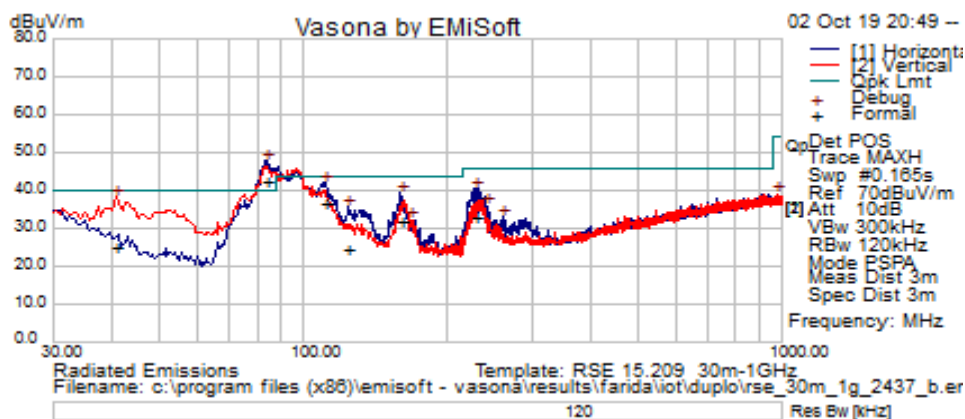
Note1: 87.77MHz is determined to be non-radio related signal. FCC part15.109 class A limit applied.

Also see FCC Part15.109 test report.

Note2: * means FCC part15.109 class A limit

Subtest Date:	02-Oct-2019
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Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	30MHz - 1GHz
Comments on the above Test Results	802.11b, Tx Channel 6 (2437 MHz)



Title: TX Spurious Emissions from 30MHz-1GHz – Ch6 (2437 MHz)

Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarit y	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Result s Pass / Fail	Comments
83.924	33.92	0.96	7.51	42.39	Quasi Max	H	238	257	50*	-7.61	Pass	See notes
111.003	23.25	1.1	12.4	36.75	Quasi Max	H	189	209	43.5	-6.75	Pass	Tx/Ch6
40.514	10.89	0.66	13.59	25.14	Quasi Max	V	130	255	40	-14.86	Pass	Tx/Ch6
159.299	18.65	1.34	12.1	32.08	Quasi Max	H	105	153	43.5	-11.42	Pass	Tx/Ch6
229.229	20.19	1.59	11.12	32.9	Quasi Max	H	116	223	46	-13.1	Pass	Tx/Ch6
123.7275	9.58	1.17	14	24.74	Quasi Max	H	324	174	43.5	-18.76	Pass	Tx/Ch6

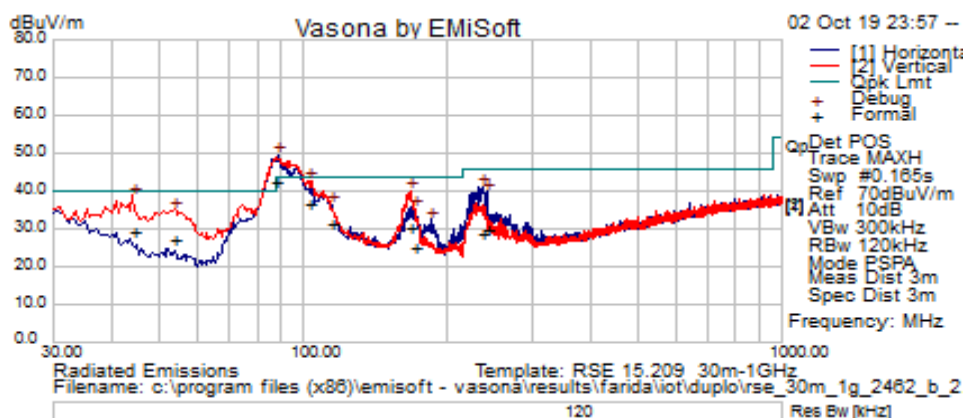
Note1: 83.92MHz is determined to be non-radio related signal. FCC part15.109 class A limit applied.

Also see FCC Part15.109 test report.

Note2: * means FCC part15.109 class A limit.

Subtest Date:	02-Oct-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions

Frequency Range	30MHz - 1GHz
Comments on the above Test Results	802.11b, Tx Channel 11 (2462 MHz)



Title: TX Spurious Emissions from 30MHz-1GHz – Ch11 (2462 MHz)

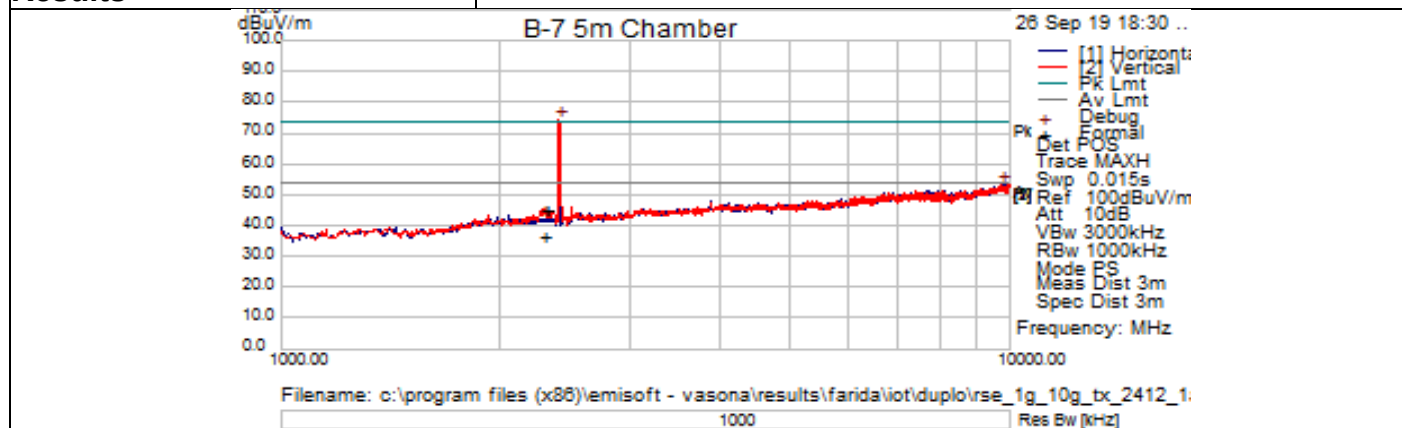
Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarity	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
87.75775	33.84	0.98	7.5	42.32	Quasi Max	H	340	258	50*	-7.68	Pass	See notes
102.5253	24.99	1.05	10.61	36.65	Quasi Max	V	103	268	43.5	-6.85	Pass	Tx/Ch11
44.23925	17.89	0.68	10.93	29.5	Quasi Max	V	148	217	40	-10.5	Pass	Tx/Ch11
167.27	17.36	1.37	11.57	30.3	Quasi Max	V	104	240	43.5	-13.2	Pass	Tx/Ch11
236.8153	15.56	1.61	11.58	28.75	Quasi Max	V	150	309	46	-17.25	Pass	Tx/Ch11
53.873	19.44	0.8	7.21	27.45	Quasi Max	V	189	333	40	-12.55	Pass	Tx/Ch11
241.8898	16.69	1.62	11.7	30.02	Quasi Max	H	120	228	46	-15.98	Pass	Tx/Ch11
114.642	17.32	1.13	13.13	31.57	Quasi Max	H	211	238	43.5	-11.93	Pass	Tx/Ch11
171.297	12.63	1.39	11.3	25.32	Quasi Max	H	176	29	43.5	-18.18	Pass	Tx/Ch11

Note1: 87.75MHz is determined to be non-radio related signal. FCC part15.109 class A limit applied.

Also see FCC Part15.109 test report.

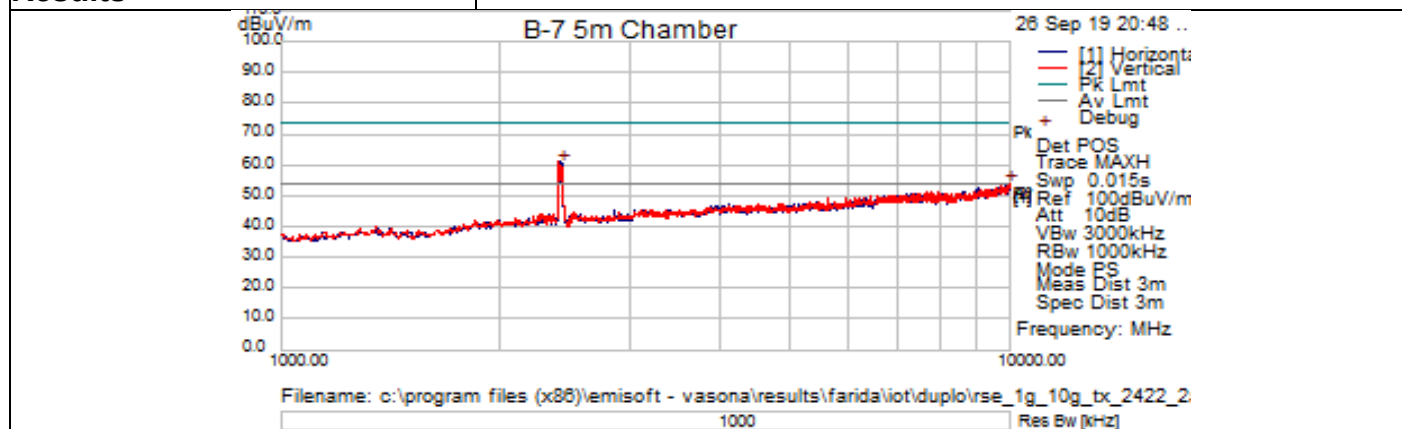
Note2: * means FCC part15.109 class A limit.

Subtest Date:	26-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	1GHz - 10GHz

Comments on the above Test Results 802.11b, Tx Channel 1 (2412 MHz)

Title: TX Spurious Emissions from 1GHz-10GHz – Ch1 (2412 MHz)

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
2406.25	76.13	5.82	-7.44	74.51	Peak	V	100	19	None	N/A	Ignored	Fundamental
2300.395	47.2	5.71	-7.85	45.06	Peak	V	109	24	74	-28.94	Pass	Tx/Ch11
2300.108	38.49	5.71	-7.85	36.35	Average	V	109	24	54	-17.65	Pass	Tx/Ch11

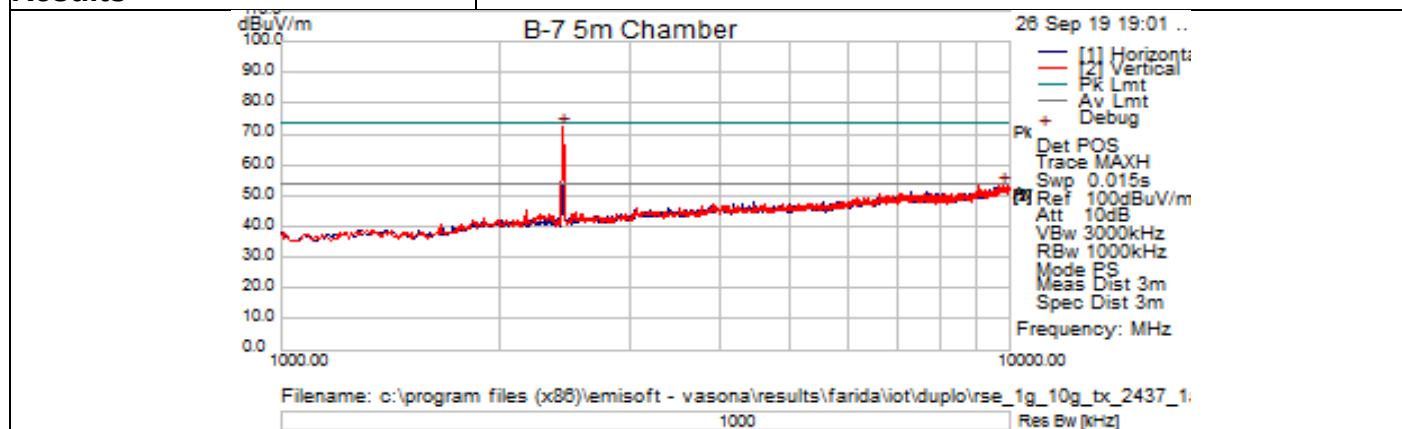
Subtest Date:	26-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	1GHz - 10GHz
Comments on the above Test Results	802.11n40 , Tx Channel 3 (2422 MHz)



Title: TX Spurious Emissions from 1GHz-10GHz – Ch3 (2422 MHz)

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
2423.125	62.35	5.87	-7.3	60.92	Peak [Scan]	H	150	20	None	N/A	Ignored	Fundamental

Subtest Date:	26-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	1GHz - 10GHz
Comments on the above Test Results	802.11b, Tx Channel 6 (2437 MHz)

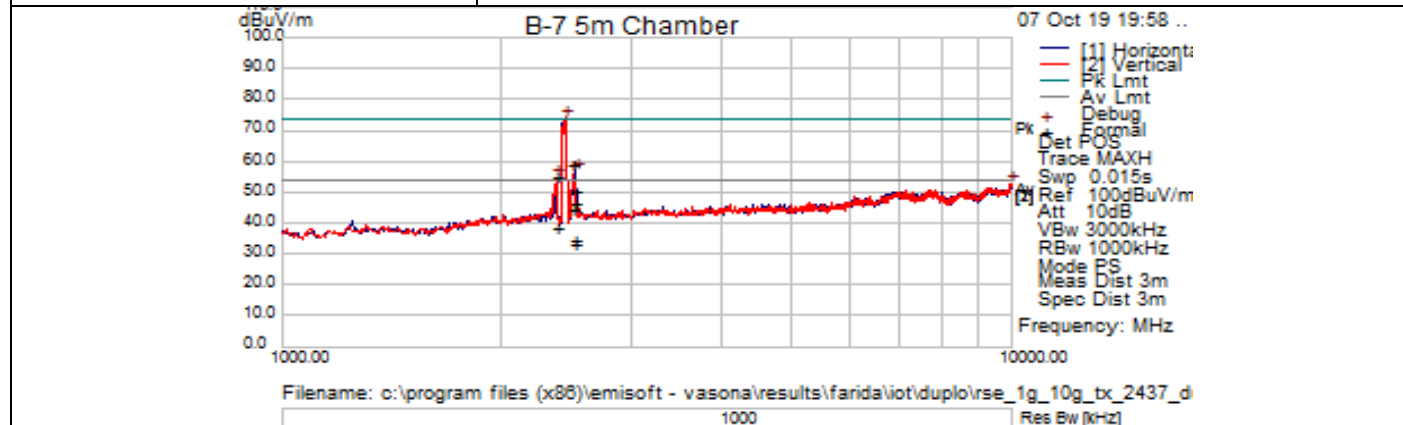


Title: TX Spurious Emissions from 1GHz-10GHz – Ch6 (2437 MHz)

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	73.85	5.89	-7.18	72.56	Peak	V	100	23	None	N/A	Ignored	Fundamental

Subtest Date:	07-Oct-2019
Engineer	Farida Rahmanzai Jose Huamani

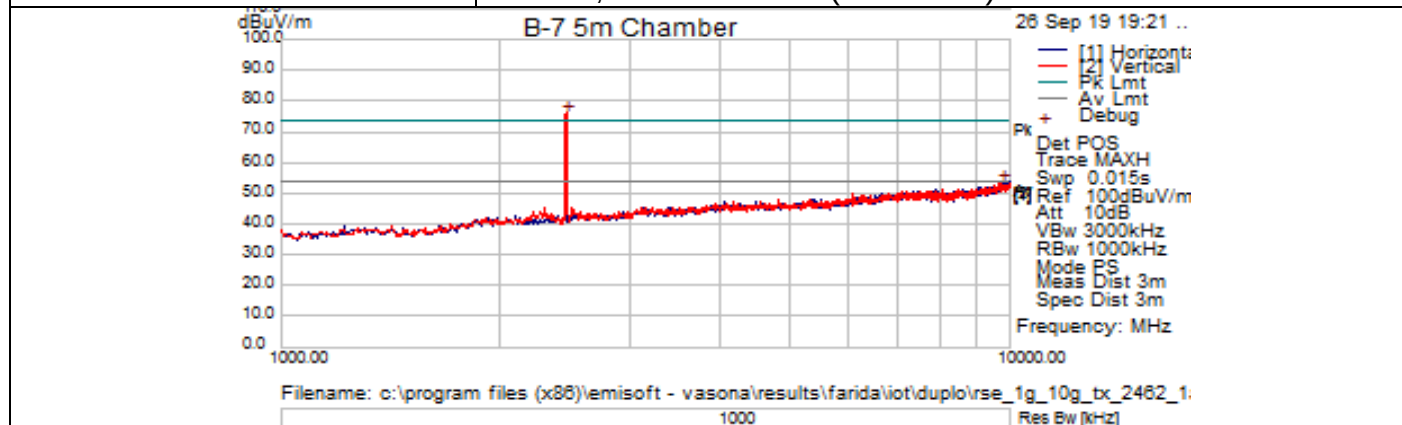
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	1GHz - 10GHz
Comments on the above Test Results	802.11n40 , Tx Channel 6 (2437 MHz)



Title: TX Spurious Emissions from 1GHz-10GHz – Ch6 (2437 MHz)

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
2445.625	75.6	5.63	-7.04	74.2	Peak [Scan]	V	150	10	NA	None	Ignored	Fundamental
2499.357	45.47	5.71	-6.74	44.44	Average	V	125	14	54	-9.56	Pass	
2500.194	60.04	5.71	-6.73	59.01	Peak	V	125	14	74	-14.99	Pass	
2373.618	41.06	5.54	-7.67	38.94	Average	V	100	6	54	-15.06	Pass	
2373.693	57.11	5.54	-7.66	54.98	Peak	V	100	6	74	-19.02	Pass	
2516.66	35.59	5.71	-6.78	34.51	Average	H	100	0	54	-19.49	Pass	
2520.865	34.73	5.71	-6.79	33.65	Average	H	100	0	54	-20.35	Pass	
2514.878	51.74	5.71	-6.78	50.67	Peak	H	100	0	74	-23.33	Pass	
2521.14	47.6	5.71	-6.79	46.52	Peak	H	100	0	74	-27.48	Pass	

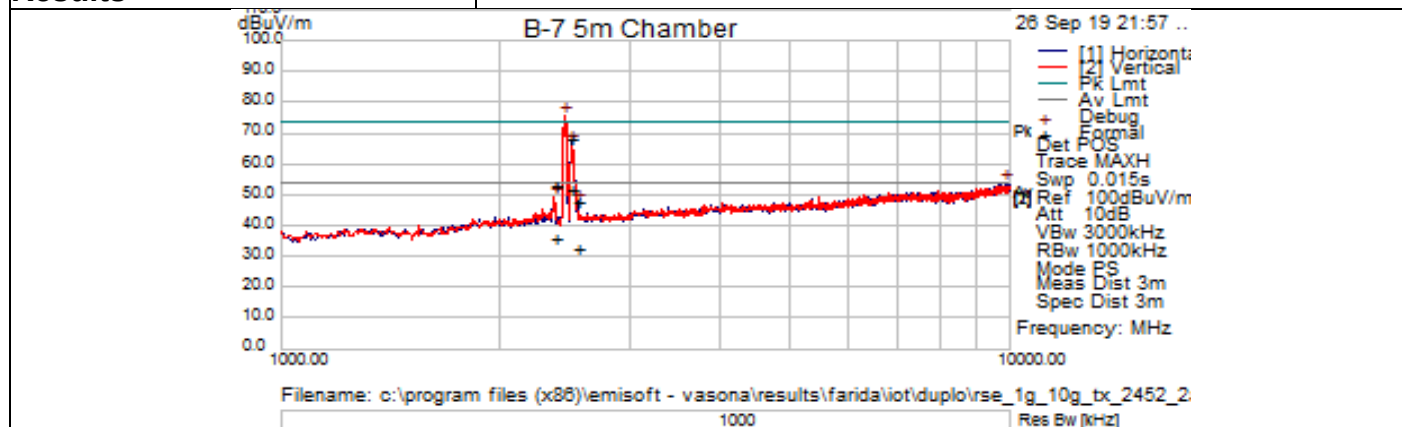
Subtest Date:	26-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	1GHz - 10GHz
Radio Mode	802.11b , Tx Channel 11 (2462 MHz)



Title: TX Spurious Emissions from 1GHz-10GHz – Ch11 (2462 MHz)

Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	AF (dB)	Level (dBuV)	Detector	Polarit y	Height (cm)	Azt (Deg)	Limit (dBuV)	Margin (dB)	Result s Pass / Fail	Comments
2462.5	77.26	5.92	-7.06	76.12	Peak [Scan]	V	100	23	None	N/A	Ignored	Fundamental

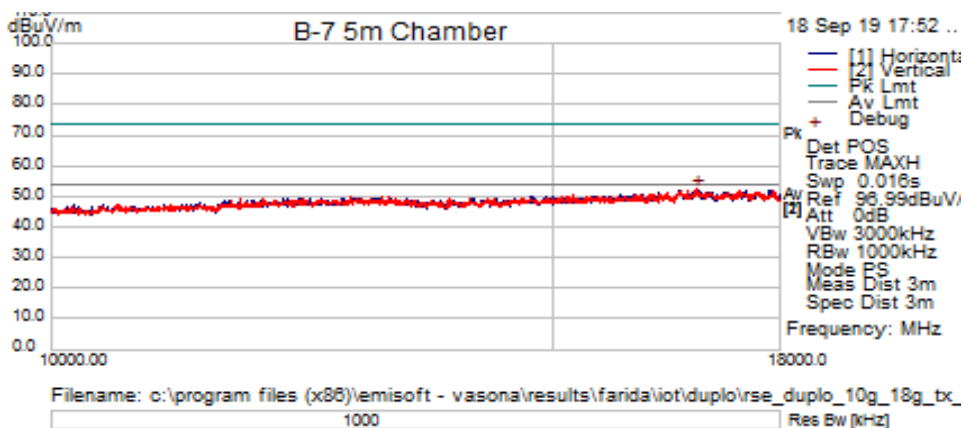
Subtest Date:	26-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	1GHz - 10GHz
Comments on the above Test Results	802.11n40 , Tx Channel 9 (2452 MHz)



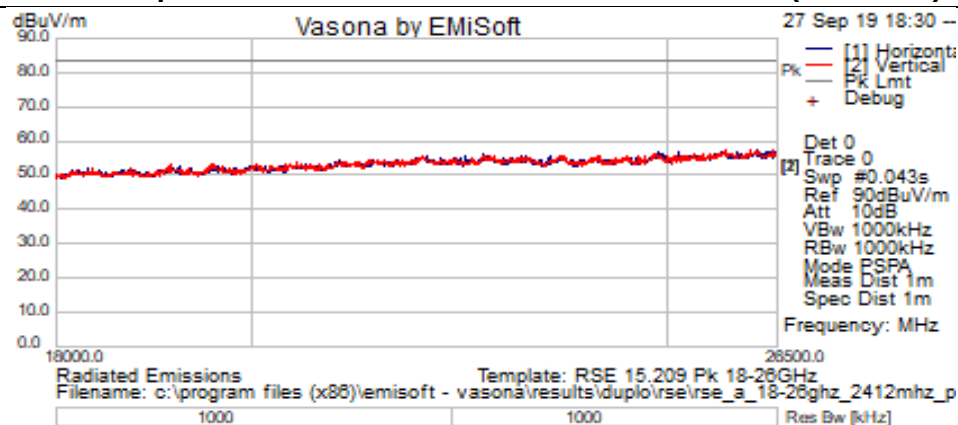
Title: TX Spurious Emissions from 1GHz-10GHz – Ch9 (2452 MHz)

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
2445.625	77.01	5.9	-7.04	75.87	Peak [Scan]	V	100	19	None	N/A	Ignored	Fundamental
2372.76	54.75	5.81	-7.67	52.89	Peak	V	108	32	74	-21.11	Pass	Tx/Ch11
2372.652	37.68	5.81	-7.67	35.82	Average	V	108	32	54	-18.18	Pass	Tx/Ch11
2500.983	69.39	5.98	-6.74	68.63	Peak	H	120	21	74	-5.37	Pass	Tx/Ch11
2500.953	52.43	5.98	-6.74	51.68	Average	H	120	21	54	-2.32	Pass	Tx/Ch11
2558.013	48.63	6.04	-6.83	47.83	Peak	H	99	21	74	-26.17	Pass	Tx/Ch11
2558.373	33.31	6.04	-6.83	32.51	Average	H	99	21	54	-21.49	Pass	Tx/Ch11

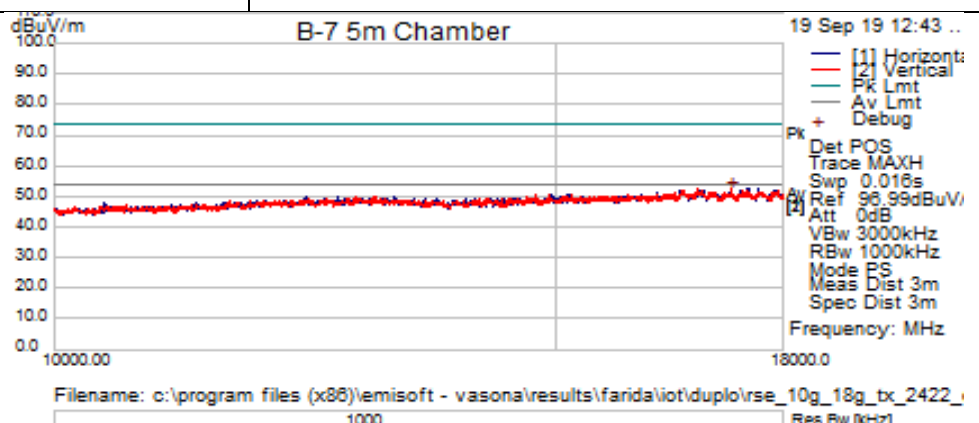
Subtest Date:	18-Sep-2019 – 27-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	10GHz – 26GHz
Comments on the above Test Results	802.11b , Tx Channel 1 (2412 MHz)



Title: TX Spurious Emissions from 10GHz-18GHz – Ch1 (2412 MHz)

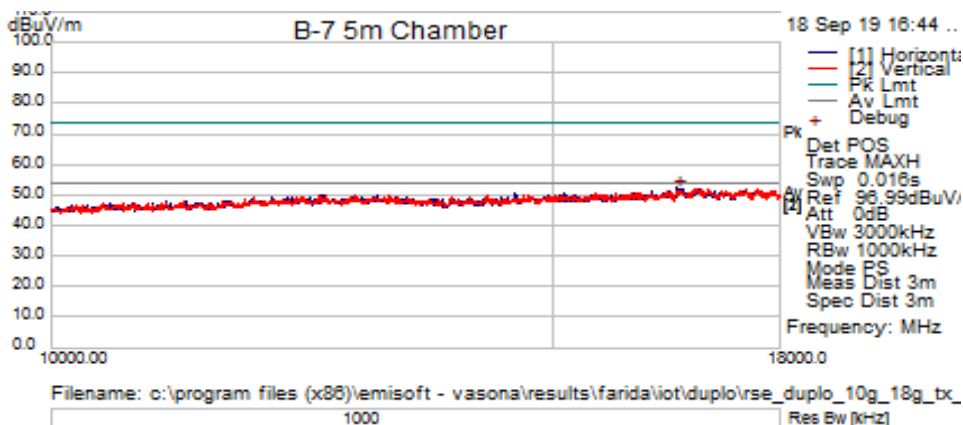


Title: TX Spurious Emissions from 18GHz-26GHz – Ch1 (2412 MHz)

Subtest Date:	19-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	10GHz – 26GHz
Comments on the above Test Results	802.11n40, Tx Channel 3 (2422 MHz)
 Title: TX Spurious Emissions from 10GHz-18GHz – Ch3 (2422 MHz)	

Note: No emissions found above 18GHz

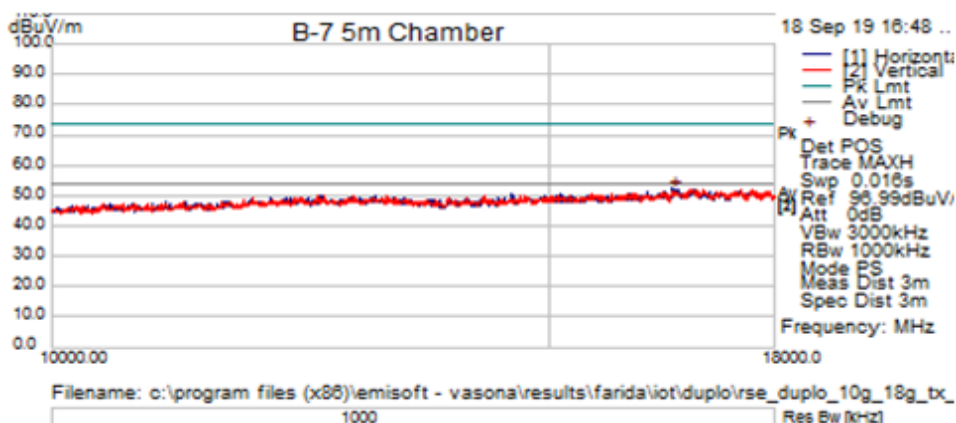
Subtest Date:	18-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	10GHz - 26GHz
Comments on the above Test Results	802.11b, Tx Channel 6 (2437 MHz)



Title: TX Spurious Emissions from 10GHz-18GHz – Ch6 (2437 MHz)

Note: No emissions found above 18GHz

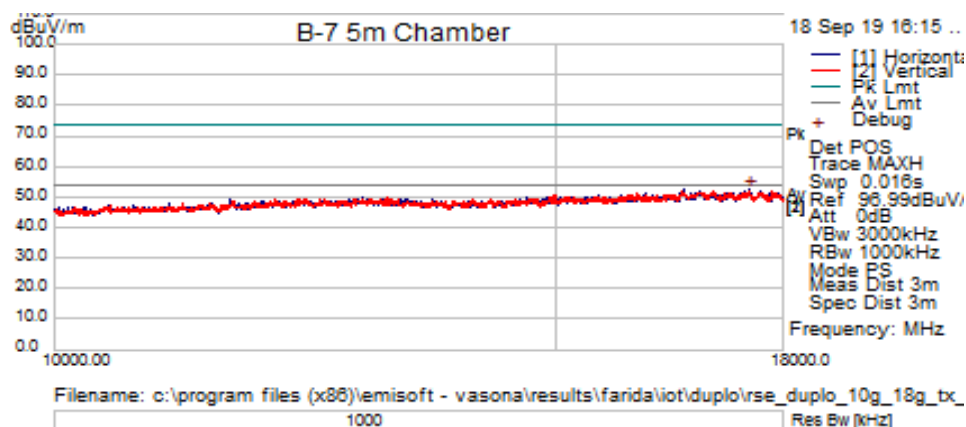
Subtest Date:	18-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	10GHz - 26GHz
Comments on the above Test Results	802.11n40, Tx Channel 6 (2437 MHz)



Title: TX Spurious Emissions from 10GHz-18GHz – Ch6 (2437 MHz)

Note: No emissions found above 18GHz

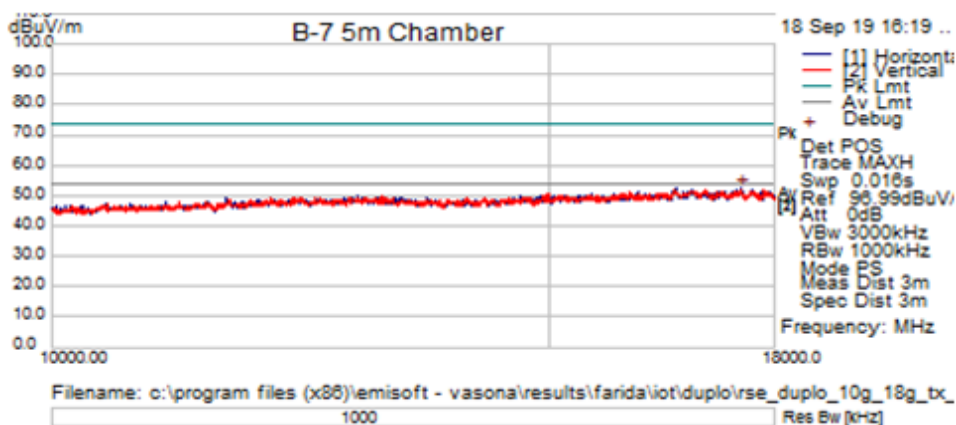
Subtest Date:	18-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	10GHz - 26GHz
Comments on the above Test Results	802.11b, Tx Channel 11 (2462 MHz)



Title: TX Spurious Emissions from 10GHz-18GHz – Ch11 (2462 MHz)

Note: No emissions found above 18GHz

Subtest Date:	18-Sep-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, 5m Anechoic
Subtest Title	Transmitter Spurious Emissions
Frequency Range	10GHz - 26GHz
Comments on the above Test Results	802.11n40, Tx Channel 9 (2452 MHz)

Title: **TX Spurious Emissions from 10GHz-18GHz – Ch11 (2462 MHz)**

Note: No emissions found above 18GHz

B.2 AC Conducted Emissions

B2.1 Limits

FCC 15.207 , LP0002:2.3

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of Emission (MHz)	Conducted Limits	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

RSS-Gen 8.8: Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4 (AC power-line conducted emissions limit), as measured using a 50 μ H / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

B2.2**Test Procedures****Ref:** C63.10:2013, section 6.2.2**Section 6.2.2 Measurement requirements**

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument, or where permitted or required, the emission currents on the power line sensed by a current probe. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer, and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements, using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having a 50 Ω input impedance. All other ports are terminated in 50 Ω loads. Figure 5, Figure 6, and Figure 7 show typical test setups for ac power-line conducted emissions testing (see 6.13). For information about the use of a RF-shielded (screen) room, vertical conducting plane and voltage probe, see ANSI C63.4.

Tabletop devices shall be placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screen) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

Section 6.2.5 Final ac power-line conducted emission measurements

Based on the exploratory tests of the EUT performed in 6.2.4, the one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT. If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation. If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.

Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency.

Ref. C63.10-2013 section 6.2**Test Procedure**

1. Using Vasona software, configure the spectrum analyzer as shown above (be sure to enter all losses between the transmitter output and the spectrum analyzer).
2. Set the radio in continuous transmit mode.
3. Connect cable end to LISN Hot port and other cable end to the spectrum Analyzer/EMC receiver RF input port. Terminate the LISN neutral port with a 50 Ω impedance terminator.
4. Sweep the frequency range from 150 kHz to 30 MHz (segment if necessary)
5. Use the peak marker function to determine the maximum amplitude level.
6. Center marker frequency and perform final measurement using applicable detector (Quasi-Pk/Average).
7. Record at least 6 highest reading for the worst case operating modes in Quasi-peak/Average.
8. Repeat the test on Neutral lead.
9. Repeat step 3 – 7 with the radio sets in the Receiver mode.
10. Record at least 6 highest reading in Quasi-peak/Average

Ref. C63.10-2013 section 4 / CISPR16-1-1

Test Parameters
Span = Entire frequency range or segment if necessary. Reference Level = 70 dBuV RBW = 9 kHz VBW $\geq$ 3 x RBW Sweep Time = Couple Detector = Quasi-Peak & Average

Samples, Systems, and Modes

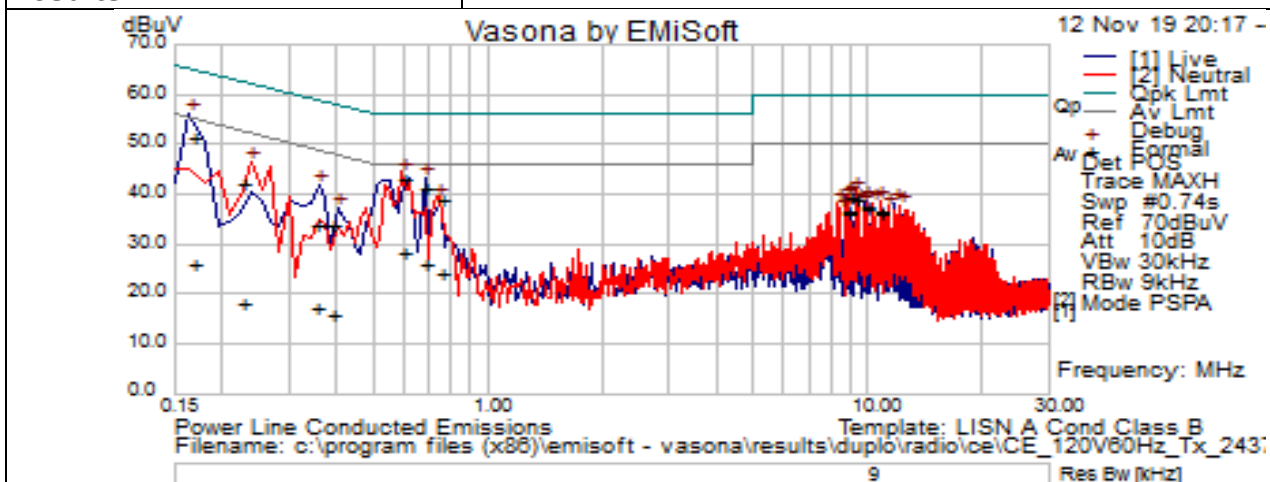
System Number	Description	Samples	System under test	Support equipment
2	EUT	IW-6300H with Air-ANT2513P4M-N antenna	☒	☐
	Support	IW-6300H-AC-X-K9 power supply	☐	☒

Mode Setting#	Wi-Fi Mode	Modulation	Data Rate
1	802.11b*	CCK	1 Mbps

Tested By: Test Engineer(s): Farida Rahmanzai, Jose Huamani	Date of testing: Date of testing: 12-Nov-2019
Test Result: PASS	

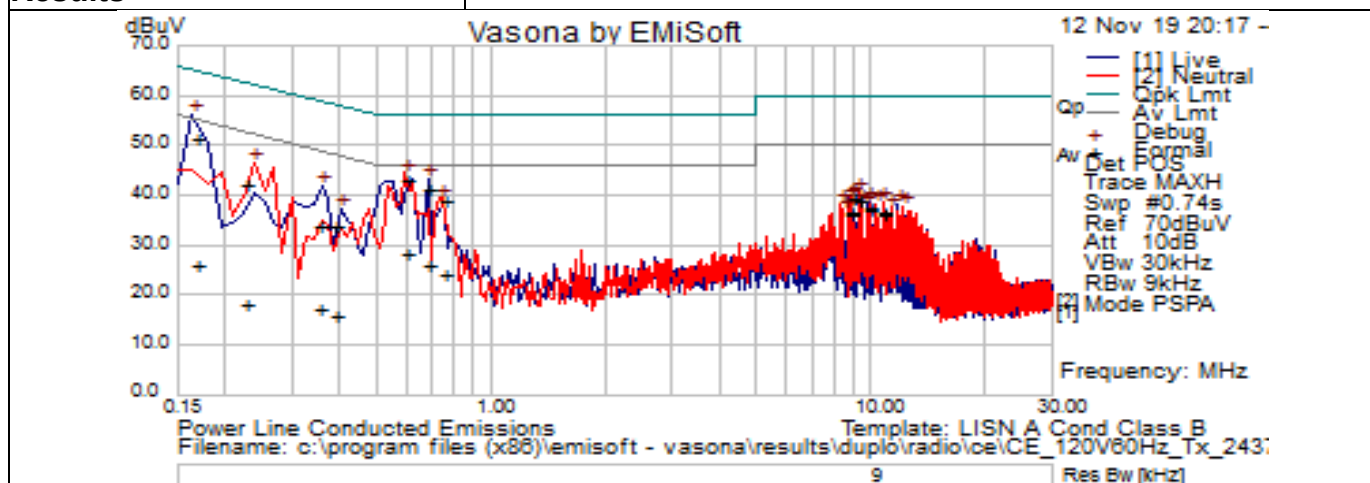
B2.3
Emissions Test Data and Graphical Test Results
AC Conducted

Subtest Date:	12-Nov-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, formal immunity room
Subtest Title	Conducted Emissions
Frequency Range	150 kHz - 30 MHz
Comments on the above Test Results	TX Ch6 (2437 MHz) with CCK modulation – 1 Mbps


AC Conducted Emissions Test Result Tables for 802.11b / TX Ch6

Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	Factors (dB)	Level (dBuV)	Detector	Lines (Live/Neutral)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
0.390873	13.56	20.14	0.07	33.77	Quasi Peak	Live	58.05	-24.28	Pass	TX / Ch 6
0.390873	-4.15	20.14	0.07	16.06	Average	Live	48.05	-31.99	Pass	TX / Ch 6
0.169407	30.48	21.07	0.11	51.67	Quasi Peak	Live	64.99	-13.32	Pass	TX / Ch 6
0.169407	4.93	21.07	0.11	26.11	Average	Live	54.99	-28.87	Pass	TX / Ch 6
0.356214	13.84	20.24	0.07	34.15	Quasi Peak	Live	58.82	-24.66	Pass	TX / Ch 6
0.356214	-2.97	20.24	0.07	17.35	Average	Live	48.82	-31.47	Pass	TX / Ch 6
0.68847	21.3	19.98	0.07	41.34	Quasi Peak	Live	56	-14.66	Pass	TX / Ch 6
0.68847	5.94	19.98	0.07	25.99	Average	Live	46	-20.01	Pass	TX / Ch 6
8.775606	16.56	20.13	0.11	36.8	Quasi Peak	Live	60	-23.2	Pass	TX / Ch 6
8.775606	16.1	20.13	0.11	36.34	Average	Live	50	-13.66	Pass	TX / Ch 6
9.925209	17.33	20.15	0.1	37.58	Quasi Peak	Live	60	-22.42	Pass	TX / Ch 6
9.925209	17.06	20.15	0.1	37.31	Average	Live	50	-12.69	Pass	TX / Ch 6

Subtest Date:	12-Nov-2019
Engineer	Farida Rahmanzai Jose Huamani
Lab Information	Building 7, formal immunity room
Subtest Title	Conducted Emissions
Frequency Range	150 kHz - 30 MHz
Comments on the above Test Results	TX Ch6 (2437 MHz) with CCK modulation – 1 Mbps



AC Conducted Emissions Test Result Tables for 802.11b / TX Ch6

Frequency (MHz)	Raw (dBuV)	Cab Loss (dB)	Factors (dB)	Level (dBuV)	Detector	Lines (Live/Neutral)	Limit (dBuV)	Margin (dB)	Results Pass / Fail	Comments
0.22542	21.61	20.75	0.09	42.45	Quasi Peak	Neutral	62.62	-20.17	Pass	TX / Ch 6
0.22542	-2.61	20.75	0.09	18.23	Average	Neutral	52.62	-34.39	Pass	TX / Ch 6
0.601782	23.18	19.98	0.07	43.22	Quasi Peak	Neutral	56	-12.78	Pass	TX / Ch 6
0.601782	8.56	19.98	0.07	28.6	Average	Neutral	46	-17.4	Pass	TX / Ch 6
0.751572	19.19	19.98	0.07	39.23	Quasi Peak	Neutral	56	-16.77	Pass	TX / Ch 6
0.751572	4.15	19.98	0.07	24.19	Average	Neutral	46	-21.81	Pass	TX / Ch 6
8.920515	19.11	20.14	0.1	39.34	Quasi Peak	Neutral	60	-20.66	Pass	TX / Ch 6
8.920515	19.15	20.14	0.1	39.38	Average	Neutral	50	-10.62	Pass	TX / Ch 6
9.351	18.59	20.14	0.11	38.85	Average	Neutral	50	-11.15	Pass	TX / Ch 6
9.351	18.74	20.14	0.11	38.99	Quasi Peak	Neutral	60	-21.01	Pass	TX / Ch 6
10.79036	16.54	20.17	0.1	36.82	Quasi Peak	Neutral	60	-23.18	Pass	TX / Ch 6
10.79036	16.17	20.17	0.1	36.44	Average	Neutral	50	-13.56	Pass	TX / Ch 6

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

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due	Test Item
Test Equipment used for Radiated Emissions					
CIS008113	Cisco/NSA 5m Chamber	NSA 5m Chamber	01-Oct-19	01-Oct-20	B1
CIS037581	ETS Lindgren / 3117	Double Ridged Guide Horn Antenna	25-Jan-19	25-Jan-20	B1
CIS039131	Cisco / TH0118	Mast Mount Preamplifier Array, 1-18GHz	25-Feb-19	25-Feb-20	B1
CIS038404	Sunol Sciences / JB1	Combination Bi-Log Antenna, 30MHz-2GHz	31-Jan-19	31-Jan-20	B1
CIS036710	Cisco/1840	18-40GHz EMI Test Head/Verification Fixture	12-Aug-19	12-Aug-20	B1
CIS018231	Rohde & Schwarz / ESI 40(ESIB 40)	EMI RECEIVER TEST 20Hz-40GHz	07-Mar-19	07-Mar-20	B1
CIS042012	Rohde & Schwarz / ESCI	EMI Test Receiver	12-Aug-19	12-Aug-20	B1
CIS040604	Agilent / E4440A	Precision Spectrum Analyzer	19-Oct-18	19-Oct-20	B1
CIS047311	Huber+ Suhner/Sucoflex 106PA	RF Coaxial Cable, to 18GHz, 8.5 m	30-Sep-19	30-Sep-20	B1
CIS025660	Micro-Coax / UFB311A-1-0840-504504	RF Coaxial Cable, to 18GHz, 8.5 m	30-Sep-19	30-Sep-20	B1
CIS025640	Micro-Coax / UFB311A-0-2720-520520	Coaxial Cable, 272.0 in. to 18GHz	30-Sep-19	30-Sep-20	B1
CIS056055	Wainwright Instruments/ WRCGV8-2360-2400-2483.5-40SS	SMA Band Reject Filter 2.36GHz to 2.5235 GHz	10-Apr-19	10-Apr-20	B1
Test Equipment used for AC Conducted Emissions					
CIS41955	Rohde & Schwarz / ESCI	EMI Test Receiver	25-Apr-19	25-Apr-20	B2
CIS08187	Fisher Custom Com / FCC-450B-2.4-N	Pulse Limiter	15-May-19	15-May-20	B2
CIS019210	TTE / H785-150K-50-21378	High Pass Filter 150KHz	25-Feb-19	25-Feb-20	B2
CIS05039	Fisher Custom Com / 50/250-50-2-02	LISN (9kHz-30MHz)	21-Feb-19	21-Feb-20	B2
CIS034158	Fisher Custom Com / 50-2-RA-NEMA-5-20R	LISN Receptacle Adaptor	21-Feb-19	21-Feb-20	B2
CIS040532	Coleman / RG-223	25 ft RG-223 Cable	04-Dec-18	04-Dec-19	B2
51663	Bird / 5-T-MB	50Ω termination	04-Dec-18	04-Dec-19	B2

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

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
RF Conducted at output antenna port				
7329	OMEGA/CT485B	Chart Recorder	18 Feb. 2019	18 Feb. 2020
49516	Keysight (Agilent/HP) / N9030A	PXA Signal Analyzer, 3Hz to 50GHz	29 Nov. 2019	29 Nov. 2019
55097	National Instruments / PXI-1042	Chassis PXI	Cal Not Required	Cal Not Required
56089	National Instruments / PXI-2796	40GHz Dual 6x1 Multiplexer (SP6T)	Verify Before Use	Verify Before Use
56328	Pasternack / PE5019-1	Torque Wrench	13 Feb. 2019	13 Feb. 2020
57233	National Instruments / PXI-8115	Embedded Controller	Cal Not Required	Cal Not Required
57253	National Instruments / PXI-2796	40GHz Dual 6x1 Multiplexer (SP6T)	Verify Before Use	Verify Before Use
57254	National Instruments / PXI-2799	Switch 1x1	Verify Before Use	Verify Before Use
57479	CISCO / ATIL	Automation Test Insertion Loss System	Verify Before Use	Verify Before Use

Appendix C: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz (1×10^3)
EN	European Norm	MHz	MegaHertz (1×10^6)
IEC	International Electro technical Commission	GHz	Gigahertz (1×10^9)
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 (1×10^3)
L1	Line 1	μ V	Microvolt (1×10^{-6})
L2	Line2	A	Amp
L3	Line 3	μ A	Micro Amp (1×10^{-6})
DC	Direct Current	mS	Milli Second (1×10^{-3})
RAW	Uncorrected measurement value, as indicated by the measuring device	μ S	Micro Second (1×10^{-6})
RF	Radio Frequency	μ S	Micro Second (1×10^{-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

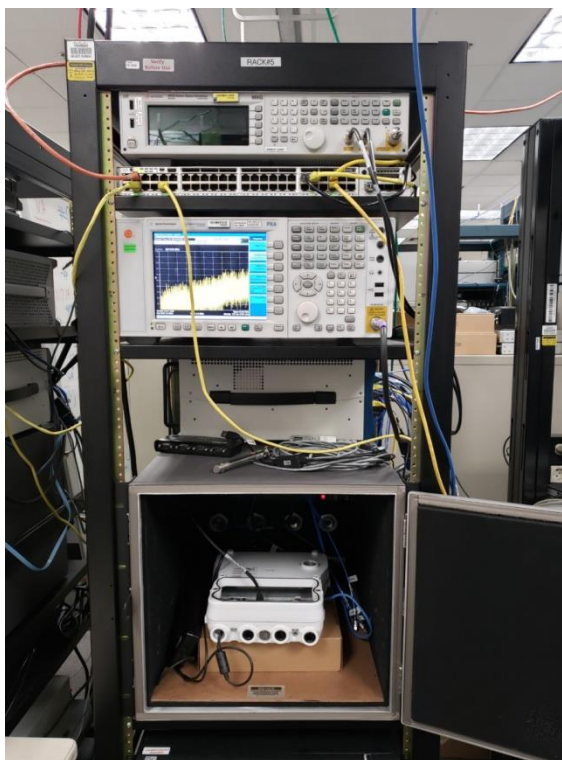
Appendix D: Photographs of Test Setups

Title: EUT Pictures

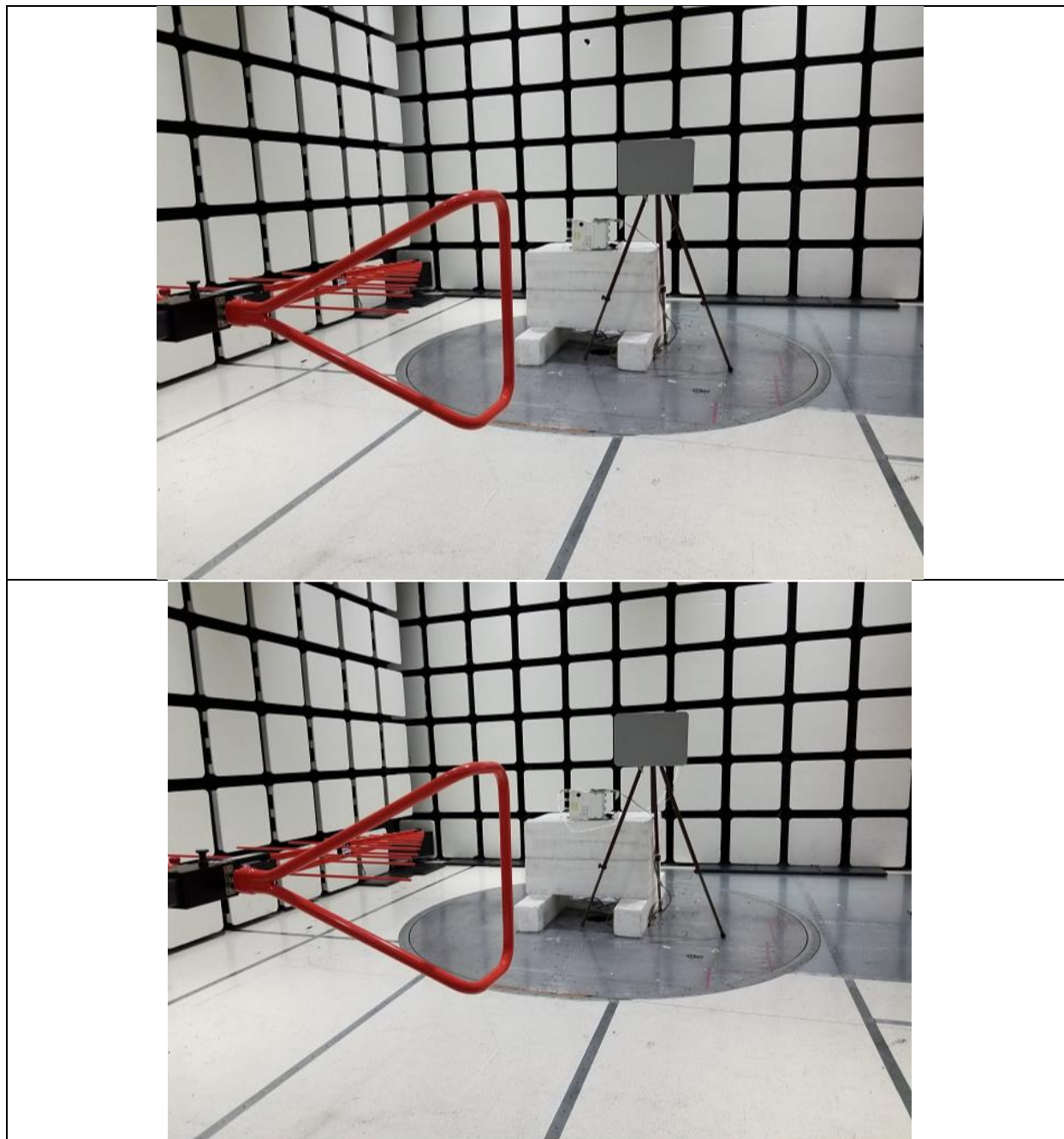




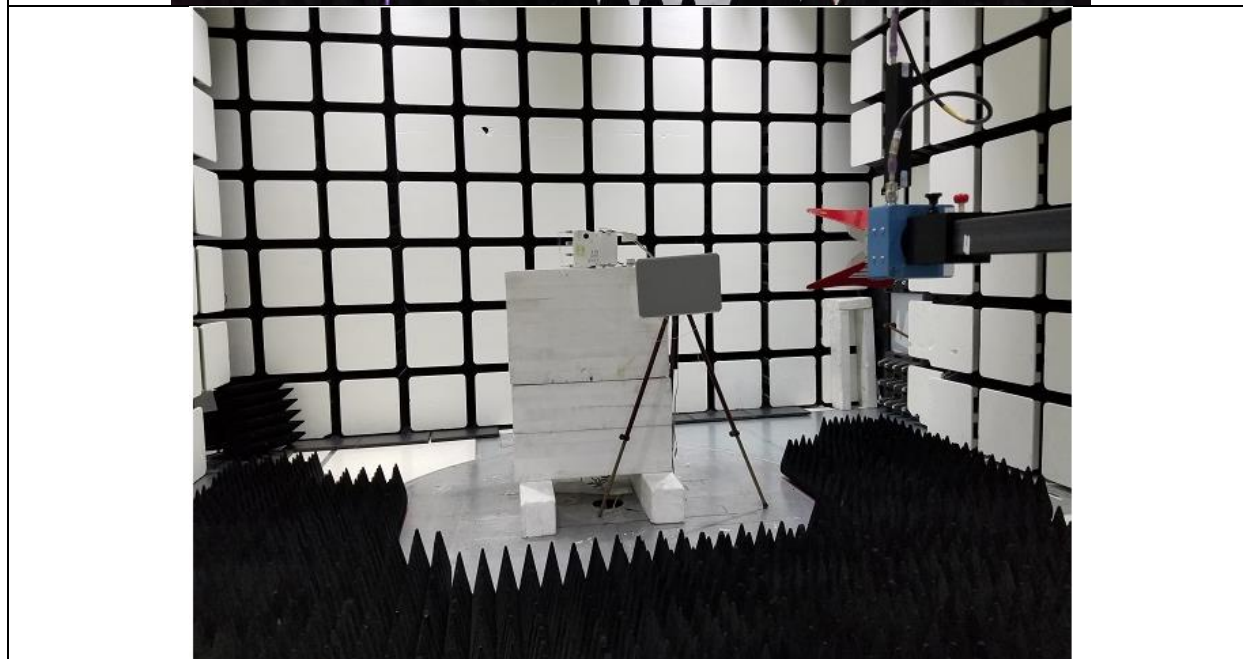
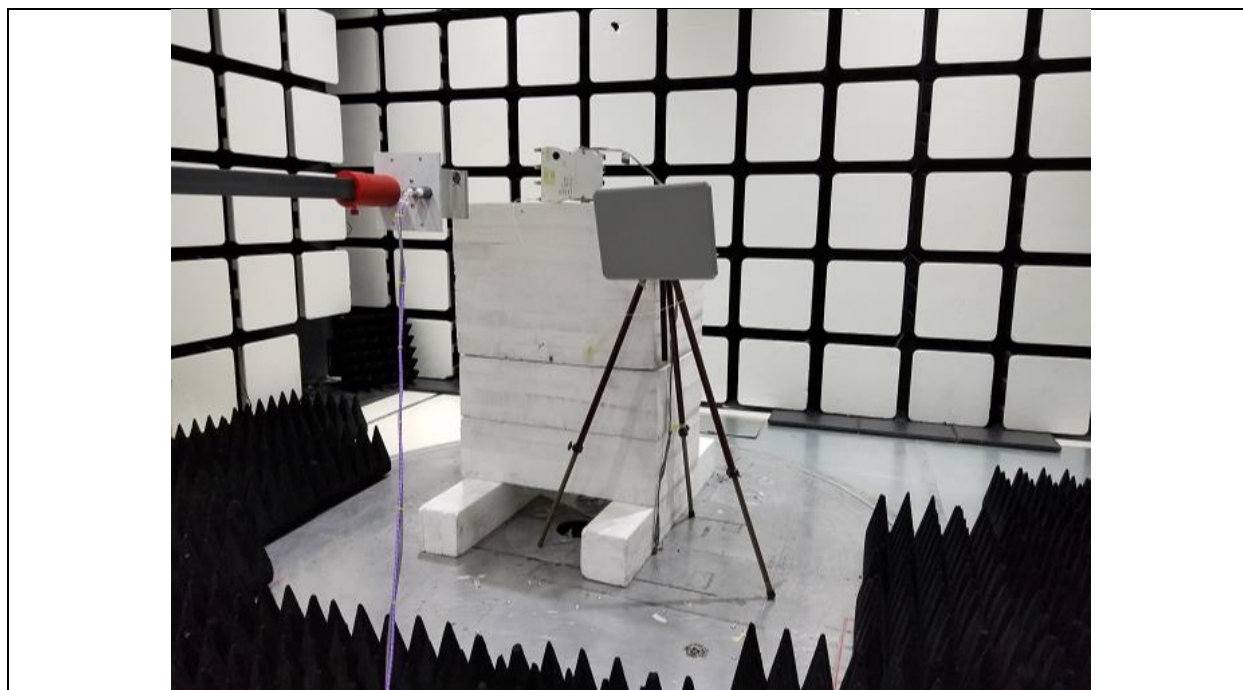
Appendix E:
Title: Radio Conducted Test Setup



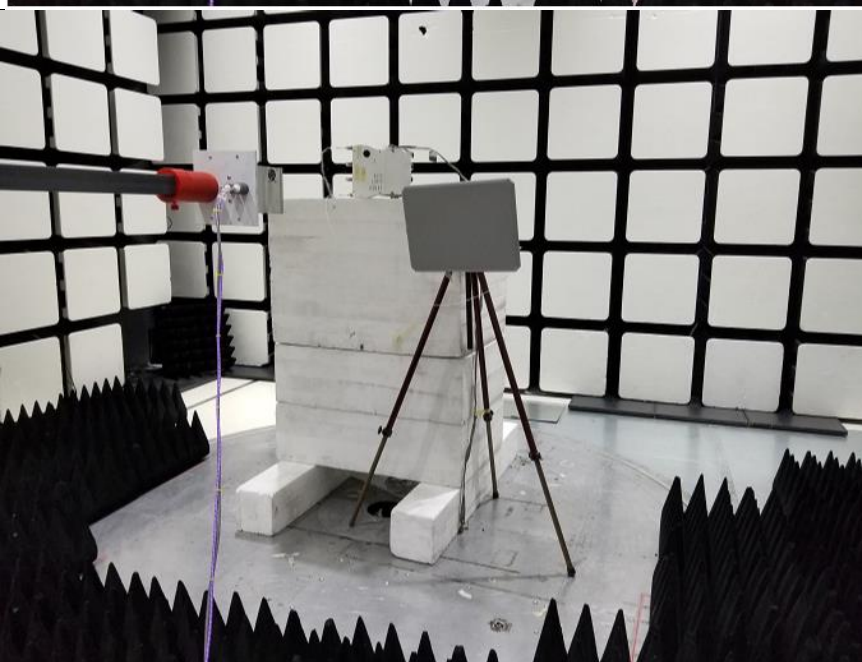
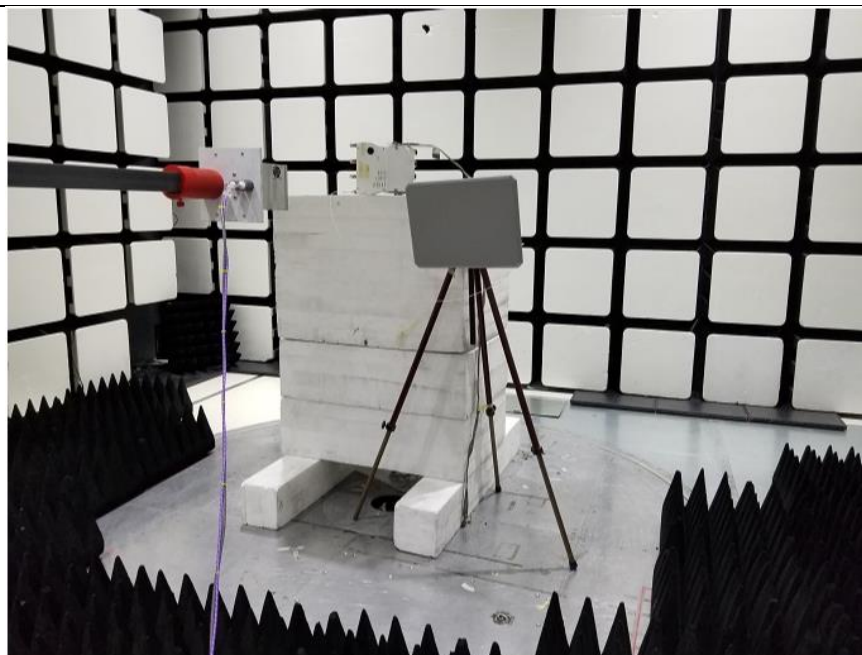
Title: Radiated Spurious Emissions Test Setup



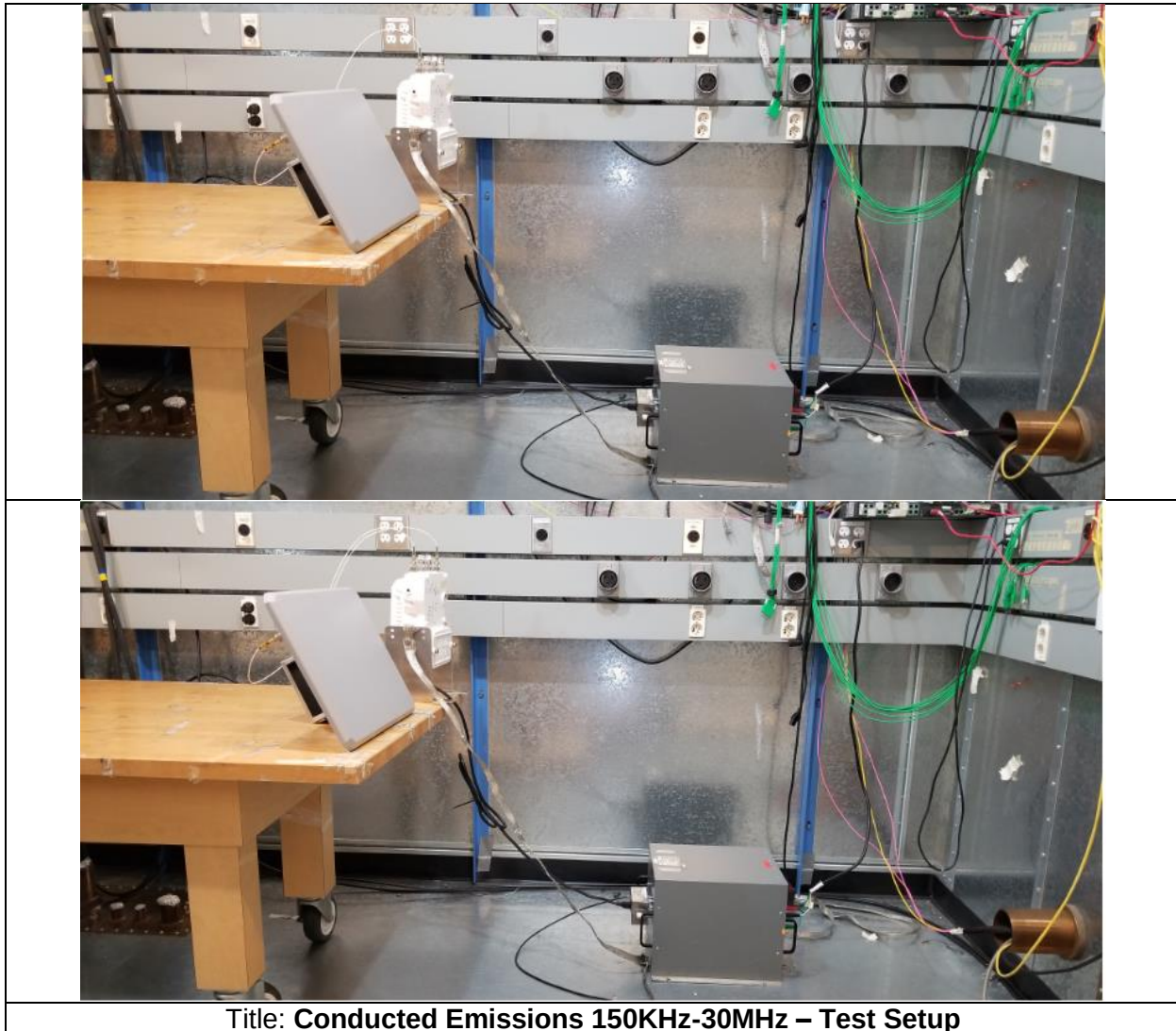
Title: Radiated Spurious Emissions 30MHz-1GHz – Test Setup



Title: Radiated Spurious Emissions 1GHz-18GHz – Test Setup



Title: Radiated Spurious Emissions 18GHz-40GHz – Test Setup



Title: **Conducted Emissions 150KHz-30MHz – Test Setup**

Appendix F: Software Used to Perform Testing

EMIsoft Vasona, version 6.024

Appendix G: Test Procedures

Measurements were made in accordance with

- KDB 662911 - MIMO
- ANSI C63.4 2014 Unintentional Radiators
- ANSI C63.10 2013 Intentional Radiators

Test procedures are summarized below

FCC 2.4GHz RSE Test Procedures	EDCS # 1480386
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Appendix H: Test Assessment Plan

Compliance Test Plan (Excel) EDCS# 18357550

Target Power Tables EDCS# 18295686

Appendix I: Worst Case Justification

All 3 orientations (Z, Y, Z) of the EUT were assessed by performing pre-scan.
The Z orientation was determined to be the worst-case orientation.

Worst Case Mode: Worst case mode shall be the mode that produces the highest power level based on conducted power measurement.

Also see Appendix A the test report.

Appendix J: Test Procedures

Measurements were made in accordance with

- KDB 558074 - D01 DTS Meas Guidance v05
- 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

AppendixK: 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>

END