Radio Test Report

C9130AXE-A; C9130AXE-B; C9130AXE-T;

C9130AXE-S; C9130AXE-K; C9130AXE-D; C9130AXE-Z;

Wi-Fi 6 Access Point

FCC ID: LDK948342197
IC: 2461N-948342197

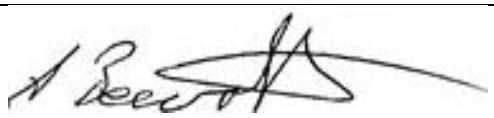
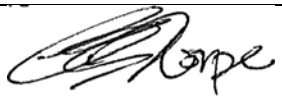
5150 MHz – 5250 MHz
5250 MHz – 5350 MHz
5470 MHz – 5725 MHz
5725 MHz – 5850 MHz

Against the following Specifications:

Radiated TX Spurious Emissions
CFR47 Part 15.407; LP0002 (2018);
RSS-247 Issue 2, Feb 2017; RSS-GEN Issue 5, Feb 2019

ACCREDITED

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

	
Author: Allan Beecroft **Tested By: Allan Beecroft**	**Approved By:** Gerard Thorpe **Title:** Manager. MGMT-Engineering
Revision: 5.0	**Issue Date: 30-JAN-2020**

This report replaces any previously entered test report under EDCS – 18486571 This test report has been electronically authorized and archived using the CISCO Engineering Document Control system. Test Report Template EDCS# 1526148

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 only **CFR47 Part 15.407;** **LP0002 (2018);** **RSS-247 Issue 2, Feb 2017;** **RSS-GEN Issue 5, Feb 2019**

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)

28-OCT-2019 to 07-NOV-2019

2.4 Report Issue Date

See cover page.

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 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 United States	Company #: 2461M-1

Test Engineers
Allan Beecroft

2.6 Equipment Assessed (EUT)

C9130AXE

2.7 EUT Description

Product Name - Catalyst 9130AX 802.11ax Access Point
Program Summary – Mid-tier 8x8 802.11ax Access Point with Dual Band (2.4GHz - 4x4 MIMO with 4 SS/ 5GHz - 8X8 with 8 Spatial Streams) supports max 8 SS

The modes included in this report represent data for all modes.

The following antennas are supported by this product series.
The data included in this report represents data for all antennas.

List of External Antennas Supported on C9130AXE

Part Number	Description	Gain
C-ANT9101=	Ceiling Mount Omni Self-Identifying Antenna with Bluetooth, 8-port, with DART connectors.	2 dBi (2.4 GHz) 6 dBi (5 GHz) 3 dBi (BLE)
C-ANT9102=	Pole or Wall Mount Omni Self-Identifying Antenna with Bluetooth, 8-port, with DART connectors.	4 dBi (2.4 GHz) 4 dBi (5 GHz) 4 dBi (BLE)
C-ANT9103=	Pole or Wall mount 75° Directional Self-Identifying Antenna with Bluetooth, 8-port, with DART connectors.	6 dBi (2.4 GHz) 6 dBi (5 GHz) 6 dBi (BLE)
AIR-ANT2513P4M-N=	Patch Antenna, 4-port, with N connectors. **Note** Connect to AP using AIR-CAB003-D8-N=.	13 dBi (2.4 GHz) 13 dBi (5 GHz) 13 dBi (BLE)
AIR-ANT2524V4C-R=	Ceiling Mount Omni Antenna, 4-port, with RP-TNC connectors. **Note** Connect to AP using AIR-CAB002-D8-R=.	2 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2524V4C-RS=	Ceiling Mount Omni Self-Identifying Antenna, 4-port, with RP-TNC connectors. **Note** Connect to AP using AIR-CAB002-D8-R=.	2 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2544V4M-R=	Wall Mount Omni Antenna, 4-port, with RP-TNC connectors. **Note** Connect to AP using AIR-CAB002-D8-R=.	4 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2544V4M-RS=	Wall Mount Omni Self-Identifying Antenna, 4-port, with RP-TNC connectors. **Note** Connect to AP using AIR-CAB002-D8-R=.	4 dBi (2.4 GHz) 4 dBi (5 GHz)
AIR-ANT2566D4M-R=	60° Patch Antenna, 4-port, with RP-TNC connectors.[1] **Note** Connect to AP using AIR-CAB002-D8-R=.	6 dBi (2.4 GHz) 6 dBi (5 GHz)
AIR-ANT2566D4M-RS=	60° Patch Self-Identifying Antenna, 4-port, with RP-TNC connectors. **Note** Connect to AP using AIR-CAB002-D8-R=.	6 dBi (2.4 GHz) 6 dBi (5 GHz)
AIR-ANT2566P4W-R=	Directional Antenna, 4-port, with RP-TNC connectors. **Note** Connect to AP using AIR-CAB002-D8-R=.	6 dBi (2.4 GHz) 6 dBi (5 GHz)
AIR-ANT2566P4W-RS=	Directional Self-Identifying Antenna, 4-port, with RP-TNC connectors. **Note** Connect to AP using AIR-CAB002-D8-R=.	6 dBi (2.4 GHz) 6 dBi (5 GHz)

Section 3: Result Summary

3.1 Results Summary Table

Radiated 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; LP0002 (2018) Sec 3.10 & 4.7	**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

Section 4: Sample Details

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

4.1 Sample Details

Sample No.	**Equipment Details**	**Manufacturer**	Hardware Rev.	Firmware Rev.	Software Rev.	**Serial Number**
S01	C9130AXE	Cisco Systems, Inc	800-106171-01	NA	NA	KWC233200VP
S02	CISCO POE16U-1AF Power Injector	Cisco Systems, Inc	341-0556-01 REV A0	NA	NA	PHI 95204Y5

4.2 System Details

System #	**Description**	**Samples**
1	Equipment Under Test	S01
2	POE Power Injector (support equipment)	S02

4.3 Mode of Operation Details

Mode#	**Description**	**Comments**
1	Multiple Radio Mode	Both 5GHz radios (do1, do2) and the Chillwave radio were operating simultaneously.

Appendix A: Emission Test Results

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

A1 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.

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

Tested By : Allan Beecroft	**Date of testing: 28-OCT-2019 – 07-NOV-2019**
Test Result : Pass	

See Appendix C for list of test equipment

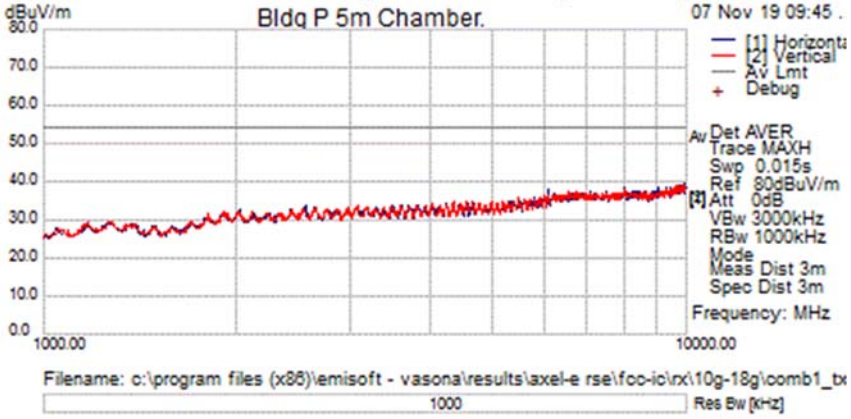
A.1.A Transmitter Radiated Spurious Emissions-Average (1GHz – 10GHz)

5GHz filters were used to prevent overloading the antenna pre-amp and/or spectrum analyzer.

There are no harmonic emissions to measure below 10GHz.

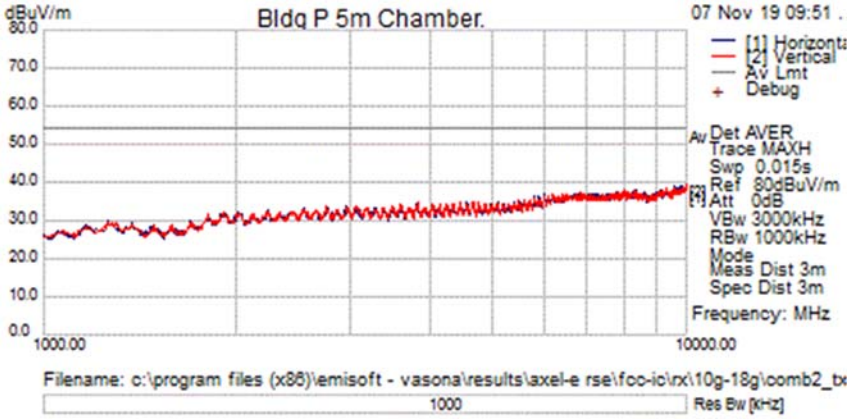
Non-HE20, Do1 radio 5180MHz, Do2 radio 5745MHz, Chillwave 5180MHz

A.1.A.1 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (1-10GHz)



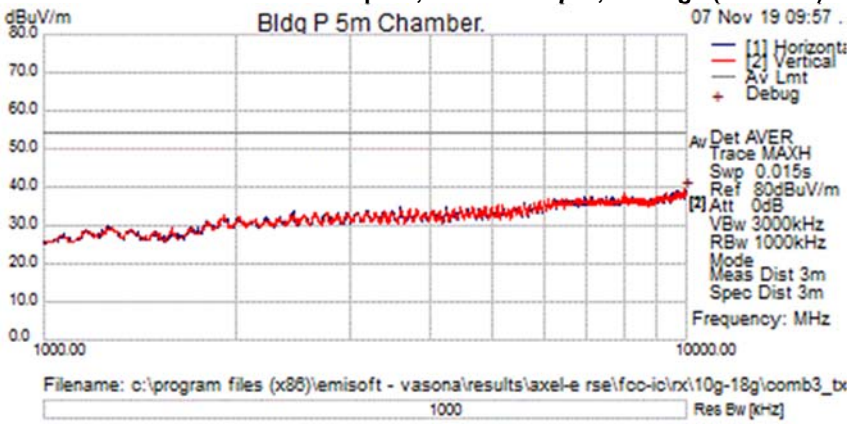
Non-HE20, Do1 radio 5220MHz, Do2 radio 5785MHz, Chillwave 5220MHz

A.1.A.2 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (1-10GHz)

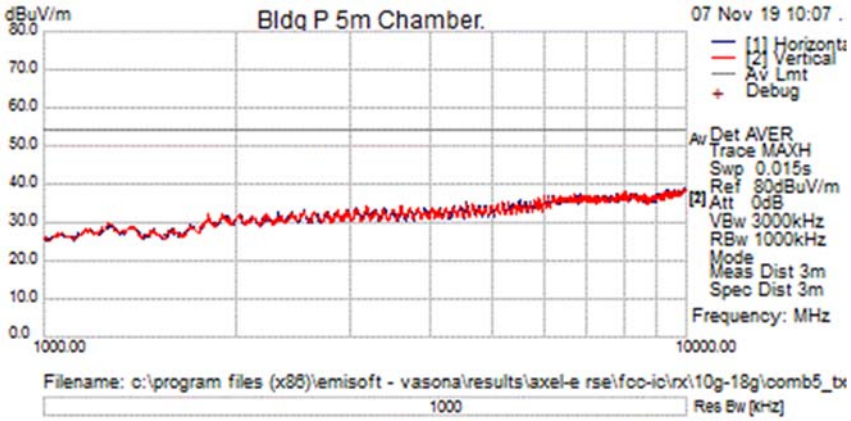


Non-HE20, Do1 radio 5240MHz, Do2 radio 5825MHz, Chillwave 5240MHz

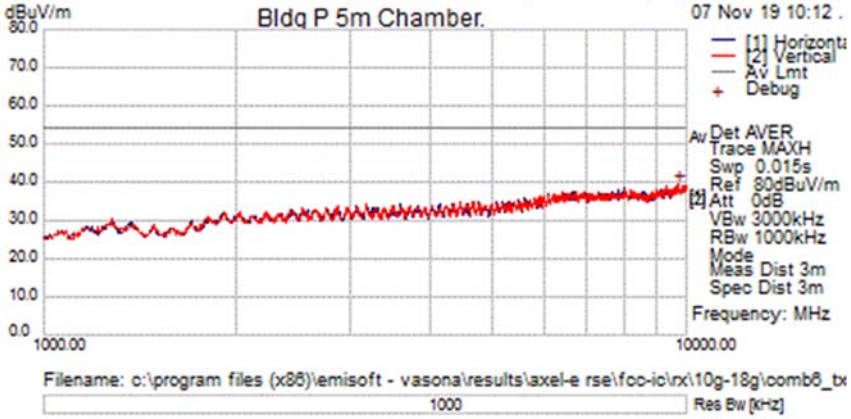
A.1.A.3 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (1-10GHz)



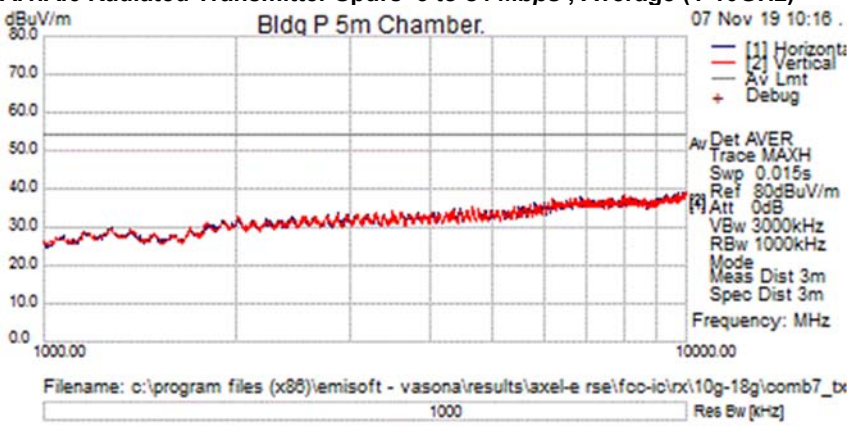
Non-HE20, Do1 radio *5320 MHz, Do2 radio 5500MHz,* Chillwave 5320MHz
A.1.A.4 Radiated Transmitter Spurs *6 to 54 Mbps*, Average (1-10GHz)



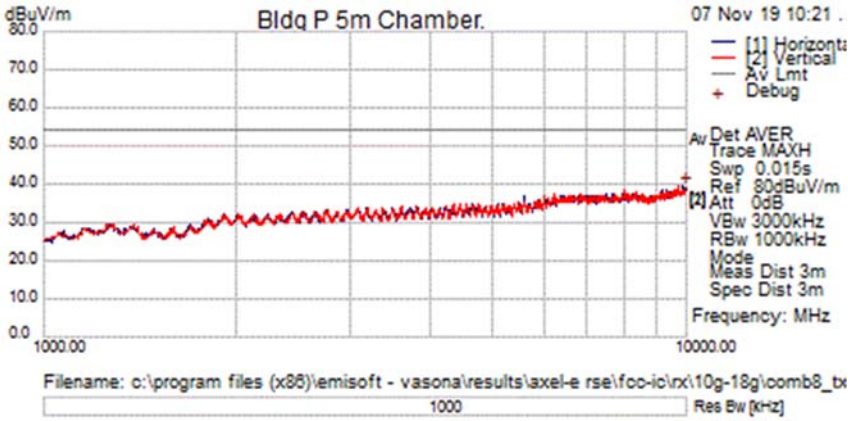
Non-HE20, Do1 radio *5300 MHz, Do2 radio 5560MHz,* Chillwave 5300MHz
A.1.A.5 Radiated Transmitter Spurs *6 to 54 Mbps* , Average (1-10GHz)



Non-HE20, *Do2 radio 5700MHz,* Chillwave 5700MHz
A.1.A.6 Radiated Transmitter Spurs *6 to 54 Mbps* , Average (1-10GHz)



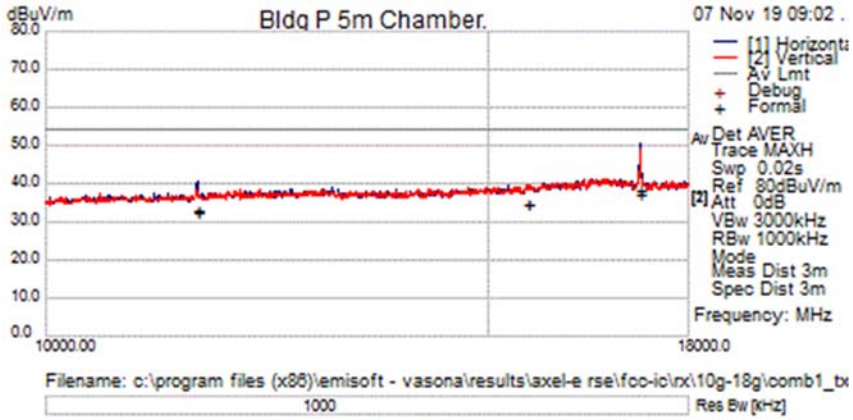
Non-HE20, Do1 radio 5260 MHz, Do2 radio 5720MHz, Chillwave 5260MHz
A.1.A.7 Radiated Transmitter Spurs 6 to 54 Mbps , Average (1-10GHz)



Transmitter Radiated Spurious Emissions-Average (10GHz – 18GHz)

Non-HE20, Do1 radio 5180MHz, Do2 radio 5745MHz, Chillwave 5180MHz

A.1.A.8 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (10-18GHz)

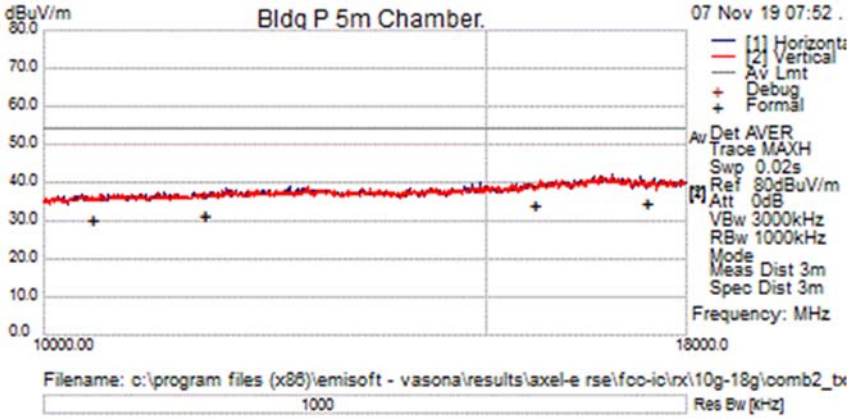


Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	1036.000	-15.5	3.1	27.4	15.0	Average	H	150	0	54.0	-39.0	Pass	
2	1036.000	-15.5	3.1	27.4	15.0	Average	V	150	0	54.0	-39.0	Pass	
3	15540.000	30.1	15.2	-10.7	34.5	Average	V	150	0	54.0	-19.5	Pass	
4	15540.000	30.1	15.2	-10.7	34.6	Average	H	150	0	54.0	-19.4	Pass	
5	11490.000	32.7	12.7	-12.4	33.0	Average	H	109	280	54.0	-21.0	Pass	
6	11490.000	31.9	12.7	-12.4	32.3	Average	V	99	243	54.0	-21.7	Pass	
7	17235.000	31.6	16.2	-9.7	38.1	Average	H	167	280	54.0	-15.9	Pass	
8	17235.000	30.5	16.2	-9.7	37.0	Average	V	99	315	54.0	-17.0	Pass	

Non-HE20, Do1 radio 5220MHz, Do2 radio 5785MHz, Chillwave 5220MHz

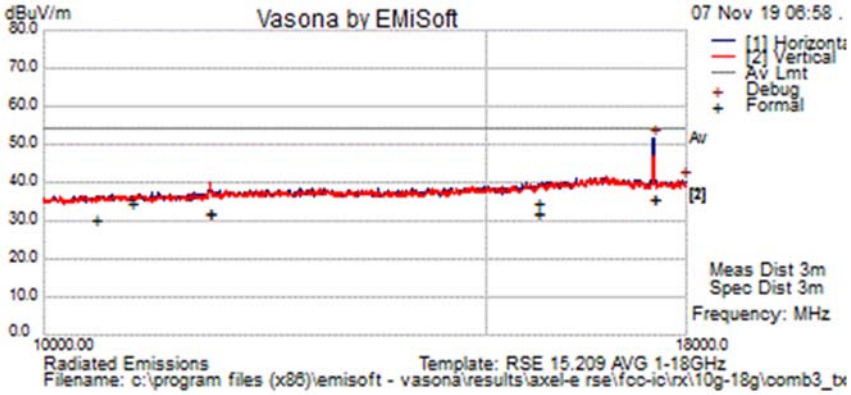
A.1.A.9 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10440.000	32.5	11.9	-14.0	30.5	Average	V	150	0	54.0	-23.5	Pass	
2	10440.000	32.5	11.9	-14.0	30.4	Average	H	150	0	54.0	-23.6	Pass	
3	15660.000	29.5	15.3	-11.0	33.9	Average	H	150	0	54.0	-20.1	Pass	
4	15660.000	29.5	15.3	-11.0	33.8	Average	V	150	0	54.0	-20.2	Pass	
5	11570.000	31.2	12.6	-12.5	31.3	Average	V	150	0	54.0	-22.7	Pass	
6	11570.000	31.2	12.6	-12.5	31.3	Average	H	150	0	54.0	-22.7	Pass	
7	17355.000	28.3	16.3	-10.0	34.6	Average	H	156	35	54.0	-19.4	Pass	
8	17355.000	28.5	16.3	-10.0	34.8	Average	V	99	0	54.0	-19.2	Pass	

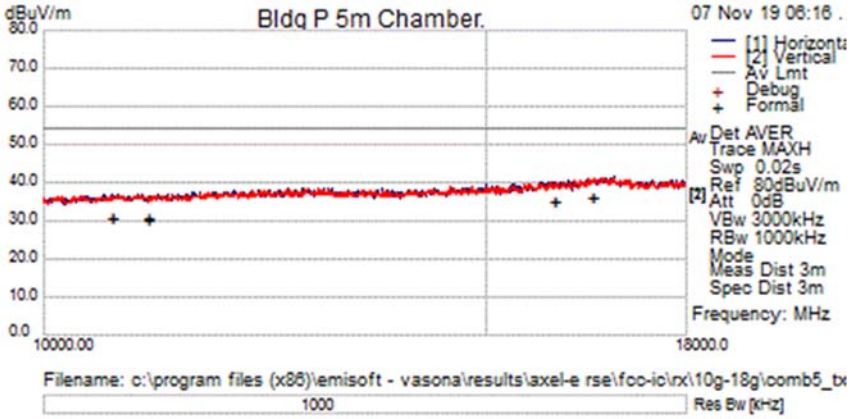
Non-HE20, Do1 radio 5240MHz, Do2 radio 5825MHz, Chillwave 5240MHz
A.1.A.10 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1	10480.000	32.5	12.0	-13.9	30.6	Average	H	164	279	54.0	-23.4	Pass	
2	10480.000	32.5	12.0	-13.9	30.6	Average	V	164	279	54.0	-23.4	Pass	
3	15720.000	29.9	15.4	-10.9	34.4	Average	V	164	279	54.0	-19.6	Pass	
4	15720.000	29.9	15.4	-10.9	34.5	Average	H	164	279	54.0	-19.5	Pass	
5	11650.000	32.6	12.8	-12.1	33.3	Average	H	164	279	54.0	-20.7	Pass	
6	11650.000	32.4	12.8	-12.1	33.1	Average	V	164	279	54.0	-20.9	Pass	
7	17475.000	34.1	16.5	-9.5	41.0	Average	H	161	20	54.0	-13.0	Pass	
8	17475.000	35.4	16.5	-9.5	42.4	Average	V	159	0	54.0	-11.6	Pass	

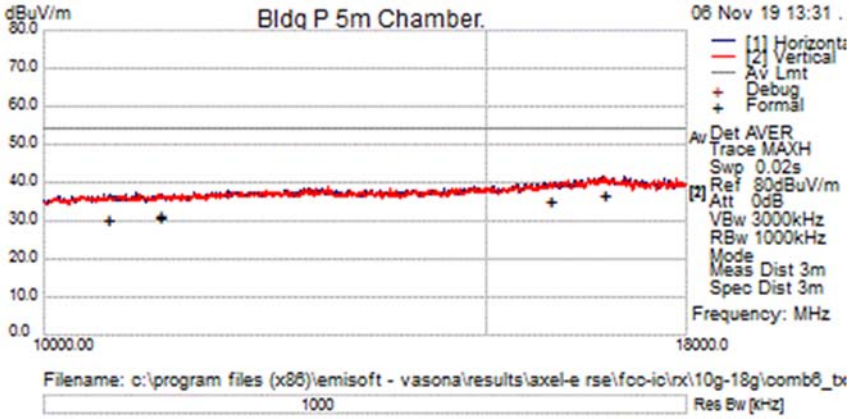
Non-HE20, Do1 radio 5320MHz, Do2 radio 5500MHz, Chillwave 5320MHz
A.1.A.11 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Ht cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10640.000	32.3	12.1	-13.6	30.9	Average	V	151	0	54.0	-23.1	Pass	
2	10640.000	32.4	12.1	-13.6	31.0	Average	H	151	0	54.0	-23.0	Pass	
3	15960.000	30.0	15.6	-10.4	35.2	Average	H	151	0	54.0	-18.8	Pass	
4	15960.000	29.9	15.6	-10.4	35.1	Average	V	151	0	54.0	-18.9	Pass	
5	11000.000	31.3	12.4	-13.1	30.6	Average	V	151	0	54.0	-23.4	Pass	
6	11000.000	31.4	12.4	-13.1	30.7	Average	H	151	0	54.0	-23.3	Pass	
7	16500.000	29.9	15.8	-9.4	36.3	Average	H	151	0	54.0	-17.7	Pass	
8	16500.000	29.9	15.8	-9.4	36.2	Average	V	151	0	54.0	-17.8	Pass	

Non-HE20, Do1 radio 5300MHz, Do2 radio 5560MHz, Chillwave 5300MHz
A.1.A.12 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (10-18GHz)

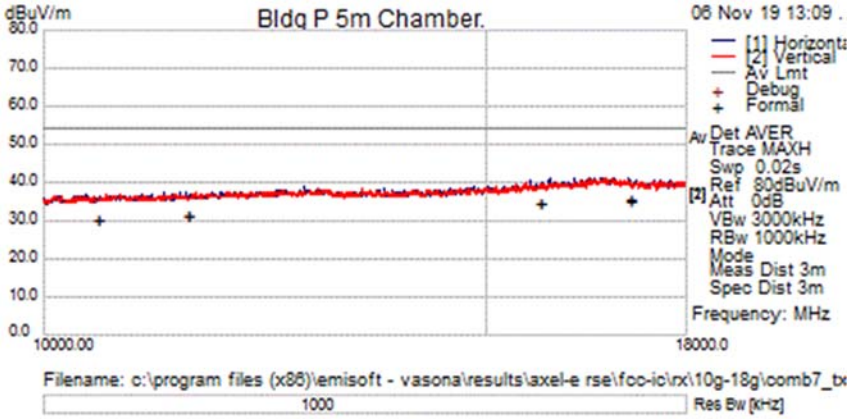


Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10600.000	32.1	12.1	-13.6	30.5	Average	V	151	360	54.0	-23.5	Pass	
2	10600.000	32.1	12.1	-13.6	30.6	Average	H	151	360	54.0	-23.4	Pass	
3	15900.000	30.2	15.5	-10.6	35.1	Average	H	151	360	54.0	-18.9	Pass	
4	15900.000	30.1	15.5	-10.6	34.9	Average	V	151	360	54.0	-19.1	Pass	
5	11120.000	31.6	12.5	-13.1	31.1	Average	V	151	360	54.0	-22.9	Pass	
6	11120.000	31.8	12.5	-13.1	31.3	Average	H	151	360	54.0	-22.7	Pass	
7	16680.000	29.9	16.2	-9.4	36.7	Average	V	151	360	54.0	-17.3	Pass	
8	16680.000	29.8	16.2	-9.4	36.6	Average	H	151	360	54.0	-17.4	Pass	

Non-HE20, Do2 radio 5700MHz, Chillwave 5700MHz

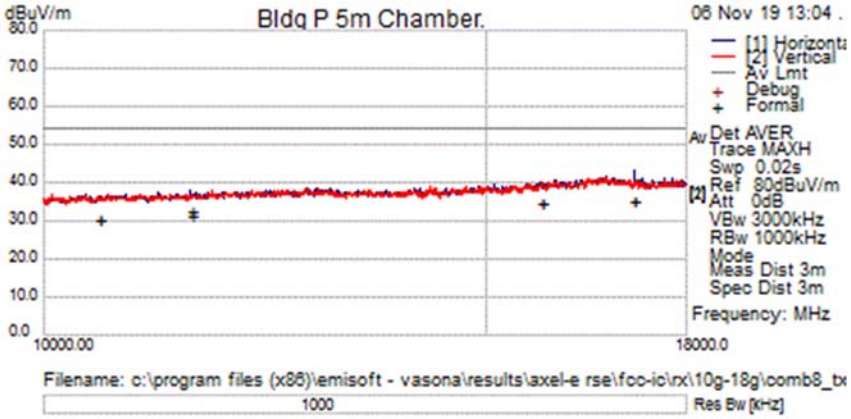
A.1.A.13 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Ht cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10500.000	32.3	12.0	-13.8	30.4	Average	V	149	360	54.0	-23.6	Pass	
2	10500.000	32.3	12.0	-13.8	30.4	Average	H	151	360	54.0	-23.6	Pass	
3	15750.000	29.9	15.4	-10.7	34.7	Average	H	151	360	54.0	-19.3	Pass	
4	15750.000	29.7	15.4	-10.7	34.5	Average	V	151	360	54.0	-19.5	Pass	
5	11400.000	31.6	12.5	-12.8	31.3	Average	V	151	360	54.0	-22.7	Pass	
6	11400.000	32.0	12.5	-12.8	31.7	Average	H	151	360	54.0	-22.3	Pass	
7	17100.000	29.1	16.1	-9.6	35.6	Average	H	151	360	54.0	-18.4	Pass	
8	17100.000	28.8	16.1	-9.6	35.4	Average	V	151	360	54.0	-18.6	Pass	

Non-HE20, Do1 radio 5260MHz, Do2 radio 5720MHz, Chillwave 5260MHz
A.1.A.14 Radiated Transmitter Spurs, *6 to 54 Mbps* , Average (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	15780.000	29.8	15.4	-10.5	34.6	Average	V	149	360	54.0	-19.4	Pass	
2	10520.000	32.2	11.9	-13.7	30.5	Average	H	149	360	54.0	-23.5	Pass	
3	10520.000	32.2	11.9	-13.7	30.4	Average	V	149	360	54.0	-23.6	Pass	
4	15780.000	29.9	15.4	-10.5	34.8	Average	H	149	360	54.0	-19.2	Pass	
5	11440.000	32.5	12.5	-12.6	32.4	Average	H	149	360	54.0	-21.6	Pass	
6	11440.000	31.8	12.5	-12.6	31.7	Average	V	149	360	54.0	-22.3	Pass	
7	17160.000	28.6	16.3	-9.6	35.3	Average	V	149	360	54.0	-18.7	Pass	
8	17160.000	28.5	16.3	-9.6	35.2	Average	H	149	360	54.0	-18.8	Pass	

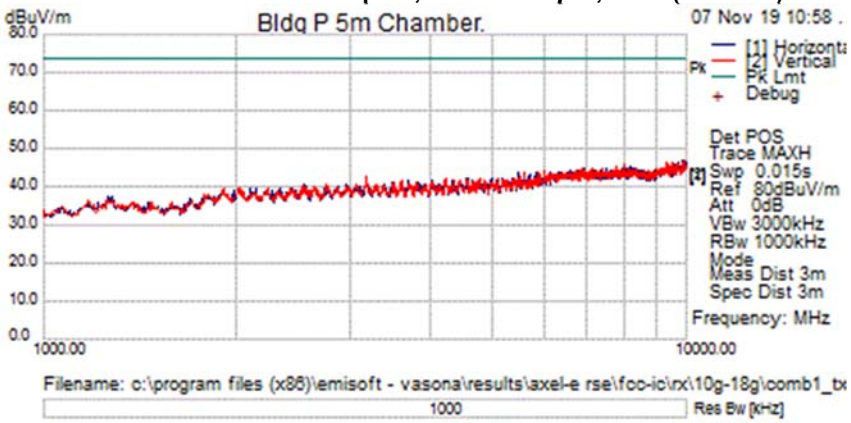
A.1.P Transmitter Radiated Spurious Emissions-Peak (1GHz – 10GHz)

5GHz filters were used to prevent overloading the antenna pre-amp and/or spectrum analyzer.

There are no harmonic emissions to measure below 10GHz.

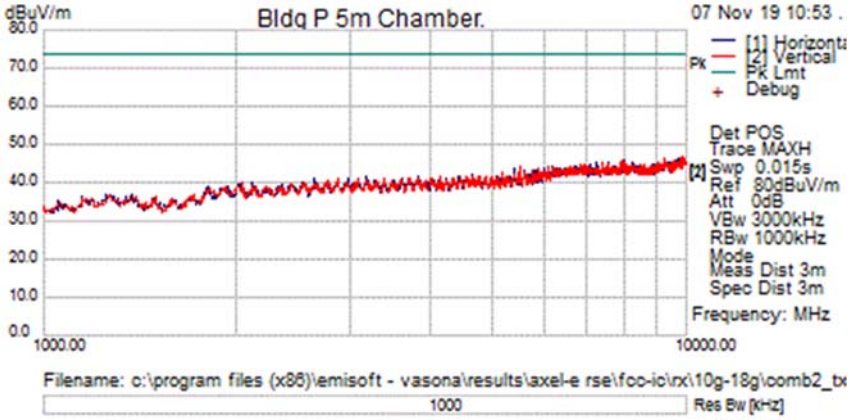
Non-HE20, Do1 radio 5180MHz, Do2 radio 5745MHz, Chillwave 5180MHz

A.1.P.1 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (1-10GHz)



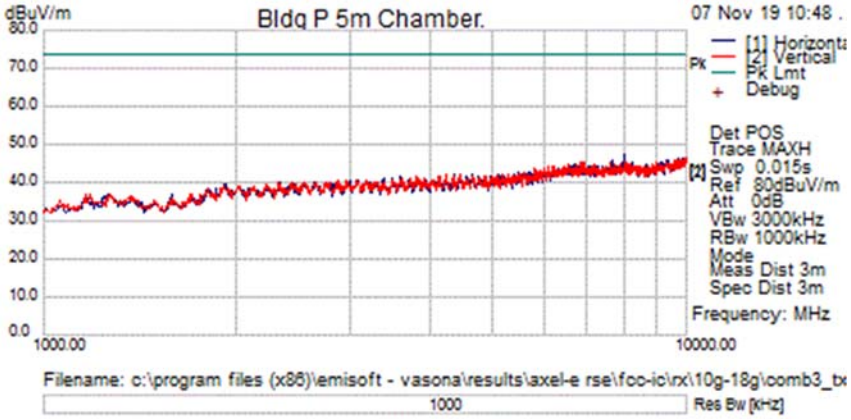
Non-HE20, Do1 radio 5220MHz, Do2 radio 5785MHz, Chillwave 5220MHz

A.1..P.2 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (1-10GHz)



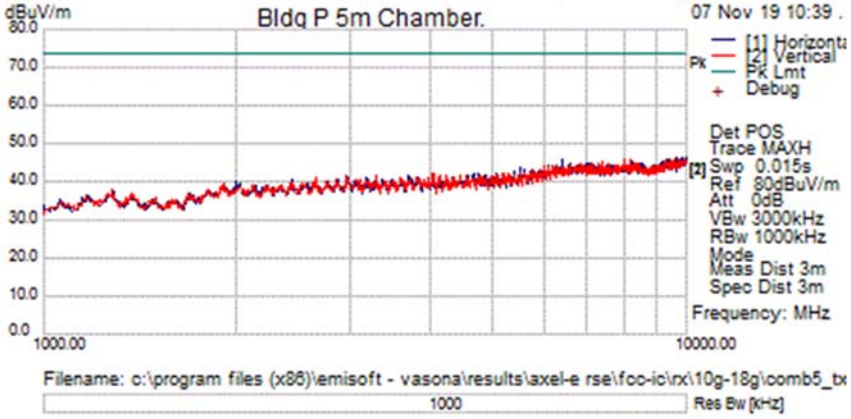
Non-HE20, Do1 radio 5240MHz, Do2 radio 5825MHz, Chillwave 5240MHz

A.1.P.3 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (1-10GHz)



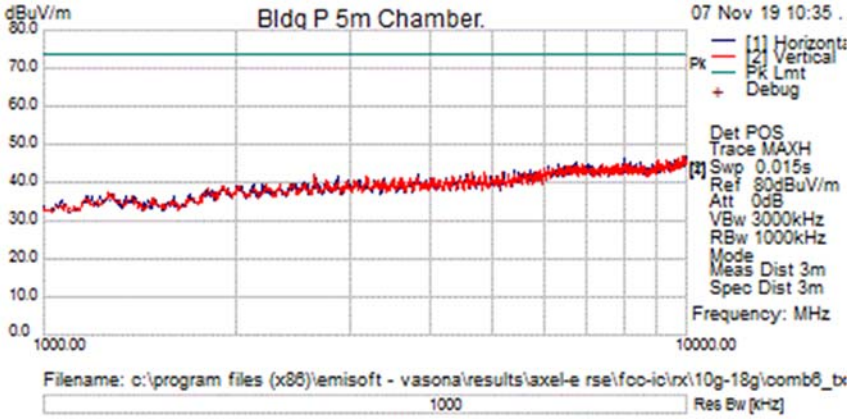
Non-HE20, Do1 radio 5320MHz, Do2 radio 5500MH , Chillwave 5320MHz

A.1.P.4 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (1-10GHz)



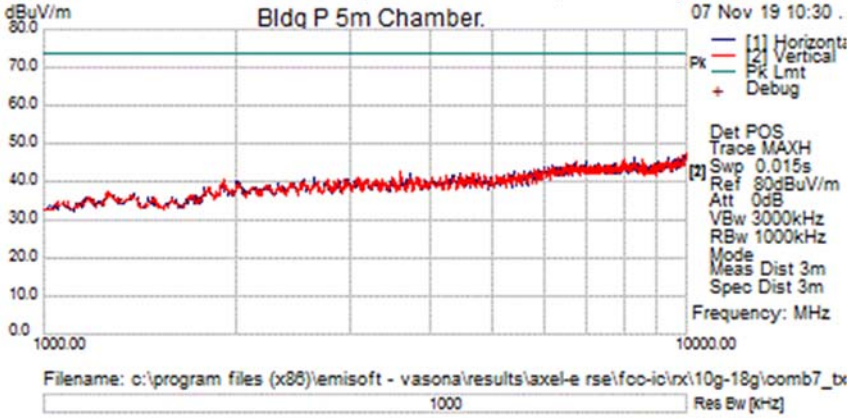
Non-HE20, Do1 radio 5240MHz, Do2 radio 5825MHz, Chillwave 5240MHz

A.1.P.5 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (1-10GHz)



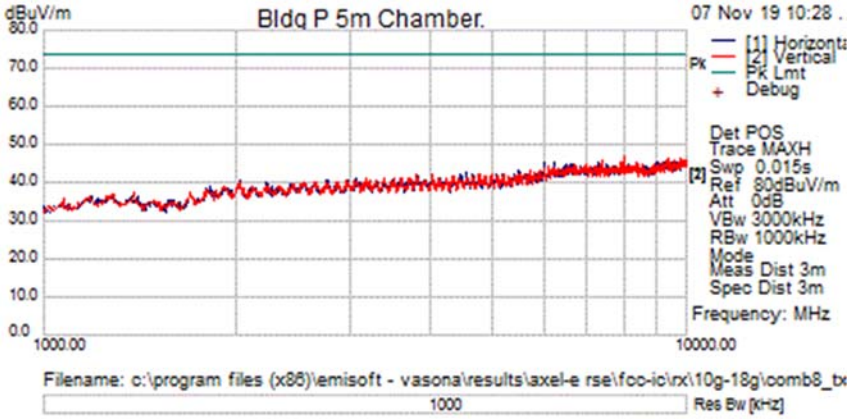
Non-HE20, Do2 radio 5700MHz, Chillwave 5700MHz

A.1.P.6 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (1-10GHz)



Non-HE20, Do1 radio 5260MHz, Do2 radio 5720MHz, Chillwave 5260MHz

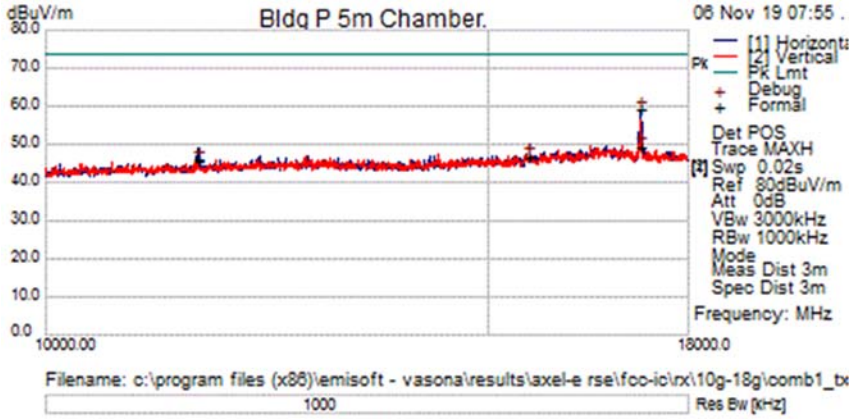
A.1.P.7 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (1-10GHz)



Transmitter Radiated Spurious Emissions-Peak (10GHz – 18GHz)

Non-HE20, Do1 radio 5180MHz, Do2 radio 5745MHz, Chillwave 5180MHz

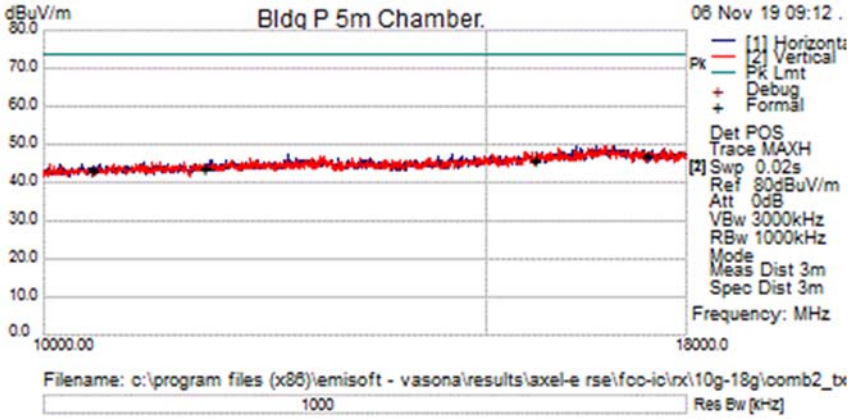
A.1.P.8 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	1036.000	-4.0	3.1	27.4	26.6	Peak	H	189	360	74.0	-47.5	Pass	
2	1036.000	-3.2	3.1	27.4	27.3	Peak	V	99	0	74.0	-46.7	Pass	
3	11490.000	45.5	12.8	-12.4	45.8	Peak	V	151	284	74.0	-28.2	Pass	
4	11490.000	45.6	12.8	-12.4	46.0	Peak	H	151	284	74.0	-28.0	Pass	
5	15540.000	42.3	15.2	-10.7	46.8	Peak	V	151	284	74.0	-27.2	Pass	
6	15540.000	42.5	15.2	-10.7	47.0	Peak	H	151	284	74.0	-27.0	Pass	
7	17233.594	52.7	16.2	-9.7	59.2	Peak	H	183	360	74.0	-14.8	Pass	
8	17233.594	43.0	16.2	-9.7	49.5	Peak	V	145	360	74.0	-24.5	Pass	

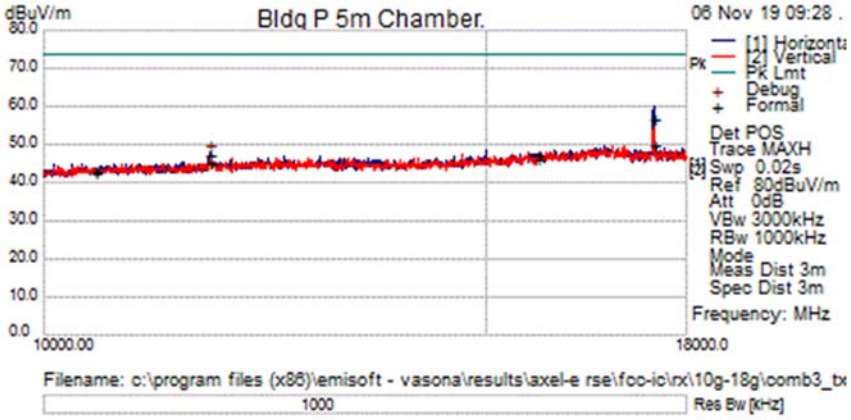
Non-HE20, Do1 radio 5220MHz, Do2 radio 5785MHz, Chillwave 5220MHz
A.1.P.9 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10440.000	45.6	11.9	-14.0	43.6	Peak	H	151	360	74.0	-30.4	Pass	
2	10440.000	44.9	11.9	-14.0	42.8	Peak	V	151	360	74.0	-31.2	Pass	
3	15660.000	41.1	15.3	-11.0	45.5	Peak	V	151	360	74.0	-28.5	Pass	
4	15660.000	41.6	15.3	-11.0	46.0	Peak	H	151	360	74.0	-28.0	Pass	
5	11570.000	43.3	12.6	-12.5	43.4	Peak	H	151	360	74.0	-30.6	Pass	
6	11570.000	44.1	12.6	-12.5	44.2	Peak	V	151	360	74.0	-29.8	Pass	
7	17355.000	40.5	16.3	-10.0	46.8	Peak	V	151	360	74.0	-27.2	Pass	
8	17355.000	41.0	16.3	-10.0	47.3	Peak	H	151	360	74.0	-26.7	Pass	

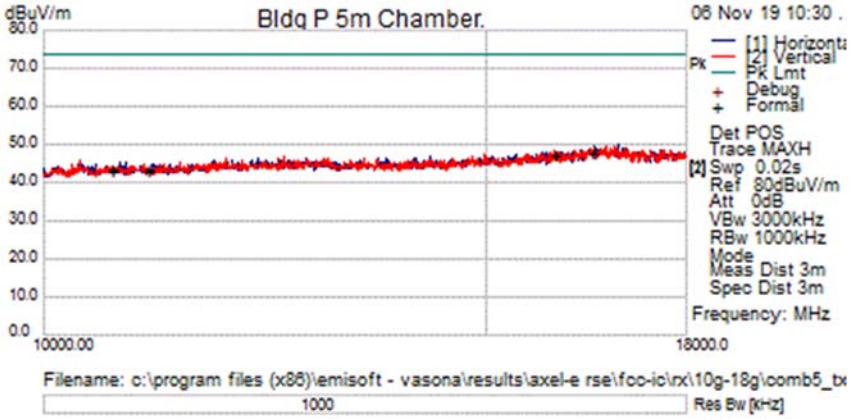
Non-HE20, Do1 radio 5240MHz, Do2 radio 5825MHz, Chillwave 5240MHz
A.1.P.10 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10480.000	44.8	12.0	-13.9	42.9	Peak	H	151	360	74.0	-31.1	Pass	
2	10480.000	44.3	12.0	-13.9	42.4	Peak	V	151	360	74.0	-31.6	Pass	
3	15720.000	41.5	15.4	-10.9	46.0	Peak	V	151	360	74.0	-28.0	Pass	
4	15720.000	42.5	15.4	-10.9	47.1	Peak	H	151	360	74.0	-26.9	Pass	
5	11650.000	44.5	12.8	-12.1	45.2	Peak	H	151	360	74.0	-28.8	Pass	
6	11650.000	46.8	12.8	-12.1	47.5	Peak	V	151	360	74.0	-26.5	Pass	
7	17475.000	43.1	16.5	-9.5	50.0	Peak	V	99	270	74.0	-24.0	Pass	
8	17475.000	49.7	16.5	-9.5	56.7	Peak	H	232	270	74.0	-17.3	Pass	

Non-HE20, Do1 radio 5320MHz, Do2 radio 5500MHz, Chillwave 5320MHz
A.1.P.11 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (10-18GHz)

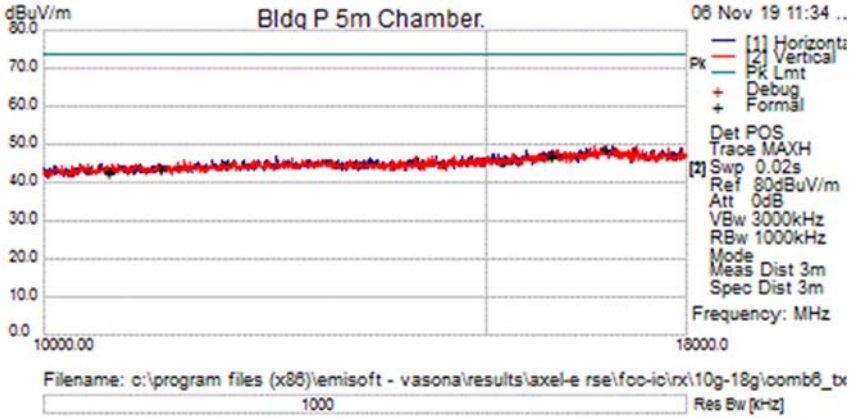


Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10640.000	45.1	12.1	-13.6	43.6	Peak	H	197	70	74.0	-30.4	Pass	
2	10640.000	44.5	12.1	-13.6	43.0	Peak	V	99	0	74.0	-31.0	Pass	
3	15960.000	42.1	15.6	-10.4	47.3	Peak	V	99	259	74.0	-26.7	Pass	
4	15960.000	42.1	15.6	-10.4	47.3	Peak	H	151	259	74.0	-26.7	Pass	
5	11000.000	44.3	12.4	-13.1	43.5	Peak	H	99	0	74.0	-30.5	Pass	
6	11000.000	43.8	12.4	-13.1	43.1	Peak	V	99	0	74.0	-30.9	Pass	
7	16500.000	41.7	15.8	-9.4	48.1	Peak	V	99	0	74.0	-25.9	Pass	
8	16500.000	41.7	15.8	-9.4	48.1	Peak	H	156	0	74.0	-25.9	Pass	

Non-HE20, Do1 radio 5300MHz, Do2 radio 5560MHz, Chillwave 5300MHz

A.1.P.12 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (10-18GHz)

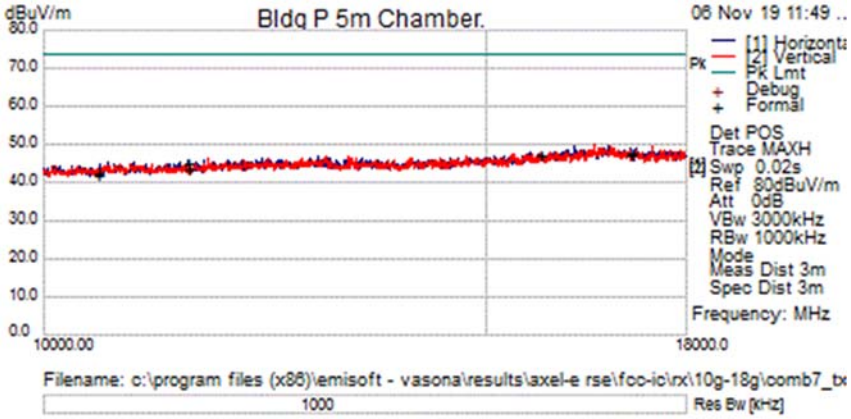


Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10600.000	44.7	12.1	-13.6	43.2	Peak	H	149	0	74.0	-30.8	Pass	
2	10600.000	44.2	12.1	-13.6	42.7	Peak	V	99	0	74.0	-31.3	Pass	
3	15900.000	42.6	15.5	-10.6	47.5	Peak	V	99	0	74.0	-26.5	Pass	
4	15900.000	42.0	15.5	-10.6	46.9	Peak	H	99	0	74.0	-27.1	Pass	
5	11120.000	44.0	12.5	-13.1	43.4	Peak	H	99	0	74.0	-30.6	Pass	
6	11120.000	44.3	12.5	-13.1	43.7	Peak	V	99	0	74.0	-30.3	Pass	
7	16680.000	41.9	16.2	-9.4	48.7	Peak	V	99	0	74.0	-25.3	Pass	
8	16680.000	41.9	16.2	-9.4	48.8	Peak	H	99	0	74.0	-25.2	Pass	

Non-HE20, Do2 radio 5700MHz, Chillwave 5700MHz

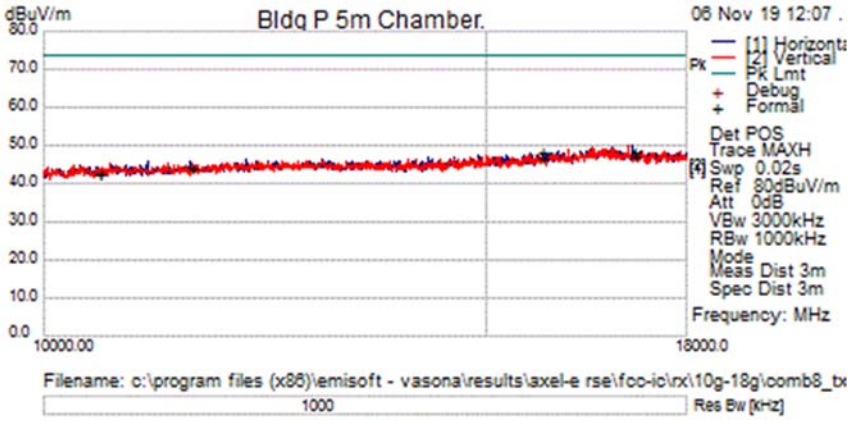
A.1.P.13 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (10-18GHz)



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10500.000	44.7	12.0	-13.8	42.8	Peak	H	149	0	74.0	-31.2	Pass	
2	10500.000	44.1	12.0	-13.8	42.2	Peak	V	149	0	74.0	-31.8	Pass	
3	15750.000	42.3	15.4	-10.7	47.1	Peak	V	149	0	74.0	-26.9	Pass	
4	15750.000	42.3	15.4	-10.7	47.1	Peak	H	149	0	74.0	-26.9	Pass	
5	11400.000	45.7	12.5	-12.8	45.4	Peak	H	149	0	74.0	-28.6	Pass	
6	11400.000	43.8	12.5	-12.8	43.4	Peak	V	149	0	74.0	-30.6	Pass	
7	17100.000	41.5	16.1	-9.6	48.0	Peak	V	149	0	74.0	-26.0	Pass	
8	17100.000	40.9	16.1	-9.6	47.4	Peak	H	149	0	74.0	-26.6	Pass	

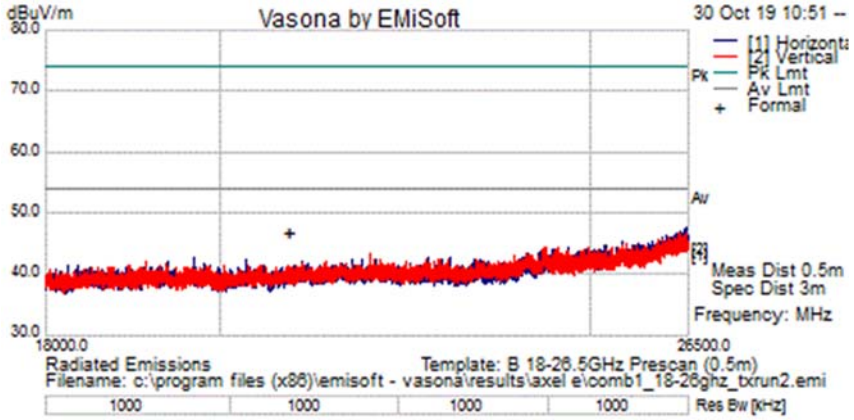
Non-HE20, Do1 radio 5260MHz, Do2 radio 5720MHz, Chillwave 5260MHz
A.1.P.14 Radiated Transmitter Spurs, *6 to 54 Mbps* , Peak (10-18GHz)



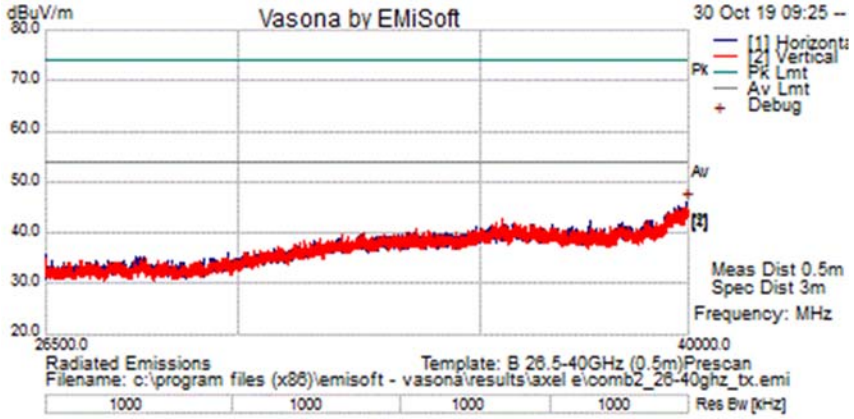
Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	10520.000	44.1	11.9	-13.7	42.3	Peak	H	149	0	74.0	-31.7	Pass	
2	10520.000	44.2	11.9	-13.7	42.4	Peak	V	149	0	74.0	-31.6	Pass	
3	15780.000	43.4	15.4	-10.5	48.3	Peak	V	149	0	74.0	-25.7	Pass	
4	15780.000	41.6	15.4	-10.5	46.5	Peak	H	149	0	74.0	-27.5	Pass	
5	11440.000	44.2	12.5	-12.6	44.0	Peak	H	149	0	74.0	-30.0	Pass	
6	11440.000	44.4	12.5	-12.6	44.2	Peak	V	149	0	74.0	-29.8	Pass	
7	17160.000	41.8	16.3	-9.6	48.5	Peak	H	149	243	74.0	-25.5	Pass	
8	17160.000	40.5	16.3	-9.6	47.2	Peak	V	99	360	74.0	-26.8	Pass	

Radiated Transmitter Spurs, All radios, All rate, All modes, Peak & Average (18GHz-26.5GHz) Horizontal & Vertical



Radiated Transmitter Spurs, All radios, All rate, All modes, Peak & Average (26.5-40GHz) Horizontal & Vertical



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.

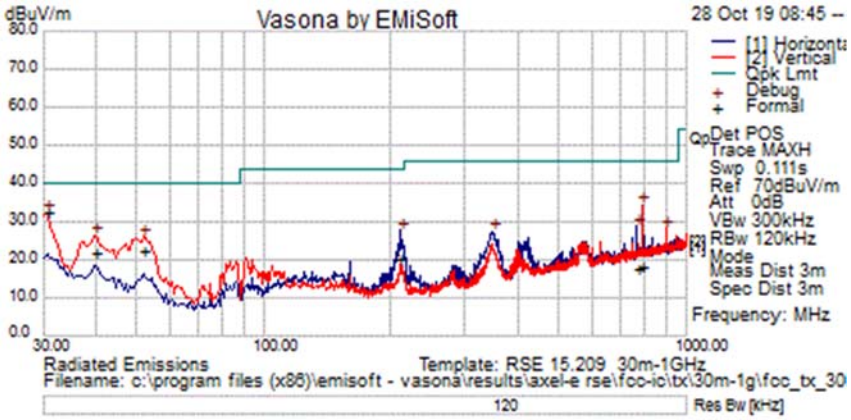
System #	Description	Samples
1	EUT	S01
2	Support Power Supply	S02

Tested By : Allan Beecroft	**Date of testing: 28-OCT-2019**
Test Result : PASS	

See Appendix C for list of test equipment

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

All rates, all modes.



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail	Comments
1	30.584	38.9	.6	-6.7	32.7	Quasi Max	V	122	11	40.0	-7.3	Pass	
2	51.884	41.8	.7	-20.1	22.4	Quasi Max	V	117	12	40.0	-17.6	Pass	
3	39.622	34.8	.6	-13.7	21.8	Quasi Max	V	124	88	40.0	-18.2	Pass	
4	210.606	35.9	1.4	-16.7	20.6	Quasi Max	H	322	85	43.5	-22.9	Pass	
5	786.051	22.2	2.7	-6.9	18.0	Quasi Max	V	219	50	46.0	-28.0	Pass	
6	766.956	22.3	2.7	-7.4	17.6	Quasi Max	H	164	200	46.0	-28.4	Pass	

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

Equip#	Manufacturer/ Model	Description	Last Cal	Next Cal
30MHz to 1GHz				
CIS008448	NSA 5m Chamber Cisco	NSA 5m Chamber	26-SEP-19	26-SEP-20
CIS047300	Keysight N9038A	MXE EMI Receiver	29-MAY-2019	29-MAY-2020
CIS030654	JB1 Sunol Sciences	Combination Antenna, 30MHz-2GHz	05 Jun 2019	05 Jun 2020
CIS021117	MICRO-COAX UFB311A-0-2484-520520	Coaxial Cable-18Ghz	12 Aug 2019	12 Aug 2020
CIS 56157	HUBER + SUHNER Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	15 Jan 2019	15 Jan 2020
CIS49563	HUBER + SUHNER Sucoflex 106A	Coaxial Cable, 8m	12 Aug 2019	12 Aug 2020
CIS45166	STANLEY 33-428	26' Tape Measure	Cal Not Required	Cal Not Required
CIS54230	NEWPORT iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	06 Feb 2019	06 Feb 2020
CIS27233	YORK VNE V	Comparison Noise Emitter	Cal Not Required	Cal Not Required
CIS54235	PASTERNACK PE5011-1	PRESET TORQUE WRENCH, 8 IN/LBS	28 Feb 2019	28 Feb 2020

1GHz to 18GHz				
CIS040597	CISCO Above 1GHz Site Cal	1GHz Cispr Site Verification	27 Sep 2019	27 Sep 2020
CIS047300	Keysight N9038A	MXE EMI Receiver	29-MAY-2019	29-MAY-2020
CIS035285	ETS Lindgren 3117	Double Ridged Horn Antenna	25 Jan 2019	25 Jan 2020
CIS45096	CISCO TH0118	Mast Mount Preamplifier Array, 1-18GHz	01 Nov 2018	01 Nov 2019
CIS49563	HUBER + SUHNER Sucoflex 106A	Coaxial Cable, 8m	12 Aug 2019	12 Aug 2020
CIS35040	Micro-Tronics HPM50112-02	Notch Filter	27 Jun 2019	27 Jun 2020
CIS34304	Micro-Tronics BRM50702-02	Band Reject Filter	27 Jun 2019	27 Jun 2020
CIS021117	MICRO-COAX UFB311A-0-2484-520520	Coaxial Cable-18Ghz	12 Aug 2019	12 Aug 2020
CIS 56157	HUBER + SUHNER Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	15 Jan 2019	15 Jan 2020
CIS45166	STANLEY 33-428	26' Tape Measure	Cal Not Required	Cal Not Required
CIS54230	NEWPORT iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	06 Feb 2019	06 Feb 2020
CIS54235	PASTERNACK PE5011-1	PRESET TORQUE WRENCH, 8 IN/LBS	28 Feb 2019	28 Feb 2020
CIS4883	EMCO 3115	Horn Antenna	Cal Not Required	Cal Not Required
CIS8171	Keysight (Agilent/HP) 8491B Opt 010	ATTENUATOR	23 Apr 2019	23 Apr 2020
CIS34075	SCHAFFNER RSG 2000	Reference Spectrum Generator, 1-18GHz	Cal Not Required	Cal Not Required

18GHz to 40GHz				
CIS040597	CISCO Above 1GHz Site Cal	1GHz Cispr Site Verification	27 Sep 2019	27 Sep 2020
CIS45166	STANLEY 33-428	26' Tape Measure	Cal Not Required	Cal Not Required
CIS54230	NEWPORT iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	06 Feb 2019	06 Feb 2020
CIS54235	PASTERNACK PE5011-1	PRESET TORQUE WRENCH, 8 IN/LBS	28 Feb 2019	28 Feb 2020
CIS41979	CISCO 1840	18-40GHz EMI Test Head/Verification Fixture	09 Apr 2019	09 Apr 2020
CIS5972	Keysight (Agilent/HP) 83712B	SYNTHESIZED CW GENERATOR	Cal Not Required	Cal Not Required
CIS44940	ROHDE & SCHWARZ ESU40	EMI RECEIVER, 40GHZ	13 Dec 2018	13 Dec 2019
CIS37236	JFW 50CB-015	Control Box, GPIB	Cal Not Required	Cal Not Required

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

Please refer to the attachment

Appendix E: Photographs of EUT

Please refer to the attachment

Appendix F: Software Used to Perform Testing

EMIsoft Vasona, version 6.024

Appendix G: Test Procedures

Measurements were made in accordance with

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

Test procedures are summarized below:

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 (Excel) EDCS# 18486508