



Radio Test Report

Model: C9120AXI-x

(x=B)

Cisco Catalyst C9120AX Series 802.11ax Access Point

5GHz XOR Radio

FCC ID: LDKVCVER1937

5470-5725 MHz

Against the following Specifications for Radiated Spurious Emissions (RSE):




CFR47 Part 15.407



Cisco Systems

170 West Tasman Drive

San Jose, CA 95134

| | |
|---|--|
|   |  |
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This report replaces any previously entered test report under EDCS – **19196616**. This test report has been electronically authorized and archived using the CISCO Engineering Document Control system. Test Report Template EDCS# 1526150.



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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 |
|-------------------|
| CFR47 Part 15.407 |

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*% |

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 | $\pm 2.4 \times 10^{-7}$ |
| 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 |
|----------------|---------------|

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

22-JAN-2020 to 20-FEB-2020

2.4 Report Issue Date

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2.5 Testing facilities

This assessment was performed by:

Testing Laboratory

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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

Chris Blair, Allan Beecroft



2.6 Equipment Assessed (EUT)

Model: C9120AXI-x, VE

2.7 EUT Description

802.11ax Access Point with Dual 4x4 MIMO with 4 Spatial Streams

The EUT 5GHz XOR 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. Data is recorded at the lowest supported data rate for each mode.

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

802.11a - Non HT20 Beam Forming, Two Antennas, 6 to 54 Mbps, 1ss
802.11a - Non HT20 Beam Forming, Three Antennas, 6 to 54 Mbps, 1ss
802.11a - Non HT20 Beam Forming, Four 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, Three Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT20, Three Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT20, Three Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT20, Four Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT20, Four Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT20, Four Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT20, Four Antennas, M24 to M31, 4ss

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 Beam Forming, Three Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT20 Beam Forming, Three Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT20 Beam Forming, Three Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT20 Beam Forming, Four Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT20 Beam Forming, Four Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT20 Beam Forming, Four Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT20 Beam Forming, Four Antennas, M24 to M31, 4ss

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



802.11ax - HE20, One Antenna, M0 to M9 1ss
802.11ax - HE20, Two Antennas, M0 to M9 1ss
802.11ax - HE20, Two Antennas, M0 to M9 2ss
802.11ax - HE20, Three Antennas, M0 to M9 1ss
802.11ax - HE20, Three Antennas, M0 to M9 2ss
802.11ax - HE20, Three Antennas, M0 to M9 3ss
802.11ax - HE20, Four Antennas, M0 to M9 1ss
802.11ax - HE20, Four Antennas, M0 to M9 2ss
802.11ax - HE20, Four Antennas, M0 to M9 3ss
802.11ax - HE20, Four Antennas, M0 to M9 4ss

802.11ax - HE20 Beam Forming, Two Antennas, M0 to M9 1ss
802.11ax - HE20 Beam Forming, Two Antennas, M0 to M9 2ss
802.11ax - HE20 Beam Forming, Three Antennas, M0 to M9 1ss
802.11ax - HE20 Beam Forming, Three Antennas, M0 to M9 2ss
802.11ax - HE20 Beam Forming, Three Antennas, M0 to M9 3ss
802.11ax - HE20 Beam Forming, Four Antennas, M0 to M9 1ss
802.11ax - HE20 Beam Forming, Four Antennas, M0 to M9 2ss
802.11ax - HE20 Beam Forming, Four Antennas, M0 to M9 3ss
802.11ax - HE20 Beam Forming, Four Antennas, M0 to M9 4ss

802.11ax - HE20 STBC, Two Antennas, M0 to M9 2ss
802.11ax - HE20 STBC, Three Antennas, M0 to M9 2ss
802.11ax - HE20 STBC, Four Antennas, M0 to M9 2ss

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

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, Three Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT40, Three Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT40, Three Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT40, Four Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT40, Four Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT40, Four Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT40, Four Antennas, M24 to M31, 4ss

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 Beam Forming, Three Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT40 Beam Forming, Three Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT40 Beam Forming, Three Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT40 Beam Forming, Four Antennas, M0 to M7, 1ss



802.11n/ac - HT/VHT40 Beam Forming, Four Antennas, M8 to M15, 2ss
802.11n/ac - HT/VHT40 Beam Forming, Four Antennas, M16 to M23, 3ss
802.11n/ac - HT/VHT40 Beam Forming, Four Antennas, M24 to M31, 4ss

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

802.11ax - HE40, One Antenna, M0 to M9 1ss
802.11ax - HE40, Two Antennas, M0 to M9 1ss
802.11ax - HE40, Two Antennas, M0 to M9 2ss
802.11ax - HE40, Three Antennas, M0 to M9 1ss
802.11ax - HE40, Three Antennas, M0 to M9 2ss
802.11ax - HE40, Three Antennas, M0 to M9 3ss
802.11ax - HE40, Four Antennas, M0 to M9 1ss
802.11ax - HE40, Four Antennas, M0 to M9 2ss
802.11ax - HE40, Four Antennas, M0 to M9 3ss
802.11ax - HE40, Four Antennas, M0 to M9 4ss

802.11ax - HE40 Beam Forming, Two Antennas, M0 to M9 1ss
802.11ax - HE40 Beam Forming, Two Antennas, M0 to M9 2ss
802.11ax - HE40 Beam Forming, Three Antennas, M0 to M9 1ss
802.11ax - HE40 Beam Forming, Three Antennas, M0 to M9 2ss
802.11ax - HE40 Beam Forming, Three Antennas, M0 to M9 3ss
802.11ax - HE40 Beam Forming, Four Antennas, M0 to M9 1ss
802.11ax - HE40 Beam Forming, Four Antennas, M0 to M9 2ss
802.11ax - HE40 Beam Forming, Four Antennas, M0 to M9 3ss
802.11ax - HE40 Beam Forming, Four Antennas, M0 to M9 4ss

802.11ax - HE40 STBC, Two Antennas, M0 to M9 2ss
802.11ax - HE40 STBC, Three Antennas, M0 to M9 2ss
802.11ax - HE40 STBC, Four Antennas, M0 to M9 2ss

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

802.11ac - VHT80, One Antenna, M0 to M9 1ss
802.11ac - VHT80, Two Antennas, M0 to M9 1ss
802.11ac - VHT80, Two Antennas, M0 to M9 2ss
802.11ac - VHT80, Three Antennas, M0 to M9 1ss
802.11ac - VHT80, Three Antennas, M0 to M9 2ss
802.11ac - VHT80, Three Antennas, M0 to M9 3ss
802.11ac - VHT80, Four Antennas, M0 to M9 1ss
802.11ac - VHT80, Four Antennas, M0 to M9 2ss



802.11ac - VHT80, Four Antennas, M0 to M9 3ss
802.11ac - VHT80, Four Antennas, M0 to M9 4ss

802.11ac - VHT80 Beam Forming, Two Antennas, M0 to M9 1ss
802.11ac - VHT80 Beam Forming, Two Antennas, M0 to M9 2ss
802.11ac - VHT80 Beam Forming, Three Antennas, M0 to M9 1ss
802.11ac - VHT80 Beam Forming, Three Antennas, M0 to M9 2ss
802.11ac - VHT80 Beam Forming, Three Antennas, M0 to M9 3ss
802.11ac - VHT80 Beam Forming, Four Antennas, M0 to M9 1ss
802.11ac - VHT80 Beam Forming, Four Antennas, M0 to M9 2ss
802.11ac - VHT80 Beam Forming, Four Antennas, M0 to M9 3ss
802.11ac - VHT80 Beam Forming, Four Antennas, M0 to M9 4ss

802.11ac - VHT80 STBC, Two Antennas, M0 to M9 2ss
802.11ac - VHT80 STBC, Three Antennas, M0 to M9 2ss
802.11ac - VHT80 STBC, Four Antennas, M0 to M9 2ss

802.11ax - HE80, One Antenna, M0 to M9 1ss
802.11ax - HE80, Two Antennas, M0 to M9 1ss
802.11ax - HE80, Two Antennas, M0 to M9 2ss
802.11ax - HE80, Three Antennas, M0 to M9 1ss
802.11ax - HE80, Three Antennas, M0 to M9 2ss
802.11ax - HE80, Three Antennas, M0 to M9 3ss
802.11ax - HE80, Four Antennas, M0 to M9 1ss
802.11ax - HE80, Four Antennas, M0 to M9 2ss
802.11ax - HE80, Four Antennas, M0 to M9 3ss
802.11ax - HE80, Four Antennas, M0 to M9 4ss

802.11ax - HE80 Beam Forming, Two Antennas, M0 to M9 1ss
802.11ax - HE80 Beam Forming, Two Antennas, M0 to M9 2ss
802.11ax - HE80 Beam Forming, Three Antennas, M0 to M9 1ss
802.11ax - HE80 Beam Forming, Three Antennas, M0 to M9 2ss
802.11ax - HE80 Beam Forming, Three Antennas, M0 to M9 3ss
802.11ax - HE80 Beam Forming, Four Antennas, M0 to M9 1ss
802.11ax - HE80 Beam Forming, Four Antennas, M0 to M9 2ss
802.11ax - HE80 Beam Forming, Four Antennas, M0 to M9 3ss
802.11ax - HE80 Beam Forming, Four Antennas, M0 to M9 4ss

802.11ax - HE80 STBC, Two Antennas, M0 to M9 2ss
802.11ax - HE80 STBC, Three Antennas, M0 to M9 2ss
802.11ax - HE80 STBC, Four Antennas, M0 to M9 2ss

802.11a - Non HT160, One Antenna, 6 to 54 Mbps, 1ss
802.11a - Non HT160, Two Antennas, 6 to 54 Mbps, 1ss
802.11a - Non HT160, Three Antennas, 6 to 54 Mbps, 1ss
802.11a - Non HT160, Four Antennas, 6 to 54 Mbps, 1ss



802.11ac - VHT160, One Antenna, M0 to M9 1ss
802.11ac - VHT160, Two Antennas, M0 to M9 1ss
802.11ac - VHT160, Two Antennas, M0 to M9 2ss
802.11ac - VHT160, Three Antennas, M0 to M9 1ss
802.11ac - VHT160, Three Antennas, M0 to M9 2ss
802.11ac - VHT160, Three Antennas, M0 to M9 3ss
802.11ac - VHT160, Four Antennas, M0 to M9 1ss
802.11ac - VHT160, Four Antennas, M0 to M9 2ss
802.11ac - VHT160, Four Antennas, M0 to M9 3ss
802.11ac - VHT160, Four Antennas, M0 to M9 4ss

802.11ac - VHT160 Beam Forming, Two Antennas, M0 to M9 1ss
802.11ac - VHT160 Beam Forming, Two Antennas, M0 to M9 2ss
802.11ac - VHT160 Beam Forming, Three Antennas, M0 to M9 1ss
802.11ac - VHT160 Beam Forming, Three Antennas, M0 to M9 2ss
802.11ac - VHT160 Beam Forming, Three Antennas, M0 to M9 3ss
802.11ac - VHT160 Beam Forming, Four Antennas, M0 to M9 1ss
802.11ac - VHT160 Beam Forming, Four Antennas, M0 to M9 2ss
802.11ac - VHT160 Beam Forming, Four Antennas, M0 to M9 3ss
802.11ac - VHT160 Beam Forming, Four Antennas, M0 to M9 4ss

802.11ac - VHT160 STBC, Two Antennas, M0 to M9 2ss
802.11ac - VHT160 STBC, Three Antennas, M0 to M9 2ss
802.11ac - VHT160 STBC, Four Antennas, M0 to M9 2ss

802.11ax - HE160, One Antenna, M0 to M9 1ss
802.11ax - HE160, Two Antennas, M0 to M9 1ss
802.11ax - HE160, Two Antennas, M0 to M9 2ss
802.11ax - HE160, Three Antennas, M0 to M9 1ss
802.11ax - HE160, Three Antennas, M0 to M9 2ss
802.11ax - HE160, Three Antennas, M0 to M9 3ss
802.11ax - HE160, Four Antennas, M0 to M9 1ss
802.11ax - HE160, Four Antennas, M0 to M9 2ss
802.11ax - HE160, Four Antennas, M0 to M9 3ss
802.11ax - HE160, Four Antennas, M0 to M9 4ss

802.11ax - HE160 Beam Forming, Two Antennas, M0 to M9 1ss
802.11ax - HE160 Beam Forming, Two Antennas, M0 to M9 2ss
802.11ax - HE160 Beam Forming, Three Antennas, M0 to M9 1ss
802.11ax - HE160 Beam Forming, Three Antennas, M0 to M9 2ss
802.11ax - HE160 Beam Forming, Three Antennas, M0 to M9 3ss
802.11ax - HE160 Beam Forming, Four Antennas, M0 to M9 1ss
802.11ax - HE160 Beam Forming, Four Antennas, M0 to M9 2ss
802.11ax - HE160 Beam Forming, Four Antennas, M0 to M9 3ss
802.11ax - HE160 Beam Forming, Four Antennas, M0 to M9 4ss

802.11ax - HE160 STBC, Two Antennas, M0 to M9 2ss



802.11ax - HE160 STBC, Three Antennas, M0 to M9 2ss

802.11ax - HE160 STBC, Four Antennas, M0 to M9 2ss

The following antennas are supported by this product series.

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

| Frequency | Part Number | Antenna Type | Antenna Gain (dBi) |
|-----------|-------------|---|-----------------------|
| 5GHz | - | Internal, Dual-band, HPOL, Omni-directional | 5 |



Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

| Basic Standard | Technical Requirements / Details | Result |
|--------------------------|---|------------|
| FCC 15.407 | <p>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.</p> <p>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.</p> | Not Tested |
| FCC 15.407 | <p>Output Power: 15.407 (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> | Not Tested |
| FCC 15.407 | <p>Power Spectral Density 15.407 (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands...the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> | Not Tested |
| FCC 15.407 | <p>Conducted Spurious Emissions / Band-Edge: 15.407 (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz..</p> | Not Tested |
| FCC 15.407 FCC 15.205 | <p>Restricted band: Unwanted emissions falling within the restricted bands, as defined in FCC 15.205 (a) must also comply with the radiated emission limits specified in FCC 15.209 (a)</p> | Not Tested |

Radiated Emissions (General requirements)

| Basic Standard | Technical Requirements / Details | Result |
|----------------|--|------------|
| FCC 15.209 | 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 | 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. | Not Tested |



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. | Firmware Rev. | Software Rev. | Serial Number |
|------------|-------------------|--------------------------|---------------|---|---|-----------------------|
| S01 | C9120AXI-B | Foxconn (for Cisco) | 800-106693-01 | Radio FW ver. : 14948.14801. r39245 39245 | Cisco AP Software, (ap1g7), [cheetah-build6:/san2/BUILD/ workspace/Nightly-Cheetah-a xel-bcm-mfg-c8_10_throttle] Compiled Mon Jan 27 08:40:01 PST 2020 | FOC23447 WF2 |
| S02 | AIR-PWRINJ6 | Microsemi (for Cisco) | V01 | NA | NA | C16176663 00000860 |

4.2 System Details

| System # | Description | Samples |
|----------|-------------------------------|---------|
| 1 | EUT+power source for RSE test | S01+S02 |

4.3 Mode of Operation Details

| Mode# | Description | Comments |
|-------|-------------------------|----------|
| 1 | Continuous Transmitting | |



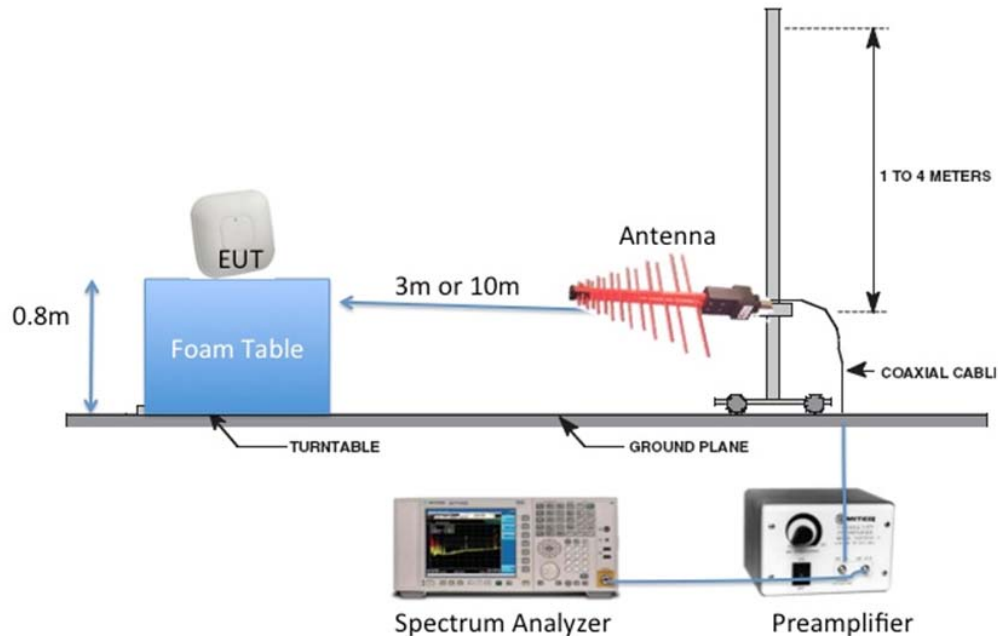
Appendix A: RF Conducted Test Results

RF conducted tests are not covered by this report.

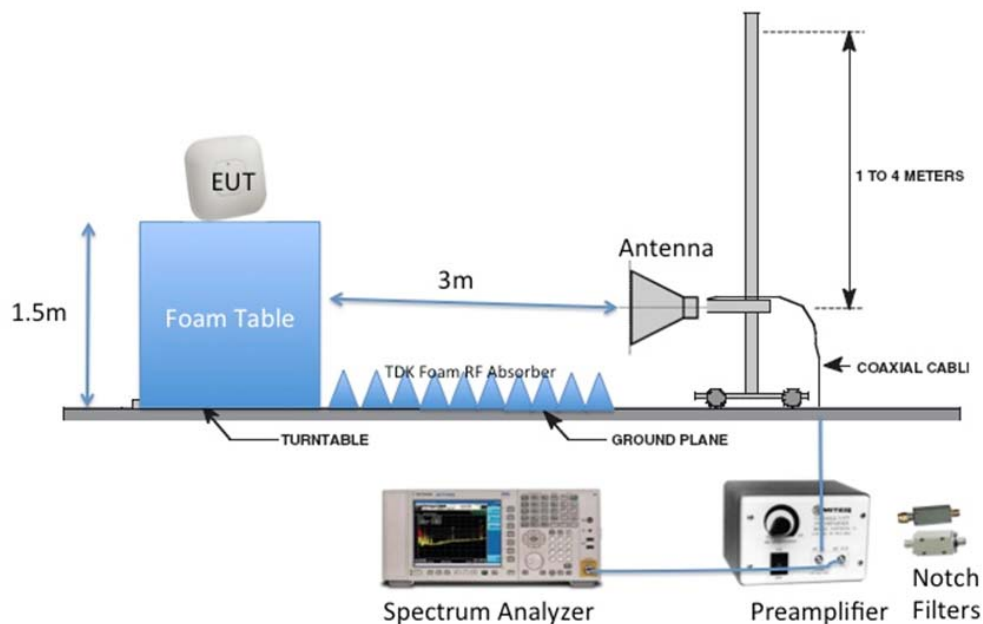
Appendix B: Emission Test Results

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

Radiated Emission Setup Diagram-Below 1G



Radiated Emission Setup Diagram-Above 1G





B.1 Radiated Spurious Emissions

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

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

15.205 / 15.209

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

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

Test Procedure

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

| Radiated Spurious Emissions | |
|--|--|
| Test parameters | |
| Peak Span = 1-18GHz /18GHz-26.5GHz/26.5GHz-40GHz RBW = 1 MHz VBW \geq 3 MHz Sweep = Auto couple Detector = Peak Trace = Max Hold. | Average Span = 1-18GHz /18GHz-26.5GHz/26.5GHz-40GHz RBW = 1 MHz VBW \geq 3 MHz Sweep = Auto couple Detector = RMS Power Averaging |

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)

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

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance.
 Also measure any emissions in the restricted bands.

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

Samples, Systems, and Modes

| System Number | Description | Samples | System under test | Support equipment |
|---------------|-------------|---------|-------------------------------------|-------------------------------------|
| 1 | EUT | S01 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| | Support | S02 | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| | |
|--|--------------------------------------|
| Tested By : Chris Blair & Allan Beecroft | Date of testing: February 2-20, 2020 |
| Test Result : PASS | |

See Appendix C for list of test equipment



B.1.A Transmitter Radiated Spurious Emissions-Average

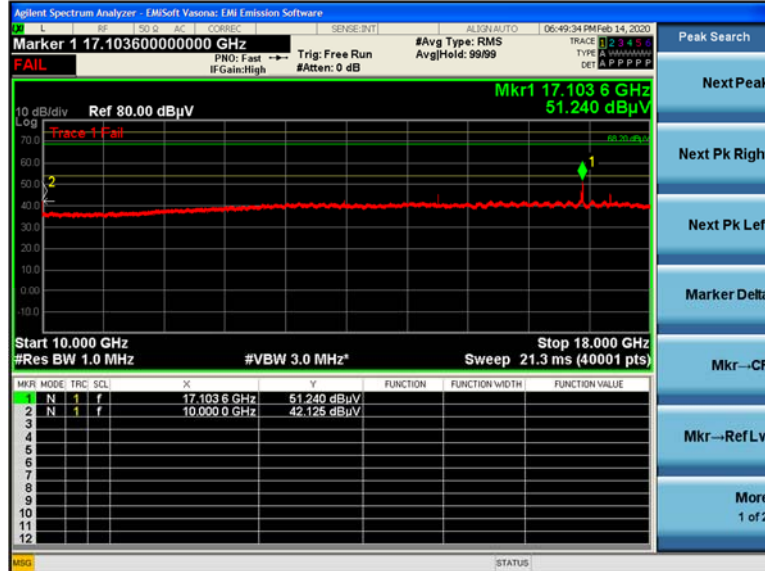
| Frequency (MHz) | Mode | Data Rate (Mbps) | Spurious Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|------------------|----------------------------------|----------------|-------------|
| 5500 | NonHT20 | 6 | 50.070 | <54 | 3.9 |
| | HE20 | m0h1 | 47.078 | <54 | 6.9 |
| 5580 | NonHT20 | 6 | 46.566 | <54 | 7.4 |
| | HE20 | m0h1 | 46.267 | <54 | 7.7 |
| 5700 | NonHT20 | 6 | 51.240 | <54 | 2.8 |
| | HE20 | m0h1 | 47.785 | <54 | 6.2 |
| 5720 | NonHT20 | 6 | 51.181 | <54 | 2.8 |
| | HE20 | m0h1 | 47.090 | <54 | 6.9 |
| 5510 | NonHT40 | 6 | 48.214 | <54 | 5.8 |
| | HE40 | m0h1 | 45.548 | <54 | 8.5 |
| 5550 | NonHT40 | 6 | 46.444 | <54 | 7.6 |
| | HE40 | m0h1 | 46.202 | <54 | 7.8 |
| 5590 | NonHT40 | 6 | 46.143 | <54 | 7.9 |
| | HE40 | m0h1 | 45.856 | <54 | 8.1 |
| 5670 | NonHT40 | 6 | 46.265 | <54 | 7.7 |
| | HE40 | m0h1 | 45.831 | <54 | 8.2 |
| 5710 | NonHT40 | 6 | 46.085 | <54 | 7.9 |
| | HE40 | m0h1 | 46.856 | <54 | 7.1 |

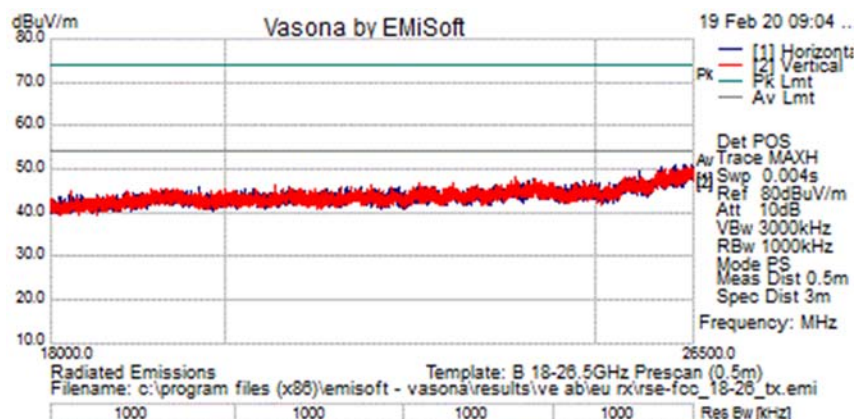


| Frequency (MHz) | Mode | Data Rate (Mbps) | Spurious Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|----------|------------------|----------------------------------|----------------|-------------|
| 5530 | NonHT80 | 6 | 46.797 | <54 | 7.2 |
| | HE80 | m0h1 | 46.457 | <54 | 7.5 |
| 5610 | NonHT80 | 6 | 46.038 | <54 | 8.0 |
| | HE80 | m0h1 | 45.712 | <54 | 8.3 |
| 5690 | NonHT80 | 6 | 48.477 | <54 | 5.5 |
| | HE80 | m0h1 | 46.361 | <54 | 7.6 |
| 5570 | NonHT160 | 6 | 45.891 | <54 | 8.1 |
| | HE160 | m0h1 | 46.473 | <54 | 7.5 |

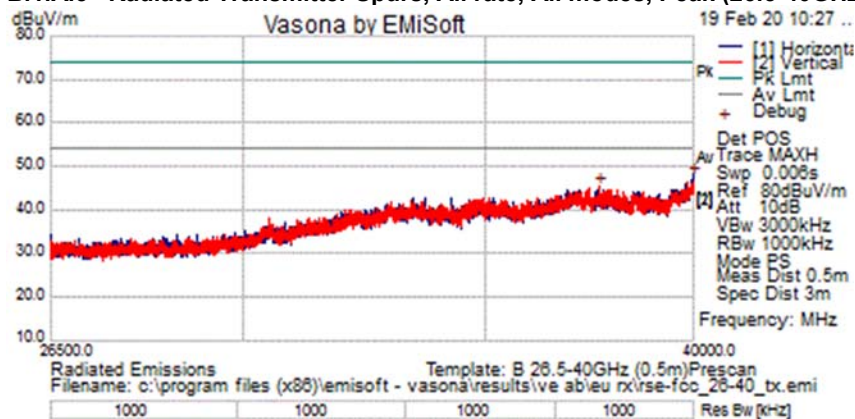
Note: Formal average measurements not required for 1-10GHz, because peak emissions were under the average limit. See section B.1.P.

B.1.A.1 Radiated Transmitter Spurs, 5700 MHz, 6 to 54 Mbps , Average (10-18GHz)



B.1.A.2 Radiated Transmitter Spurs, Peak and Average (18-26.5GHz)

All emissions were below the average limit when measured using a peak detector. There were no emissions within 20dB of the peak limit.

B.1.A.3 Radiated Transmitter Spurs, All rate, All modes, Peak (26.5-40GHz)

All emissions were below the average limit when measured using a peak detector. There were no emissions within 20dB of the peak limit.



B.1.P Transmitter Radiated Spurious Emissions-Peak

| Frequency (MHz) | Mode | Data Rate (Mbps) | Spurious Emission Level (dBuV/m) | Limit (dBuV/m)* | Margin (dB) |
|-----------------|---------|------------------|----------------------------------|-----------------|-------------|
| 5500 | NonHT20 | 6 | 60.06 | <68.2 | 8.1 |
| | HE20 | m0h1 | 55.87 | <68.2 | 12.3 |
| 5580 | NonHT20 | 6 | 55.07 | <68.2 | 13.1 |
| | HE20 | m0h1 | 55.01 | <68.2 | 13.2 |
| 5700 | NonHT20 | 6 | 62.56 | <68.2 | 5.6 |
| | HE20 | m0h1 | 56.62 | <68.2 | 11.6 |
| 5720 | NonHT20 | 6 | 62.11 | <68.2 | 6.1 |
| | HE20 | m0h1 | 55.37 | <68.2 | 12.8 |
| 5510 | NonHT40 | 6 | 58.65 | <68.2 | 9.6 |
| | HE40 | m0h1 | 59.07 | <68.2 | 9.1 |
| 5550 | NonHT40 | 6 | 57.24 | <68.2 | 11.0 |
| | HE40 | m0h1 | 55.55 | <68.2 | 12.7 |
| 5590 | NonHT40 | 6 | 55.76 | <68.2 | 12.4 |
| | HE40 | m0h1 | 54.49 | <68.2 | 13.7 |
| 5670 | NonHT40 | 6 | 54.62 | <68.2 | 13.6 |
| | HE40 | m0h1 | 54.27 | <68.2 | 13.9 |
| 5710 | NonHT40 | 6 | 57.50 | <68.2 | 10.7 |
| | HE40 | m0h1 | 58.37 | <68.2 | 9.8 |

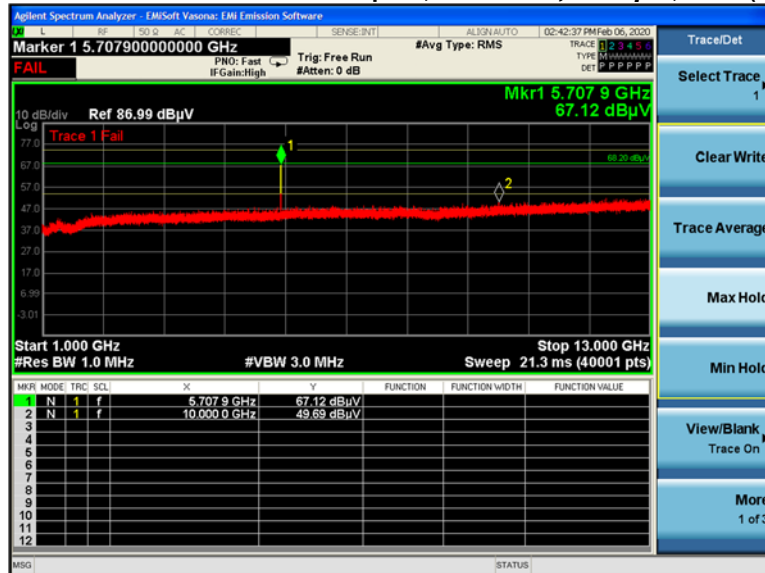
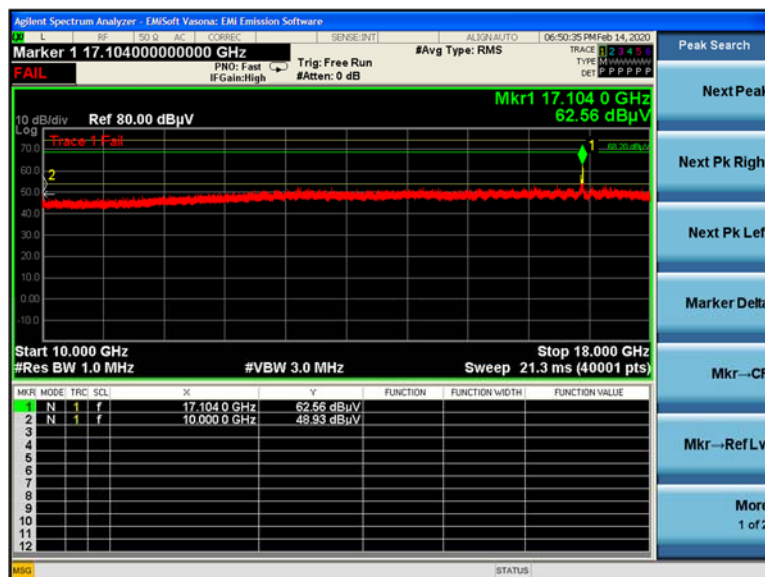


| Frequency (MHz) | Mode | Data Rate (Mbps) | Spurious Emission Level (dBuV/m) | Limit (dBuV/m)* | Margin (dB) |
|-----------------|----------|------------------|----------------------------------|-----------------|-------------|
| 5530 | NonHT80 | 6 | 56.93 | <68.2 | 11.3 |
| | HE80 | m0h1 | 55.79 | <68.2 | 12.4 |
| 5610 | NonHT80 | 6 | 53.85 | <68.2 | 14.4 |
| | HE80 | m0h1 | 53.07 | <68.2 | 15.1 |
| 5690 | NonHT80 | 6 | 59.26 | <68.2 | 8.9 |
| | HE80 | m0h1 | 55.70 | <68.2 | 12.5 |
| 5570 | NonHT160 | 6 | 55.16 | <68.2 | 13.0 |
| | HE160 | m0h1 | 53.36 | <68.2 | 14.8 |

*The peak limit for emissions in the Restricted Band = 74dBuV/m, with additional average limit = 54dBuV/m.

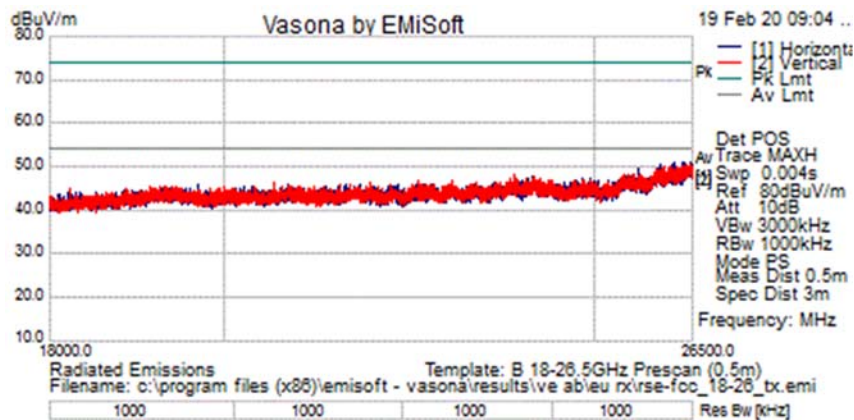
The peak limit for emissions in the Non-Restricted Band = 68.2dBuV/m, with no additional average limit.

The limit in this column reflects the worst-case peak limit, to cover all emission frequencies.

**B.1.P.1 Radiated Transmitter Spurs, 5700 MHz, 6 Mbps , Peak (1-10GHz)****B.1.P.2 Radiated Transmitter Spurs, 5700 MHz, 6Mbps, Peak (10-18GHz)**

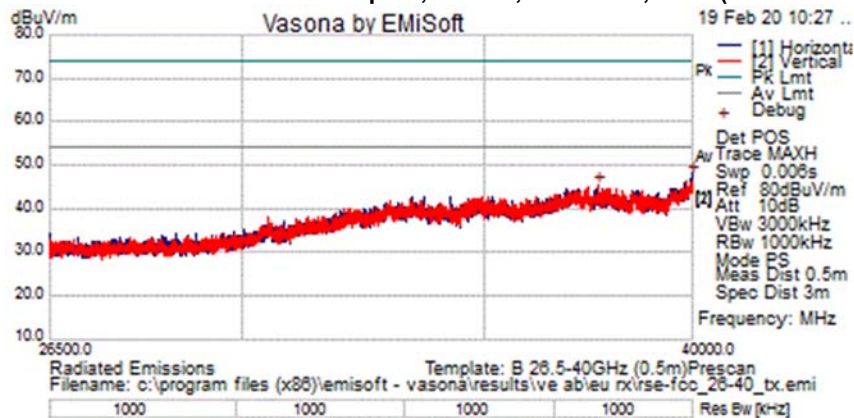


B.1.P.3 Radiated Transmitter Spurs, Peak and Average (18-26.5GHz)



All emissions were below the average limit when measured using a peak detector. There were no emissions within 20dB of the peak limit.

B.1.P.4 Radiated Transmitter Spurs, All rate, All modes, Peak (26.5-40GHz)



All emissions were below the average limit when measured using a peak detector. There were no emissions within 20dB of the peak limit.



B.2 Radiated Emissions 30MHz to 1GHz

15.205 / 15.209

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

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

Ref. ANSI C63.10: 2013 section 12.7 sec 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: Quasi-Peak

Terminate the access Point RF ports with 50 ohm loads.

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

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

Samples, Systems, and Modes

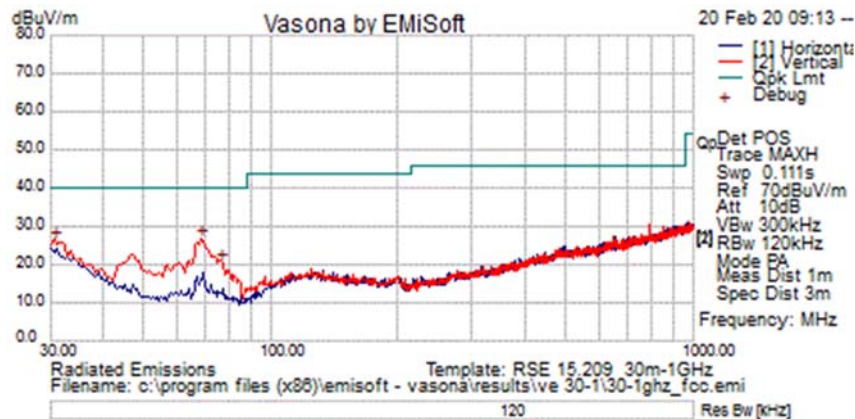
| System Number | Description | Samples | System under test | Support equipment |
|---------------|-------------|---------|-------------------------------------|-------------------------------------|
| 1 | EUT | S01 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| | Support | S02 | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| | |
|--------------------------------------|--|
| Tested By : Allan Beecroft | Date of testing: 20-FEB-2020 |
| Test Result : PASS | |

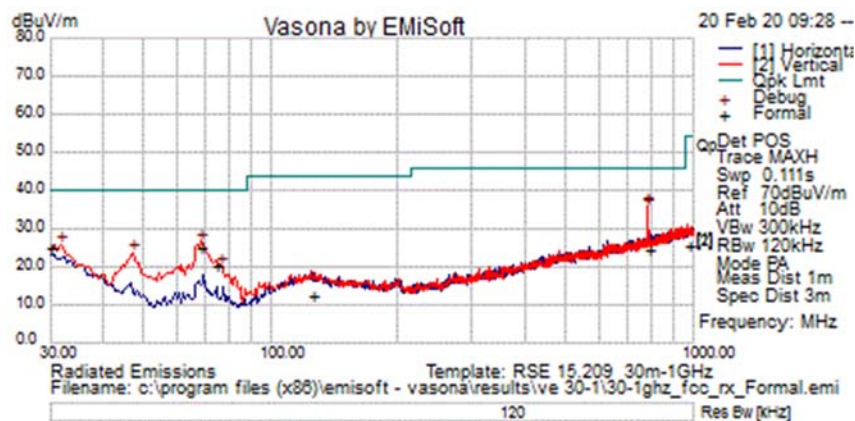
Test Equipment

See Appendix C for list of test equipment

Transmitter Radiated Emission



Receiver Radiated Emission



| Formal Data | | | | | | | | | | | | | |
|-------------|-------------------|-----------------|-------------------|----------|---------------------|----------------------|---------|---------------|----------------|---------------------|---------------|-------------------|----------------|
| N o | Frequenc y MHz | Raw dBu V | Cabl e Loss | AF dB | Level dBuV/ m | Measuremen t Type | Po l | Hg t cm | Azt De g | Limit dBuV/ m | Margi n dB | Pass /Fai l | Comment |
| 1 | 30.000 | 12.8 | .5 | 11.7 | 25.0 | Quasi Peak | V | 99 | -3 | 40.0 | -15.0 | Pass | |
| 2 | 68.372 | 25.7 | .8 | -1.4 | 25.1 | Quasi Peak | V | 261 | 363 | 40.0 | -14.9 | Pass | |
| 3 | 787.111 | 10.1 | 2.8 | 11.9 | 24.7 | Quasi Peak | H | 99 | 363 | 46.0 | -21.3 | Pass | Cell frequency |
| 4 | 74.441 | 20.9 | .8 | -1.6 | 20.1 | Quasi Peak | V | 153 | -3 | 40.0 | -19.9 | Pass | |
| 5 | 977.875 | 9.2 | 3.1 | 13.6 | 25.8 | Quasi Peak | H | 361 | -3 | 54.0 | -28.2 | Pass | |
| 6 | 124.999 | 7.0 | 1.1 | 4.5 | 12.6 | Quasi Peak | H | 99 | -3 | 43.5 | -30.9 | Pass | |



B.3 AC Conducted Emissions

AC conducted tests are not covered by this report.



Appendix C: 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, 1-18GHz | | | | | |
| 41201 | ETS/Lindgren 3117 | Double Ridged Horn Antenna | 27 Aug 2019 | 27 Aug 2020 | B.1 |
| 45096 | Cisco TH0118 | Mast Mount Preamplifier Array, 1-18GHz | 29 Oct 2019 | 29 Oct 2020 | B.1 |
| 38375 | Cisco TH0118-PS | Power Supply for TH0118 1-18GHz Preamplifier | NA | NA | B.1 |
| 37237 | JFW 50CB-015 | GPIB control box | NA | NA | B.1 |
| 41202 | ETS/Lindgren 3117 | Double Ridged Horn Antenna | 15 Feb 2019 | 15 Feb 2020 | B.1 |
| 56066 | Miteq TTA1800-30-HG-S | 18GHz SMA Pre-Amplifier | 20 May 2019 | 20 May 2020 | B.1 |
| 56060 | Miteq TTA1800-30-HG | SMA 18GHz Pre Amplifier | 08 Apr 2019 | 08 Apr 2020 | B. |
| 47286 | H+S Sucoflex 102E | 40GHz Cable K Connector | 05 Sep 2019 | 05 Sep 2020 | B.1 |
| 35040 | Micro-Tronics HPM50112-02 | Notch Filter | 27 Jun 2019 | 27 Jun 2020 | B.1 |
| 51802 | H+S Sucoflex 102PE | 40 GHz Cable, K-Type | 23 Dec 2019 | 23 Dec 2020 | B.1 |
| 49563 | H+S Sucoflex 106A | Coaxial Cable, 8m | 12 Aug 2019 | 12 Aug 2020 | B.1, B.2 |
| 21117 | Micro-coax UFB311A-0-2484-520520 | Coaxial Cable-18Ghz | 12 Aug 2019 | 12 Aug 2020 | B.1, B.2 |
| 56155 | H+S Sucoflex 104PEA | Sucoflex N Type blue 7ft cable | 13 Jan 2020 | 13 Jan 2021 | B.1, B.2 |
| 47300 | Keysight N9038A | EMI Receiver | 29 May 2019 | 29 May 2020 | B.1, B.2 |
| 34075 | Schaffner RSG 2000 | Reference Spectrum Generator, 1-18GHz | NA | NA | B.1 |
| 4883 | EMCO 3115 | Horn antenna | NA | NA | B.1 |
| 8171 | Keysight 8491B Opt 010 | Attenuator | 23 Apr 2019 | 23 Apr 2020 | B.1 |
| 35242 | Klein tools 926-8ME | 8m measurement tape | NA | NA | B.1, B.2 |
| 40597 | Cisco Above 1GHz Site Cal | 1GHz Cisp Site Verification | 27 Sep 2019 | 27 Sep 2020 | B.1 |
| 8448 | Cisco NSA Cal | NSA/chamber | 26 Sep 2019 | 26 Sep 2020 | B.1, B.2 |



| | | | | | |
|-------|---------------------|--|-------------|-------------|----------|
| 58225 | Comet T7611-4 | WEB SENSOR FOR REMOTE THERMOMETER HYGROMETER | 20 Aug 2019 | 20 Aug 2020 | B.1, B.2 |
| 56328 | Pasternack PE5019-1 | Torque wrench | 25 Feb 2020 | 25 Feb 2021 | B.1 |
| 56330 | Pasternack PE5019-1 | Torque wrench | 02 Mar 2020 | 02 Mar 2021 | B.1 |
| 33040 | Fluke 175 | True RMS Multimeter | 04 Sep 2019 | 04 Sep 2020 | B.1, B.2 |

| Test Equipment used for Radiated Emissions, 18-40GHz | | | | | |
|--|------------------------------|--|------------------|------------------|--|
| CIS040597 | CISCO Above 1GHz Site Cal | 1GHz Cispr Site Verification | 27 Sep 2019 | 27 Sep 2020 | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |
| CIS45166 | STANLEY 33-428 | 26' Tape Measure | Cal Not Required | Cal Not Required | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |
| CIS54235 | PASTERNAK PE5011-1 | PRESET TORQUE WRENCH, 8 IN/LBS | 28 Feb 2019 | 28 Feb 2020 | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |
| CIS41979 | CISCO 1840 | 18-40GHz EMI Test Head/Verification Fixture | 09 Apr 2019 | 09 Apr 2020 | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |
| 58225 | Comet T7611-4 | WEB SENSOR FOR REMOTE THERMOMETER HYGROMETER | 20 Aug 2019 | 20 Aug 2020 | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |
| CIS5972 | Keysight (Agilent/HP) 83712B | SYNTHESIZED CW GENERATOR | Cal Not Required | Cal Not Required | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |
| CIS44940 | ROHDE & SCHWARZ ESU40 | EMI RECEIVER, 40GHZ | 18 Dec 2019 | 18 Dec 2020 | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |



| | | | | | |
|----------------------|-------------------------------------|---|------------------|------------------|--|
| CIS37236 | JFW 50CB-015 | Control Box, GPIB | Cal Not Required | Cal Not Required | B.1.A.2, B.1.A.3, B.1.P.3, B.1.P.4, B.2.3, B.2.4 |
| 30MHz to 1GHz | | | | | |
| CIS008448 | NSA 5m Chamber Cisco | NSA 5m Chamber | 26-SEP-19 | 26-SEP-20 | B3 |
| CIS047300 | Keysight N9038A | MXE EMI Receiver | 29-MAY-2019 | 29-MAY-2020 | B3 |
| CIS030654 | JB1 Sunol Sciences | Combination Antenna, 30MHz-2GHz | 05 Jun 2019 | 05 Jun 2020 | B3 |
| CIS021117 | MICRO-COAX UFB311A-0-2484-520520 | Coaxial Cable-18Ghz | 12 Aug 2019 | 12 Aug 2020 | B3 |
| CIS 56157 | HUBER + SUHNER Sucoflex 104PEA | Sucoflex N Type blue 7ft cable | 13 Jan 2020 | 13 Jan 2021 | B3 |
| 58225 | Comet T7611-4 | WEB SENSOR FOR REMOTE THERMOMETER HYGROMETER | 20 Aug 2019 | 20 Aug 2020 | B3 |
| CIS49563 | HUBER + SUHNER Sucoflex 106A | Coaxial Cable, 8m | 12 Aug 2019 | 12 Aug 2020 | B3 |
| CIS45166 | STANLEY 33-428 | 26' Tape Measure | Cal Not Required | Cal Not Required | B3 |
| CIS27233 | YORK VNE V | Comparison Noise Emitter | Cal Not Required | Cal Not Required | B3 |
| CIS54235 | PASTERNAK PE5011-1 | PRESET TORQUE WRENCH, 8 IN/LBS | 28 Feb 2019 | 28 Feb 2020 | B3 |

Appendix D: 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 E: Photographs of Test Setups

Please refer to the attachment



Appendix F: Software Used to Perform Testing

EMIsoft Vasona, version 6.047 & 6.071

Appendix G: Test Procedures

Measurements were made in accordance with

- KDB 789033 - D02 General UNII Test Procedures New Rules v02r01
- KDB 662911 - MIMO
- ANSI C63.4 2014 Unintentional Radiators
- ANSI C63.10 2013 Intentional Radiators

Test procedures are summarized below:

| | |
|------------------------------|----------------|
| FCC 5GHz Test Procedures | EDCS # 1445048 |
| FCC 5GHz RSE Test Procedures | EDCS # 1511600 |

Appendix H: 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 I: Test Assessment Plan

Compliance Test Plan: EDCS:16915207

Target Power Tables EDCS# 16415414

END