Radio Test Report

C9124AXI-A, C9124AXD-A, C9124AXI-B, C9124AXD-B

Cisco Catalyst C9124AX Series 802.11ax Access Point

5GHz Wi-Fi Radio & 5GHz Auxiliary Radio

FCC ID: LDK-HTIAK2282
IC: 2461N-HTIAK2282

5150 MHz – 5250 MHz, 5250 MHz – 5350 MHz, 5470 MHz – 5725 MHz, 5725 MHz – 5850 MHz

Against the following Specifications:

Radiated TX Spurious Emissions and AC Conducted Emissions

CFR47 Part 15.407

RSS-247, RSS-GEN

A2LA ACCREDITED
CERTIFICATE #1178.01

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

Author: Johanna Knudsen **Tested By:** Johanna Knudsen	**Approved By:** Sam Kim **Title:** Manager, Radio Compliance **Revision:** 3

This report replaces any previously entered test report under EDCS – 21617440. This test report has been electronically authorized and archived using the CISCO Engineering Document Control system. Test Report Template EDCS# 1526148

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Section 1: Overview

1.1 Test Summary

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

Specifications
Radiated TX Spurious Emissions and AC Conducted Emissions only **CFR47 Part 15.407;** **RSS-247 Issue 2, Feb 2017;** **RSS-GEN Issue 5, Feb 2019**

Please note 5150-5250MHz not supported for C9124AXI-A

Section 2: Assessment Information

2.1 General

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

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

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

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

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

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

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

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

2.2 Units of Measurement

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

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

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

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

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

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

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

Measurement Uncertainty Values

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

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

Radiated emissions (expanded uncertainty, confidence interval 95%)

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

Conducted emissions (expanded uncertainty, confidence interval 95%)

30 MHz – 40GHz	+/- 0.38 dB

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

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

23-FEB-2021 to 10-MAY-2021

2.4 Report Issue Date

18-MAY-2021

2.5 Testing facilities

This assessment was performed by:

Testing Laboratory

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

Headquarters

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

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

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

Test Engineers

Johanna Knudsen, Dennis Thai, Ryan Pham

2.6 Equipment Assessed (EUT)

C9124AXI

2.7 EUT Description

The Cisco Catalyst 9124AX Series outdoor access points are next-generation Wi-Fi 6 access points encased in a rugged and robust design that service providers and enterprises can easily deploy.

The radio supports 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.

5GHz Wi-Fi Radio:
- 802.11a (6-54Mbps)
- 802.11n HT20 (MCS0 – MCS31)
- 802.11n HT40 (MCS0 – MCS31)
- 802.11ac VHT20 (MCS0-MCS9, 4SS)
- 802.11ac VHT40 (MCS0-MCS9, 4SS)
- 802.11ac VHT80 (MCS0-MCS9, 4SS)
- 802.11ac VHT80+80 (MCS0-MCS9, 2SS Max)
- 802.11ax HE20 (MCS0-MCS11, 4SS)
- 802.11ax HE40 (MCS0-MCS11, 4SS)
- 802.11ax HE80 (MCS0-MCS11, 4SS)
- 802.11ax HE80+80 (MCS0-MCS9, 2SS Max)

5GHz Auxiliary Radio:
- 802.11a - Non HT20, One Antenna, 6 to 54 Mbps, 1ss

The following antennas are supported by this product series. Please note, the antenna information has been provided by the customer (the Cisco business unit). The data included in this report represent the worst-case data for all antennas.

Ithaca (Internal Antenna) Model C9124AXI-x

Frequency	Antenna Name		Antenna Gain
2.4GHz & 5GHz (Wi-Fi)	Antenna 1	TX/RX: internal	7dBi@2.4GHz 7dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 2	TX/RX: internal	7dBi@2.4GHz 7dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 3	TX/RX: internal	7dBi@2.4GHz 7dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 4	TX/RX: internal	7dBi@2.4GHz 7dBi@5GHz
BLE	Antenna T	TX/RX: internal	5dBi
2.4GHz & 5GHz (Aux)	Antenna A	TX/RX: internal	6dBi@2.4GHz 7dBi@5GHz
2.4GHz & 5GHz (Aux)	Antenna B	RX: internal	6dBi@2.4GHz 7dBi@5GHz

Ithaca (Internal Antenna) Model C9124AXD-x

Frequency	Antenna Name		Antenna Gain
2.4GHz & 5GHz (Wi-Fi)	Antenna 1	TX/RX: internal	9dBi@2.4GHz 9dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 2	TX/RX: internal	9dBi@2.4GHz 9dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 3	TX/RX: internal	9dBi@2.4GHz 9dBi@5GHz
2.4GHz & 5GHz (Wi-Fi)	Antenna 4	TX/RX: internal	9dBi@2.4GHz 9dBi@5GHz
BLE	Antenna T	TX/RX: internal	4dBi
2.4GHz & 5GHz (Aux)	Antenna A	TX/RX: internal	9dBi@2.4GHz 9dBi@5GHz
2.4GHz & 5GHz (Aux)	Antenna B	RX: internal	9dBi@2.4GHz 9dBi@5GHz

Section 3: Result Summary

3.1 Results Summary Table

Emissions (General requirements)

Basic Standard	Technical Requirements / Details	Result
FCC 15.209; FCC 15.205; FCC 15.407(b); RSS-GEN Sec 8.9, 8.10; RSS-247 Sec 6.2	**Radiated 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 field strength limits table in this section.	Pass
FCC 15.207 RSS-Gen	**AC conducted Emissions:** Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries.	Pass

Section 4: Sample Details

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

4.1 Sample Details

Sample No.	Equipment Details	Maker	Hardware Rev.	Software Rev.	Serial Number
S01	C9124AXI-B	Foxconn (for Cisco)	74-125082-01 Pre-pilot	See Mode section below	FOC24523WYE
S02	AC/DC Adaptor GS60A48-CIS2	MeanWell	341-100525-01	N/A	EB66G69650
S03	C9124AXI-B	Foxconn (for Cisco)	74-125082-01 Pre-pilot	N/A	FOC24523WZ9
S04	AC/DC Adaptor GS60A48-CIS2	MeanWell	341-100525-01	N/A	EB45F54424

4.2 System Details

System #	Description	Samples
1	Equipment Under Test – Radiated Spurious Emissions	S01, S02
2	Equipment Under Test – AC Conducted Emissions	S03, S04

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Radiated Spurious Emissions	Continuous transmit mode Image used: Cisco AP Software, (ap1g6a), [sjc-ads-9175:/nobackup/rahulsi6/ithaca/c175_throttle/router] Technical Support: http://www.cisco.com/techsupport Compiled Wed Feb 17 19:47:58 PST 2021
2	AC Conducted Emissions	IPERF software to stream packets from server to EUT then wirelessly to 2.4GHz and 5GHz client laptops and reverse direction back to server. EUT transmits data via BLE to receiving access point. Console port connected to PC to monitor traffic. USB port is terminated with a flash drive. EUT is powered by PoE from the switch.

Appendix A: Emission Test Results

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

A.1 Radiated Spurious Emissions 1GHz – 40GHz

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

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

Span:	1GHz – 40 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	3 MHz
Detector:	Peak/Average

Terminate the access Point RF ports with 50 ohm loads.

Define worst case azimuth x, y, z.
Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

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

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

Samples, Systems, and Modes

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

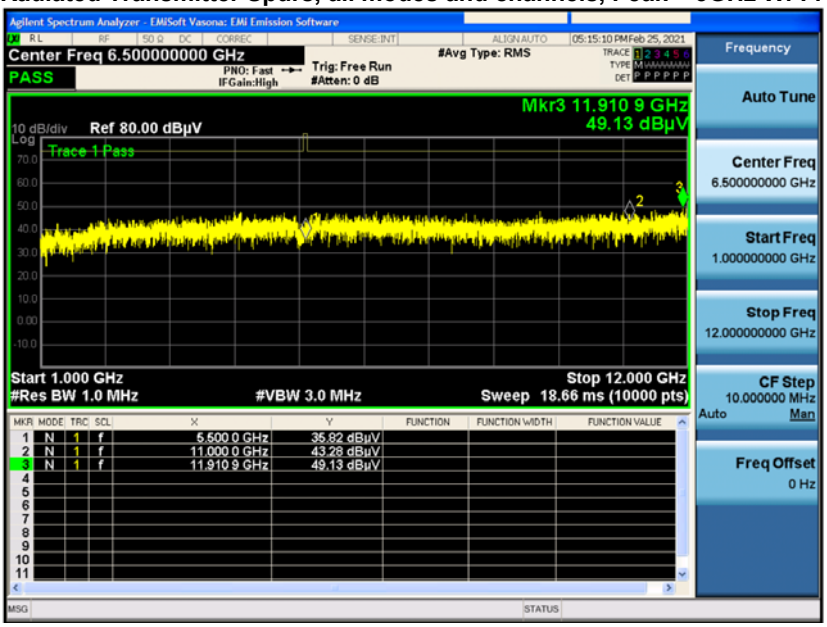
Tested By: Johanna Knudsen	**Date of testing:** 22-FEB-2021 to 26-FEB-2021 09-MAR-2021 to 10-MAR-2021
Test Result: PASS	

See Appendix B for list of test equipment

Transmitter Radiated Spurious Emissions (1GHz – 12GHz)

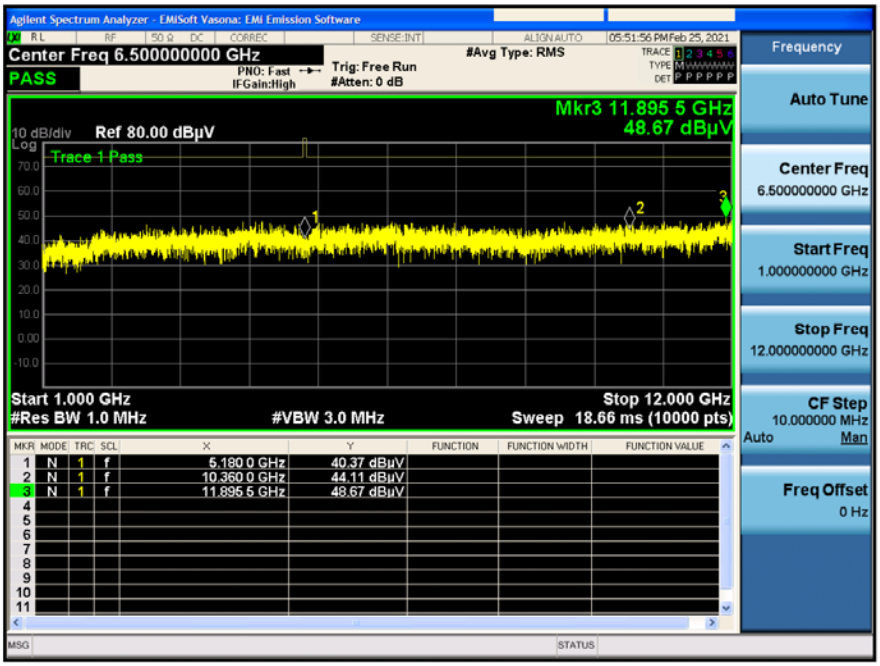
Radiated Transmitter Spurs, all modes and channels, Average – 5GHz Wi-Fi Radio

Radiated Transmitter Spurs, all modes and channels, Peak – 5GHz Wi-Fi Radio



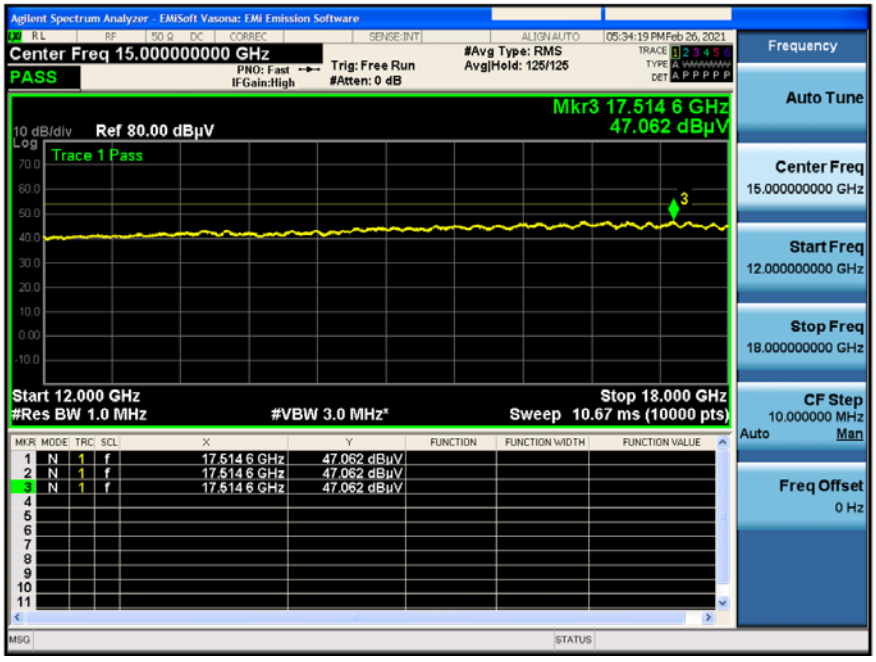
Radiated Transmitter Spurs, all modes and channels, Average – 5GHz Auxiliary Radio

Radiated Transmitter Spurs, all modes and channels, Peak – 5GHz Auxiliary Radio

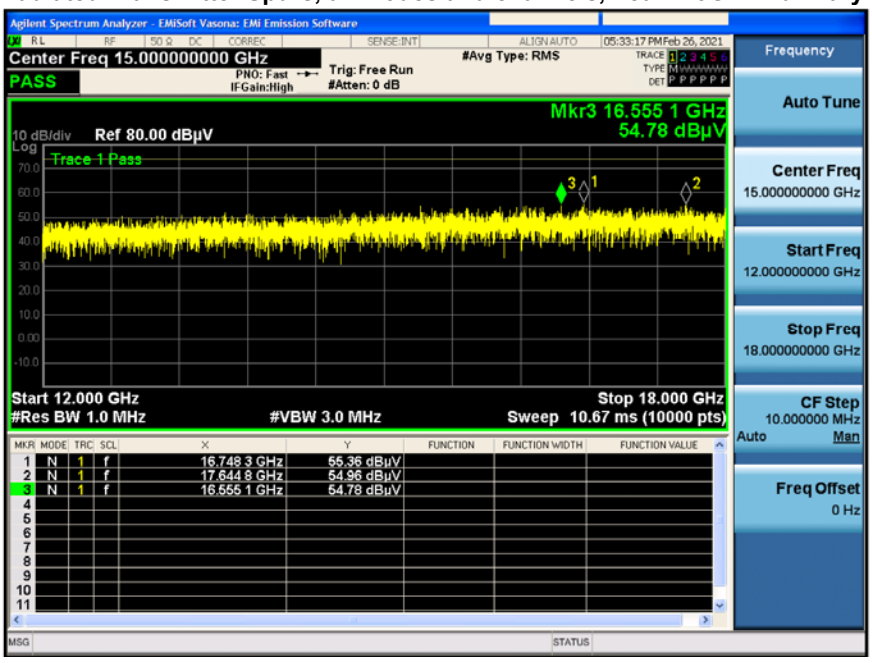


Transmitter Radiated Spurious Emissions (12GHz – 18GHz)

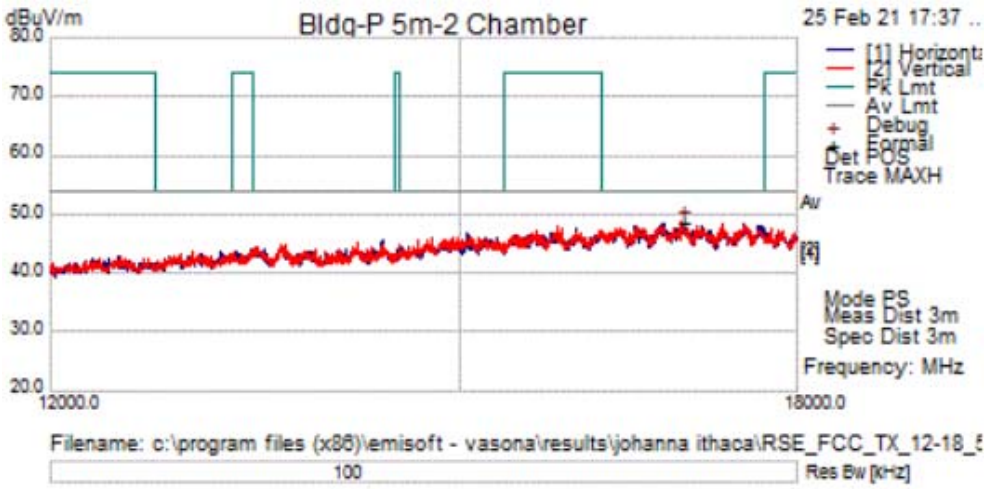
Radiated Transmitter Spurs, all modes and channels, Average – 5GHz Auxiliary Radio



Radiated Transmitter Spurs, all modes and channels, Peak – 5GHz Auxiliary Radio



Radiated Transmitter Spurs, all modes and channels, Peak & Average – 5GHz Wi-Fi Radio

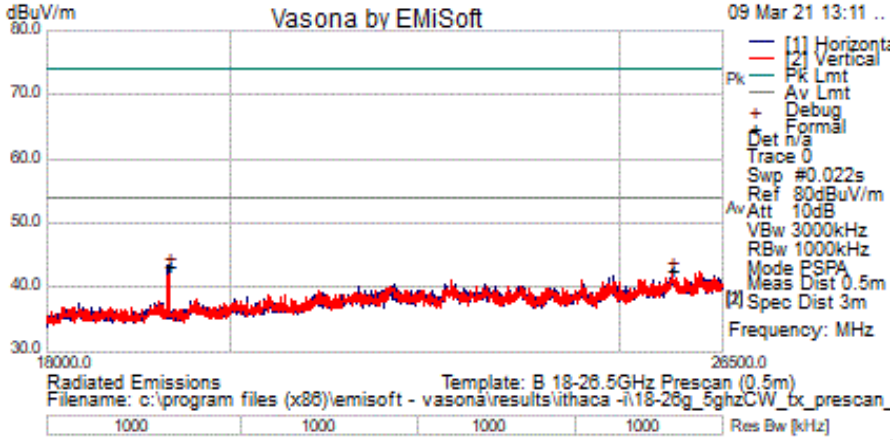


Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1	16912.500	30.8	22.4	-4.4	48.7	Peak [Scan]	V	250	199	54.0	-5.3	Pass	

Radiated Transmitter Spurs (18GHz-26.5GHz) Horizontal & Vertical

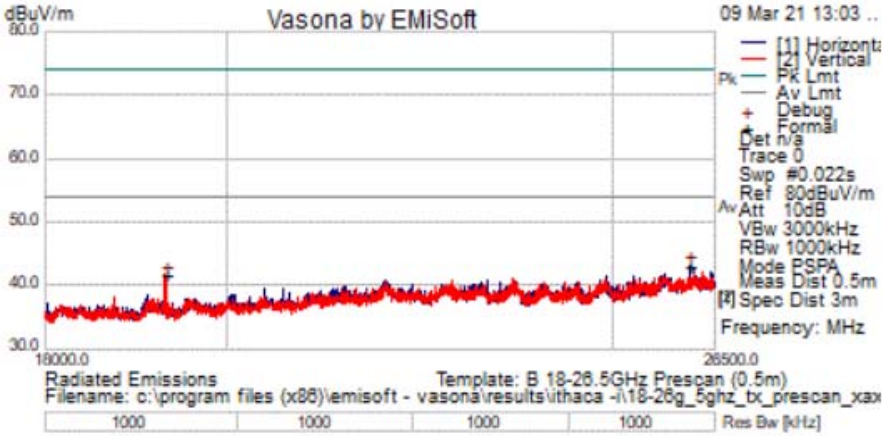
Radiated Transmitter Spurs, all modes and channels, Peak & Average – 5GHz Auxiliary Radio



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB / m	Level dBuV / m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV / m	Margin dB	Pass / Fail	Comments
1	19294.589	43.4	.0	-.1	43.3	Peak [Scan]	H	100	0	54.0	-10.7	Pass	
2	25741.983	41.6	.0	1.0	42.6	Peak [Scan]	H	100	0	54.0	-11.4	Pass	

Radiated Transmitter Spurs, all modes and channels, Peak & Average – 5GHz Wi-Fi Radio

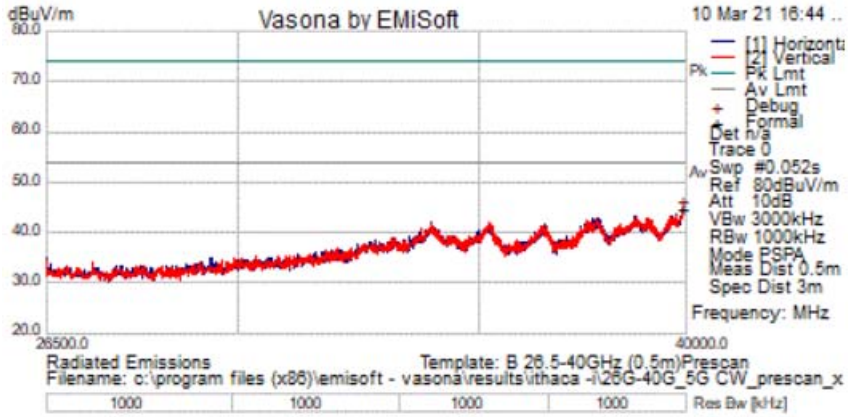


Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB / m	Level dBuV / m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV / m	Margin dB	Pass / Fail	Comments
1	26129.508	41.7	.0	1.5	43.2	Peak [Scan]	H	100	0	54.0	-10.8	Pass	
2	19294.589	41.7	.0	-.1	41.6	Peak [Scan]	V	100	0	54.0	-12.4	Pass	

Radiated Transmitter Spurs (26.5-40GHz) Horizontal & Vertical

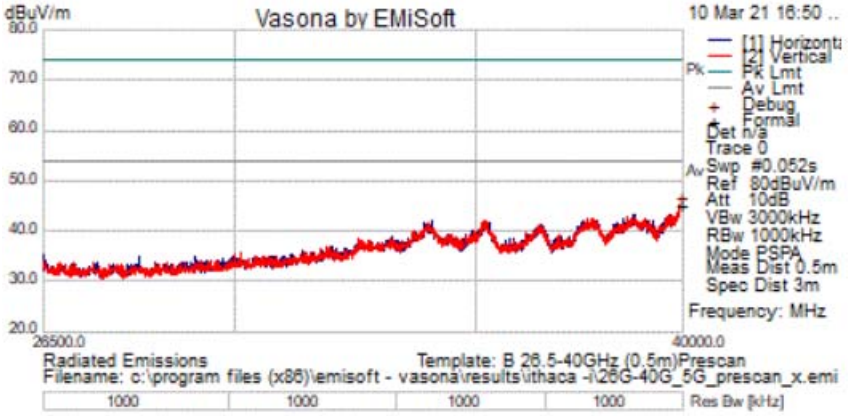
Radiated Transmitter Spurs, all modes and channels, Peak & Average – 5GHz Auxiliary Radio



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1	39912.074	57.6	.0	-12.9	44.7	Peak [Scan]	V	100	0	54.0	-9.3	Pass	
2	40000.000	57.2	.0	-12.5	44.7	Peak [Scan]	V	100	0	54.0	-9.3	Pass	

Radiated Transmitter Spurs, all modes and channels, Peak & Average – 5GHz Wi-Fi Radio



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1	39918.838	57.9	.0	-12.8	45.1	Peak [Scan]	V	100	0	54.0	-8.9	Pass	
2	40000.000	57.2	.0	-12.5	44.7	Peak [Scan]	H	100	0	54.0	-9.3	Pass	

A.2 Radiated Emissions 30MHz to 1GHz

15.209 / 15.205 / 15.407:
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Ref. ANSI C63.10: 2013 section 6.5

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

Span:	30MHz – 1GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	100kHz
Video Bandwidth:	300kHz
Detector:	Peak for Pre-scan, Quasi-Peak
.	Compliance shall be determined using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

Terminate the access Point RF ports with 50 ohm loads.

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

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

Samples, Systems, and Modes

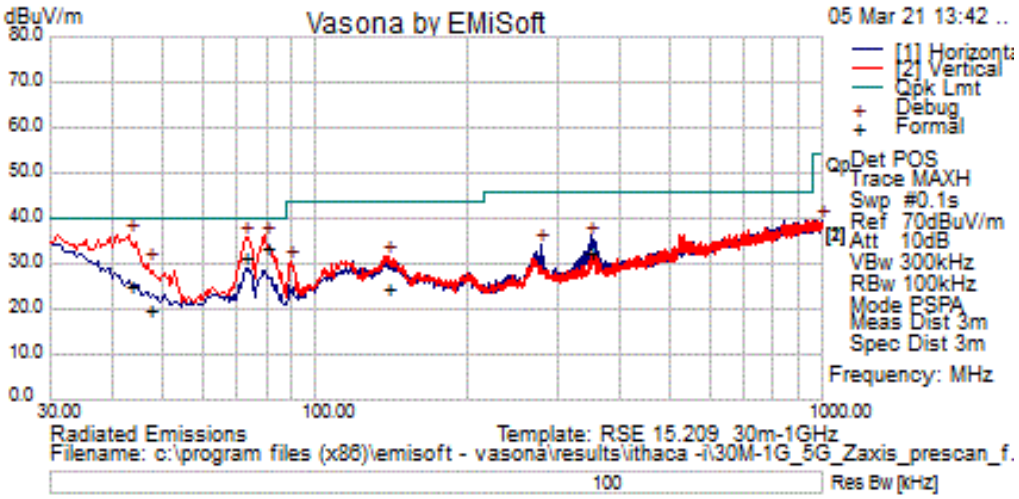
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	☑	☐
	Support	S02	☐	☑

Tested By: Johanna Knudsen	**Date of testing:** 05-MAR-2021 to 08-MAR-2021
Test Result: PASS	

See Appendix B for list of test equipment

Transmitter Radiated Emissions (30MHz – 1GHz) Horizontal & Vertical

5GHz Wi-Fi Radio
Below data representative of all rates, all modes.

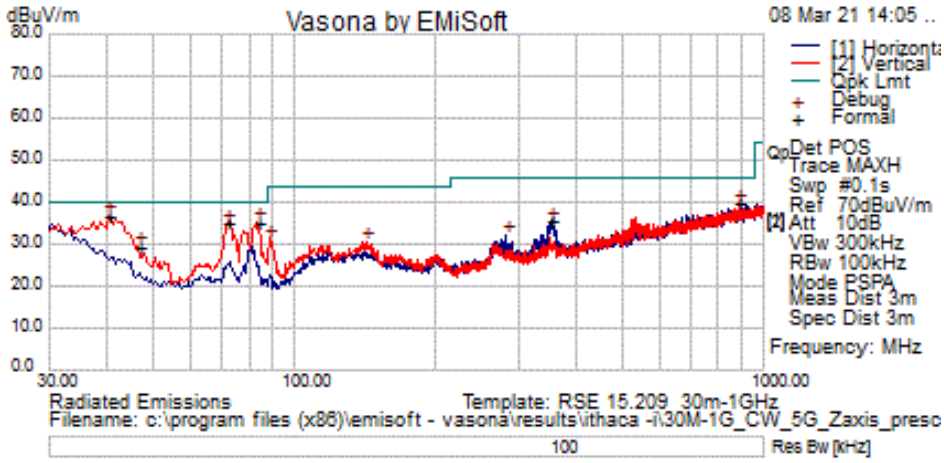


Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1	43.026	12.8	.7	11.6	25.1	Quasi Max	V	102	21	40.0	-14.9	Pass	
2	79.930	25.0	.9	7.4	33.3	Quasi Max	V	102	324	40.0	-6.7	Pass	
3	72.922	22.5	.9	8.0	31.3	Quasi Max	V	102	234	40.0	-8.7	Pass	
4	47.193	10.2	.7	9.1	20.0	Quasi Max	V	102	338	40.0	-20.0	Pass	
5	350.034	16.2	1.9	14.3	32.4	Quasi Max	H	102	158	46.0	-13.6	Pass	
6	139.343	10.2	1.2	13.1	24.6	Quasi Max	V	102	138	43.5	-18.9	Pass	

Transmitter Radiated Emissions (30MHz – 1GHz) Horizontal & Vertical

5GHz Auxiliary Radio
Below data representative of all rates, all modes.



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1	40.185	22.4	.6	13.7	36.7	Peak [Scan]	V	100	154	40.0	-3.3	Pass	Ambient
2	46.490	19.4	.7	9.4	29.5	Peak [Scan]	V	100	19	40.0	-10.5	Pass	
3	72.195	26.2	.9	8.0	35.1	Peak [Scan]	V	100	25	40.0	-5.0	Pass	Ambient
4	83.350	27.2	.9	7.2	35.3	Peak [Scan]	V	100	275	40.0	-4.7	Pass	Ambient
5	354.465	19.1	1.9	14.5	35.5	Peak [Scan]	H	100	22	46.0	-10.5	Pass	
6	884.085	14.6	3.0	22.3	39.9	Peak [Scan]	V	100	230	46.0	-6.1	Pass	

A.3 AC Conducted Spurious Emissions

FCC 15.207 (a) & RSS-Gen 8.8
Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries.

Measurement Procedure

Accordance with ANSI C63.10:2013 section 6.2

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

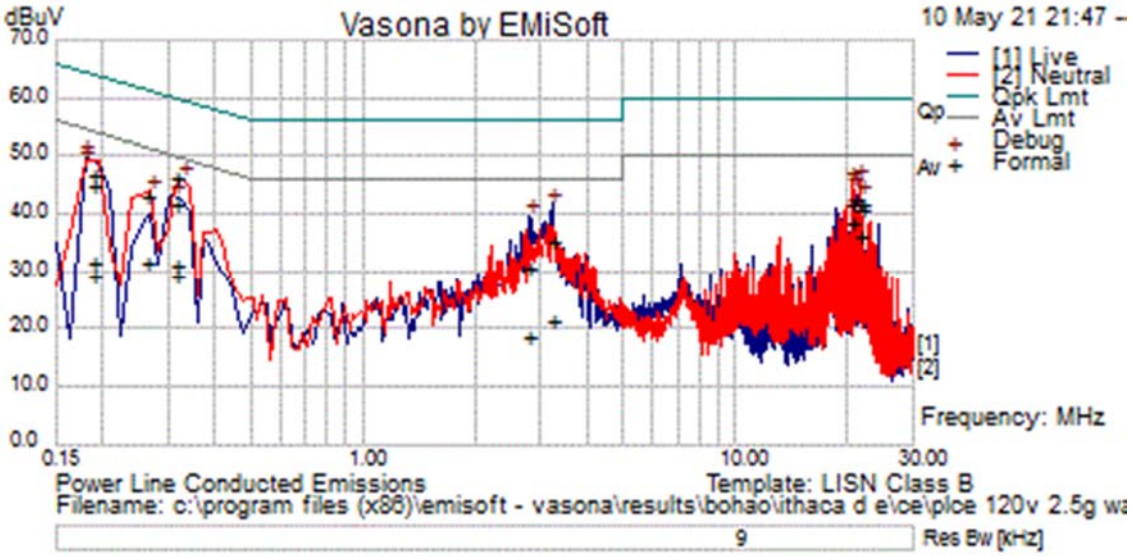
Span:	150 KHz – 30 MHz
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	9 KHz
Video Bandwidth:	30 KHz
Detector:	Quasi-Peak / Average

Samples, Systems, and Modes

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

Tested By:	**Date of testing:**
Dennis Thai, Ryan Pham	10-MAY-21
Test Result : PASS	

Test Equipment
See Appendix C for equipment list.



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass / Fail	Comments
1	20.931	22.1	20.4	.3	42.9	Average	Neutral	50.0	-7.1	Pass	
2	20.927	22.1	20.4	.3	42.8	Average	Live	50.0	-7.2	Pass	
3	21.812	20.0	20.5	.3	40.8	Average	Live	50.0	-9.2	Pass	
4	20.636	18.0	20.4	.3	38.7	Average	Neutral	50.0	-11.3	Pass	
5	.315	26.0	20.3	.0	46.3	Quasi Peak	Neutral	59.8	-13.6	Pass	
6	21.519	15.5	20.5	.3	36.3	Average	Neutral	50.0	-13.7	Pass	
7	20.927	22.0	20.4	.3	42.8	Quasi Peak	Live	60.0	-17.2	Pass	
8	20.931	22.0	20.4	.3	42.7	Quasi Peak	Neutral	60.0	-17.3	Pass	
9	.189	25.9	20.8	.0	46.7	Quasi Peak	Neutral	64.1	-17.3	Pass	
10	.264	22.9	20.5	.0	43.4	Quasi Peak	Neutral	61.3	-17.9	Pass	
11	.317	21.6	20.3	.0	41.9	Quasi Peak	Live	59.8	-17.9	Pass	

12	21.812	21.3	20.5	.3	42.1	Quasi Peak	Live	60.0	-17.9	Pass	
13	21.519	21.3	20.5	.3	42.1	Quasi Peak	Neutral	60.0	-17.9	Pass	
14	20.636	21.1	20.4	.3	41.8	Quasi Peak	Neutral	60.0	-18.2	Pass	
15	.315	11.0	20.3	.0	31.3	Average	Neutral	49.8	-18.5	Pass	
16	.189	24.3	20.8	.0	45.1	Quasi Peak	Live	64.1	-18.9	Pass	
17	.264	11.0	20.5	.0	31.5	Average	Neutral	51.3	-19.8	Pass	
18	.317	9.2	20.3	.0	29.5	Average	Live	49.8	-20.3	Pass	
19	3.225	15.3	20.0	.0	35.3	Quasi Peak	Live	56.0	-20.7	Pass	
20	.189	11.0	20.8	.0	31.9	Average	Neutral	54.1	-22.2	Pass	
21	3.225	1.7	20.0	.0	21.7	Average	Live	46.0	-24.3	Pass	
22	.189	8.5	20.8	.0	29.4	Average	Live	54.1	-24.7	Pass	
23	2.793	11.0	19.9	.0	31.0	Quasi Peak	Live	56.0	-25.0	Pass	
24	2.793	-1.1	19.9	.0	18.9	Average	Live	46.0	-27.1	Pass	

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

Building 7 - Test Equipment used for Radiated Spurious Emissions – 30MHz-1GHz

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
42933	ROHDE & SCHWARZ/ ESCI	EMI Test Receiver	23-Dec-20	23-Dec-21
25660	MICRO-CO / UFB311A-1-0840-504504AX	Coaxial Cable, 84.0 in. to 18GHz	30-Mar-20	30-Mar-21
25640	MICRO-CO / UFB311A-0-2720-520520	Coaxial Cable, 272.0 in. to 18GHz	30-Mar-20	30-Mar-21
47311	HUBER + SUHNER / Sucoflex 106PA	RF Type N Antenna Cable 18 GHz 8.5m	30-Mar-20	30-Mar-21
30654	SUNOL SCIENCES / JB1	Combination Antenna, 30MHz-2GHz	14-Jul-20	14-Jul-21
35237	STANLEY	TAPE RULE 5M	Cal Not Required	Cal Not Required
5732	York / CNE V	COMPARISON NOISE EMITTER	Cal Not Required	Cal Not Required
8113	Cisco / NSA Cal	NSA Chamber	30-Mar-20	30-Mar-21
58248	Comet / T7611-4	WEB SENSOR FOR REMOTE THERMOMETER HYGROMETER	3-Feb-21	3-Feb-22

Building 7 - Test Equipment used for Radiated Spurious Emissions - 18-40GHz

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
18231	ROHDE & SCHWARZ / ESI 40(ESIB 40)	RECEIVER TEST 20Hz-40GHz	31-Mar-20	31-Mar-21
55589	Keysight (Agilent/HP) / N5173B	EXG-B MW ANALOG SIGNAL GENERATOR	22-Sep-20	22-Sep-21
36710	Cisco / 1840	18-40GHz EMI Test Head/Verification Fixture	17-Sep-20	17-Sep-21

Building 7 - Test Equipment used for Radiated Spurious Emissions - 1-18GHz

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
35324	Keysight (Agilent/HP) / E4448A	PSA Spectrum Analyzer, 3 Hz to 50 GHz	31-Aug-20	31-Aug-21
55565	Megaphase / F120-S1S1-36	SMA cable	26-Jan-21	26-Jan-22

25660	Micro-coax / UFB311A-1-0840-504504	Coaxial Cable, 84.0 in. to 18GHz	30-Mar-21	30 Mar 2021
25640	Micro-coax / UFB311A-0-2720-520520	Coaxial Cable, 272.0 in. to 18GHz	30-Mar-20	30-Mar-21
47311	HUBER + SUHNER / Sucoflex 106PA	RF Type N Antenna Cable 18 GHz 8.5m	30-Mar-20	30-Mar-21
56060	Miteq / TTA1800-30-HG	SMA 18GHz Pre Amplifier	22-Jan-21	22-Jan-22
54390	Huber + SUHNER / Sucoflex 102	K Type 40 GHz Cable	20 Jan 2021	20 Jan 2022
47287	Huber + SUHNER / Sucoflex 102E	40GHz Cable K Connector	10-Feb-21	10-Feb-22
32801	ETS Lindgren / 3117	Double Ridged Horn Antenna	19-Mar-20	19-Mar-21
8113	Cisco / NSA Cal	NSA Chamber	30-Mar-20	30-Mar-21
58248	Comet / T7611-4	WEB SENSOR FOR REMOTE THERMOMETER HYGROMETER	3-Feb-21	3-Feb-22

Building P - Test Equipment used for Radiated Spurious Emissions - 1-18GHz

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
50721	Keysight (Agilent/HP) / N9030A-550	PXA Signal Analyzer, 3Hz to 50GHz	16-Apr-20	16-Apr-21
47287	HUBER + SUHNER / Sucoflex 102E	40GHz Cable K Connector	10-Feb-21	10-Feb-22
55294	HUBER + SUHNER / Sucoflex 106PA	RF Type N Antenna Cable 18 GHz 8.5m	24-Jun-20	24-Jun-21
20748	HUBER + SUHNER / Sucoflex 106A	Coaxial Cable, 8m	24-Jun-20	24-Jun-21
55178	HUBER + SUHNER / Sucoflex 106A	RF Type N Antenna Cable 18 GHz 8.5m	24-Jun-20	24-Jun-21
55565	Megaphase / F120-S1S1-36	SMA Cable	26-Jan-21	26-Jan-22
54390	HUBER + SUHNER / Sucoflex 102	K Type 40 GHz Cable	20-Jan-21	20-Jan-22
41201	ETS Lindgren / 3117	41201	1-Oct-20	1-Oct-21
56054	MITEQ / TTA1800-30-HG	SMA 18GHz Pre Amplifier	28-Feb-20	28-Feb-21
19638	EMCO / 3115	HORN ANTENNA	Cal not Required	Cal not Required
8166	Keysight (Agilent/HP) / 8491B Opt 010	ATTENUATOR, 18GHZ, 10DB	28-Jul-20	28-Jul-21
34375	Schaffner / RSG 2000	Reference Spectrum Generator, 1-18GHz	Cal not Required	Cal not Required

Building P - Test Equipment used for AC CE

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
39111	Fluke/83 V	DMM	10-Dec-20	10-Dec-21
45050	Rohde & Schwarz/ESCI	EMI Test Receiver	12-Dec-20	12-Dec-21
49480	Coleman/RG223	BNC 2ft Cable	1-Apr-21	1-Apr-22
45990	Fischer Custom Communications/F-090527-1009-1	Line Impedance Stabilization Network	26-Mar-21	26-Mar-22
49534	TTE/H785-150K-50-21378	High Pass Filter	13 Nov 2020	13 Nov 2021
18963	York/CNE V	Comparison Noise Emitter, 30 - 1000MHz	Cal Not Required	Cal Not Required
49558	Bird/5-T-MB	5W 50 Ohm BNC Termination 4GHz	19-Feb-21	19-Feb-22
8510	Fischer Custom Communications/FCC-450B-2.4-N	Instrumentation Limiter	15-Dec-20	15-Dec-21
37229	Coleman/RG-223	25ft BNC cable	5-Mar-21	5-Mar-22
45991	Fischer Custom Communications/F-090527-1009-2	Lisn Adapter	31-Mar-21	31-Mar-22
58245	COMET/T7611-4	Humidity Temperature Probe	26-Dec-20	26-Dec-21
2464	Fischer Custom Communications/FCC-801-M2-16	CDN, 2-LINE, 16A	12-Apr-21	12-Apr-22

Appendix C: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

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

Appendix D: Photographs of Test Setups

EUT Photos have been omitted from this test report. Photos can be found in the supplementary exhibit included in the submission and EDCS# 21541319.

Appendix E: Software Used to Perform Testing

EMIsoft Vasona, version 6.083, 6.087, 6.092
RSE Automation version 20

Appendix F: Test Procedures

Measurements were made in accordance with

- KDB 789033 - D02 General UNII Test Procedures New Rules v02r01
- KDB 662911 - MIMO
- ANSI C63.10 2013 Intentional Radiators

Test procedures are summarized below:

FCC 5GHz RSE Test Procedures	EDCS # 1511600

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

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

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

Appendix H: Test Assessment Plan

-I

Compliance Test Plan (Excel) EDCS# 21468205
Target Power Tables EDCS# 19766956

-D

Compliance Test Plan (Excel) EDCS# 21468206
Target Power Tables EDCS# 19774156